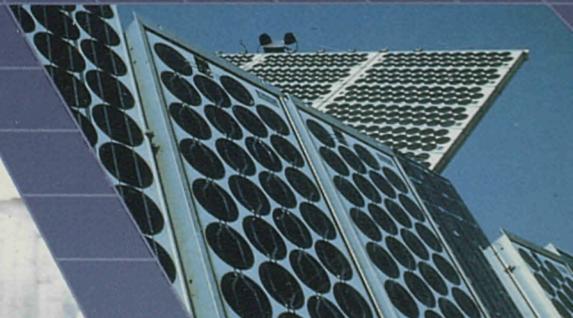
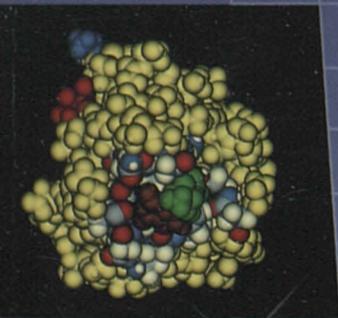


# PANORAMA OF EC INDUSTRY

OVER 125 SECTORS OF MANUFACTURING  
AND SERVICE INDUSTRIES IN FOCUS **1989**



COMMISSION OF THE  
EUROPEAN COMMUNITIES



# **PANORAMA OF EC INDUSTRY 1989**

describing over 125 sectors of the European Community's industry,  
including both manufacturing and services,  
with a macroeconomic outlook and a view of emerging industries

**Message from Jacques Delors**

**Preface by Karl-Heinz Narjes**

**Introduction by Fernand Braun**

The opinions expressed in this publication are those of the authors alone; in no circumstances should they be taken as an authoritative statement of the views of the Commission.

The production of this book has been coordinated by the 'Industrial Economy' service of the Internal Market and Industrial Affairs Directorate-General of the Commission of the European Communities, with the cooperation of the trade and professional associations of the European Community and the assistance of the consultancy firm Eurostrategies — Brussels.

All professional associations/organizations known to the Commission which represent industry at Community level have been asked to provide a chapter on their sector or sectors. Consultants were engaged to assure the technical coherence of the work and to complete gaps in the information received.

For each sector covered the name, address and telephone number of the professional association concerned are indicated. Questions about the content of the Panorama should be directed to the association concerned or to the Commission services with major responsibility for this publication:

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# PANORAMA OF EC INDUSTRY 1989





## Message from Jacques Delors,

President of the Commission of the  
European Communities

The Community has undertaken to complete, by 1992, the single European market. The size and unity of this new economic area will open up dramatic new opportunities for consolidation and expansion to European business.

The study carried out for the Commission on the "Cost of non-Europe" makes clear the scope of this ambition and the challenge that it presents.

Achieving integration of Europe's markets will require the cooperation of all parties in the pursuit of greater international competitiveness. It will also demand a broad and clear understanding of the facts underlying Europe's economy and industry.

The *Panorama of EC industry* provides, for the first time, a comprehensive up-to-date picture of the EC's manufacturing and

service industries. It demonstrates how many of Europe's industries are world-leaders in their fields, and the potential that many others have to win that place.

I believe that the "Panorama" will be of vital assistance to all those concerned with EC matters and who share our commitment to work for the future of the Community's industry.

Jacques Delors





## Preface by Karl-Heinz Narjes,

Vice-President of the Commission of  
the European Communities

As Commissioner responsible for Internal Market and Industrial Affairs it gives me great pleasure to present this first edition of the *Panorama of EC industry*.

The need for such a study has been clear for a long time, but the 1992 target for completion of the single market has made it an urgent priority.

Private and public sector enterprises, as well as individuals in their daily lives, will all be affected by this process of market opening and integration which the Community is undertaking.

I am confident that European business will take up the challenge of the integrated market, with the support and participation of political, social and economic interests.

All firms concerned by this greatest deregulation in economic history will have to

reassess their goals, strategies and approaches to take account of this new reality. Therefore accurate and relevant information is of critical importance.

The *Panorama of EC industry* offers accurate up-to-date information (and in some cases forecasts) dealing with over 125 services and manufacturing industry sectors in the EC.

The industries of each Member State have their own traditions and methods, which sometimes makes it difficult to integrate their data into an overall framework. Bearing this in mind, I believe that this study succeeds in presenting clearly and simply the underlying structures of EC industry. The picture that emerges gives confidence and faith in the future.

Karl-Heinz Narjes





## **Introduction by Fernand Braun,**

**Director-General for Internal  
Market and Industrial Affairs .**

The target date of 1992 for unification of the single market is not only an objective set in order to mobilize political will. For European enterprises, it is above all a new economic factor which is affecting current operations and which must be taken into account in strategic planning. Daily news reports mention actions and decisions taken by businessmen showing that they already consider the creation of the single market to be irreversible.

The study undertaken by the Commission on the "Cost of non-Europe" (i.e. the cost to all of not having a single internal market) has greatly stimulated interest in the question. Indeed it may have come as a surprise to many to learn that the establishment of the single market is estimated to bring benefits of some 200 billion ECU to the Community (an increase of 5% of income) and an additional 2 million jobs.

As an ever-growing number of people are becoming aware not only of the challenge of the single market, but especially of the opportunities it will offer, demand for information has exploded. Public and private sector representatives as well as the academic world are anxious to improve their understanding of the Community's industrial structure and the effects that the single market will have on it. The small and medium enterprise (SME) sector in particular needs easy access to information which it often does not have the resources to collect itself.

The market must be defined, measured and recorded. Information is needed on product markets, on production capacities, on suppliers, and, if possible, projections.

Faced with the long-felt need for this sort of Community-wide information which has now become of critical importance, the Commission services launched the *Panorama of EC industry* project.

Once authorization for the project was granted by the President and Vice-President of the Commission, Mr Delors and Mr Narjes, a pragmatic approach to the work was taken. This was partially in response to the type of information which was being sought from the Commission (basic data on markets, products, trends and projections). However the principal reason for this approach was the diversity and frequent incompatibility of definitions, structures and data in the different Member States – an indication in itself of the current state of fragmentation of the European market.

The method adopted was to ask all the professional associations or organizations known to the Commission who represent industry at Community level to provide a chapter on their sector or, if they covered a wider area, to provide a "horizontal" analysis for that area. Consultants were employed to ensure the technical coherence of the whole and to fill in the gaps in the information received.

The project was coordinated by the Directorate-General for Internal Market and Industrial Affairs, for which I am responsible; with assistance from the Statistical Office of the European Communities and the other Commission departments. Finally, the Office for Official Publications gave us invaluable assistance in editing and preparing the book for publication.

I would like to thank here all the professional organizations who worked with us on this project. They have made a major contribution under often difficult circumstances with limited resources. I believe that the results will fully justify their efforts.

The approach we have taken was, we feel, the only one possible in the circumstances, and has its limitations. We may, for instance, have overlooked a number of professional organizations. Others lacked the technical means to provide the data within the timeframe required, or were faced with geographical or sectoral constraints.

I believe, however, that this first "Panorama" will be a practical success. We intend to make it a yearly publication so that we hope not only to correct the deficiencies of this first version, but to continue to update, improve and adapt it to the needs of its users.

In order to achieve this we need help. I would welcome suggestions for improvements from readers, and would particularly like to invite all professional associations who might wish to participate to contact my services concerning future publications.

I would like here to comment on the structure and contents of the publication.

Our main objective was to create a descriptive document, one that would serve as a basic source of information for a wide public. We wanted to provide as factual and accurate a picture as possible of the state of Community Industry some years before 1992.

Most of the sectoral studies were supplied by the relevant professional associations and so often express the views and opinions of these associations, which do not necessarily correspond to those of the Commission or its services. Every effort has been made, however, to ensure that the information provided is essentially of an economic or statistical nature and is presented in an appropriately neutral form.

The work consists of two parts: :

- The first part contains an introduction which describes how to use the book, projections for some major macroeconomic quantities to 1992, a summary of the salient points that emerge from a study of the data and an outline of the emerging industries.
- The second part contains all the individual contributions dealing with the services and manufacturing industry sectors of the Community. Each contribution is intended to be read independently of the rest, giving information on the state of that sector at that time. It should be noted that the figures cannot be cumulated across sectors as this will lead to double-counting and crossover.

The large majority of industrial activity in the Community is covered in the study. Particular care has been taken to ensure that service industries are also treated as comprehensively as possible. However, statistical coverage is more difficult for these sectors and in many cases historical data are unavailable. This is one area in which we will seek improvement.

With the publication of the "Cost of non-Europe", we have all been made aware of how important it is for the future of our industry that we complete the single European market. Many decisions affecting State administrations have already been defined and their timetables for adoption established.

Industrialists, entrepreneurs and managers now have the framework, the motivation and the means to set their objectives and choose strategies and methods. Most have progressed far in the task.

I hope that this document will provide a vital tool for all in helping to understand where they stand and what they should aim for.

Fernand Braun



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# **Special Features**

# HOW TO USE THIS BOOK

The intention of this publication is to provide a perspective of industry across the European Community. The book is intended for all those interested in current and forecast trends and developments in the EC manufacturing and service industries, in terms of both specific sectors and a more general industrial outlook.

The following section sets out the methodology, terminology and conceptual basis underlying the analysis with a view to assisting interpretation of the data and information.

This year's exercise constitutes a first attempt to collect information and data on a Community-wide basis for presentation in this kind of published format. As such, the task of gathering the material clarified a number of issues and difficulties with consequent implications for refinement of methodology and expansion of sectoral coverage in future.

## *General Methodology*

The view that it is the industries themselves which are able to provide a rich source of information and assessments of future prospects is reflected in the basic methodology used in compiling the material presented here. Contributions to the publication have been sought from a wide range of industry associations represented at Community level. This methodology has raised attendant problems of sectoral definitions and in some cases lack of comprehensive data. The requirement to provide data for the historical period 1980-86 has also been particularly onerous this year involving substantial efforts to gather and collate data; the entry of Spain and Portugal to the Community during this period provided an additional complication to data collection. Inevitably in an exercise of this nature, the goal of providing absolute figures is unrealistic; a more meaningful interpretation of the available data and information is the identification of trends and developments within the sectors covered.

Forecasts contained in the sectoral profiles have been based, for the most part, on macroeconomic assumptions made by the associations or consultants involved in the compilation of the individual reports.

## *Time Frame*

The sectoral analyses were written during the third quarter of 1988 although data availability is limited to 1987 and in some cases only 1986. Each analysis consists of a qualitative

discussion with respect to the main trends and developments in the industry, in most cases accompanied by statistical material. In line with the achievement of the single market by the end of 1992, the general intention is to provide aggregate information and data at the Community level.

The availability of data has been a key constraint on the goals of the publication. However, in some cases 1986 data are provided and in many cases data for 1987; where possible, data have been estimated for these years as well as for gaps in the historical series. For many sectors, forecasts have been provided for 1988 along with a qualitative assessment of the medium-term outlook for the industry.

## *Industry Classification System*

The industrial classification which forms the basis of the selection of industries included in the book is the NACE coding system. This system classifies economic activity in terms of the nature of goods and services produced or by the nature of the production process employed. It is arranged on the decimal system and is sub-divided into divisions (1-digit codes), classes (2-digit codes), groups (3-digit codes), sub-groups (4-digit codes) and items (5-digit codes). The EC Panorama is primarily focused at the "3-digit" and "4-digit" level. More detailed information on the NACE is contained in the General Industrial Classification of Economic Activities within the European Community published by Eurostat, 1985 reprint of the 1970 edition. This publication is available from the usual outlets for Community publications.

Each chapter is headed by the appropriate NACE code. However, this should be regarded with caution; in several cases the NACE classification does not entirely coincide with the industrial sector or sub-sector under discussion. Hence, each chapter contains a preliminary section dealing with sectoral coverage in the particular chapter and indicating the extent to which this deviates from the NACE classification. Similarly, in some cases an overlap occurs between sectors and therefore data cannot be cumulated.

A number of service industries have been covered in the book. In most cases these have been defined in accordance with the NACE system; where a relevant code does not exist, for example, Electronic Information Services, these sectors are discussed under an appropriate general chapter heading, in this particular case Transport, Communications and Business Services.

## *Statistical Data*

The statistical data should be regarded with caution particularly for more recent years where data have often been estimated. The two main sources for data are Eurostat and industry association records; data sources are indicated for each statistical table. Data from the separate sources have generally not been mixed since their respective sectoral definitions frequently differ.

Of greater interest than absolute figures, is the pattern of developments in particular industry sectors. Hence, the historical data cover the period from 1980 to the current or most recent year for which figures are available. Since this is the first edition of the publication, a discussion of major trends and developments over the 1980s has been included for almost all industries and industry sectors.

For manufacturing industries each chapter includes a summary table containing the main indicators for the industry. These cover apparent consumption (defined as production + imports - exports), net export earnings (the trade balance for the Community with the rest of the world), total Community production, and employment.

Data in the tables and the text are in current ECUs, unless otherwise stated. Forecast data are in 1987 ECUs. Constant values (base year = 1980) have been calculated for production totals in order to provide an indication of a standardized measure of change by removing the element of price distortion. Indices (base year = 1980) have been applied to production and trade data providing easier reference to trend changes.

Every effort has been made to include data for all 12 Member States. However, where data are not available for EC 12, country coverage is clearly indicated in the footnotes appearing below each table.

## *Exchange Rate Conversion and Deflators*

All data are reported in ECUs and national currencies have been converted at the average exchange rate prevailing for the year in question. In the absence of a satisfactory alternative

deflator for product and service markets for the Community as a whole, data have been inflation-adjusted using the GDP deflator. In most cases this has been done by the application of the EC 12 price index to aggregate ECU totals; however, in some cases national figures have been deflated by using the national GDP deflator with totals subsequently converted into ECUs at the 1980 exchange rate.

## *Trade Data*

The trade data are reported in terms of Community trade flows with the rest of the world. In many cases these data are based on Eurostat figures in accordance with NACE groupings. Export valuations are generally fob (free on board, i.e. excluding freight and insurance costs) whereas import data is cif (i.e. inclusive of carriage, insurance and freight). Import statistics may be generally regarded as slightly more accurate than export statistics due to greater ease of data collection in the former case.

All trade data are in current ECUs. For comparative purposes, the trade ratio of exports/imports (X/M) has been calculated for each set of trade data.

## *Sources*

Where an industry association is the author of the information on the particular industry or sector, the name and details appear at the end of the section. In some cases sectoral profiles have been written by industry experts or departments of the European Commission and where relevant this has been indicated.

At the horizontal level, the spokesman for European business and industry is the Union of Industrial and Employers' Confederations of Europe (UNICE), whose objective is to promote the common professional interests of the firms represented by its 33 national member federations.

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# MACROECONOMIC OUTLOOK

## *Introduction*

This chapter consists of two parts. The first contains the draft Summary and Conclusions of the Commission's *Annual Economic Report 1988-89*. The second part is based on sectoral forecasts for 1993 undertaken for the Commission by three forecasting institutes in preparation for the achievement of the single market.

These two parts are complementary: the first part emphasizes macroeconomic policies and short-term global prospects, while the second attempts to clarify the Community's industrial structures and their medium-term development.

## I. PREPARING FOR 1992

### *Favourable Economic Prospects for the Community and the World Economy*

The economic prospects for the Community have significantly improved in recent months. In 1988 the Community benefited from an unexpected dynamism of its own, in the whole OECD area and from world trade. In the Community, growth (1988: 3.5% on average) is likely to be the strongest since the end of the 1970s; the increase in investment (7%) the highest for over two decades; the inflation rate (3.5%) should approach the levels of the 1960s. Despite slightly lower growth of the global economy, Community growth is likely to be strong in 1989 (about 2.75%). Inflation should only increase slightly.

The international framework for conducting monetary policy in the Community has changed significantly. The disequilibria in the current balances are decreasing. With an improvement in the US trade deficit early in the year and an increase in interest rates in spring 1988, the dollar had by autumn almost reached its level of January 1987, just after the Louvre accord. Partly to control the rise in the dollar and partly to insure internal stability European Central Banks were led, to different degrees, to tighten conditions on their own money markets.

International cooperation allowed significant progress to be made towards greater stability in the world economy. But it needs to be pursued with determination because important risks remain - in 1989 the reduction in balance-of-payments disequilibria is likely to slow at a time when the accumulation

of United States foreign debt is continuing - the persistence of the disequilibria continues to create risks for the stability of the international monetary system - the situation in developing countries is not improving and is affected by the recent rise in interest rates.

### *Encouraging Elements and Some Matters for Concern*

Three aspects of the economic situation are encouraging:

- The dynamism of the economies of Spain, Portugal, Italy and the United Kingdom is now spreading to their partners whose exports, and also investment, are more buoyant. Thus, for example, in France and Germany growth should be about 3% in 1988 and should only dip slightly in 1989 (compared with 2% in 1987).
- Growth is more and more being led by investment. Many factors are contributing to this: greater profitability, a historically high level of capacity utilization, a favourable international environment and preparation by private firms for 1992.
- The Community has achieved a degree of stability and convergence of inflation rates unequalled since the 1960s. However, progress is still necessary, especially in Portugal and Greece.

Despite these satisfactory trends there are four areas of concern:

- the risk of inflation
- excessive budgetary deficits in some countries
- an increase in the intra-Community disequilibria in external balances
- an average unemployment rate of more than 11% of the labour force.

Full use of existing margins for growth must remain a priority for all Member States. However, the consolidation of the current good growth performance may require, over the coming months, different actions in different Member States. As growth in the more dynamic countries is expected to slow down as a result of inflationary pressures and/or a deterioration of external accounts, economic policies in the other countries should accentuate the shift to domestic growth by a strengthening of supply and demand conditions.

## *Realizing the Medium-term Objectives*

Faster growth is now giving the Community the chance to realize in the best conditions its major objectives: to benefit from the completion of the internal market, strengthen economic and social cohesion and reduce unemployment.

The irreversible character of the completion of the internal market in 1992 was confirmed by the Council of Hanover. Significant progress has already been realized. In recent months, public opinion and enterprises have become more and more aware of the opportunities offered by this project. It is essential that these hopes are not disappointed when the decisions implementing the important measures of the White Paper are taken during the coming years.

To produce its full effects, the completion of the internal markets needs to be accompanied by structural policies, especially an effective competition policy, also necessary in their own right.

The success of the internal market will also have significant macroeconomic effects. Studies by the Commission services show that the completion of the internal market will in the medium term improve significantly growth, budgetary and external positions and will have favourable effects on inflation. If productivity gains are to be rapidly translated into higher growth and employment, it will be important to fully benefit from the alleviation of constraints by reducing domestic disequilibria and actively strengthening the conditions of supply and demand.

With the reform and the increase of the structural Funds already under way, and the greater activity of the Community financial instruments, the Community has acquired the means to strengthen its economic and social cohesion. A new model of "partnership" between the Community and the beneficiary countries must be created. Not only is the efficient utilization and addition of these resources at project level essential but economic policies in the countries concerned must ensure that the overall supply conditions improve and especially that the efficiency and the share of productive investment relative to GDP are increased.

Even if the completion of the internal market in the last analysis results in significant gains in welfare and employment, the restructuring which it will imply during the transition phase gives rise to certain pre-occupations. This is why attention must be given to the social dimension, in particular:

- the implementation of policies to facilitate the re-employment of people who may lose their jobs in sectors and regions affected by the restructuring
- the convergence towards the higher social standards by minimum security and health regulations in the work place
- the strengthening of the social dialogue at Community level.

The reduction in unemployment remains the priority task common to all Member States. Already employment is increasing at a faster rate and in many countries there are signs of greater labour market adaptability. These trends need to be reinforced. The direction of the Cooperative Growth Strategy for more employment remains valid; it involves, at the macroeconomic level, further improvement in the profitability of capacity-increasing and employment-creating investment. An increase in wage costs, which should remain moderate, in conjunction with the new favourable demand prospects, would contribute to this. It also involves concentrating attention on the elimination of unnecessary administrative obstacles which hinder employment creation and on greater mobility and skill improvements, particularly by sustained training efforts.

## *The Narrow Path towards a Consolidation of Growth*

The potential of non-inflationary growth can be strengthened by making European economies even more adaptable. Greater flexibility of markets and their positive effect on the behaviour and initiative of entrepreneurs is in itself a source of progress. In a situation where on the one hand it is necessary to avoid excessive pressures on productive capacity and on the other to further improve employment performances, structural policies are still very important.

The stabilization and later appreciation of the dollar on the foreign exchanges, led the monetary authorities to give more attention to the objectives of domestic price stability. A recent increase in money market interest rates in the Community has strengthened the credibility of monetary authorities. To the extent that longer-term expectations of inflation and/or depreciation of the currencies have been reduced, long-term interest rates could be stabilized or decrease on a sound basis; some evidence of this emerged in some countries in early autumn 1988.

In the countries participating in the exchange rate mechanism domestic inflationary pressures generally remain under control and further tightening of monetary policy does not seem necessary in the immediate future. Yet, the risk and main challenge to monetary policy could arise from renewed instability of the dollar.

For budgetary policies, medium-term objectives continue to be of primary importance. In the context of the achievement of the internal market the problems concerning the approximation of indirect taxes and taxation of capital income remain to be solved. Other medium-term objectives include the convergence of general government balances, still excessive in some Member States, and the need to use budgetary policy to strengthen the conditions of supply and demand.

The increasing interdependence between Member States makes greater coordination of economic policy essential. Furthermore, an increasingly high degree of stability in exchange rates related to converging underlying economic fundamentals would improve the functioning of the internal market. The strengthening of monetary cohesion could be realized by an enlargement of the exchange rate mechanism to those countries not yet participating, greater cooperation in the management of monetary policies and strengthening the role of the ECU. However, monetary cohesion in the

Community cannot be permanently ensured unless Member States follow compatible policies in other areas, particularly budgetary policy. In this context it is important to strengthen the consensus on the principal economic policy objectives:

- stable prices and convergence of inflation rates
- medium-term compatibility of payments balances
- the contribution of internal and external stability to the growth and employment objectives of the Community and its Member States.

**Table I**  
**GDP at Constant Prices**

| (% change on previous year) | 1985       | 1986       | 1987       | (1) 1988    | (1) 1989    |
|-----------------------------|------------|------------|------------|-------------|-------------|
| Belgium                     | 1.4        | 2.3        | 1.8        | 3.00        | 2.25        |
| Denmark                     | 4.2        | 3.4        | -1.0       | 0.00        | 1.75        |
| Germany                     | 2.1        | 2.6        | 1.9        | 3.25        | 2.50        |
| Greece                      | 3.0        | 1.3        | -0.4       | 2.75        | 2.00        |
| Spain                       | 2.3        | 3.3        | 5.2        | 4.75        | 4.00        |
| France                      | 1.7        | 2.1        | 2.3        | 3.00        | 2.75        |
| Ireland                     | 1.1        | -0.3       | 4.1        | 3.00        | 3.25        |
| Italy                       | 2.7        | 2.7        | 3.1        | 4.00        | 3.25        |
| Luxembourg                  | 3.8        | 2.9        | 2.4        | 3.00        | 2.50        |
| Netherlands                 | 2.3        | 2.4        | 1.5        | 2.24        | 2.25        |
| Portugal                    | 3.3        | 4.3        | 4.6        | 4.00        | 3.50        |
| United Kingdom              | 3.7        | 2.9        | 4.3        | 3.75        | 2.50        |
| <b>EC 12</b>                | <b>2.5</b> | <b>2.6</b> | <b>2.9</b> | <b>3.50</b> | <b>2.75</b> |
| USA                         | 3.1        | 3.0        | 3.4        | 4.00        | 2.25        |
| Japan                       | 4.5        | 2.4        | 4.2        | 5.50        | 3.75        |

(1) Forecasts September-October 1988.

Source: DG II, Economic and Financial Affairs, Commission of the European Communities.

**Table II**  
**Domestic Demand at Constant Prices**

| (% change on previous year) | 1985       | 1986       | 1987       | (1) 1988    | (1) 1989    |
|-----------------------------|------------|------------|------------|-------------|-------------|
| Belgium                     | 1.3        | 3.2        | 2.4        | 3.00        | 2.25        |
| Denmark                     | 5.7        | 5.7        | -3.2       | -1.50       | 0.75        |
| Germany                     | 1.0        | 3.7        | 3.1        | 3.50        | 2.50        |
| Greece                      | 6.1        | -0.5       | 0.2        | 3.75        | 3.50        |
| Spain                       | 2.9        | 5.9        | 8.0        | 6.25        | 5.25        |
| France                      | 2.2        | 3.7        | 3.3        | 3.00        | 2.75        |
| Ireland                     | -1.3       | 0.8        | -1.5       | -0.25       | 1.50        |
| Italy                       | 3.2        | 3.6        | 4.6        | 4.50        | 3.50        |
| Luxembourg                  | 0.7        | -0.9       | 6.1        | 0.50        | 2.50        |
| Netherlands                 | 2.5        | 3.9        | 2.2        | 1.75        | 2.00        |
| Portugal                    | 0.8        | 8.4        | 9.5        | 6.25        | 5.50        |
| United Kingdom              | 2.9        | 3.8        | 4.3        | 5.25        | 3.50        |
| <b>EC 12</b>                | <b>2.4</b> | <b>3.9</b> | <b>3.9</b> | <b>4.00</b> | <b>3.25</b> |
| USA                         | 3.5        | 3.8        | 3.0        | 2.75        | 2.00        |
| Japan                       | 3.8        | 4.0        | 5.1        | 7.25        | 4.25        |

(1) Forecasts September-October 1988.

Source: DG II, Economic and Financial Affairs, Commission of the European Communities.

**Table III**  
**Deflator of Private Consumption**

| (% change on previous year) | 1985       | 1986       | 1987       | (1) 1988    | (1) 1989    |
|-----------------------------|------------|------------|------------|-------------|-------------|
| Belgium                     | 5.2        | 0.8        | 1.6        | 1.25        | 2.50        |
| Denmark                     | 4.9        | 3.6        | 4.1        | 4.75        | 3.75        |
| Germany                     | 2.1        | -0.2       | 0.5        | 1.25        | 2.50        |
| Greece                      | 18.7       | 22.2       | 18.5       | 13.25       | 12.75       |
| Spain                       | 8.3        | 8.7        | 5.3        | 4.75        | 4.25        |
| France                      | 5.7        | 2.5        | 3.2        | 2.75        | 2.75        |
| Ireland                     | 4.5        | 3.6        | 3.1        | 2.00        | 2.75        |
| Italy                       | 9.3        | 6.1        | 4.8        | 5.00        | 4.50        |
| Luxembourg                  | 5.2        | 0.6        | 0.6        | 1.50        | 2.25        |
| Netherlands                 | 2.5        | 0.2        | -0.4       | 1.00        | 1.25        |
| Portugal                    | 19.0       | 12.0       | 10.2       | 9.50        | 7.00        |
| United Kingdom              | 5.2        | 3.6        | 3.6        | 4.50        | 4.75        |
| <b>EC 12</b>                | <b>5.9</b> | <b>3.0</b> | <b>3.3</b> | <b>3.50</b> | <b>3.75</b> |
| USA                         | 3.1        | 2.1        | 4.5        | 4.25        | 5.00        |
| Japan                       | 2.1        | 0.6        | -0.2       | 1.00        | 2.00        |

(1) Forecasts September-October 1988.

Source: DG II, Economic and Financial Affairs, Commission of the European Communities.

**Table IV**  
**Balance on Current Transactions**

| (as a % of GDP) (1) | 1985       | 1986       | 1987       | (2) 1988    | (2) 1989    |
|---------------------|------------|------------|------------|-------------|-------------|
| Belgium             | 0.7        | 2.5        | 1.9        | 1.75        | 1.75        |
| Denmark             | -4.7       | -5.2       | -3.0       | -2.50       | -2.25       |
| Germany             | 2.4        | 4.4        | 4.0        | 4.00        | 4.25        |
| Greece              | -8.2       | -5.5       | -3.4       | -2.75       | -3.50       |
| Spain               | 1.6        | 1.7        | 0.1        | -0.75       | -2.00       |
| France              | 0.1        | 0.4        | -0.3       | 0.00        | 0.25        |
| Ireland             | -3.8       | -2.8       | 1.3        | 2.50        | 3.50        |
| Italy               | -0.9       | 0.4        | -0.1       | -1.50       | -0.50       |
| Luxembourg          | 43.3       | 43.7       | 38.0       | 38.50       | 36.50       |
| Netherlands         | 4.3        | 2.9        | 1.7        | 1.50        | 1.75        |
| Portugal            | 1.7        | 3.9        | 1.8        | 0.00        | -1.75       |
| United Kingdom      | 0.5        | 0.0        | -0.6       | -3.00       | -3.25       |
| <b>EC 12</b>        | <b>0.7</b> | <b>1.5</b> | <b>1.0</b> | <b>0.50</b> | <b>0.25</b> |
| USA                 | -2.9       | -3.4       | -3.4       | -2.75       | -2.50       |
| Japan               | 3.7        | 4.3        | 3.8        | 2.75        | 3.00        |

(1) GDP for USA and Japan from 1987 onwards.

(2) Forecasts September-October 1988.

Source: DG II, Economic and Financial Affairs, Commission of the European Communities.

**Table V**  
**Number of Unemployed as % of the Civilian Labour Force(1)**

|                | 1985        | 1986        | 1987        | (2) 1988     | (2) 1989     |
|----------------|-------------|-------------|-------------|--------------|--------------|
| Belgium        | 13.6        | 12.6        | 12.3        | 11.5         | 11.00        |
| Denmark        | 8.7         | 7.4         | 7.6         | 8.50         | 9.00         |
| Germany        | 8.4         | 8.1         | 8.1         | 8.25         | 8.25         |
| Greece         | 7.8         | 7.4         | 7.4         | 7.50         | 7.50         |
| Spain          | 19.5        | 21.0        | 20.5        | 20.00        | 19.50        |
| France         | 10.5        | 10.6        | 10.8        | 10.75        | 10.50        |
| Ireland        | 17.9        | 18.2        | 19.2        | 18.75        | 18.25        |
| Italy          | 12.9        | 13.7        | 14.0        | 15.00        | 14.50        |
| Luxembourg     | 1.7         | 1.4         | 1.6         | 1.50         | 1.25         |
| Netherlands    | 13.3        | 12.1        | 11.5        | 11.25        | 11.00        |
| Portugal       | 7.7         | 8.7         | 7.2         | 6.50         | 6.50         |
| United Kingdom | 12.0        | 11.9        | 10.6        | 8.50         | 7.25         |
| <b>EC 12</b>   | <b>11.6</b> | <b>11.9</b> | <b>11.5</b> | <b>11.25</b> | <b>11.00</b> |
| USA            | 7.2         | 7.0         | 6.2         | 5.50         | 5.50         |
| Japan          | 2.6         | 2.8         | 2.8         | 2.50         | 2.50         |

(1) EC 9: registered unemployed; Greece, Spain and Portugal: labour force sample survey.

(2) Forecasts September-October 1988.

Source: DG II, Economic and Financial Affairs, Commission of the European Communities.

**Table VI**  
**General Government Lending and Borrowing (1)**

| (as a % of GDP) | 1985        | 1986        | 1987        | (2) 1988     | (2) 1989     |
|-----------------|-------------|-------------|-------------|--------------|--------------|
| Belgium         | -8.3        | -8.9        | -7.2        | -7.25        | -6.50        |
| Denmark         | -2.1        | 3.1         | 2.1         | 1.00         | 1.25         |
| Germany         | -1.1        | -1.3        | -1.8        | -2.52        | -1.52        |
| Greece          | -13.6       | -10.8       | -9.5        | -12.00       | -13.25       |
| Spain           | -7.0        | -5.7        | -3.6        | -3.00        | -3.00        |
| France          | -2.9        | -2.9        | -2.5        | -2.00        | -1.75        |
| Ireland         | -11.3       | -10.6       | -8.8        | -6.50        | -6.00        |
| Italy           | -12.3       | -11.4       | -10.5       | -10.00       | -10.00       |
| Luxembourg      | 5.5         | 6.0         | 5.2         | 5.25         | 6.25         |
| Netherlands     | -4.7        | -6.0        | -6.3        | -5.25        | -4.50        |
| Portugal        | -10.0       | -7.8        | -8.4        | -8.25        | -7.75        |
| United Kingdom  | -2.8        | -2.4        | -1.4        | -0.25        | 0.00         |
| <b>EC 12</b>    | <b>-5.2</b> | <b>-4.7</b> | <b>-4.2</b> | <b>-3.75</b> | <b>-3.50</b> |
| USA             | -4.3        | -3.5        | -2.3        | -1.75        | -1.75        |
| Japan           | -0.8        | -1.5        | -0.3        | -1.25        | 0.25         |

(1) ESA definition of general government which includes social security funds.

(2) Forecasts September-October 1988.

Source: DG II, Economic and Financial Affairs, Commission of the European Communities.

**Table VII**  
**Total Employment**

| (annual % change) | 1985       | 1986       | 1987       | (1) 1988    | (1) 1989    |
|-------------------|------------|------------|------------|-------------|-------------|
| Belgium           | 0.8        | 1.0        | 0.3        | 1.25        | 0.75        |
| Denmark           | 2.9        | 2.3        | 1.1        | -0.25       | 0.25        |
| Germany           | 0.7        | 1.0        | 0.7        | 0.50        | 0.75        |
| Greece            | 1.0        | 0.1        | -0.1       | 1.00        | 0.75        |
| Spain             | -1.0       | 2.0        | 3.0        | 1.00        | 2.00        |
| France            | -0.4       | 0.3        | 0.1        | 0.50        | 0.50        |
| Ireland           | -2.2       | -0.4       | -0.1       | 0.00        | 0.25        |
| Italy             | 1.4        | 0.8        | -0.1       | 0.50        | 0.50        |
| Luxembourg        | 1.4        | 2.6        | 2.7        | 2.00        | 1.50        |
| Netherlands       | 1.3        | 1.8        | 1.2        | 0.75        | 1.00        |
| Portugal          | -0.3       | 0.0        | 2.7        | 1.75        | 1.00        |
| United Kingdom    | 1.6        | 0.4        | 1.7        | 2.00        | 1.00        |
| <b>EC 12</b>      | <b>0.7</b> | <b>0.8</b> | <b>0.9</b> | <b>1.00</b> | <b>0.75</b> |
| USA               | 2.3        | 1.6        | 2.6        | 2.25        | 1.50        |
| Japan             | 0.7        | 0.8        | 1.0        | 4.50        | 0.75        |

(1) Forecasts September-October 1988.

Source: DG II, Economic and Financial Affairs, Commission of the European Communities.

**Table VIII**  
**Real Compensation of Employees per Head (1)**

| (annual % change) | 1985       | 1986       | 1987       | (2) 1988    | (2) 1989    |
|-------------------|------------|------------|------------|-------------|-------------|
| Belgium           | -0.4       | 3.0        | 1.7        | 1.00        | 1.25        |
| Denmark           | -0.3       | 1.0        | 4.0        | -0.50       | -1.00       |
| Germany           | 0.9        | 4.1        | 2.4        | 1.75        | 0.00        |
| Greece            | 3.3        | -5.4       | -2.9       | 3.25        | 1.00        |
| Spain             | 0.9        | -0.8       | 2.1        | 1.75        | 1.75        |
| France            | 0.9        | 1.5        | 0.1        | 1.00        | 1.00        |
| Ireland           | 1.8        | 1.5        | 1.9        | 1.25        | 1.00        |
| Italy             | 0.8        | 1.5        | 3.8        | 2.00        | 2.75        |
| Luxembourg        | -1.4       | 4.3        | 3.3        | 2.00        | 2.75        |
| Netherlands       | -1.1       | 1.4        | 1.6        | 1.00        | -0.25       |
| Portugal          | 2.8        | 4.5        | 3.4        | 1.50        | 2.75        |
| United Kingdom    | 1.4        | 3.5        | 3.0        | 3.00        | 3.00        |
| <b>EC12</b>       | <b>0.9</b> | <b>2.3</b> | <b>2.1</b> | <b>1.75</b> | <b>1.50</b> |
| USA               | 1.1        | 1.6        | -0.4       | 1.00        | -0.25       |
| Japan             | 1.3        | 3.1        | 3.3        | 3.25        | 2.50        |

(1) Deflated by the price deflator of private consumption.

(2) Forecasts September-October 1988.

Source: DG II, Economic and Financial Affairs, Commission of the European Communities.

## II. MACROECONOMIC OUTLOOK TO 1993

The information presented here comes from the first joint study carried out on behalf of the Commission of the European Communities by three European forecasting institutes - BIPE (France), IFO (Federal Republic of Germany), and Prometeia (Italy), scheduled for publication early in 1989. In order to present a coherent macroeconomic framework, this study utilizes the Hermes model set up by the Commission and the national models upon which it is based. Its aim is to establish links between the microeconomic level, as understood by firms in the sectors under consideration, and the global approach that represents overall macroeconomic equilibria. The forecasts presented here thus do not necessarily correspond to raw projections based on models; rather, they attempt to correlate macro- and microeconomic approaches. Since this study is not yet complete, results presented here are tentative.

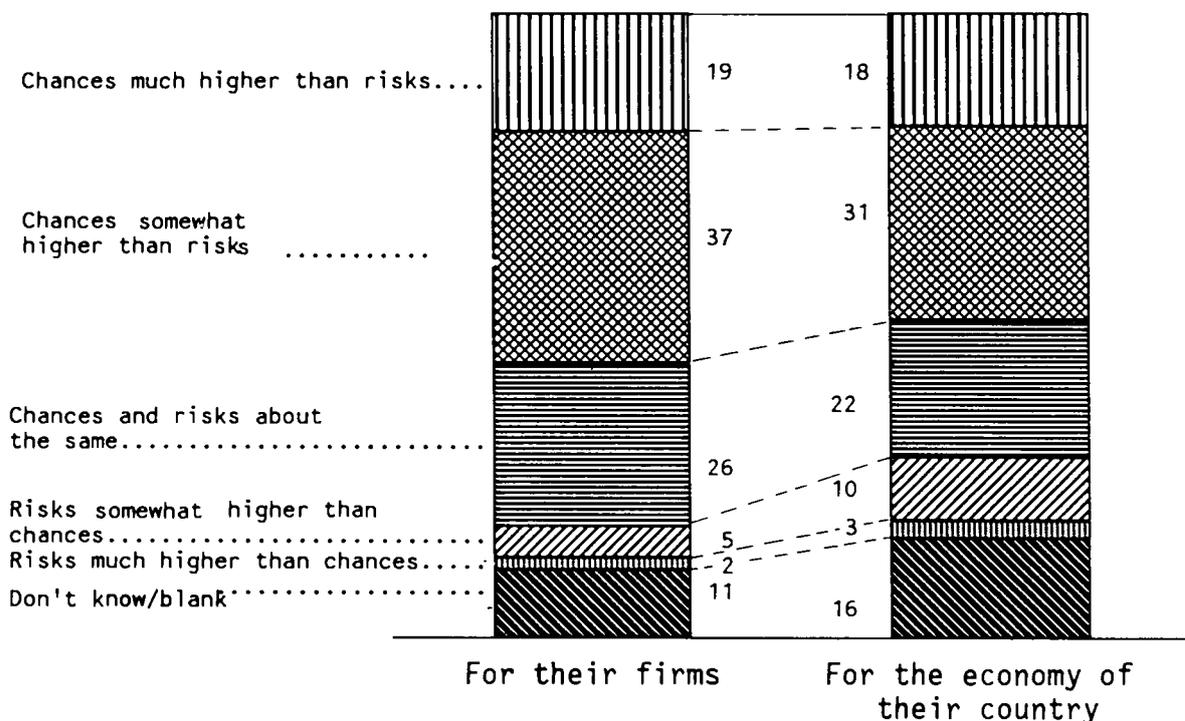
### *Global Forecasts for Europe*

Studies on the cost of non-Europe commissioned by the EC estimate the net effects of the measures proposed in the White Paper on the completion of the internal market at 4.5% growth and 1.8 million additional jobs within 5-6 years, as well as a 6% drop in prices, an improvement in the Community's trade balance, and a notable easing of budgetary constraints in European countries.

These positive results could be expanded considerably if trade liberalization measures were to be accompanied by a concerted shift in economic policies towards stimulating demand and growth.

At the microeconomic level, the inquiry undertaken by the Commission at the end of 1987 among 11 000 heads of firms confirms this forecast: whether they were speaking for their firms or their national economies, the majority of economic managers stressed the opportunities presented by the com-

**THE ATTITUDE OF MANAGERS TO THE COMPLETION OF THE SINGLE COMMON MARKET**  
(% responses EC 12)



Source : "The completion of the Internal market a survey of European industry's perception of the likely effects" Commission of the European Communities- 1988.

Graph 1

**Table IX**  
**Worldwide GDP Growth**  
**Average Annual Change in Volume**

| (%)                                       | 1979-82    | 1982-87    | 1987-93    |
|---|------------|------------|------------|
| Germany                                   | 0.2        | 2.2        | 2.4        |
| Spain                                     | 0.8        | 2.7        | 3.9        |
| France                                    | 1.7        | 1.6        | 2.4        |
| Italy                                     | 1.2        | 2.5        | 2.7        |
| United Kingdom                            | -0.8       | 3.1        | 2.5        |
| <b>EC 12</b>                              | <b>0.6</b> | <b>2.2</b> | <b>2.6</b> |
| USA                                       | -0.3       | 3.6        | 2.5        |
| Japan                                     | 3.7        | 3.7        | 3.5        |
| <b>Total industrialized countries (1)</b> | <b>0.7</b> | <b>2.9</b> | <b>2.6</b> |
| Africa                                    | 2.1        | 0.8        | 2.5        |
| Middle East                               | -1.4       | -0.2       | 2.0        |
| America (excl. USA and Canada)            | 1.7        | 2.4        | 3.0        |
| Asia                                      | 5.3        | 6.9        | 6.0        |
| Eastern Europe                            | 2.7        | 3.1        | 3.5        |
| <b>Total non-OECD countries (1)</b>       | <b>2.6</b> | <b>3.5</b> | <b>3.8</b> |
| <b>Total (1)</b>                          | <b>1.4</b> | <b>3.1</b> | <b>3.1</b> |

(1) Weighted by GDP.

Sources: BIPE, IFO and Prometeia. Preliminary results, September 1988.

pletion of the internal market rather than the risks that might result from structural reorganization or increased competition (see Graph 1). However, the structural functions which occur as a result of 1992 will undoubtedly be felt at the micro level.

Although the economic outlook within the Community may seem favourable, the external environment remains uncertain. The three Institutes were thus led to assume a slowdown in the US business cycle; this would allow some improvement in the US trade balance but would lead to the outlook for

1993 being for weaker economic growth than that recorded in 1988, both in Europe and worldwide.

Even if worldwide economic growth in the coming years is not greater than that observed in 1982-87, European growth is expected to increase (see Table IX).

In the EC countries, rapid growth in investment (see Table X) should create conditions favourable to manufacturing as a whole, and particularly to the goods and services associated with new information technologies. The macroeconomic context may thus encourage European producers in a sector of key importance for the development of emerging industries.

### *Preliminary Sectoral Results*

On the basis of the preceding assumptions, medium-term prospects for some 20 EC sectors have been established. The choice of sectors takes into account:

- the economic importance of these activities for Europe: industries such as agriculture and food, textiles and clothing, and automobiles are therefore included
- the strategic character of certain industries, even those whose direct economic importance is limited; this includes manufacturing activities such as the production of machine tools or semiconductors, and service activities such as software development.

In order to facilitate the definition of macroeconomic assumptions, the elaboration of sectoral forecasts and the establishment of links between these two levels of analysis, the results are checked at regular intervals with a panel of experts.

Using the preliminary results obtained by the three Institutes and those of similar studies for the United States and Japan, it is possible to draw up a diagram of the EC 12 production portfolio in relation to the major developed countries as a whole (see Figure 1).

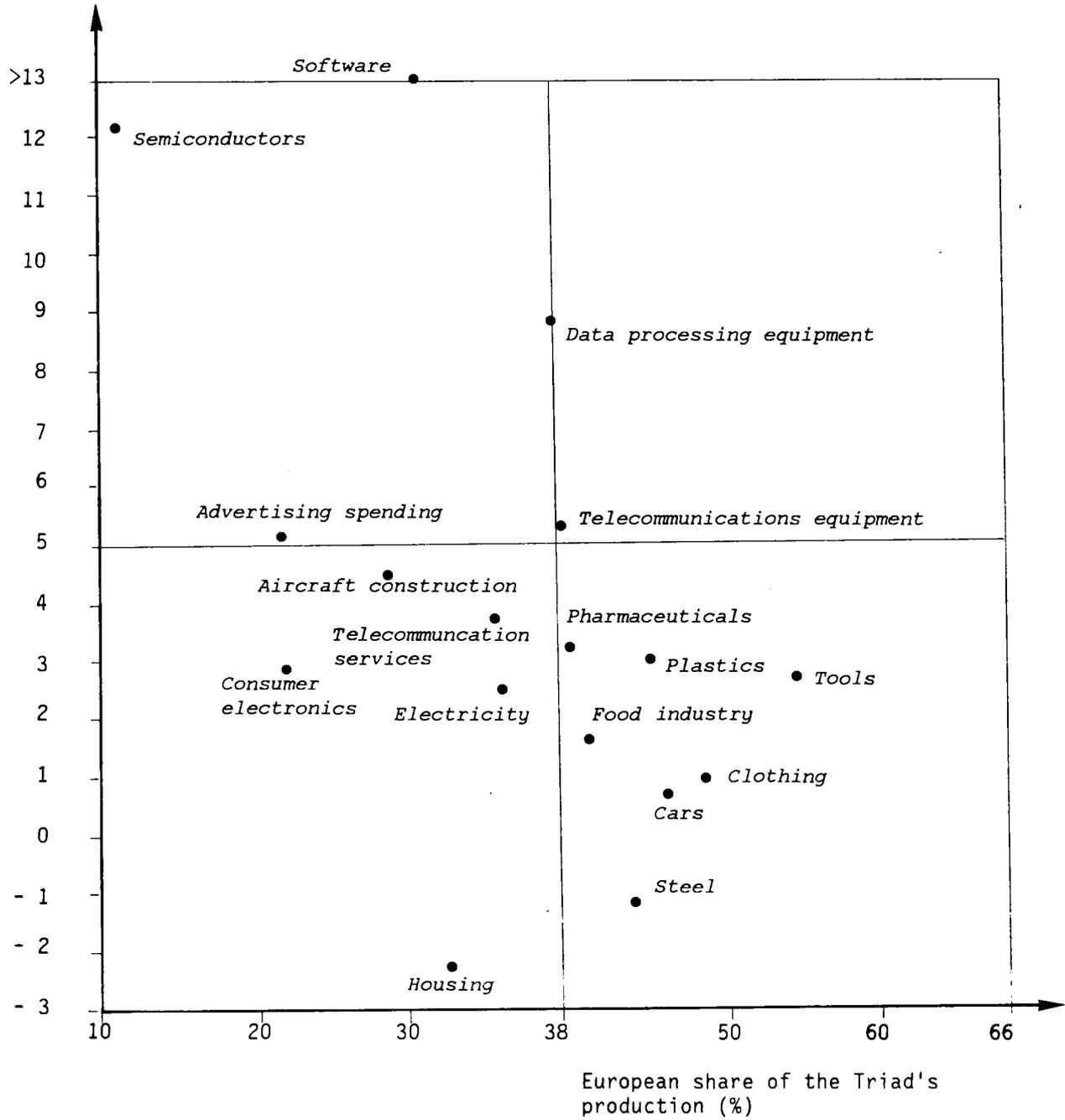
**Table X**  
**Allocation of GNP by Consumption**

|  | Average annual change |         |         | 1987<br>(billion ECU) |
|--|-----------------------|---------|---------|-----------------------|
|  | 1979-82               | 1982-87 | 1987-93 |                       |
| Gross domestic product                 | 0.6                   | 2.2     | 2.6     | 3 704                 |
| Extra-EC imports of goods and services | 0.8                   | 4.6     | 5.1     | 405                   |
| Private consumption                    | 0.9                   | 2.4     | 2.6     | 2 245                 |
| Government consumption                 | 1.8                   | 1.4     | 2.0     | 695                   |
| Gross fixed capital formation          | -1.5                  | 2.3     | 3.7     | 706                   |
| of which:                              |                       |         |         |                       |
| capital goods                          | N/A                   | 5.2     | 4.5     | 341                   |
| building and works                     | N/A                   | 0.6     | 2.9     | 365                   |
| Extra-EC exports of goods and services | 2.3                   | 3.9     | 4.3     | 26                    |
| GDP deflator                           | 11.6                  | 6.1     | 3.5     |                       |

Sources: BIPE, IFO and Prometeia. Preliminary results, September 1988.

## THE EUROPEAN PORTFOLIO

Annual volume growth of the Triad's production 1987-1993 (%)



The term "Triad" refers to total activity in Japan, the United States of America and the European Community.

Figure 1

This diagram compares:

- sectoral growth outlook for the United States-Japan-EC Triad
- the production share of the EC within the Triad. This indicator makes it possible to assess the EC's strong points, conventionally defined as those areas where the Community contribution to Triad production is above 38%, and its weak points, where its contribution is less than 38%.

Within the United States-Japan-EC Triad, Europe's industrial past is still strongly in evidence: the EC is best represented in the area of machine tools, cars, steel, and textiles and clothing. Inversely, Europe is under-represented in the areas of consumer electronics and semiconductors - two activities distinctly more representative of the new technological system taking shape than are the four industries where Europe excels.

The European Community thus has more "cash cows" (mature products with limited market prospects but where Europe's position is good: this is the case for machine tools) than "stars" (products with high growth potential and good European position: telecommunications equipment may be included in this category).

However, this somewhat unsatisfactory starting position should not be considered definitive. The analyses carried out by BIPE, IFO and Prometeia suggest that the Community's position may improve in some problem sectors (see

Figure 1) such as software, aerospace engineering and consumer electronics.

Within this framework, Table XI indicates future Community shares in each sector within the Triad on the basis of the preliminary results coming out of this study.

The principal market for a number of emerging industries is in traditional activities (see the chapter on Emerging Industries). The real challenge for these activities is to introduce new technologies in such a way that the EC's industrial competitiveness is maintained and even increased.

Seen from this point of view, the preliminary results obtained by the three Institutes are encouraging. The development and mastery of microelectronics in the EC machine tool industry, advances in continuous casting and new steel products in the iron and steel industry (for example, coated sheeting), the penetration of robotics in the textile and clothing, and agricultural and food industries indicate how firms are attempting to revitalize the Community's industrial structure.

This effort must be extended. It requires that production investment be accelerated, and the macroeconomic situation makes this possible. But beyond this essential modernization of the tools of production, an increase in non-material investment, particularly in areas such as education, training and R&D, is called for.

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Table XI

| EUROPEAN OUTLOOK BY SECTOR             |  |   |
|--|--|---|
| Sectors                                | Annual average growth rate in volume for the production of the Triad 1987-1993 (%) | European share:<br>↗ Growing<br>= No real change<br>↘ Diminishing |
| Software.....                          | 15.0   | ↗   |
| Semi-conductors.....                   | 12.3   | ↘   |
| Data processing equipment.....         | 9.0  | =   |
| Telecommunications equipment.....      | 5.3  | =   |
| Advertising spending (T.V.).....       | 5.1  | ↗   |
| Aircraft construction.....             | 4.6  | ↗   |
| Pharmaceuticals.....                   | 3.7  | ↗   |
| Telecommunications services.....       | 3.7  | ↗   |
| Plastics.....                          | 3.0  | =   |
| Consumer electronics.....              | 2.8  | ↗   |
| Machine tools.....                     | 2.6  | =   |
| Electricity (Twh).....                 | 2.3  | =   |
| Food industry.....                     | 1.6  | =   |
| Textiles clothing.....                 | 1.0  | =   |
| Automotive (number of cars).....       | 0.6  | =   |
| Raw steel (millions of tons).....      | - 1.2  | ↘   |
| Housing (number of new housing starts) | - 2.4  | ↘   |

Sources : BIPE - IFO - Prometeia

# HIGHLIGHTS

The sectoral monographs in this volume furnish a host of detailed information for the specialist - banker, trade negotiator, market researcher, etc. But they also help to draw a picture of the current state and evolution of the Community economy and its changing structure which is different from that provided by the aggregate data usually available. For example, macroeconomic statistics tell a dismal story of stagnation, low investment rates and stubborn unemployment. The wealth of material assembled for the first time in this volume permits a more nuanced and optimistic reading of the 1980s - and the basis for greater confidence into the future.

The statistical material commented in this chapter includes general data which complement those furnished in the sector studies. This broad picture is then refined in successive levels of disaggregation and comparison - drawing on the data of the sector monographs - to bring out the most striking patterns. Since full statistics are available either in this volume, or from Eurostat, we have sacrificed precision to readability: rounded figures are preferred to highlight changes in orders of magnitude. With the same purpose of quick readability in mind we also rely heavily on index figures. Here the reader must be warned of a possible confusion between nominal growth figures (in so-called "current ECU") on the one hand, and real growth, allowing for inflation, on the other. A benchmark figure to keep in mind is that nominal growth to an index of 165 in 1987, from a 1980 = 100 basis, equals zero real growth.

The great disadvantage of the so-called "GDP deflator" we use is that prices have risen less in manufactures than in the economy overall. There is thus a general bias in all statistical data in this volume towards underestimating growth in manufactures and towards overestimating growth in services.

Statistics may not only be misleading on technical grounds. They may also hide qualitative changes. Thus on the (macroeconomic) surface, the poor-growth, high-unemployment 1980s seem to differ from the stagnation of the 1970s only with a better record on inflation. The first indication that there is a more interesting story is the surprisingly optimistic assessment by most individual industry analysts - many of them sector federations - of the future of their respective activities, paradoxically against a background of statistics showing rising imports, stagnant production, and massive employment losses in their sector.

A simple explanation could be that these analysts are aware of the sharp improvements in 1988 which are not captured in the detailed statistics available (which mostly end with the

year 1986 or 1987). As suggested in the previous chapter, economic growth is expected to reach 3.5% in 1988. This recent improvement is also reflected in the latest Eurostat data on industrial output. The index, which stood at 107.7 in 1987 - suggesting a real annual growth of just over 1% since 1980 - had jumped to 113.4 for the first quarter of 1988, a gain almost equivalent to the previous seven years. Is this simply a "blip" in the business cycle, essentially due to macroeconomic causes, or are there perhaps structural improvements which suggest a more fundamental upturn?

The monographs indicate the second alternative. In fact, under the calm surface represented by flat statistical curves there has clearly been considerable turmoil at the level of individual industries. Rationalization and adjustment are rather broad terms used for these processes. The monographs reveal the rich diversity of responses of industry to change.

The challenges were indeed massive. Coping with macroeconomic austerity policies, large changes in exchange rates - notably the US dollar - and high interest rates would have been difficult enough by itself. Accelerating technological change, increased pressure from new competitors, de-regulation, and the prospect of substantially changed market prospects after 1992 combined to present managers and employees with daunting problems. Environmental regulation, requiring a change in product and/or production technology, is also frequently cited.

Not all their responses can be documented by statistics, but many are mentioned in the accompanying texts. Among the structural changes rarely documented by statistics but reported for most sectors - services and manufactures alike - is an apparent increase in concentration ratios. This seems to lead to a camel- rather than bell-shaped curve of distribution of turnover between few very large firms, a declining proportion of medium-sized, and a large number of small, increasingly specialized firms. At the same time, even small firms are getting larger (90 rather than 10 employees), as sophisticated and more capital-intensive technology is introduced into "cottage" industries, from brick making to paper bags or thermoplastics; and from transport to software.

Other responses not directly captured in sectoral statistics include changes in production technology (automation) and a move up-market to higher value-added activities. Such specialization can sometimes be documented by a strong absolute rise in both exports and imports, with the X/M ratio remaining stable. In other cases, some market segments are

left to imports altogether while the remaining Community production has been put on a smaller but more solid cost and quality basis to prevent further deterioration. Yet another response has been a quest for greater flexibility, of which the transfer of services inputs, from in-house staff to specialist firms, is one example. Before exploring in greater detail the changes in the Community manufacturing industries we highlight some of the main trends emerging from the monographs on services.

### Services

Services have further consolidated their position as the largest part of the Community's economy. For the seven countries for which full figures are available (Belgium, Denmark, Germany, France, Italy, Netherlands and UK), market services increased their share 44.1 to 47.7% of value added between 1980 and 1986 - a very substantial shift in such a short time. Together with non-market services (most education, administration, etc.), which interestingly enough only maintained their share at 15.7% during this period, services thus accounted for 63.4% or almost two thirds of Community value added.

**Table I**  
**Shares of Main Economic Activities in Value Added at Market Prices, 1980-87 (1)**

| (%)                    | 1980 | 1983 | 1986 |
|------------------------|------|------|------|
| Manufacturing industry | 27.6 | 25.8 | 26.3 |
| Market services        | 44.1 | 46.0 | 47.7 |
| Non-market services    | 15.6 | 16.1 | 15.7 |

(1) EC 7: Belgium, Denmark, Germany, France, Italy, Netherlands, UK. Source: Eurostat.

Market services, however, account for only 40.6% of employment (as against 21% for non-market services). When set against their much higher contribution to value-added, i.e. 47.7%, the lower employment share reflects the high productivity of market services, both relative to industry and to non-

market services - and in some cases their ability to charge high prices within regulatory frameworks which often limit competition.

Table II also reveals a rise in the share of services in total employment from 53.6 to 60%, which for such a broad structural variable must be considered a dramatic gain over such a short period.

In actual numbers total Community employment in services increased from almost 68 million to almost 76 million (1980-87). The increase of 8 million exactly matches the combined decline in industry employment from 46.7 to 40.6 million and in agriculture from 11.9 to 9.8 million during this period.

The dynamism of the services sector also appears from the figures in Table IV. Even when inflation is taken into account, the numbers are impressive.

### Externalization

Part of the growth of these activities can be directly ascribed to the externalization, by business and public agencies alike, of activities previously carried out in-house. This transfer usually improves flexibility and quality while cutting costs. But in statistical terms, it means that the "shift towards the services economy" is overstated, as is, to a lesser degree, the decline of industrial employment.

One powerful motive for externalization has been the desire for greater flexibility in staffing. This may relate to the top management level, where large corporations increasingly prefer to place a ceiling - as few as 100 for headquarters of large corporations - to prevent bureaucratic growth - with much of the legal, fiscal, accountancy, financial controlling, technical and strategic advice "farmed out" according to need.

At lower, operational levels, the motives for externalization are specialization of knowledge on the one hand - not all technical know-how can be held, even in the largest firms - and the perceived need to avoid fixed staff levels which, given Europe's strong cultural and legal bias towards job security, could prove costly in a downturn.

**Table II**  
**Employment by Main Economic Activity, 1980-87**

| (% of total) | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 |
|--------------|------|------|------|------|------|------|------|------|
| Agriculture  | 9.4  | 9.2  | 8.9  | 8.9  | 8.7  | 8.5  | 8.1  | 7.8  |
| Industry     | 36.9 | 36.0 | 35.2 | 34.3 | 33.5 | 32.8 | 32.5 | 32.1 |
| Services     | 53.6 | 54.8 | 55.9 | 56.8 | 57.8 | 58.7 | 59.5 | 60.0 |

Source: Eurostat.

**Table III**  
**Employment by Main Economic Activities, 1980-87**

| (1 000)      | 1980           | 1982           | 1985           | 1987           |
|--------------|----------------|----------------|----------------|----------------|
| Agriculture  | 11 959         | 11 107         | 10 500         | 9 886          |
| Industry     | 46 729         | 43 673         | 40 737         | 40 630         |
| Services     | 67 910         | 69 373         | 72 880         | 75 905         |
| <b>Total</b> | <b>126 598</b> | <b>124 153</b> | <b>124 117</b> | <b>126 421</b> |

Source: Eurostat.

In these monographs particular attention has been paid to the lesser known segments of the services market, which largely fall under the heading of "other" services:

- contract cleaning
- express services
- management consultancy
- consulting engineers
- technical consultancies
- construction economists
- market research
- security services.

A good example of surprising progress is furnished by the unglamorous contract cleaning industry. First of all, it is large, with a turnover of some 12 billion ECU and employing two million people. Secondly, it is modern. This is reflected in increasingly sophisticated management, use of specialist products and machinery, and a general increase in professionalism which allowed productivity to rise from 100 m<sup>2</sup> per man-hour a decade ago to 230 m<sup>2</sup> (and even 500 m<sup>2</sup> in specialized markets) today. Last but not least, the industry, heavily unionized, contributes to taking a particularly vulnerable group of people (women; immigrants) out of the black economy and into regulated fiscal and social regimes.

The need for professionalism, notably as regards electronics, has also led to a transfer of many security services from in-house to specialized companies. With only 300 000 staff, the industry is estimated to achieve a turnover of 9 billion ECU - 30 000 per employee as against contract cleaning's 6 000 ECU.

Among business services in the narrow sense which have experienced rapid growth rates are advertising and market research. Development and structure of these industries are directly linked to the internationalization of markets in final products, and the completion of the internal market. One reason for growth is that competition is becoming fiercer and the stakes in success or failure of a product launch much greater. As regards structure, however, the integration of markets requires international agencies able to operate everywhere. This leads to a marked process of concentration

and internationalization. This in turn is associated with an increasing role of US firms in the cross-national part of the Community market, as these have already established the global presence needed to provide a comprehensive "international" service.

Precisely the same points can be made with regard to accountancy, business consultancy and even express (courier) services, where American businesses, able to insure both Europe-wide and worldwide coverage have an edge over most European companies. However, as some monographs point out, as labour-intensive and capital-extensive industries relying on local inputs of all kinds, most of the economic benefits of these operations remain in Europe. National companies can still defend particular niche markets.

Another sector experiencing rapid expansion, due to externalization and the need for firms to acquire unfamiliar new technologies quickly, has been engineering and technical consultants. However, the Community market is only one fifth of the American, suggesting scope for further growth. The sector is highly fragmented nationally, with exports - half of turnover for Italy, up to one third of turnover for the UK, France and Germany; one fourth for the Netherlands - going to Third World countries. Only 4% of turnover crosses intra-EC borders. Accordingly, company structures vary widely among Member States: 217 Italian firms have only slightly lower turnover than 2 800 German firms. 1992 is likely to bring substantial changes to the industry.

One service catering to the increasing need for flexibility through externalization is provided by temporary work services, a branch with annual growth rates of 20% and employing an average of about 0.4% of the labour force at any one time (2% in the Netherlands, where regulation is more liberal). Given rapid turnover, and the fact that one third find permanent employment through the initial assignment, the number of persons involved in a full year is probably well above 1% of the labour force.

**Table IV**  
**Growth of Nominal Output in Market Services by Subsector, 1980-86 (1)**

| (Billion ECU)              | 1980       | 1986         | Growth (%) |
|----------------------------|------------|--------------|------------|
| Retail and repair          | 248        | 395          | 59         |
| Hotels/restaurants         | 37         | 68           | 84         |
| Transport                  | 46         | 71           | 54         |
| Air and sea transport      | 13         | 19           | 46         |
| Transport-related services | 23         | 34           | 33         |
| Communication              | 37         | 66           | 78         |
| Finance and insurance      | 128        | 235          | 91         |
| Other market services      | 296        | 489          | 65         |
| <b>Total</b>               | <b>830</b> | <b>1 412</b> | <b>70</b>  |

(1) EC 7: Belgium, Denmark, Germany, France, Italy, Netherlands, UK. Sources: Eurostat (rounded figures), ERA.

## *IT in Services*

Many of the services sectors report the increased use of information technology as a major factor for change. In some cases this means a second order of externalization, as service industries transfer IT services to specialist units: international airline booking systems (Amadeus; Galileo), bank transfer (SWIFT). These interactive systems form part of NACE 839.3, "electronic information services", which also includes on-line data banks and videotex services. The market for these services is expected to grow to 16 billion ECU by 1990. The development of the market, particularly across Community borders, depends crucially on the success of the telecom de- and re-regulation now being attempted by the Community.

Retailing accounts for perhaps a quarter of total market services. It is another of the sectors for which structural change and rapid modernization are not reflected in output statistics (output is entirely determined by conjunctural patterns in the short term, and by income-related shifts in consumer spending patterns in the medium term). Information technology is beginning to make an impact on the sector, with computerized stock control and the increasing use of bar codes and cashless shopping on the one hand, and such innovations as tele-shopping on the other. Except for Italy, with its preference for old-fashioned neighbourhood shopping, hypermarkets are generally on the increase. So are multiple (chain) stores, reflecting a process of concentration which, in the run-up to 1992, is taking on European rather than merely national proportions.

IT is also central to wholesale and distribution, a major sector which in its largest definition accounts for one tenth of Community employment, and a slightly larger share of GDP. This indeed is a prime example of a service industry engaging increasingly in what might be called applied data processing. This extends from transport logistics and stock control (just-in-time techniques for both retail trade and industry) to overall commercial optimization for retailers, using i.a. data from EPOS (bar code scanners linked to computers). The difference between vertically integrated marketing companies and stand-alone wholesaling thus becomes blurred, contributing to the survival of independent retailers.

While retailers' need for sophisticated upstream services provides one impetus for development, externalization of the marketing function by suppliers, notably (small) machinery manufacturers, provides another impetus for wholesaling. A recent UK study suggest that 75% of new jobs "created" in the sector were in fact due to re-classification through externalization.

One of the most important "business services", in strategic terms, is the provision of software and connected services. Software development is the key to sophisticated production technology, advanced products in the informatics and tele-

informatics industry, and to the use of these products in most service industries.

The strong trend towards externalization is to be welcomed, as one-off in-house solutions to complex production problems are increasingly replaced by standardized, fault-tested, software. Production in the EC only increased two and a half times, from four to 10 billion ECU, while consumption increased over three and a half times, from 6.3 to 22.7 billion. However, the increased consumption must be welcomed as a general indicator of the speed of modernization in the Community's services and industry. Even as regards production, the EC's world share increased from 23% to 27%. With its strength in applications-specific software and the imminent revolution of software engineering - liable to increase productivity of software production by a factor of 10 - Europe is well placed to increase its share in the high value-added segment of the market. Like other service sectors, the industry structure is tending towards large (European) systems houses on the one hand, and small local service companies on the other.

## *Manufacturing Industry*

The industrial performance of the Community gives rise to two major preoccupations: competitiveness and employment. A separate chapter is devoted to technological competitiveness and the industries of the future. In this chapter, we analyse the data on industry performance furnished by the sector monographs against the general theme of employment. Nevertheless, even with this emphasis the theme of the modernization of European industry dominates much of the story of the 1980s.

The slow growth of European industry - 1% annually in real terms since 1980 - was, in fact, largely a phenomenon of the first half of the decade. Production in 1984 equalled that of 1980.

But industrial output grew by 7.3% between 1985-87. The depth of the cyclical downturn was especially pronounced in Italy (lowest index 92.5 in 1983), the Netherlands (94.3) and Germany (95.3), the latter two in 1982.

**Table V**  
**Industrial Production, 1980-87**

|      |       |
|------|-------|
| 1980 | 100.0 |
| 1981 | 98.1  |
| 1982 | 96.9  |
| 1983 | 97.8  |
| 1984 | 100.1 |
| 1985 | 103.3 |
| 1986 | 105.3 |
| 1987 | 107.4 |

Source: Eurostat.

## Industrial Employment

An absolute loss of six million jobs has pushed the share of industrial employment from 36.9% to 32.1% of total employment. As recent US experience suggests, this fall could be partially reversed in an economic upswing. It has already slowed from about one percentage point in the early 1980s to a third of that figure in the last two years.

**Table VI**  
Share of Industrial Employment in  
Total Employment, 1980-87

|      |      |
|------|------|
| 1980 | 36.9 |
| 1981 | 36.0 |
| 1982 | 35.2 |
| 1983 | 34.3 |
| 1984 | 33.5 |
| 1985 | 32.8 |
| 1986 | 32.5 |
| 1987 | 32.1 |

Source: Eurostat.

A breakdown by country reveals a non-uniform pattern. Germany, traditionally with a share of industrial employment often 10 and more percentage points higher than other Community countries, also showed the smallest decline of the major countries in this decade. The UK showed one of the steepest. In absolute figures this translated into a loss of one million and two million industrial jobs in these two countries, respectively, or half the Community's total loss of industrial employment.

Comparing these national performances it must be kept in mind that the rapid fall in the share of industrial employment

**Table VII**  
Evolution of the Share of Industrial Employment in  
Total Employment

| (%)            | 1980 | 1987 |
|----------------|------|------|
| Belgium        | 33.6 | 28.3 |
| Denmark        | 28.6 | 26.1 |
| Germany        | 43.2 | 39.7 |
| Greece         | 28.7 | 26.6 |
| Spain          | 34.8 | 31.4 |
| France         | 35.0 | 30.1 |
| Ireland        | 32.1 | 27.8 |
| Italy          | 36.9 | 31.7 |
| Luxembourg     | 38.0 | 32.4 |
| Netherlands    | 30.8 | 26.6 |
| Portugal       | 35.3 | 34.7 |
| United Kingdom | 37.2 | 29.8 |

Source: Eurostat.

**Table VIII**  
Evolution of Industrial Labour Force

| (Millions) (1) | 1980 | 1987 |
|----------------|------|------|
| Belgium        | 1.3  | 1.1  |
| Denmark        | 0.7  | 0.7  |
| Germany        | 11.4 | 10.3 |
| Greece         | 1.0  | 1.0  |
| Spain          | 4.2  | 3.7  |
| France         | 7.7  | 6.5  |
| Ireland        | 0.4  | 0.3  |
| Italy          | 7.7  | 6.7  |
| Luxembourg     | 0.1  | 0.1  |
| Netherlands    | 1.6  | 1.4  |
| Portugal       | 1.4  | 1.5  |
| United Kingdom | 9.4  | 7.5  |

(1) Rounded figures.

Source: Eurostat.

may reflect both good news - productivity increases and structural adjustment to a modern service economy - and bad news, i.e. a sluggish economy.

The pattern of job losses across seven Member States is shown in Table IX.

With few exceptions, the sectors cluster around the average of 15% employment losses. Steel (-30%) shows a massive, because delayed, adjustment. Some of the best performers - chemicals, paper and board, and rubber and plastics - are highly efficient process industries which are least affected by the new automated production technologies now becoming common in the more labour-intensive and engineering industries. Office machinery and informatics perform well because of sector-specific growth.

## Investment

Macroeconomic explanations for this massive decline in industrial employment - especially when set against an increase in such employment in the USA - stress above all distorted relative factor prices: labour costs are assumed to be too high, leading to a substitution of labour by machines. The monographs partially confirm this view; but they also suggest that labour saving is inherently linked to a change in production technology and to a shift in the composition of output in Community manufacturing.

One of the most widely cited and discouraging figures refers to Europe's poor investment record, rendered worse by the declining marginal efficiency of capital (growth of output divided by share of gross investment in output). For the four large Community countries the figures are set out in Table X.

The cyclical element reflected in the doubling of growth in European investment during the second period is confirmed

**Table IX**  
**Evolution of Employment by Industrial Sector (1)**

| (1 000)                               | 1980          | 1986          | Change        | (%)        |
|---------------------------------------|---------------|---------------|---------------|------------|
| Industrial and agricultural machinery | 3 220         | 2 730         | -490          | -15        |
| Office machines and informatics       | 760           | 720           | -40           | -5         |
| Textiles/leather/clothing             | 3 860         | 3 140         | -720          | -19        |
| Ores and metals                       | 1 320         | 920           | -400          | -30        |
| Non-metallic minerals                 | 1 500         | 1 310         | -190          | -13        |
| Chemical products                     | 1 750         | 1 590         | -160          | -9         |
| Metal products                        | 3 000         | 2 500         | -500          | -17        |
| Electrical equipment                  | 2 940         | 2 590         | -350          | -12        |
| Means of transport                    | 3 000         | 2 490         | -510          | -17        |
| Food, drink, tobacco                  | 2 990         | 2 660         | -330          | -11        |
| Paper and board                       | 1 900         | 1 750         | -150          | -8         |
| Rubber and plastics                   | 1 100         | 1 030         | -70           | -6         |
| Other industrial products             | 2 030         | 1 730         | -300          | -15        |
| <b>Total industrial products</b>      | <b>29 340</b> | <b>25 080</b> | <b>-4 260</b> | <b>-15</b> |

(1) EC 7: Belgium, Denmark, Germany, France, Italy, Netherlands, UK.  
Sources: Eurostat, ERA calculations.

by Eurostat indexes for the EC 12 (and a forecast further growth in investment of 7% in 1988, the highest for two decades). The second row in Table XI shows the extent to which these changes are explained by what happened in manufactures.

The really worrying figures, however, are provided by evidence of a fall in the marginal efficiency of capital of the four major European countries, while that of Japan is still rising. The implication is that for every ECU invested Europe is gaining an ever smaller increase in final output.

### *The Hidden Revolution*

The explanation cited earlier - that much investment merely serves to displace expensive labour rather than creating output - has rather negative implications. It suggests that the share of wages and benefits must come down further if employment is to go up. This would worsen income distribution - with all the social conflict potential this implies - and depress mass purchasing power and hence, ultimately, investment.

**Table X**  
**Comparative Growth in Fixed Asset Investment**

|               | 1982-84 | 1984-86 |
|---------------|---------|---------|
| United States | 26.0    | 11.0    |
| Japan         | 14.5    | 20.0    |
| EC 4 (1)      | 5.0     | 10.0    |

(1) Germany, France, Italy, United Kingdom.

Source: calculated from OECD national accounts, 1982-86, in Malcolm Salter, "Europe's New Industrial Revolution", European Affairs, Vol. 2, No 3, 1988, p. 107.

The sector monographs suggest an additional explanation for why investment might be associated with static output figures in the short term - an explanation which offers less dismal prospects for European industry and its employees.

Essentially this explanation suggests that manufacturing investment in the 1980s served to improve the quality of final output and to change its composition in response to both intra-EC and world competition. Actually, this investment did indeed yield higher output; but the same increased trade competition which provided the incentive for investment did not allow the consequent "higher value" of production to be translated into higher prices. This price effect thus gives an exaggerated impression of stagnating output and a poor return on capital investment.

Progress in this reading, statistically speaking, is "wasted" in consumer rent - the enjoyment of better products from do-

**Table XI**  
**Volume Change in Gross Fixed Capital Formation**

|      | Economy | Manufactures |
|------|---------|--------------|
| 1980 | 100.0   | 100.0        |
| 1981 | 95.3    | 90.7         |
| 1982 | 93.8    | 83.1         |
| 1983 | 94.0    | 81.8         |
| 1984 | 96.1    | 99.1         |
| 1985 | 96.3    | 101.6        |
| 1986 | 99.3    | 105.2        |
| 1987 | 103.0   | N/A          |
| 1988 | 106.3   | N/A          |

Source: Eurostat.

**Table XII**  
**Marginal Efficiency of Investment for Selected Countries**

|                | 1974-79 | 1980-84 |
|----------------|---------|---------|
| United States  | 13.7    | 11.5    |
| Japan          | 11.4    | 13.7    |
| Germany        | 11.3    | 6.1     |
| France         | 13.4    | 7.5     |
| Italy          | 13.0    | 10.4    |
| United Kingdom | 7.3     | 7.2     |

Source: Salter, op. cit., p. 108.

mestic suppliers and cheaper products from foreign suppliers - rather than expressed in higher output values and higher (monetary) incomes.

This is because statistics do not adequately reflect changes in the composition of output, since such changes often occur at the individual product level: the products stay identical in definitional terms. High-tech sportswear still equals shirts, etc.; water-based paints, although a major advance, do not change classification; numerical machine tools are, statistically speaking, indistinguishable from their more primitive predecessors.

An exception is provided by "metal products", an 136 billion ECU industry at the centre of "traditional" industry. Here the quality shift shows up in the discrepancy between an estimated 7% fall in volume as against a 33% (nominal) rise in value - and a 46% increase in investment.

Among the dozens of "traditional" industries undergoing unspectacular but nevertheless important changes in output described in the monographs one can cite, almost at random, industrial handling equipment ("fork-lift trucks") - from all-purpose vehicles to sophisticated warehouse management equipment; medical dressings, developing high-tech composites to maintain market share against imports; and the packaging industry, again partially by introducing composites and low-weight/high-strength versions of traditional products.

Change in the composition of output towards higher quality engenders labour-saving investment for several reasons. First - assuming that (more) lower-value equivalents are imported, a move up-market tends to reduce unit volume of domestic production: fewer, but more highly skilled, people are needed to produce a given value of output. Metal products, cited earlier, are an example.

Secondly, and much more importantly, high-quality output under today's technological conditions requires a degree of precision and uniform quality of a kind which can only be assured by machines; workers would be replaced irrespective of wage levels. This view shifts the responsibility for employment generation back to macroeconomic manage-

**Table XIII**  
**EC Trade Balance in Industrial Goods**

| (Billion ECU) | Imports | Exports | Balance |
|---------------|---------|---------|---------|
| 1981 (EC 10)  | 262     | 244     | + 18    |
| 1987 (EC 12)  | 297     | 293     | -4      |

Source: Eurostat, rounded figures.

**Table XIV**  
**EC Trade Balance in Manufactured Goods**

| (Billion ECU) | Imports | Exports | Balance |
|---------------|---------|---------|---------|
| 1981 (EC 10)  | 171     | 236     | + 65    |
| 1987 (EC 12)  | 252     | 289     | + 37    |

Source: Eurostat, rounded figures.

ment, including the assurance of domestic and global purchasing power.

Whatever the merits of this interpretation of the data provided, the perception of many of our industry analysts that a double modernization crisis - regarding both costs and quality - is well on the way to being mastered explains more than anything else their confidence regarding the future noted in the introduction.

### *Trade Performance*

One touchstone of industrial success is its international competitiveness measured by the trade balance. The Community is broadly in balance as regards industrial products and has

**Table XV**  
**Manufactures Imports from and Exports to Asian Newly Industrializing Countries**

| (Billion ECU)           | 1980       | 1987        | Change       |
|-------------------------|------------|-------------|--------------|
| <b>Imports from:</b>    |            |             |              |
| Hong-Kong               | 3.2        | 5.3         | +2.1         |
| Taiwan                  | 1.8        | 6.1         | +4.3         |
| South Korea             | 1.7        | 5.5         | +3.8         |
| Singapore               | 0.9        | 2.0         | +1.1         |
| <b>Total Asian NICs</b> | <b>7.6</b> | <b>18.9</b> | <b>+11.3</b> |
| <b>Exports to:</b>      |            |             |              |
| Hong-Kong               | 1.8        | 3.9         | +2.1         |
| Taiwan                  | 0.7        | 2.8         | +2.1         |
| South Korea             | 0.8        | 2.8         | +2.0         |
| Singapore               | 1.4        | 2.7         | +1.3         |
| <b>Total Asian NICs</b> | <b>4.7</b> | <b>12.2</b> | <b>+7.5</b>  |
| Trade balance           | -2.9       | -6.7        | -3.8         |

Sources: Eurostat, ERA calculations.

**Table XVI**  
**Extra-EC Imports and Exports by Branch, Evolution since 1980**

| <b>(Index 1980=100)</b>            | <b>1982</b> | <b>1985</b> | <b>1987</b> | <b>1987 value<br/>(billion ECU)</b> |
|------------------------------------|-------------|-------------|-------------|-------------------------------------|
| <b>Processed foodstuffs</b>        |             |             |             |                                     |
| Imports                            | 119         | 155         | 127         | 12.9                                |
| Exports                            | 136         | 183         | 159         | 13.2                                |
| Intra-EC trade                     | 131         | 185         | 209         | 22.3                                |
| <b>Chemicals</b>                   |             |             |             |                                     |
| Imports                            | 126         | 203         | 185         | 19.7                                |
| Exports                            | 118         | 187         | 160         | 32.0                                |
| Intra-EC trade                     | 128         | 197         | 206         | 44.9                                |
| <b>Plastics</b>                    |             |             |             |                                     |
| Imports                            | 118         | 186         | 184         | 8.3                                 |
| Exports                            | 115         | 178         | 157         | 14.1                                |
| Intra-EC trade                     | 120         | 186         | 219         | 29.6                                |
| <b>Leather</b>                     |             |             |             |                                     |
| Imports                            | 99          | 146         | 150         | 5.9                                 |
| Exports                            | 119         | 211         | 216         | 3.9                                 |
| Intra-EC trade                     | 144         | 210         | 234         | 5.2                                 |
| <b>Paper and board</b>             |             |             |             |                                     |
| Imports                            | 123         | 175         | 180         | 14.6                                |
| Exports                            | 125         | 220         | 216         | 7.2                                 |
| Intra-EC trade                     | 125         | 187         | 234         | 15.1                                |
| <b>Textiles</b>                    |             |             |             |                                     |
| Imports                            | 113         | 165         | 165         | 25.8                                |
| Exports                            | 124         | 204         | 186         | 19.3                                |
| Intra-EC trade                     | 120         | 170         | 201         | 35.9                                |
| <b>Footwear</b>                    |             |             |             |                                     |
| Imports                            | 116         | 181         | 173         | 2.8                                 |
| Exports                            | 143         | 271         | 216         | 3.6                                 |
| Intra-EC trade                     | 119         | 151         | 201         | 5.6                                 |
| <b>Glass, ceramics</b>             |             |             |             |                                     |
| Imports                            | 112         | 162         | 145         | 2.3                                 |
| Exports                            | 122         | 186         | 164         | 6.5                                 |
| Intra-EC trade                     | 108         | 143         | 183         | 9.3                                 |
| <b>Machinery</b>                   |             |             |             |                                     |
| Imports                            | 135         | 226         | 236         | 60.5                                |
| Exports                            | 128         | 171         | 155         | 85.8                                |
| Intra-EC trade                     | 119         | 189         | 232         | 91.1                                |
| <b>Transport equipment</b>         |             |             |             |                                     |
| Imports                            | 129         | 202         | 190         | 19.5                                |
| Exports                            | 139         | 181         | 159         | 43.8                                |
| Intra-EC trade                     | 135         | 172         | 239         | 64.9                                |
| <b>Audio/video/photo equipment</b> |             |             |             |                                     |
| Imports                            | 141         | 215         | 232         | 18.2                                |
| Exports                            | 139         | 222         | 207         | 14.6                                |
| Intra-EC trade                     | 124         | 202         | 252         | 16.7                                |

Source: Eurostat (rounded figures).

halved its surplus in manufactures as such since 1981 (largely owing to the accession of Spain and Portugal).

The deterioration occurred in spite of an increase in manufacturing surplus with the US from about 7 billion ECU in 1980 to 17 billion ECU in 1987, and of a constant surplus with the EFTA countries at around 15 billion ECU. But the Japanese surplus increased from around 8 billion ECU to 23 billion ECU - despite a tripling of Community manufacturing exports to Japan.

Although the four dynamic Asian NICs may pose problems for individual sectors, the overall trade problem they represent is not at all of the same order of magnitude: they added an extra 3.8 billion ECU to their trade surplus in manufactures, as against Japan's additional 15 billion ECU.

A much more telling picture of what happened to manufacturing industry in the 1980s is furnished by Table XVI. (Unfortunately, aggregate trade statistics are still only available in the outdated NIMEXE categories.) First, as a minor point, the table shows the extent of the export boom of the mid-1980s, as domestic recession and the over-valued US dollar combined to push up the level of exports. For all but one of the sectors cited, the 1985 indices for extra-Community exports are higher than those of 1987.

Above all, the indices reveal the extent of international specialization taking place, with both imports and exports rising much faster than nominal output (which shows indices between 140 and 160). Since trade statistics are published in NIMEXE, and production in NACE codes, the categories do not always match completely.

Interestingly enough - and a confirmation of the specialization thesis - Community exports rose faster than imports in such "troubled" sectors as leather, footwear, and textiles.

The most impressive indices, however, are those related to intra-Community trade. With one minor exception, nominal values have doubled since 1980, with several indices above 230. Apart from suggesting that European manufacturing industry is well on its way to 1992, these figures must have translated into a substantial increase in competition.

The information furnished by the sector and sub-sector monographs, although incomplete on this point, makes it possible to pinpoint some particularly strong performers as regards intra-Community trade (see Table XVII).

It is above all this evidence of sharply increased trade which gives plausibility to our thesis that "real" growth has been much higher than suggested. For irrespective of whether the increase occurred in extra- or intra-Community trade, the heightened competition must have depressed prices, and hence output as expressed in (monetary) value terms. Moreover, this trade adjustment took place in conditions of near-

**Table XVII**  
**Sectors with High Indices for**  
**Intra-Community Trade Growth**

| (1980=100)          | 1987 index |
|---------------------|------------|
| Medical disposables | 267        |
| Audio-video/photo   | 252        |
| Pharmaceuticals     | 242        |
| Batteries etc.      | (1) 241    |
| Paper and board     | 234        |
| Wire and cables     | 234        |
| Leather             | 227        |
| Transport equipment | 230        |
| Plastics            | 222        |

(1) 1986.

Sources: Sector monographs, Eurostat.

recession and widespread overcapacity, further depressing prices.

The difference between nominal and real value can be illustrated by an admittedly extreme example: computers. Output of office machines and data processing equipment has grown at an annual rate of 16.5%. But growth of computing capacity, expressed in "bytes installed", has recently been growing at nearer 20% a quarter. At the same time, unit prices have actually declined in many cases.

Moreover, as far as investment goods are concerned, the "true" value in terms of increased output efficiency of the new generation of equipment installed in the 1980s may only appear with a lag. Not only does it take years to match software and organization with the inherent capacity of electronically controlled equipment, i.e. to move from CAM to CIM, but the products themselves need to be redesigned to make full use of the new technologies. If this is correct, the "marginal productivity of capital" should show a marked improvement in the run-up to 1992.

### *Adjustment or Contraction?*

Again, the detailed evidence provided by the monographs reveals a more differentiated picture.

One large group of industries can be described as follows:

- stagnating (index 165) or falling production
- exports increase as fast or faster than imports; but
- domestic market share decreases (suggesting both specialization and a greater pressure on prices and profits)
- above average employment decline due to automation.

The performance of the machine tool industry is disappointing, especially when the nominal output growth of 45% is set

**Table XVIII**  
**Competitiveness and Employment in Selected Moderate Growth Sectors**

| (Index 1980=100)       | 1987<br>Production | Imports | Exports | X/M 1980 | X/M 1987 | Change in<br>employment<br>(%) |
|------------------------|--------------------|---------|---------|----------|----------|--------------------------------|
| Machine tools          | 145                | 166     | 122     | 2.7      | 2.0      | -21                            |
| Textile machinery (1)  | 125                | 197     | 169     | 3.8      | 3.3      | -26                            |
| Furniture              | 113                | 191     | 217     | N/A      | N/A      | -16                            |
| Metal packaging        | 166                | 160     | 230     | 3.6      | 1.4      | -22                            |
| Leather finishing      | 168                | 180     | 257     | 0.9      | 1.3      | -9                             |
| Electrical engineering | 163                | 229     | 173     | 1.4      | 1.0      | -33                            |
| Liquid pumps           | 117                | 139     | 120     | 3.7      | 3.2      | (2)                            |
| Clothing               | 135                | 161     | 243     | 0.5      | 0.7      | -13                            |
| Woodworking            | 114                | 118     | 191     | 0.4      | 0.6      | N/A                            |
| Glass                  | 116                | N/A     | N/A     | 0.9      | 1.6      | -22                            |
| Consumer electronics   | 149                | 190     | 182     | 0.2      | 0.2      | -21                            |
| Metal products         | 138                | 185     | 129     | 2.9      | 2.1      | -27                            |
| Paper converting       | 136                | 173     | 193     | 1.2      | 1.4      | -16                            |

(1) All data for 1980-86.

(2) Substantial, non-quantified, fall reported.

Sources: Eurostat, sector monographs, ERA.

against an increase in consumption of 61%. This is partially due to the French and British industries not shifting quickly enough to numerically controlled tools. While intra-EC trade increased faster than output (by 60% nominally), extra EC-imports increased by 66%. Competition is even more threatening in the Community's export markets, with Japan, Taiwan, and to a lesser extent, South Korea likely to cut further into the Community's lead in world markets. However, the growing sophistication of production techniques, with computer-integrated systems solutions requiring close cooperation with the customer, will lead to a regionalization of world trade in this kind of capital goods.

Another capital goods sector, textile machinery, which exports 70% of production, combines particularly dismal output figures with great confidence in the future. Having invested heavily in R&D, the move towards computer-integrated manufacturing of textiles is likely to reinforce its world leadership (the EC accounts for 55% of world production). At the same time, by reducing the relative importance of labour costs, this technology will shift some demand (i.e. textile production) back to the Community.

The liquid pumps industry, with a 1987 output of some 3.8 billion ECU, also illustrates particularly well the paradox of poor output figures and a relatively optimistic outlook. While real output declined by some 18% in the period, there has been growth of 3.6% in value terms since 1984 (when production had dropped by 30% from 1980 levels). During this period, production automation became standard for the industry; and technological product innovations, like the use of plastic components and sophisticated variable speed con-

trols, were introduced. Further rationalization of this sector dominated by medium-sized companies is expected, with the prospect of 1992 and the need for a strong R&D base arguing for cross-European link-ups.

A very similar case is provided by the glass industry. Although output had dropped by 18% in real terms by 1986 and imports of cheap glass from Eastern Europe had continued to increase, the export/import ratio improved. Technological innovations both in production and in products - optronics, thermal glass, etc. - have been substantial. The industry outlook is optimistic.

Although its industry structure (20 000 firms!) greatly differs from that of the glass industry, woodworking has had a very similar experience. With an annual output valued at 19 billion ECU (glass 16 billion), it also experienced a sharp contraction in the early 1980s through a combination of cyclical causes, including demand from the building sector, and structural factors, notably substitution from new materials. Like glass (containers), the sector is now set to benefit from its inherent environmental advantages. It has continued to invest and to rationalize production and now reports shortages of skilled labour as a constraint on healthy growth. Even by 1990, however, output will still be 20% below the 1980 level.

Another substantial industry, paper and board converting (ranging from newsprint to packaging), with a turnover of 28 billion ECU, shows few signs of change. R&D expenditure is a low 1% of turnover and small, traditionally equipped SMEs predominate. Employment losses (-16%) have only matched output losses (real index at 85 in 1986).

**Table XIX**  
**Competitiveness and Employment in Information Technology**

| (Index 1980=100)                           | 1987<br>Production | Imports | Exports | X/M 1980 | X/M 1987 | Change in<br>employment (%) |
|--|--------------------|---------|---------|----------|----------|-----------------------------|
| Office machinery/data processing equipment | 215                | 312     | 325     | 0.6      | 0.6      | +9                          |
| Electronic components (1)                  | 191                | 225     | 177     | 1.4      | 1.1      | N/A                         |

(1) 1986.

Sources: Sectoral monographs, ERA.

Electrical and electronic engineering is perhaps the single most strategic industrial sector in the present phase of industrial development, since it includes not only electricity generation, power transmission, etc., but also telecommunications, electronics for the automobile sector, control equipment of factory automation, etc. For a leading high-tech sector it showed relatively lacklustre growth (real index 113 in 1987, only twice the modest average growth rate of industry) and trade performance. On the other hand, restructuring has been massive, notably as regards ownership patterns (the further consolidation of Euro-multinationals); and gross investment has more than doubled since 1980. Forecasts are for a steady 3.5% annual growth, with only a small further encroachment by imports. Given the size of the sector - 182 billion ECU produced by 2.3 million people - the accuracy of this forecast has a bearing on the future of Community industry as a whole.

The picture looks somewhat different for the information technology sectors as such (Table XIX).

These sectors are more extensively covered in the following chapter on emerging industries.

The general pattern of a relative decline of medium-sized firms in favour of multinationals and small niche companies is only partially confirmed by the electronic engineering industry. While 90% of the firms in the sector have 200 or fewer employees - accounting for 20% of Community output - and large European multinationals dominate in certain sectors,

firms employing between 1 000 and 10 000 employees continue to make an above-average contribution to output.

Another group of industries has clearly been damaged by imports, in that production has fallen continuously in real terms, with imports taking up any increases in demand.

Although, surprisingly, complete figures on trade are not available, the shoe industry, with a 40% import penetration, is clearly struggling. The value of imports rose by 11% annually until 1986. In 1987 the rise was 67%. The good news is that the industry is continuing to invest, especially in Italy.

Man-made fibres have not only seen domestic growth of demand taken up by imports, they also suffer from the fact that their customer, the textile industry, faces stiff import competition. Anti-dumping duties for direct imports and measures to restrict textiles trade under the Multifibre Arrangement both provide relief to the industry. Investments, while doubling in the 1980s, remain at a modest 3% of turnover and serve above all to further reduce and rationalize capacity.

Textiles are a peculiar case. The export/import ratio actually improved for EC 10 to 0.86, and for EC 12, including the large producing countries Spain and Portugal, it was close to 1.

Nevertheless, this position - and relatively moderate employment losses - could only be held owing to the Multifibre Arrangement limiting, above all, Asian imports. Surges of very low-priced imports, such as from Eastern Europe in

**Table XX**  
**Competitiveness and Employment in Import-Sensitive Sectors**

| (Index 1980=100)    | 1987<br>Production | Imports      | Exports | X/M 1980 | X/M 1987 | Change in<br>employment (%) |
|---------------------|--------------------|--------------|---------|----------|----------|-----------------------------|
| Toys                | 120                | 179          | 163     | 0.5      | 0.4      | -40                         |
| White goods (1)     | 133                | 229          | 148     | 3.0      | 1.9      | -23                         |
| Footwear            | 138                | (2) over 230 | N/A     | 0.6      | 0.3      | -10                         |
| Man-made fibres (3) | 127                | 160          | 104     | 2.2      | 1.4      | -32                         |

(1) 1986.

(2) Estimated.

(3) Series from 1981 = 100 to 1986.

Sources: Sectoral monographs, ERA.

**Table XXI**  
**Competitiveness and Employment in Wires and Cables**

| (Index 1980=100) | 1987<br>Production | Imports | Exports | X/M 1980 | X/M 1987 | Change in<br>employment (%) |
|------------------|--------------------|---------|---------|----------|----------|-----------------------------|
| Wires and cables | 139                | 293     | 111     | 4.4      | 1.7      | N/A                         |

Sources: Sector monographs, ERA.

1987, do, however, periodically depress profits: consumption grew by 1.4% in value while imports grew by 22% in tonnage. The industry has responded by intense process and product innovation.

Clothing (see data in Table XVIII) is generally thought of as being under greater trade pressure than textiles. This is true for some items, like anoraks, where imports account for 67% of consumption. Overall, however, extra-Community imports accounted for only 9.6% of consumption in 1986, while the export/import ratio narrowed from 0.45 to 0.68. Employment - over one million people - has fallen by only 13%, below the average for manufacturing industry. However, since 1987, for which full figures were not available, the weak dollar has again clouded prospects for the industry.

Consumer electronics, for which basic data are cited in Table XVIII, has a much higher import penetration rate than any other manufacturing sector: almost half the Community's consumption is supplied, essentially, by Asia. Accordingly, Community production amounted to a relatively modest 12 billion ECU - the size of the thermoplastics or the ceramic goods industries for example, or one tenth of the metal working industries.

While in the current situation the benefits to consumers clearly outweigh the damage to producer interests of the high import ratio, the increasing importance of the sector as a

market for key high-tech intermediary products, notably semiconductors, is changing its strategic importance. The introduction of a European system of high definition television (HDTV) is therefore considered crucial for the fate of European consumer electronics in the 1990s.

Other industries, while still growing and indeed maintaining a world lead, are not fully exploiting the dynamism of world or domestic consumption. An example are power cables, where Europe supplies 39% of world production but faces competition not least from import-substituting policies in developing countries. As a highly automated process industry, the industry has chosen to defend its competitiveness through R&D, confirming its technological lead in such areas as effective insulation and fire safety.

Industries where employment has fallen least, or even increased, typically face little international and indeed intra-Community competition. These are among the sectors where substantial changes can be expected after 1992.

Similar industries (for which full statistics are not available) include electric switching equipment. The Community market is fragmented (procurement) with as yet little intra-trade. Employment is relatively high.

At the opposite end of the spectrum we have "emerging industries" in the narrow sense, i.e. "high tech" activities carried out by "cottage industries". One of these is fibre-reinforced (thermo) plastics (NACE 483), an 11 billion ECU industry with an average company turnover of under 4 million, a 10% growth rate, and an increase in employment from 56 000 to 70 000. The move towards more large-scale production, requiring larger firms is, however, under way.

One group of industries where one would expect the worst employment performance is those which were hit by a cyclical shift in demand while experiencing strong internal and external competition. However, one of the examples, the furniture industry, only matched employment losses (16%) with the decline in output (16.2%). In an inherently labour-intensive industry, the move towards specialization, reflected in sharp increases in both imports and exports, required proportionally more skilled labour inputs despite reported automation in the industry.

**Table XXII**  
**Competitiveness and Employment in Selected Sheltered or World-competitive Sectors**

| (Index 1980=100)                | 1987<br>Production | Imports/<br>production<br>(%) | Change in<br>employment<br>(%) |
|---------------------------------|--------------------|-------------------------------|--------------------------------|
| Printing (1)                    | 151                | 3.3                           | (2) +0                         |
| Pharmaceuticals                 | 195                | 8.3                           | +5                             |
| Dressing and<br>medical devices | 212                | 2.8                           | +5                             |
| Soap and detergents (1)         | 149                | 1.5                           | -7                             |
| All chemicals                   | 133                | 8.8                           | -1                             |

(1) 1986.

(2) Time series in the sector monograph not on uniform country basis.

Sources: Sector monographs, ERA.

**Table XXIII**  
**Cycle-sensitive Sectors with Strong Competition/Rationalization**  
**1987 Indexes**

| (Index 1980=100)        | (1) Production | Production | Import | Export | Change in employment (%) |
|-------------------------|----------------|------------|--------|--------|--------------------------|
| Steel tubes             | N/A            | 103        | 139.0  | 64.0   | -41                      |
| Shipbuilding and repair | (2) 54         | N/A        | N/A    | N/A    | -53                      |
| Steel                   | 86             | 138        | 113    | 130    | (3) -42                  |
| Bricks and tiles (4)    | N/A            | 104        | N/A    | N/A    | -36                      |
| Oil refining            | (5) 82         | N/A        | (6)    | N/A    | -20                      |

(1) Constant value.

(2) 1982 = 100, production in tonnage index, not value.

(3) EC 10, excluding Spain and Portugal.

(4) 1986.

(5) Tonnage index.

(6) Net imports trebled to 14% of consumption.

Source: Sector monographs, ERA calculations.

In shipbuilding, the term "imports" is of course meaningless. In terms of new orders, the Community did in fact hold on to its share in a declining world market of around 20% since 1982, while Japan dropped from 50% to 32% in this period, mostly in favour of South Korea (increase from 9% to 20% of new orders). While new orders in 1987 stood at a level 18% below 1982, production was down 46% and employment 53%. With a workforce of 139 000, this is now a small segment of the Community economy.

Steel represents a special case. Competition is largely an intra-Community phenomenon, with a structural shift in demand, coupled with government intervention, leading to severe overcapacity (since 1975). Reducing this capacity was as much a political task, undertaken by the Community, as a managerial and social challenge for the industry. The process is not yet completed.

As regards brick and tile making ("clay products"), the downturn in the building industry and the continued move towards modern production methods reduced the number of firms in the Community by one third, to just over 2 000. With volume expansion unlikely, the sector is forced to grow through higher quality products. It is noteworthy that this modernization effort is taking place even without the pressure of intra-Community or external competition.

In oil refining, employment losses merely matched production cutbacks, suggesting that technical efficiency was already optimal.

### *Automobiles*

One sector which does not fit into any of the categories is motor vehicle production. First, there is the sheer size of the industry - almost one tenth of industrial value-added and employment. It consumes intermediate products from a wide

variety of key industries, from steel to glass, textiles, rubber, plastics, electrical and electronic equipment. It is the prime customer (and occasionally producer) of the most advanced automated production equipment.

Although it shares some of the recent history of Community manufacturing, notably productivity increases of over 30% in the period, and a massive introduction of automation and other innovations in the organization of production, its situation is different from most other sectors. Basically, it is more successful than most in the present, but faces the future with greater trepidation.

The success, apart from real growth of around 20% in the period, can be gauged above all from profitability. After losing a total of about 3 billion ECU in the years 1981-85, profits rose to 2.3 billion ECU in 1986 and provisional estimates for 1987 are 7 billion ECU.

The fears for the future primarily relate to foreign trade. One part of this concerns possible imports from the United States, above all from Japanese-owned plants, as one way to reduce the massive US external debt. The second relates to Japanese exports, especially after 1992 when previous national import quotas in the UK, France, Spain, and Italy will be removed. These are the fastest growing markets in the Community. The third fear relates to Japanese production in Europe, adding capacity and competitive pressures likely again to depress profit levels.

Meanwhile, the structural adjustment of European industry is paralysed by the presence of six almost equal volume producers (VW, FIAT, PSA, Ford, GM and Renault), with "Japan" as a seventh, all with a market share of 10-14% each. It is clear that major private and public policy decisions need to be made regarding this sector, with major implications for Community manufacturing and international trade.

## EC MEMBER STATES ' SHARES IN TOTAL EC POPULATION, GDP AND MANUFACTURED PRODUCTS (1985)

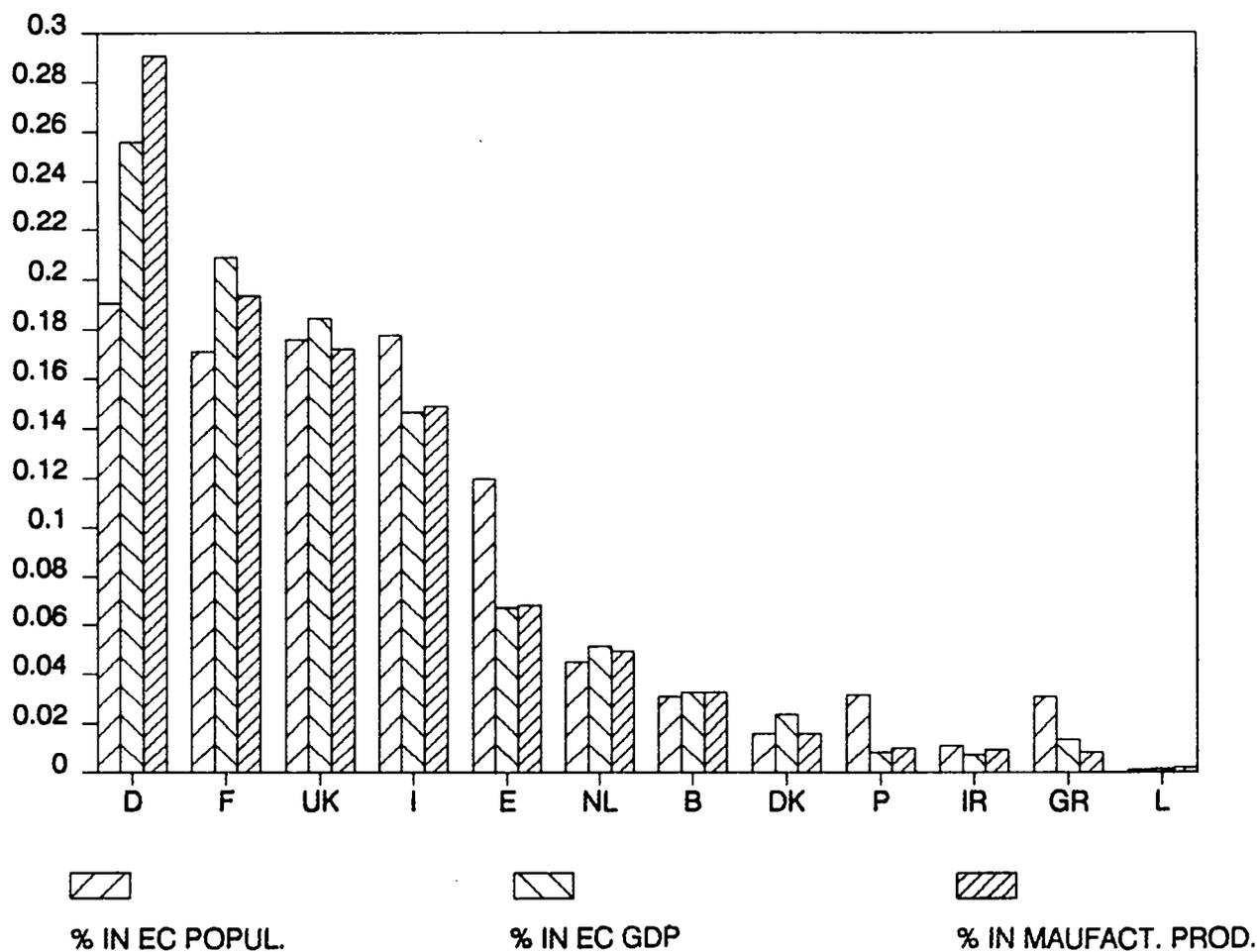


Chart 1

### *Intra-EC Specialization*

Until quite recently there was a tendency for industry structures of different Member States to converge: countries which had entered the post-war era without significant chemical or electrical engineering industries acquired them; aerospace industries were developed in almost every Member State, etc. Within Member States, however, i.e. within areas where both goods and factor markets function, regional specialization is pronounced: areas producing machinery, textiles, furniture, aerospace products or services can be identified. It would thus be a sign of maturity of Community

economic integration if specialization among Member States were on the increase.

Lack of data and space does not permit a systematic exploration of this question here. We merely point to two or three striking examples of increased specialization in the 1980s, with Germany and the Mediterranean countries as the main protagonists.

As Chart 1 indicates, the share of individual Member States in total manufacturing output of the EC corresponds to their share in overall GDP. Major exceptions are Germany, with an above-average share, matched by below-average shares in

France and the UK. (The Italian column is misleading, since real GDP is underestimated.)

While Germany's overall position in manufactures differs significantly, differences in engineering are much more dramatic. One of the most striking instances of specialization is Germany's dominance in the machine tool industry. It accounts for 54% of the Community's output, as against 18.6% for Italy, 11.5% for the UK, and 8.7% for France.

Moreover, intra-Community specialization in machine tools increased sharply in the 1980s. While production in Germany grew by almost 10% in real terms, it fell in France and the Netherlands by nearly one third and in the UK by a quarter. However, real output rose by an impressive 40% in Spain, to reach 75% of the French output. As regards the UK and France, direct investment from other European countries as well as from the US and Japan is now improving the situation.

Germany also accounts for half of fluid power equipment - a component of production equipment from mining to machine tools and transport.

In view of the importance of public procurement in parts of the sector, France and the UK hold surprisingly small shares in one of the largest capital goods industries, electrical and electronic engineering.

### *The Mediterranean Industries*

The shoe industry is above all a Mediterranean industry. The four Mediterranean countries account for 64.5% of EC production, France for another 14%. Germany, with some 7%, represents the reverse side of this specialization. Italy's dominance (41%) is likely to increase, since its up-market products and sophisticated markets will stand up to Asian competition better than many others.

The leather tanning and finishing industry is even more concentrated in the Mediterranean area: 90% of production is located there. Italy alone accounts for 77% of EC firms, if not production. Specialization in this direction is still continuing, as all Mediterranean countries have increased production in the context of an overall decline in Community production. Environmental regulation is one factor; the presence of downstream industries (shoes; bags) is another; low wages are a third.

Stone working, a 5 billion ECU industry with almost 1 billion in exports, is also largely concentrated in Italy. The sector employs 43 000 people in that country, as against 9 500 in France, 6 000 in Germany, and 3 500 in Belgium.

**Table XXIV**  
**Shares in Electrical Engineering by**  
**Member State, 1987**

|                | (%)  |
|----------------|------|
| Belgium        | 2.3  |
| Denmark        | 1.2  |
| Germany        | 39.5 |
| Greece         | 0.4  |
| Spain          | 5.8  |
| France         | 14.8 |
| Ireland        | 0.5  |
| Italy          | 10.9 |
| Luxembourg     | 0.1  |
| Netherlands    | 5.8  |
| United Kingdom | 18.2 |

Sources: Orgalime, Eurostat.

### *Other Examples*

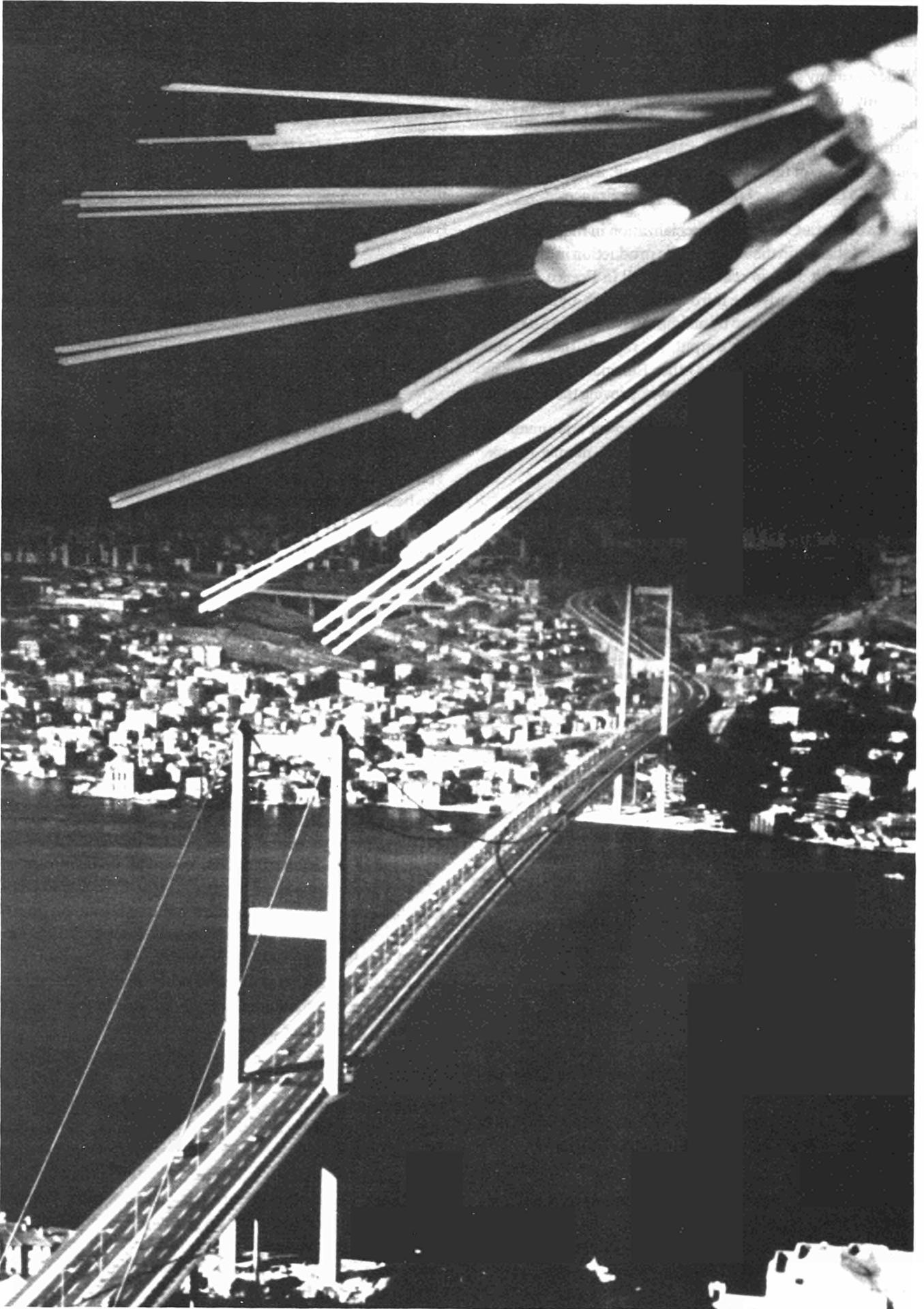
The importance of market pull in the location of industry can also be seen in the case of heat insulation products (rock wool etc.), where Denmark accounts for 15% of Community production, 10 times its "normal" share, not least owing to the most stringent regulatory requirements for house insulation.

Climatic conditions, and the demand they create, may also account for the specialization of Italy (55% of Community production) and Spain (20%) in the ceramic tile industry.

On the other hand, demand patterns seem to be swamped by supply factors as regards agricultural machinery: Germany's share of Community production (minus Spain) is 42%, well above such important agricultural producers as France (15%), and Italy (11%).

While the UK tends to have shares of industrial activity at or below its share in GDP, in the service industries it has an outstanding position. Thus employment in insurance is 327 000, around one third higher than the French and German figures; and UK companies write substantially more insurance abroad than those of other Member States. On the other hand, on productivity measured by premiums per employee, the UK ranks below other major Community countries and the Community average; and Danish insurers do almost three times as well.

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# EMERGING INDUSTRIES

## ECONOMIC GROWTH AND TECHNOLOGICAL CHANGE

The sluggish worldwide growth of the last 15 years masks the extent of recent changes in production structures. The third technological revolution is already well underway, even in Europe, where the growth of economic activity since the beginning of the decade has been slower than in other regions. Annual GDP growth in the 12 EC countries was 1.6% between 1979 and 1987, compared with 2.1% in the United States, 3.7% in Japan and 2.5% for the world as a whole. In the words of Bertrand Gille, a new technological system is gradually being set up in the difficult phase of transition we are currently going through. Some observers see in the current upswing signs that it is already bringing to an end the long period of low growth (see Figure 1).

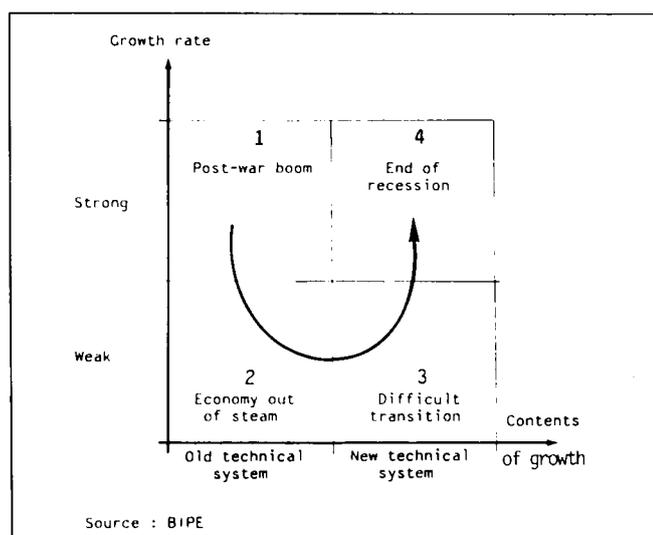


Figure 1

This report covers the set of activities that make up the new technological system, or the emerging industries. This term includes new products, such as optical fibres, new production technologies, and the new informatics-based infrastructure and services linking its complex elements. The concept of "emerging industries" encompasses much more than the OECD's definition of high-tech industries which only covers those having a ratio of R&D spending to production value of more than 4%. Besides information technology, including telematics and automation, it encompasses new materials, biotechnology and energy.

## The Contents of the Emerging Industries

### *Information Technology*

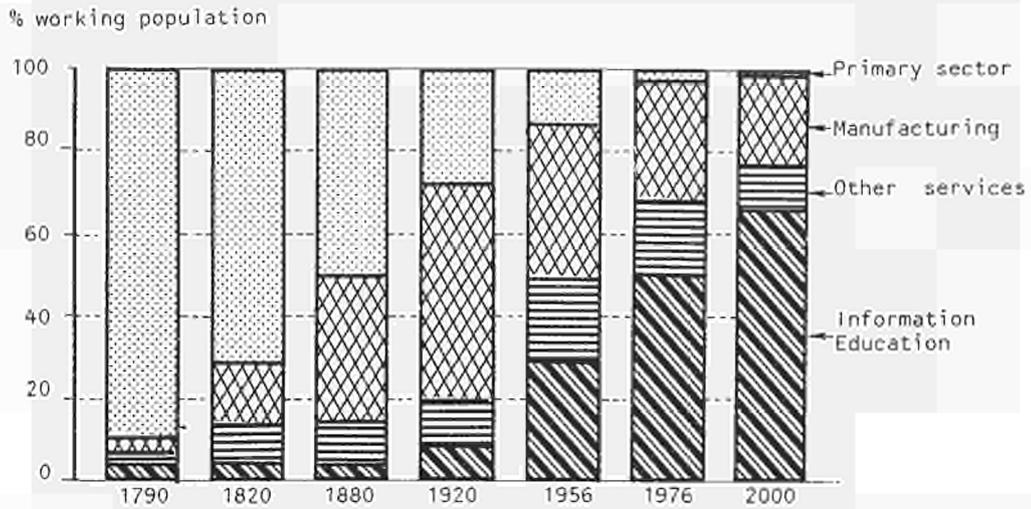
Information technology is at the core of the emerging industries, in manufacturing (with electronic and optoelectronic components), in the equipment industries (with computers, consumer electronic goods, telecommunications equipment, office automation, and computer-aided and computer-integrated manufacturing, including robots). Moreover, it is transforming traditional services as well as creating new ones based on information - its collection, analysis and transmission.

The combination of the telephone and the computer has given rise to a new field: telematics. The dovetailing of computer and telephone technology is such that researchers at AT&T and IBM are today working on the same problems. The spread of computer-integrated manufacturing, of office automation and, in the near future, digital high-definition television also illustrates this convergence of technologies for producing, storing, processing, transporting and communicating information. The success of these technologies, however, is not solely the result of trends in supply; it can also be put down to an explosion in demand. For example, over the past fifty years, the store of scientific knowledge has doubled every five years. This growth rate has been estimated from the volume of scientific publications that come out each year. The need to organize, select, process and spread information in our increasingly complex society is, therefore, growing rapidly. In the United States, more than half of the working population is working with information and this proportion is expected to rise to two thirds towards the year 2000 (see Graph 1).

Nevertheless, progress in this vast set of information technologies has been patchy. At the supply end of the field, miniaturization of components is continuing with up to two million transistors being placed on a one-square-centimetre chip. When the limits of silicon technology have been reached, the development of superconductors, optronics and even biochips will probably make it possible to extend present limits even further.

Vast strides have been made in the field of equipment as well. The new micro-computers are achieving the same performance levels in terms of speed as the business computers of the mid-1970s which cost several millions of dollars. Ac-

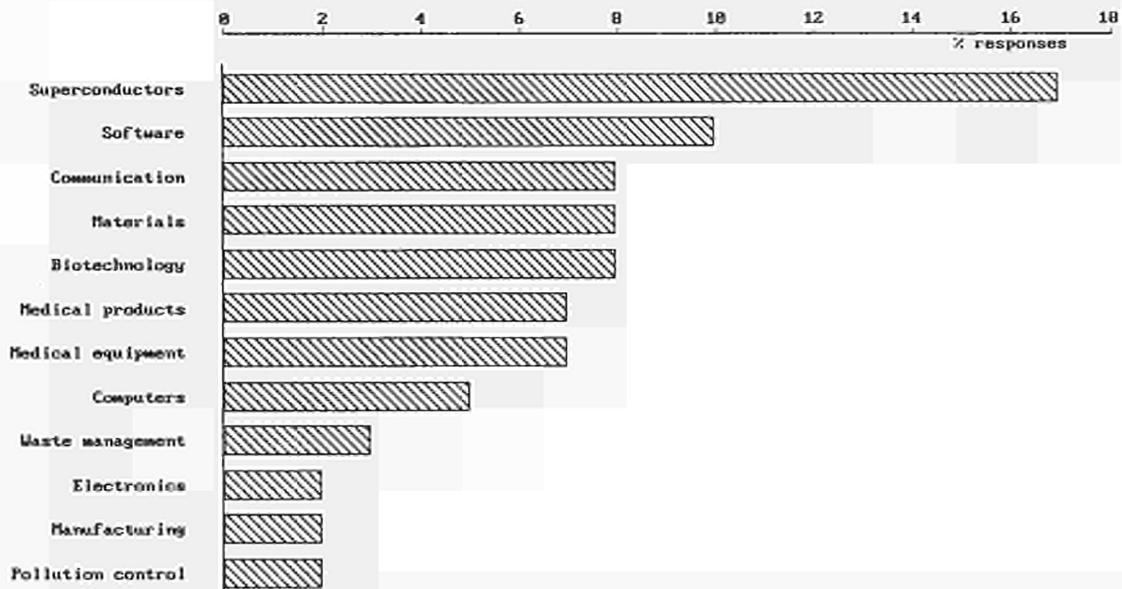
### BREAKDOWN OF THE US WORKING POPULATION BY TYPE OF ACTIVITY



Source : M.I.T. - J. BAAL-SCHEM (IEEE Technology and Society Magazine - December 1985)

Graph 1

### FIELDS OF PARTICULAR INTEREST TO AMERICAN VENTURE CAPITAL FIRMS IN 1988\*



\* The most frequently mentioned sectors from a selection of 40. Poll of 200 American venture capital firms conducted by High Technology Business Research - March 1988.

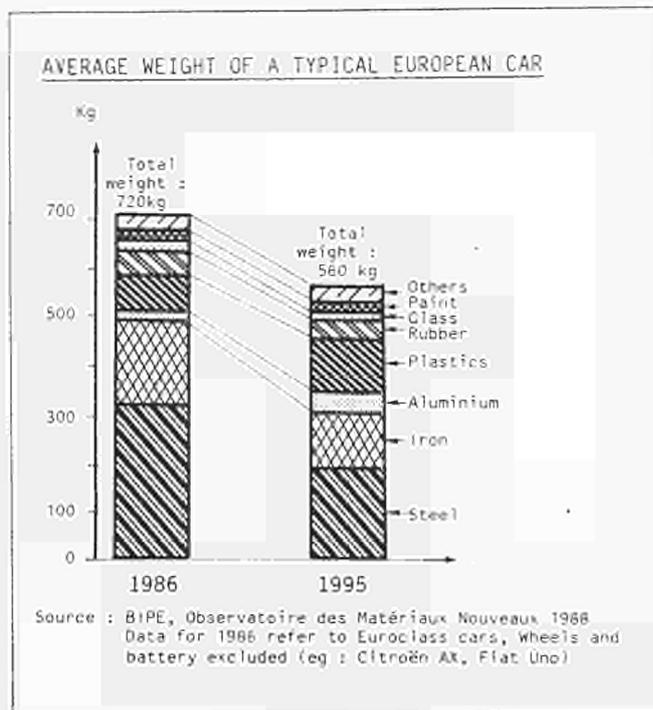
Graph 2

According to Kenett Flamm (*Targeting the Computer*, 1987, Brookings Institution), technological progress in information is running at about 20% per year. This breaks down as 10% lower prices for the same performance and 10% more performance for the same prices. If a notion of worldwide computer capacity is defined as including the combined processing and storage capacity of computers and peripherals, then this worldwide capacity has increased by a factor of three or four every five years.

At the user end of the information technology field, the need for services, whether in software or in consulting activities, is growing at about the same pace as worldwide computer capacity. The recent development of spreadsheet software, new programming languages such as ADA, and achievements in software engineering such as artificial intelligence provide proof of sweeping technological advances in the field of information technology. However, there is a consensus amongst professionals that overall productivity in the software industry cannot grow very quickly. According to David Parnas, a Canadian information sciences professor, as quoted by Cap Gemini Sogeti, "software development is difficult because there are very few reusable patterns in the job of designing software". This raises the question of whether the growing needs for software development will become the bottleneck blocking the advance of information technology and, more generally, the new technological system.

### New Materials

The important role of new materials including superconductors in the emerging industries is widely recognized today, as



Graph 3

can be seen by the pattern of venture capital investment in the United States (see Graph 2).

The development of new materials is taking place in two large categories of products. On the one hand, there are the materials which have been developed in the high-tech industries, such as technical ceramics or high-performance composites. These materials are trying to make their way into the mass

Table I

### WORLD MARKET FOR NEW MATERIALS

|  | 1986<br>million ECU | % average annual volume<br>growth 1986 - 95 |
|--|---------------------|---|
| New steel products.....                | 50 000              | 2.3   |
| Technical thermoplastics.....          | 10 000              | 8.3   |
| Technical thermosets.....              | 15 000              | 5.5   |
| New non ferrous metals .....           | 13 000              | 3.8   |
| Composites .....                       | 12 000              | 8.8   |
| Technical ceramics.....                | 7 000               | 13.9  |
| New glass products.....                | 4 000               | 9.3   |
| Functional materials for electronics.. | 14 000              | 12.0  |
| <b>TOTAL.....</b>                      | <b>125 000</b>      | <b>6.4</b>                                  |

Source: BIPE - New Materials Outlook 1988

consumption industries, with the automobile industry being a prime target.

On the other hand, there are materials used in middle and lower-range products which have been upgraded to withstand competition from new materials. An example of this is coated sheet metal. When the weight of a car is broken down by the type of material used to build it, a trend emerges which is similar to the overall trend in demand. Graph 3 and Table I show the important role that upgraded materials play in current markets and their potential for medium-term growth.

This prominent role for upgraded materials does not mean that radically new products cannot enjoy sustained growth. It does, however, show that at the supply end of the process of technological innovation, there is a very long gap between research work and the arrival of new products on the market.

For example, many of the technical plastics which are currently undergoing rapid growth were developed during the Second World War. Similarly, the aluminium-lithium alloys that were first patented in the late 1950s will not be widely used in the aerospace industry before the early 1990s.

Research will inevitably have an edge over application; this means that there will always be an under-utilized stock of new materials. This is what Alan Toffler called a "hyperchoice" of materials. In this field, there is no technological determinism. The value of steel used in the car industry in Japan is increasing, whereas in the United States car makers have developed the use of plastics such as polyurethane because of the unimaginative policies of the steel industry.

As for the future, two scenarios have been drawn up by BETA (see the FAST report *New Materials*, 1987).

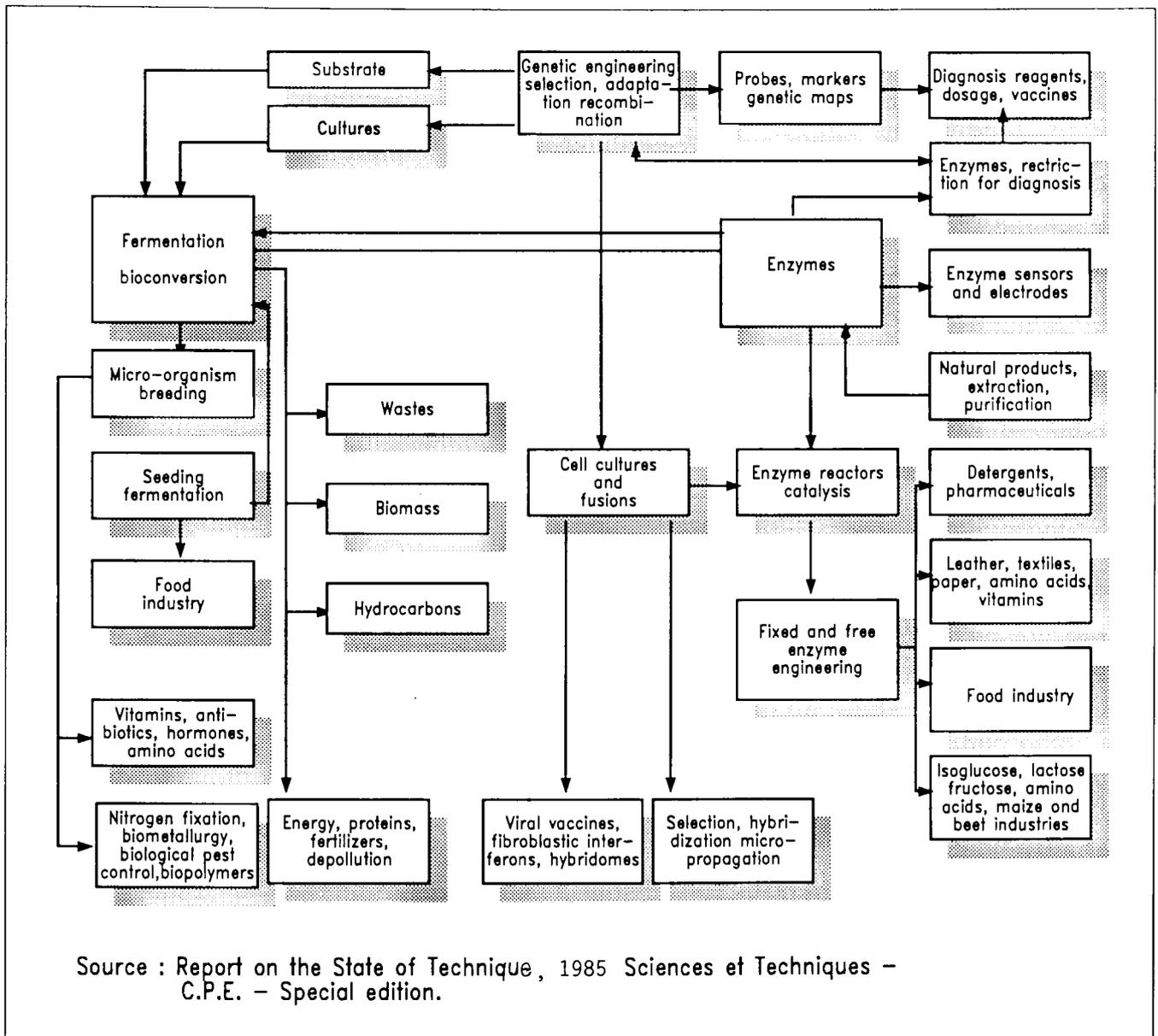


Figure 2

- According to some authorities, the growth of plastics has only just begun. They say that at the beginning of the 1980s the number of cubic metres of plastic produced outstripped the combined total of cubic metres of steel and aluminium produced. This measurement in volume rather than weight probably gives a clearer picture of the final uses to which plastics, steel and aluminium are put.
- Other observers feel that we are seeing the establishment of permanent variety featuring the development of multi-materials which associate different primary materials. These include composites, but also plastic alloys, elastomers, thermo-plastics, fibre-reinforced ceramics, plastified sheet metal, multi-layered packaging material, and so on.

### Biotechnology

Biotechnology (see Figure 2) has the potential to bring about sweeping transformations in the fields of health, the food and drink industry, chemistry, the environment, and even electronics. This potential has hardly been tapped.

The contributions of biotechnology could be:

- to shorten production processes and increase efficiency. Until 1950 it took 37 separate steps to synthesize cortisone.

Now, thanks to micro-organisms, there are only 10 steps and the cost has been divided by 300

- to speed up the development of new strains of plants. According to Dr David Paisley of the University of Illinois, the increase in the yield of corn from 1930 to 1980 was 70%. This can be attributed to a long process of genetic selection. The same improvements could now be obtained in a few years or even a few months with genetic engineering
- to develop and produce products which could not be made any other way. According to some observers, it will be possible to build computers which will imitate the operating principles of the human brain. Human neurons represent a billion components and each individual neuron operates on its own with a cycle of several milliseconds, but they also operate simultaneously with the others. Computers built with biological components could deliver vastly higher performances than current technology allows. In addition, in the near future, biotechnology holds out the only real hope of conquering cancer and AIDS.

The emergence and the development of biotechnology is an illustration of the age-old tendency to manipulate living matter with increasing mastery of its complexity. This mastery comes from having taken manipulation down to the sub-

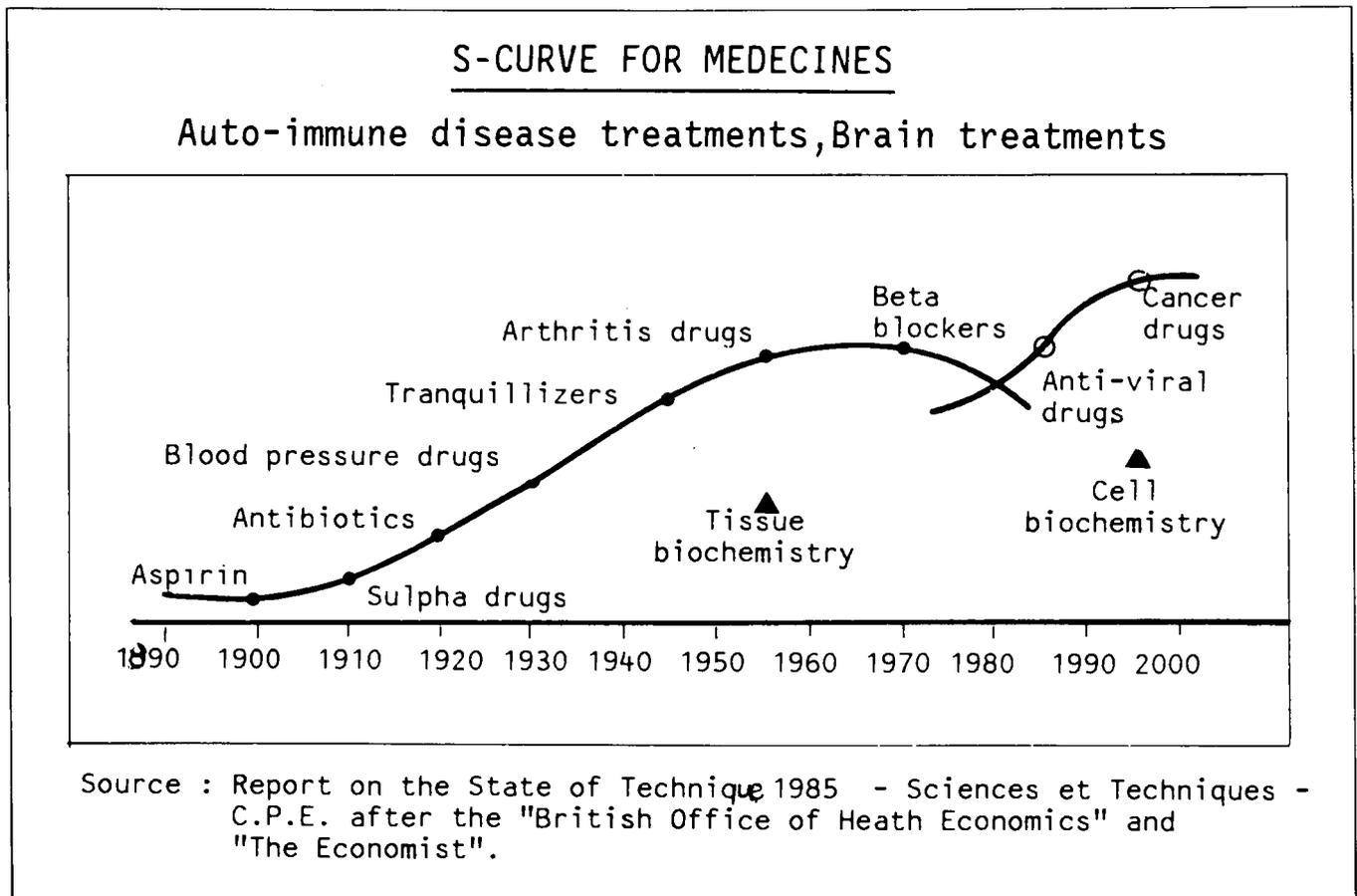


Figure 3

molecular level. According to the report on the state of technology published by the *Centre de Prospective et d'Evaluation* (CPE) and *Sciences et Techniques*, "the selection of plant strains and animal breeds in the Middle Ages was macroscopic; Pasteur's microbiology was microscopic; enzymology takes place at the molecular level; finally, genetic manipulation is now carried out at the sub-molecular level" (see Figure 3 on pharmaceutical developments).

### Energy

Energy - and the new forms of its production, transportation, storage and use - also belongs to the emerging industries, even though the basic technology may not seem to be changing as rapidly as in the previously mentioned fields, and the current surplus of energy supply over demand has made the issues less acute. However, the unexpected could still happen. Superconductors could modify the way electricity is transported and stored, hydrogen could be used to transmit energy, solar-generated electricity could be a feasible alternative for supplying isolated areas and, closer to home, substitute fuels could provide an original solution to some problems of agricultural surpluses in Europe. More importantly, the current abundance of energy will not last in the long term and growing concern for environmental protection and controlling technological risks will call for sweeping and constant changes in energy infrastructures.

Obviously, the four families of emerging industries mentioned above are not independent of each other, and it is precisely their interaction which gives rise to the emergence of a new technological system. Table II attempts to show some of these interdependent relationships. Thus, lasers which were developed from opto-electronics are used for cutting and milling metals and plastics, composites and ceramics. Com-

puter-aided design has now become an indispensable tool for making structures out of composite materials whose strength varies according to the orientation of the stress applied to them (anisotropic materials).

On the other hand, silicon and, perhaps tomorrow, gallium arsenide and, even more likely, superconductors are materials and families of materials without which improvements in components and therefore in information technology would not be conceivable.

## The Emerging Industries and Traditional Activities

There are two aspects to the emerging industries (see Figure 4).

- They create new products (goods and services) for the end demand, whether for consumers (VCRs, compact discs, high-definition TV) or for governments in major programmes (exploration and conquest of space, setting-up of new telecommunications infrastructures).
- They also contribute to the profitability of traditional activity, as is the case with computer-integrated manufacturing which should improve the competitiveness of entire manufacturing sectors such as the textiles and clothing, food, and metalworking industries. The same holds true for office automation, which has transformed the nature of many service activities. It has been demonstrated in the United States that the share of products which cannot be built without semiconductors has reached 15% of GDP. This means that semiconductors will find uses in many other fields outside the leading-edge industries which cover professional electronics and automation and which together represent only 5% of GDP.

Table II

| The Industries of the Future and the Establishment of a New Technological System |  |  |                          |  |
|--|--|--|--------------------------|--|
| From To  | Information Technology   | Materials  | Biotechnologies          | Energy   |
| Information Technology   | Telematics (computers and telecommunications)<br>Automatic component testing | Silicon<br>GaAs<br>Superconductors                             | Biosensors<br>Biochips   | Development of electric processes for the Industries of the Future |
| Materials  | Lasers for materials processing<br>CAD for anisotropic composite structures  | Carbon or ceramic fibres for high-performance composites       | Microbic leaching        | Electric fusion ovens  |
| Biotechnology  | Automatic regulation of fermentation reactions                               | Special supports for enzyme fixation                           | Enzymatical catalysis    | In vitro cell cultures   |
| Energy   | Robots for work in radioactive environments                                  | Crystalline or amorphous photo-voltaic silicon superconductors | Direct nitrogen fixation | Super nuclear generators   |

Key to Reading the Table: the table shows the interdependent relationships and cross-fertilization of the industries of the future. The development of new materials (2nd column) gives rise to advances in information technology and electronics (1st row: silicon GaAs, etc.) On the other hand, information technology in turn spurs advances in the materials industry (1st column, 2nd row).

Source: BIPE

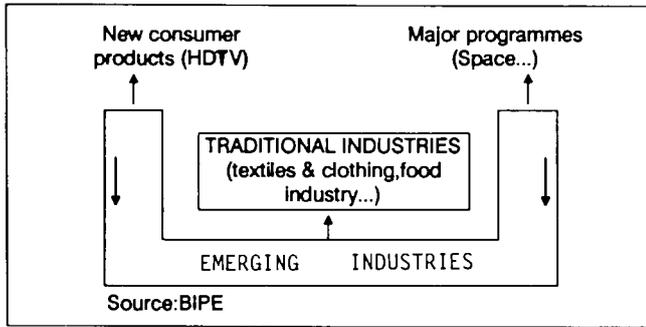


Figure 4

Even though a precise definition of the markets for the emerging industries is inevitably arbitrary, these markets can be broken down more or less as follows:

- 20% for consumption within the emerging industries themselves (e.g. electronic components for computers)
- 20% for the end consumer and government markets
- 60% for intermediate consumption and investment in traditional activity sectors.

These traditional activities are well represented in Europe, which has been the starting point for previous technological revolutions. The Community accounts for some 35% of GDP in the EC-United States-Japan triad, but in 1986 it produced 44% of the cars, 42% of the steel and 40% of the textiles and clothing produced in the same triad. Europe's stake in the emerging industries thus lies both in the creation of new poles of excellence and in the technological upgrading and improved competitiveness of its traditional industries.

But this transformation of traditional activity stemming from the introduction of new technology also causes production structures and corporate organization to change. An example of this is the automobile industry, which has been reshaped by the introduction of electronics (see Figure 5).

As a first step, specific electronic components had to be developed to operate in the difficult conditions present in a car, with high temperature and vibration levels. Some of the components that are examples of these first developments are the alternator, the regulator and transistorized ignition systems for controlling the electric energy used in a car. Other examples are the electronic dashboard instruments now seen: speedometers and clocks, gauges and tachometers. These examples of early developments are now widespread.

This movement was led mainly by parts makers. It saw the arrival of a new player in the car industry, the electronic component manufacturer, who took over some of the markets of mechanical parts makers. For example, transistors have taken the place of various mechanical elements making up the ignition system.

Even more sweeping changes can be expected in the years to come. Now that microprocessors are beginning to be used in cars, information processing capacity surpasses present requirements. This will lead to the development of new applications such as centralized alarm systems and electronic control of air conditioning, transmission, braking and suspension. It will also provide maintenance assistance and will gather and process information from outside the car which will make the car easier to drive or even help choose the best route. In the long term, a car might be designed to fit around its electronic system and multiplexing rather than around its engine, as is the case at present.

This trend will lead to a growing role for a new player: the electronics system integrator. His contribution to the value of the car will increase because of his important role as an architect. The cost of the electronics system could thus reach 15% of the cost price of the car towards the year 2000. As a comparison, on-board electronics now represent 50% of the price of a modern jet fighter.

But other changes are in view. With the design and production of navigational assistance systems for town or country driving, there will be a greater role for computer service companies and software manufacturers. The organizational set-up for carrying out major programmes within the framework of Eureka, including Carminat and especially Prometheus, is testimony to European industry's commitment to these developments.

Heavy industry for semi-finished products, including steel making, non-ferrous metals and chemicals, is directly concerned with the development of new materials. Many indica-

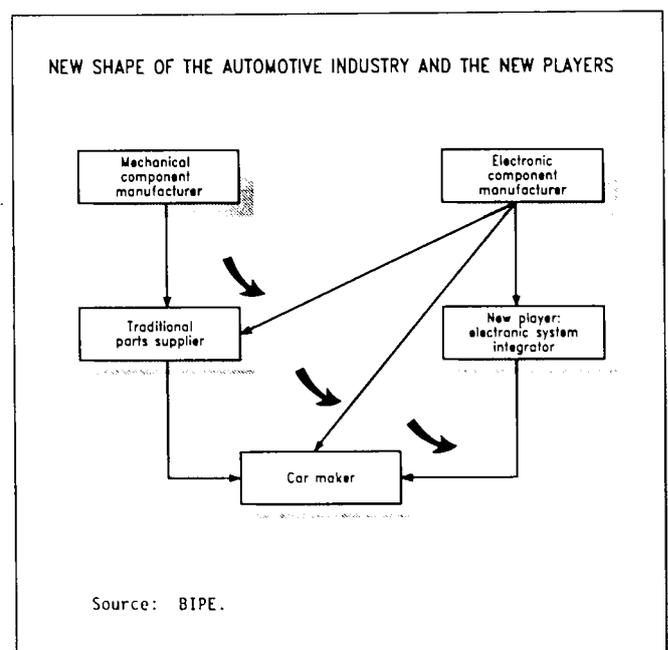


Figure 5

tors point to a scenario featuring the development of multi-materials. This will lead to synergism between trades which are presently distinct and separate.

An example of this is the firms experienced in milling silk or in texturization, who now work on the creation of composite materials. This is because the methods for processing materials used for making composites are quite close to those used in some textile industries.

On a more general level, industrial firms specializing in multi-materials could emerge, whereas today the activity of firms is still structured around the major basic tools, which are the blast furnace, the steam-cracking plant and the glass kiln. There is already evidence of such a trend. Nippon Steel and Nippon Kokan are already active in technical ceramics and composites. Dupont de Nemours is developing ceramics and steel makers are carrying out research in fields which used to be the exclusive preserve of non-ferrous metal makers. Many European chemical and glass firms are now active in composite materials.

Major changes can also be expected in the division of labour and the breakdown of added value between the different production circuits. The role played by the materials processing industry could be changed by the future trend to develop functional materials and shift to working on materials "from the inside" and less by such "macroscopic" processes as machining. Alongside classical, or rather "physical", industry, which takes matter and makes it into intermediate or semi-finished products before producing final products, a new type of service industry is gradually emerging and new relationships are developing between players (see Figure 6).

If, in the end, the user calls on an expert system to help choose the material required, the materials processor will have to spend more time on the design and calculation of structures and the producer will increase his efforts to adapt his products and sell them.

The growing role of the sales function at the sources end of the industry could be based on the use of data banks and give rise to new businesses such as consulting for users and processors. In other words, the materials industry could be expected to turn more and more towards information technology. In what is apparently a paradoxical situation, the materials industry would itself become an intermediary industry by virtue of its cost structure with lower costs for raw materials and energy.

Other traditional activity sectors will undergo sweeping changes because of new technology. In the vast communications industry (see Figure 7) there is a two-way movement:

- On the one hand, new technology could lead to the elimination of barriers to entry in the communications industry. The lower cost of new techniques for publishing and printing make it possible for small firms to enter the industry. These developments include desk-top publishing techniques.
- On the other hand, there is also a movement towards concentration and internationalization with the growth of multi-media "firms" which are active in several sectors that were formerly separate, such as the press, book publishing, music recording, cinema, radio and television. Specialization in a particular medium could give way to specialization by function in, for example, design, production or distribution. Firms could also specialize on targeting specific clienteles such as professionals or the general public. Their production could be aimed at a national audience or a European audience, local cable network audiences or specific social and professional groups.

Beyond the impact of new technology on the sectors that have just been examined, there are links between the emerging industries and traditional activity which can be seen at both the micro- and macro-economic levels. At the micro-economic level, there are many firms which have attempted to reduce overheads and lower their break-even point by farming out more and more of their business. This shift towards more subcontracting started in the early 1980s, with many firms preferring to concentrate on their main business. Even if growth increases, it is unlikely that there will be any reversal of this trend, which affects both the manufacturing industries such as the car industry and the service industries such as the management of engineering projects. At the same time, information technology has been developed as a result of new supply sources but also in order to set up new organizations inspired by the Kanban system, using zero stock and just-in-time sourcing. This technology brings several firms into play and calls for a structure including:

- more communication between partners
- compatibility between information system hardware and software

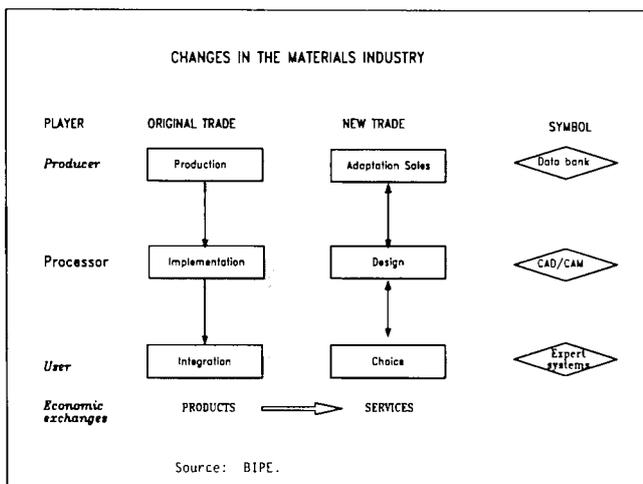


Figure 6

- long-lasting relationships between client firms and suppliers which are called for by the preceding points.

Car makers have thus reduced the number of subcontractors or suppliers they work with but now have working agreements which cover several years with their remaining suppliers. The former customer-supplier relationship is giving way gradually to a form of partnership.

The notion of an extended firm is the logical result of these trends. In the emerging industries, a large proportion of production could be expected to be carried out by these new entities which will have various outside partners revolving around a central firm, linked to each other by common contractual goals.

At the macro-economic level, the successful integration of emerging industries and traditional activity takes on vital importance. Abundant new technology is being confronted with rigid organizational, social and economic structures. If inte-

gration is not successful, the emerging industries will be reduced to turning out "show technology" for a few major projects. But if technological progress spreads successfully into traditional activity, increased productivity could make the current bright economic situation last longer and lead to an end to the low growth of the last two decades. The success of this integration depends on a happy marriage of technological and organizational innovation at both the company and the European level (see Figure 8).

## Questions for the Future

### *Faster Product Innovation?*

In some industries, such as the chemical industry, the rate of innovation seemed to slow down in the period which followed the first oil crisis (see Table III).

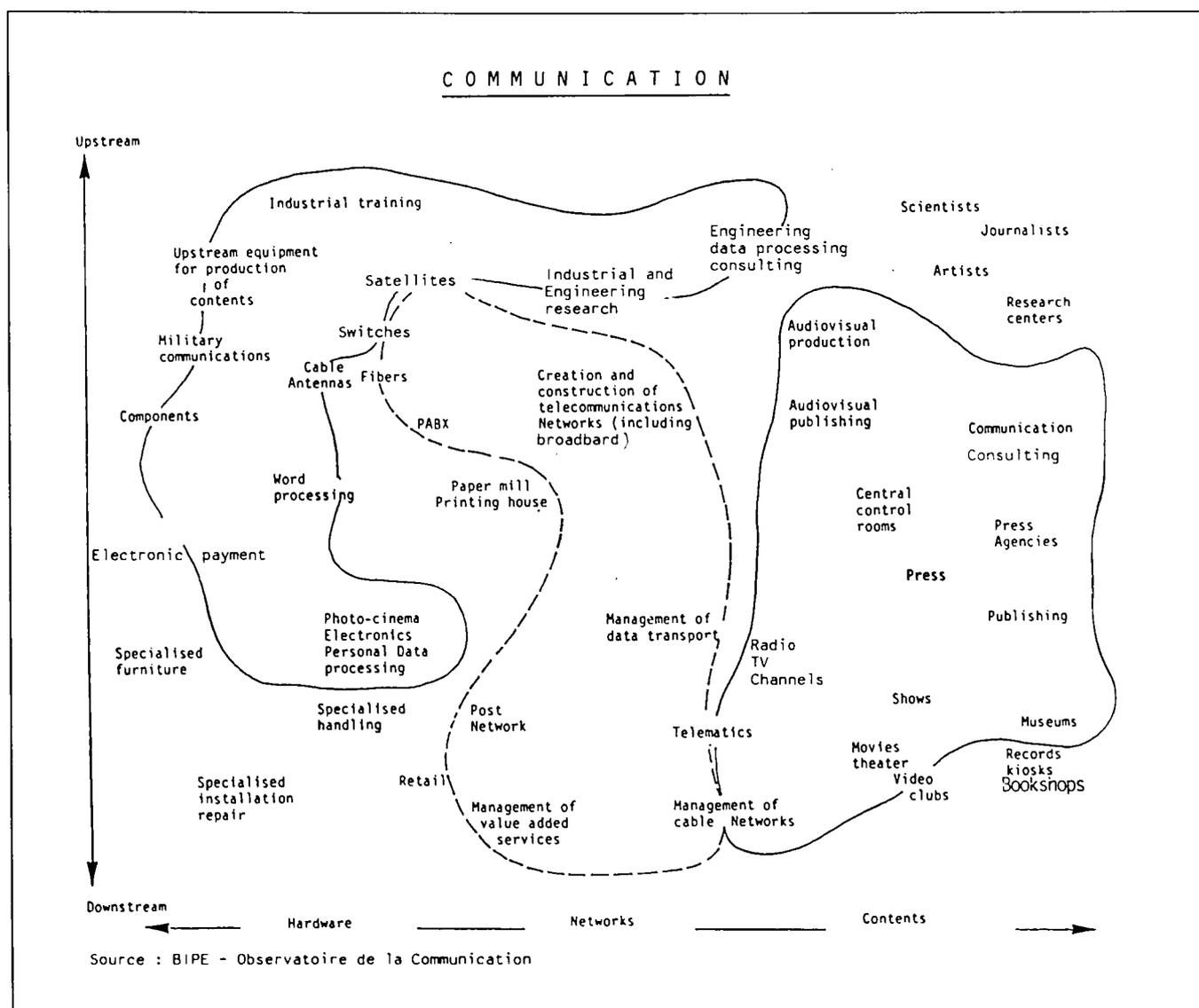
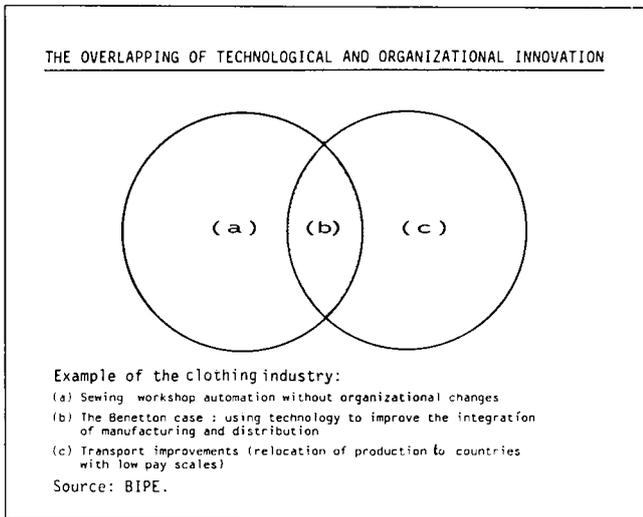
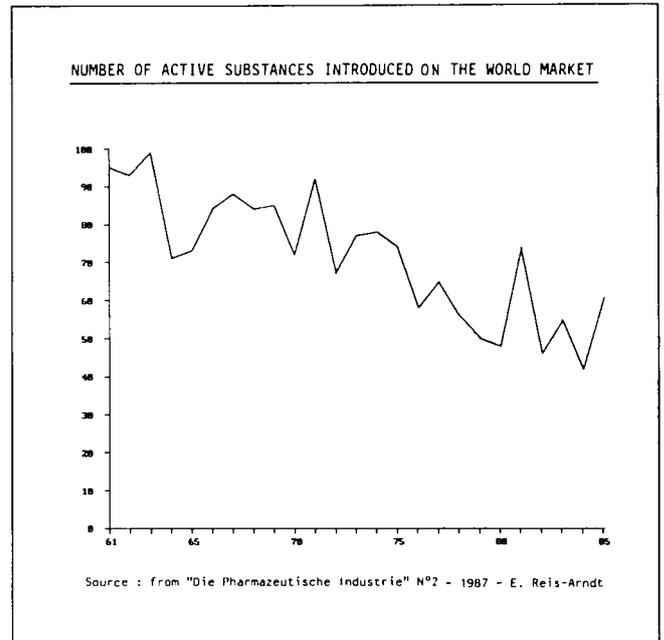


Figure 7



**Figure 8**



**Graph 4**

In the pharmaceutical industry, the number of active substances being developed into new drugs to be marketed worldwide has also slowed down. This can be attributed, according to some, to excessive screening requirements (see Graph 4).

Despite these unfavourable developments, there are indications, however slim, that the trend is being reversed. In the case of the pharmaceutical industry, biotechnology could

provide a new stimulus to the production of new substances. Some 150 pharmaceutical products made with biotechnology are currently undergoing testing around the world and it is estimated that the 20 American firms with the biggest com-

**Table III**

INTRODUCTION OF INNOVATIONS IN CHEMICAL TECHNOLOGIES

| Period  | Chemical products | Chemical processes | Equipment | Process instruments |
|---|-------------------|--------------------|-----------|---------------------|
| Rate of introduction of innovations<br>Average number per year  |                   |                    |           |                     |
| 1967-1973.....  | 322.3             | 39.0               | 105.0     | 29.6                |
| 1974-1979.....  | 39.0              | 32.3               | 54.7      | 18.2                |
| 1980-1982.....  | 64.0              | 34.7               | 101.3     | 54.0                |
| Fraction of innovations that are "radical innovations" or "major technical changes" in each period<br>Percent |                   |                    |           |                     |
| 1967-1973.....  | 0.8               | 8.1                | 6.0       | 14.5                |
| 1974-1979.....  | 0.4               | 8.0                | 0.6       | 10.1                |
| 1980-1982.....  | 0.0               | 6.7                | 1.3       | 5.6                 |

Source : Alok K. Chakrabarti "Trends in innovation and Productivity : The case of chemical and textile industries in the U.S.", paper presented at the INSEAD Conference, July 7-9, 1987.  
 Sciences & Engineering Indicators - 1987

mitment to manufacturing biodrugs could increase their sales fivefold in the next two to three years.

On a more general level, the increase of R&D budgets after the slump in the 1970s could bring about a recovery in product innovation and innovation in general. But the time lag between expenditure and first results must be taken into account. Some European pharmaceutical firms are apparently now starting to reap the benefits of earlier R&D efforts.

In the automotive industry the impact of product innovation has undoubtedly been underestimated. Technological improvements to cars such as electronic ignition and electronic injection, fuel economy, ABS systems, four-wheel drive and so on, have led to a quality effect in Europe over the last 10 years. This has meant that the value of car sales has grown by 2% a year, which is two to three times more than the growth in new car registrations.

The development of computer-aided design has made it possible to accelerate product renewal. Japan applied this strategy very early on in consumer electronics and is now extending it to most industries.

All in all, an acceleration of product innovation now looks probable. This will call for more research at the supply end and more investment at the market end, but this will not be enough. The real bottleneck is between the two and can only be broken by a greater "technological marketing" effort. This composite notion covers the development of new products

and the definition of their position on the market. Once again, this will have a huge impact on organizations because this new function has not yet made its way into corporate structures and is now split between research and marketing departments.

### *Will Environmental Considerations Become the Overriding Criteria for Selecting Innovations?*

Environmental protection is one of the explicit goals of the European Community, part of the Treaty as amended through the Single European Act. Public concern for water, forests, and the global climate is growing. This has given new importance to issues which the recession seemed to have pushed to the background.

It is likely that an increasing number of environmental markets will be open to the private sector of different Member States in future. These markets include water and waste management, air pollution control and protection of our natural environment (see Table IV).

In spite of varying public perceptions of environmental concerns between the north and the south of Europe, the harmonization of standards will largely be aligned on those countries with the strictest environmental legislation.

The trend towards privatization of local public services should also lead to a growing market for the private sector. The open-

**Table IV**

#### 1987 NATIONAL ENVIRONMENTAL PROTECTION MARKETS BY SECTOR

|                    | Air (%) | Noise (%) | Waste (%) | Water (%) | TOTAL (million ECU) |
|--------------------|---------|-----------|-----------|-----------|---------------------|
| Belgium .....      | N/A     | N/A       | N/A       | N/A       | 1 300               |
| Denmark .....      | 18.0    | 3.0       | 23.0      | 56.0      | 900                 |
| Germany .....      | 29.8    | 2.7       | 21.0      | 46.5      | 14 600              |
| Greece .....       | 17.0    | 1.0       | 32.0      | 50.0      | 200                 |
| Spain .....        | 14.0    | 2.0       | 30.0      | 54.0      | 1 200               |
| France .....       | 11.3    | 4.2       | 32.0      | 52.5      | 7 700               |
| Ireland .....      | 4.0     | 3.0       | 23.0      | 70.0      | 200                 |
| Italy .....        | 17.0    | 2.0       | 35.0      | 46.0      | 4 700               |
| Luxembourg .....   | N/A     | N/A       | N/A       | N/A       | 100                 |
| Netherlands .....  | 20.0    | 3.4       | 28.7      | 47.9      | 2 000               |
| Portugal .....     | N/A     | N/A       | N/A       | N/A       | 200                 |
| United Kingdom ... | 22.0    | 4.0       | 28.0      | 46.0      | 6 900               |
| EC 12 .....        | 21.4    | 3.3       | 27.0      | 48.3      | 40 000              |

Source : BIPE "European Environmental Markets" 1988

ing of water supply markets will lead to larger markets for each nation's industry and increased competition, even if at first glance there will be no overall increase in demand.

Environmental considerations have evolved from being considered a restraint to being regarded as a market opportunity. In Germany, for example, the "environment" label has helped the sales of many products ranging from asbestos-free construction materials to clean-running cars. Other ecological products include aerosols without chlorofluorocarbons or quiet lawn mowers. Some 2 500 products are now being sold under the "environment-friendly" label. The completion of the single market at the end of 1992 should step up this trend towards larger environmental markets by incorporating new "clean" products currently being developed by the chemical and capital goods industries.

Growing concerns about environmental protection and major technological risks seem to be the vital and long-lasting features of the coming years. Many factors make it likely that the real or supposed ecological impact of the different forms of energy will now be major criteria in the selection of energy production methods in Europe and worldwide. These

factors include public concern after the Chernobyl accident; fears of the greenhouse effect; the high cost of pollution control in some energy industries such as coal-based electricity generation which involves desulphurization and dust removal; and new technological advances such as second-generation liquid coals, high-power/high-output gas turbines, and so on.

### *What is the Outlook for the Emerging Industries?*

Technological progress is not enough to determine the shape of the emerging industries. Several scenarios can be foreseen depending on whether the corporate structures can adapt to new technology, or whether product innovation fulfils a real need. In order to sketch out possible future developments, BIPE drew up three long-term scenarios for the publication of the 1988 edition of its revolving medium-term forecasts. These scenarios are presented in Table V.

In the scenario of lasting crisis, the United States will continue to weaken, but neither Japan nor the Community nor any other power will be able to establish a rate of growth

**Table V**

### THREE CRISIS SCENARIOS

| Criteria \ Scenarios       | LASTING CRISIS  | FRAGMENTATION   | END OF CRISIS   |
|----------------------------|---|---|---|
| VALUES AND LIFESTYLES      | No social consensus<br>Self-centred consumption (self-image security)                             | Solidarity (e.g. European social security system)<br>Collective responses to the crisis             | New enterprise ethics<br>Innovative labour-saving products for consumers    |
| TECHNOLOGY                 | High tech confined to captive markets (defence)<br>Product innovation limited to showy technology | Technological duality<br>Relocation of ordinary manufacturing within each bloc                      | New technology for traditional industries<br>New generations of products    |
| GEOGRAPHY AND INSTITUTIONS | Phasing out of individual States.<br>Growing imbalances in cities and between town and country    | Stronger States and supra-States within each bloc (USA, Europe, Japan, and SE-Asia)                 | Japanese-American model spreads to all the world's major cities             |
| GROWTH                     | Patchy and weak (1.5% in Europe). Worsening of the situation in most developing countries         | Steady but slow (2.5% in Europe). Developing countries are reintegrated in the economy of each bloc | Rapid (4% in Europe) with strong but uneven growth for developing countries |

Source: BIPE.

strong enough to put it into the world leadership position. National policy-makers will be unable to overcome growing imbalances between a few great cities and the rest of their countries. The cities will be hothouses where new lifestyles and methods of production will develop - not without tension. Growth will be very weak, reaching only 1.5% a year in Europe. It will also be very patchy. New technology and, more generally, the emerging industries will be restricted to a few narrow fields of application such as defence and major projects.

The scenario of fragmentation in the world economy features the organization of three large economic zones which will be under the control of the United States, Japan and the Community, respectively. There will still be great instability in the relations between the blocs, but there will be a new international division of labour within each. High-technology industries will thrive in the most advanced countries and certain traditional industries will migrate to less advanced countries. In the case of the textile and clothing industry one can see a good example of this trend, with design being carried out in Europe and manufacturing in other areas such as North Africa and Turkey.

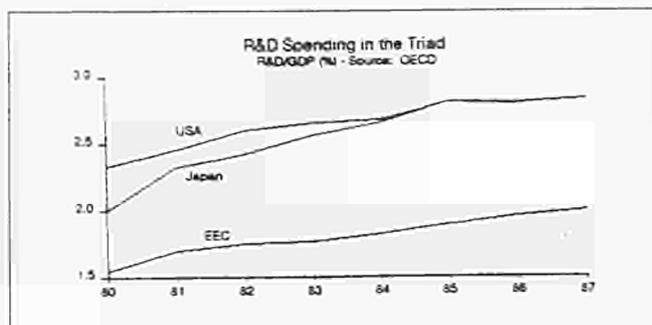
Another feature of this scenario is a new social consensus established by both States and supra-States (Europe) with regular but modest growth reaching 2.5% in Europe. The fragmentation scenario allows for the development of European industry, especially in new technology, capital goods and communications.

The third scenario calls for an end to the crisis. This will be brought about by intensive growth. The scenario calls for a Japanese-American condominium which will bring forth a new pattern of development in which Japan contributes its capacity for technical innovation and organization and the United States its political and military might. This model, and the new business ethic which underlies it, will become widespread especially throughout the major metropolitan areas. The emerging industries will undergo strong growth with high-tech business, revitalization of traditional industry through technology, and new services linked to the implementation of a society which is largely based on the production and use of information. Growth will accelerate to reach 4% p.a. in Europe.

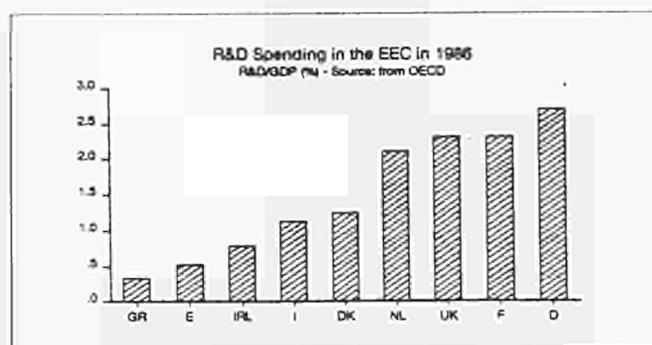
## The Situation in the EC

### Overview

Even though the emerging industries cannot be restricted merely to technology-intensive activities, an assessment of R&D efforts (the ratio of internal R&D spending to GDP) none the less gives a good indication of the comparative development of these industries within the EC-USA-Japan triad.



Graph 5



Graph 6

In spite of significant growth in R&D efforts since the beginning of the decade, there is still a big quantitative gap between the Community on the one hand and the United States and Japan on the other. Moreover, Community R&D efforts are highly concentrated, with three Member States - Germany, France and the UK - accounting for more than 80%.

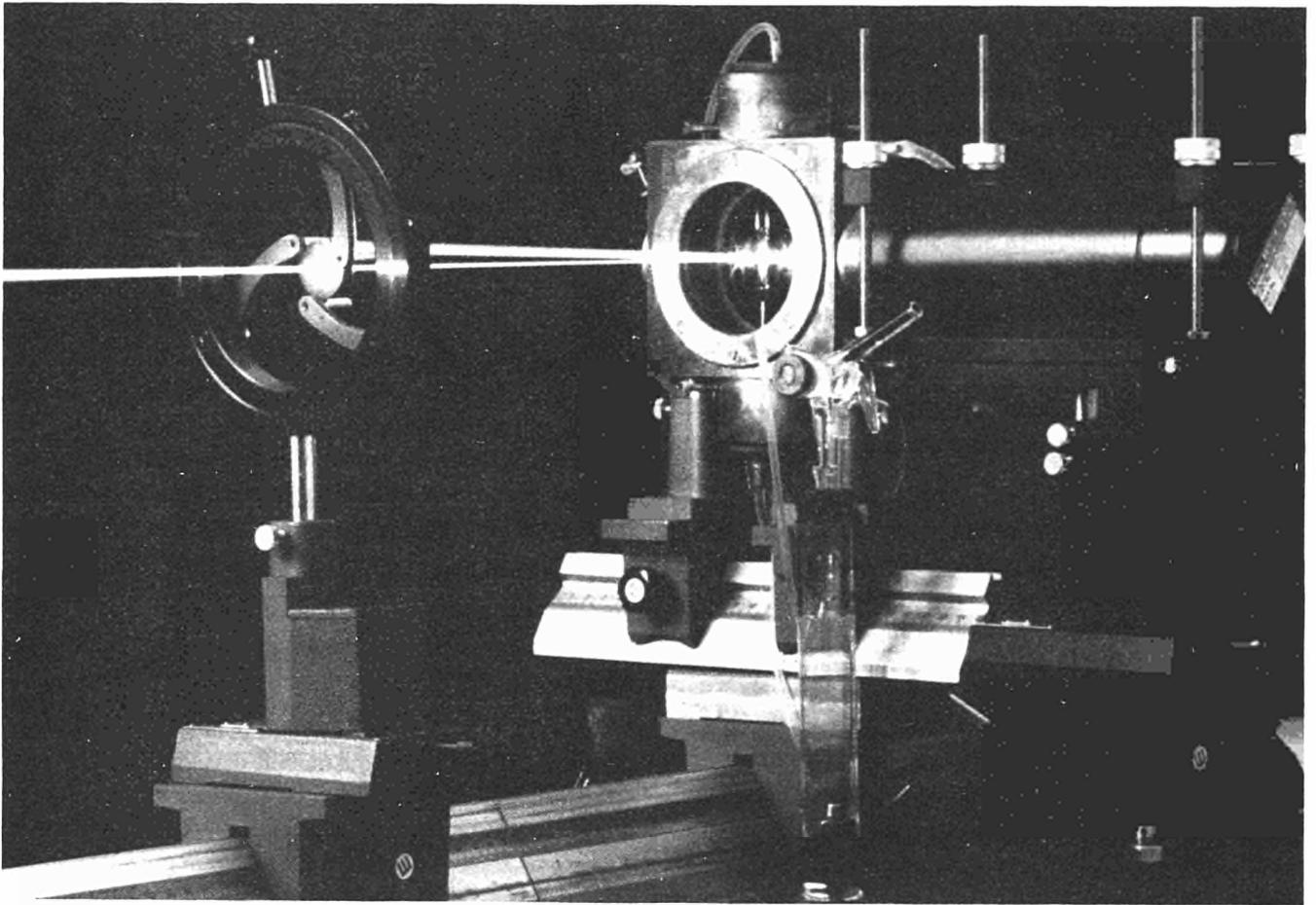
R&D efforts are mainly oriented towards the high-tech industries, especially in the United Kingdom and France, whereas in Japan they are largely aimed at traditional industries (see Table VI).

In his book, J. C. Derian (*La grande panne de la technologie américaine*, 1988), points out that the development of a "sheltered" scientific culture in Europe is caused by the weight of government projects, and of defence projects in particular. This shows some similarity to the situation prevailing in the United States. But the sheer scale of the American economy means that government projects only mobilize a small part of

Table VI

| THE DIVISION OF GOVERNMENT R&D SUPPORT BETWEEN HIGH TECH AND TRADITIONAL INDUSTRIES IN OECD COUNTRIES |                      |                        |
|---|----------------------|------------------------|
|   | High tech industries | Traditional industries |
| United States   | 88 %                 | 12 %                   |
| France  | 91 %                 | 9 %                    |
| United Kingdom  | 90 %                 | 10 %                   |
| Germany   | 87 %                 | 13 %                   |
| Japan   | 21 %                 | 79 %                   |

Source: OECD, Science and Technology Indicators, 1988



the industrial fabric. This leaves considerable room for developing an "exposed" scientific culture. Its success is illustrated by firms such as IBM, Xerox and Digital Equipment.

Major projects in Europe, however, have had a bigger impact on industrial structures. Nevertheless, there are some notable exceptions to this theoretical pattern in Germany, Italy and the Netherlands. One of the preconditions for the development of the emerging industries in the Community is arriving at a balance between the sheltered and the exposed scientific cultures.

When it comes to exports, the EC is in a good position for high and medium technology industries, as is suggested in Table VII.

Table VII

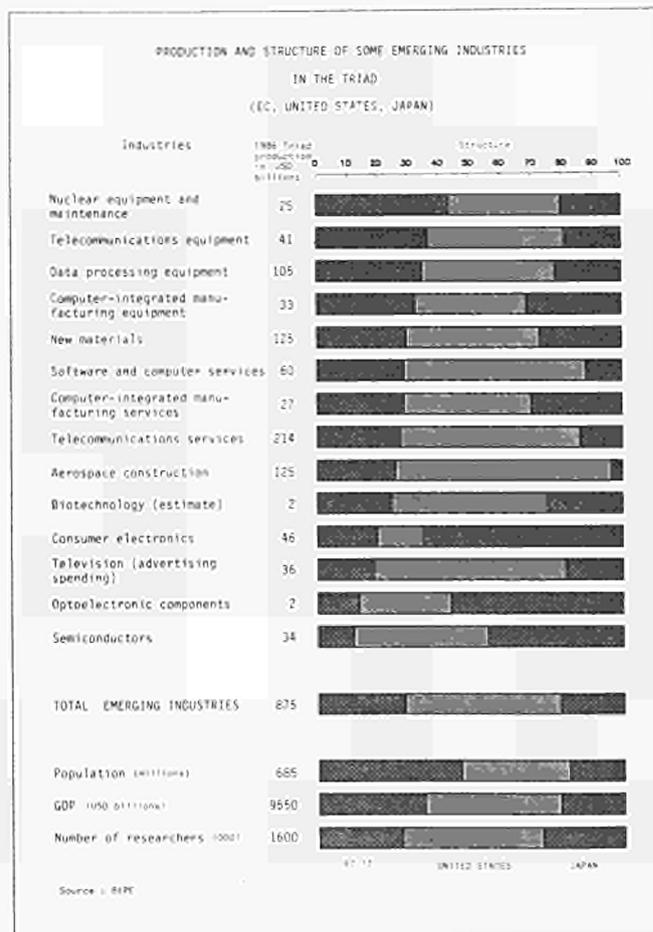
| Export Market Shares<br>(civil markets exc. intra EEC exchanges) |      |      |       |
|--|------|------|-------|
| 1986 % of world market   | EEC  | USA  | JAPAN |
| HIGH TECHNOLOGY (1)  | 18.8 | 15.7 | 22.4  |
| MEDIUM TECHNOLOGY (2)  | 28.0 | 12.1 | 15.6  |

(1) R&D spending to production value ratio of over 4%. This group includes the following industries: pharmaceuticals, office and data processing machines, professional and domestic electrical equipment, aeronautics, precision instruments and equipment.  
(2) R&D spending to production value ratio of between 1% and 4%.  
Source: OECD data. EEC figures are estimates after an attempt to exclude intra-European trade.

However, an analysis of imports tempers these good results. Even if intra-EC trade is excluded, the penetration of high-tech imports into EC markets is greater than it is in the Japanese and American markets. Overall, the trade balances of both high and medium technology industries in Europe are positive, but the prevailing impression is still one of relative vulnerability. Thus it seemed worthwhile to take the analysis further with a sector-by-sector approach to assess the Community's share in the triad's production of some 15 goods and services which feature strongly in the emerging industries. It would have been easy to make the list longer (notable omissions are marine sciences, high-speed trains and environmental protection technology, for which Europe is fairly well placed). None the less, this list seems sufficient for an evaluation of the Community's commitment to the new technological system, in spite of its incompleteness and somewhat arbitrary nature. Indeed, the inclusion in the emerging industries of any single activity in its entirety could be questioned.

### Analysis by Industry

Graph 7 gives 1986 production figures for 15 emerging industries within the triad and shows the production shares of the 12 Member States, the United States and Japan. These industries have been ranked by the size of the EC's output.



Graph 7

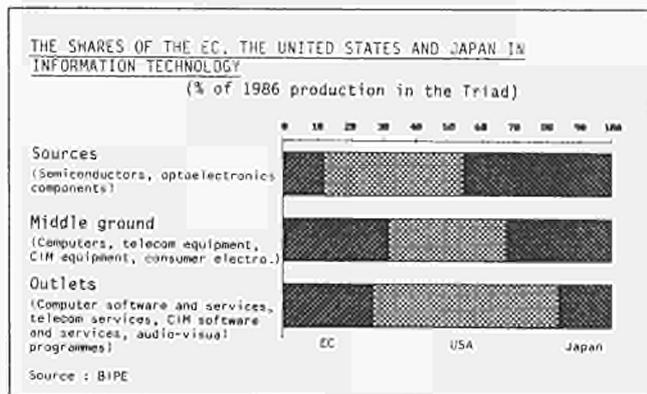
Overall, the EC accounted for a bit less than 30% of the triad's emerging industries, which is about the same as its contribution in terms of research manpower (28%) but much less than its share of economic power (35%) or its share of the triad's population (47%).

While the United States comes out on top for the services of the future (57%) and Japan leads the triad for goods (25%), the Community holds the same rank for both goods and services. Perhaps this is a sign of complementarity between certain Member States, especially Germany and Italy, which have concentrated on industrial products, and others which, like France and the United Kingdom, have concentrated on developing their service activities.

Table VIII

| US, Western Europe, Japan and USSR<br>in four key high technology sectors |     |       |           |      |
|---|-----|-------|-----------|------|
|   | USA | JAPAN | W. EUROPE | USSR |
| COMPUTERS   | 9.9 | 7.3   | 4.4       | 1.5  |
| LIFE SCIENCES   | 8.9 | 5.7   | 4.9       | 1.3  |
| NEW MATERIALS   | 7.7 | 6.3   | 6.0       | 3.8  |
| OPTOELECTRONICS (i)   | 7.8 | 9.5   | 5.7       | 3.6  |

(i) excluding big lasers  
Source: Fortune, October 1985



Graph 8

With a view to completing this approach and introducing an analysis by industry, Table VIII reproduces survey results published by *Fortune Magazine* in October 1986. The survey was an attempt to rank the United States, Japan, Western Europe and the USSR in four key areas of emerging industries. The marks correspond to the average out of 10 awarded by 10 experts selected by *Fortune*.

The Community enjoys a higher rank than Japan in terms of revenue for the emerging industries because of its economic weight and the foreign firms established on its soil (see Graph 7). None the less, the experts consulted rank Japan higher when it comes to the capacity for taking initiatives.

### Electronic and Information Industries

Overall, the Community's position is fragile. Japanese firms dominate the sources (components) and American firms dominate the outlets (services). Therefore, the Community's least unfavourable position is in the middle ground with equipment, especially telecommunications equipment.

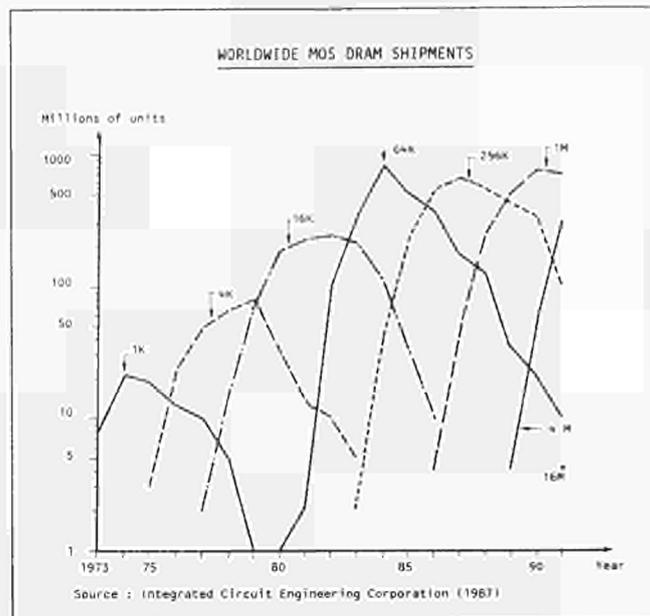
#### Semiconductors

Japanese producers of semiconductors have registered very strong growth mainly at the expense of their American and European counterparts (see Table IX).

Table IX

| The World's Leading Semiconductor Producers<br>(Revenue in \$ billions) |     |                   |     |
|---|-----|-------------------|-----|
| 1980  |     | 1986              |     |
| Texas Instruments   | 1.6 | NEC               | 2.6 |
| Motorola  | 1.1 | Hitachi           | 2.3 |
| Philips   | 0.9 | Toshiba           | 2.3 |
| NEC   | 0.8 | Motorola          | 2.0 |
| Nat. Semiconductor  | 0.7 | Texas Instruments | 1.8 |
| Toshiba   | 0.6 | Philips           | 1.4 |
| Hitachi   | 0.6 | Fujitsu           | 1.3 |
| Intel   | 0.6 | Matsushita        | 1.2 |
| Fairchild   | 0.6 | Mitsubishi        | 1.2 |
| Siemens   | 0.4 | Intel             | 1.0 |

From: 'L'Avenir de la Politique de la Communauté Economique Européenne en matière de Science et Technologie.' Conseil Economique et Social Français (CESF) February 1988.



Graph 9

Product renewal is very rapid as can be seen by the trend observed in dynamic random access memories or DRAMs (see Graph 9).

There is a trend towards growing European dependence on Japan.

European firms, seeking critical mass in the rapidly changing technology of this field, have undertaken joint research projects (Philips and Siemens) and/or have merged their activities (the Thomson-SGS merger). In spite of the present unfavourable situation, Europe should be able to improve its position in the semiconductor field through coordinated R&D (Esprit, Racc, Eureka) or, at the very least, it should be able to prevent the gap that separates it from the Japanese and American leaders from widening.

From this point of view, "catching-up" projects in micro-processors are worthwhile: not only because the technology may yield surprises allowing leap-frogging breakthroughs; but above all because - as the current megachip shortage and Europe's low priority as client demonstrate - a "domestic" European manufacturing capacity is needed to provide at least a substantial "second sourcing" reserve for European clients.

#### Optoelectronics

Optoelectronics - which covers LEDs, laser diodes, silicon and plastic fibres, sensors and specialized passive components - is a technological family which is likely to replace electronics to a certain degree. For this reason annual growth in optoelectronics is 15-20%, against 10% in semiconductors. The Japanese are clearly dominant except in silicon fibres (Corning Glass Works) and high-power lasers, where the United States leads. These are fields where Europe initially occupied a leadership position.

EC industry should be able to capitalize on the experience of firms already present in these markets. These include large groups (Philips, Siemens, CGE, Thomson) but also established networks of small European firms involved in the production of lasers, optical fibres and VDUs. Because the technology involved is still emerging, the field of optoelectronics appears to be a vital one. It involves a wide variety of applications (telecommunications, optical recording, display functions, materials processing, medical diagnosis and therapy, printing, etc.) and the end markets have huge potential. The world market for laser applications is already estimated to be worth about USD 12 billion. Moreover, when light takes the place of electricity, a new avenue of research is opened up with the possibility of the physical limits of electronic chips being overcome by the end of the century. This is another very good reason for aggressive European policy in this field.

### Data Processing Equipment

The Community's position in the field of data processing equipment is probably not as strong as it appears in the graph of the triad's emerging industries (see Graph 7), since the graph includes IBM's production in the EC under the EC heading. Not one European firm ranked in the world's top 10 until Bull and NEC bought out Honeywell's computer business and the newly formed group made it into sixth place worldwide. Table X shows the market share trends for IBM and its major competitors in different markets.

At a more micro-economic level, the Community is absent from the supercomputer market, which is dominated by Cray with 60% of the world market. Fujitsu, Control Data and IBM follow. This market is one where technological progress is the most rapid. One example is parallel architectures. Present nominal power, which is one gigaflop or one billion operations per second, could be multiplied by one hundred over the next five years.

The opening-up of EC markets and the weakening grip of IBM on world markets make it possible to conceive of a

stronger European industry. This would call for greater and more coordinated sales and R&D efforts on the part of the main manufacturers such as Bull, Siemens, Olivetti and Nixdorf.

### Telecommunications Equipment

European manufacturers enjoy a real edge in the field of telecommunications equipment, where the digitization of existing networks and the boom in new products (fax, videotex, local area networks, radiotelephones, etc.) are boosting demand (see Figure 9). The merger of ITT's and CGE's telecommunications business put the Alcatel NV group into second place worldwide, with USD 10 billion in revenue. It is also estimated that 50% of digital equipment production is European. However, certain risks remain: compatibility problems with the public switching systems Alcatel NV inherited, and the possible arrival of newcomers such as IBM to the field.

But the establishment of a common ISDN interface by Alcatel NV, Plessey, Siemens and Italtel as well as the gradual constitution of a Europe-wide industry (Bosch's takeover of Jeumont-Schneider) are all factors in Europe's favour in this field.

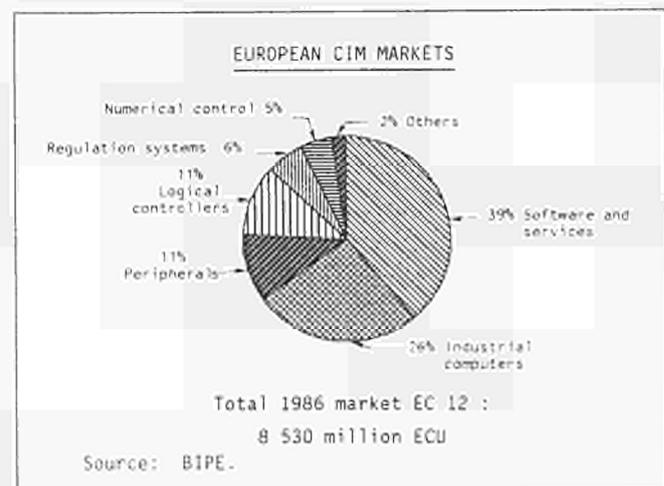
### Computer-Integrated Manufacturing (CIM)

Computer-integrated manufacturing (CIM) equipment and services (industrial computers, numerically controlled machine tools, programmable logical controllers, robots, software and automation engineering: see Graph 10) play a vital role in the sweeping modernization of the manufacturing industry. This has meant overall annual growth of 10-15% for CIM. The odds are still heavily in Europe's favour in the CIM field thanks to the vitality of the EC - especially the German-machine tool industry, which has been able to integrate programmable electronics to the extent that it now accounts for 44% of the triad's production of numerically controlled machine tools.

Table X

| World Market Shares of IBM and Its Main Competitors |                 |      |      |
|---|-----------------|------|------|
| (%)   |                 | 1984 | 1986 |
| <b>Mainframes</b>                                   |                 |      |      |
|   | IBM             | 60   | 60   |
|   | Unisys          | 15   | 15   |
|   | Fujitsu         | 16   | 7    |
| <b>Minicomputers</b>                                |                 |      |      |
|   | IBM             | 30   | 20   |
|   | DEC             | 10   | 14   |
|   | Hewlett Packard | 8    | 7    |
| <b>Microcomputers</b>                               |                 |      |      |
|   | IBM             | 45   | 28   |
|   | Apple           | 12   | 8    |
|   | Olivetti        | 2    | 8    |

Source: from the February 1988 CESF report



Graph 10

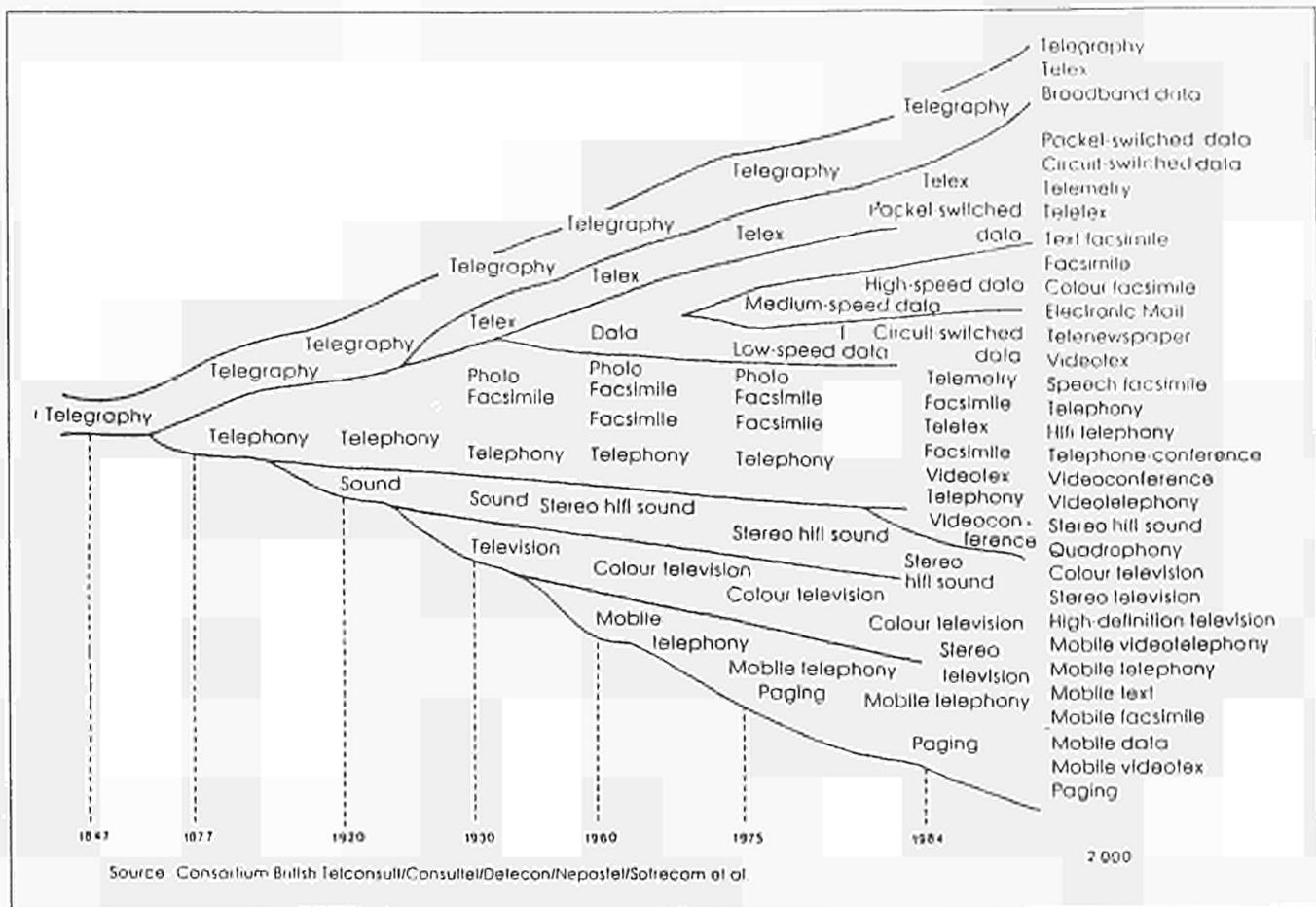


Figure 9

But Japan still tends to be the leader, especially in the field of robots: 50% of robots produced in the triad come from Japan, and of the 120 000 robots in use around the world nearly 60% are installed in Japan compared with only 20% in the EC.

A major effort must be made in this field in order to bring the various elements of a disparate and patchy industry together into an integrated supply of the highest standard. The R&D projects undertaken within the Eureka programme should make this goal feasible.

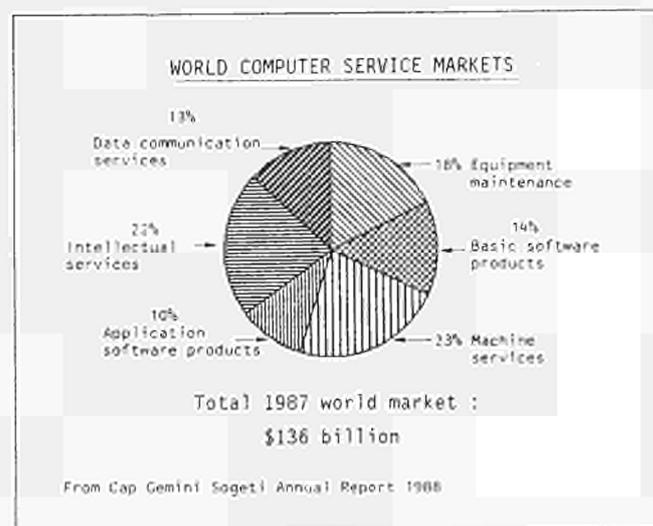
### Consumer Electronics

Japan tends to be the leader in consumer electronics (television sets, hi-fis, radios, compact disc players, etc.) worldwide: about 50% of world production comes from Japan, and Japanese manufacturers control nearly 70% of the world consumer electronics market if their off-shore production is taken into account.

However, the development of high-definition television expected for the 1990s (see Figure 10) could alter this situation. European manufacturers may be able to make their common MAC standard prevail and present a united front against the Japanese MUSE system.

### Computer Software and Packages

Computer software and services (see Graph 11) are an example of a service activity with high technological and growth potential. The world market is growing by 15% a year. Some 75% of firms active in the field of artificial intelligence (expert systems, speech recognition, language comprehen-



Graph 11

sion, machine vision, etc.) are in the United States. The Americans also dominate the software package market, which is growing by 20-25% a year. None the less, European firms are still in a good position, particularly for artificial intelligence languages (Prolog) and intellectual activities (consulting, technical support, planning and systems engineering). Software engineering should play a central role in the downstream market to facilitate the production of programmes and thus to break through one of the bottlenecks in the development of information technology. Europe certainly has strengths in this field. The ADA language, which is a trademark of the American Department of Defence, is in fact a creation of the Frenchman Jean Ichbiah. European firms have also undertaken major R&D projects.

European firms have also been able to reach the size required for international development. Cap Gemini Sogeti, GSI, SD-Scicon, and Semacap are among world leaders in the field.

### Telecommunications Services

Telecommunications services owe their considerable economic weight (more than USD 200 billion in revenue for the triad in 1986) to the preponderance of the telephone network in corporate and consumer spending for communications. Value-added services have come on top of the basic network spending including specialized services aimed at one group of users (SITA for airlines, SWIFT for banks, etc.) and

videotex services for the general public. While overall annual growth in telecommunications services is 6%, the rate for value-added services is about 40%. However, the market providing the base for the increase is still relatively small, with a 1986 value of USD 660 million. The EC, particularly France, has played such a big part in the development of these services that 40% of the 1992 world market can be expected to be in Europe. But the stakes in telecommunications services are larger. European telecommunications are made up of "national hubs" within which communication is effective and cheap, but they still lack a competitively-run continent-wide long-distance infrastructure. Setting up such a system is a priority for the development of European telecommunications services.

### Audiovisual Programmes

Finally, the last segment of the emerging industries in the field of information technology is audiovisual programmes, especially for television. This raises a particular problem, with the development of truly Europe-wide channels being hampered by inadequate broadcasting infrastructures, differences in culture and language, and rivalry between producers. The European audiovisual programme industry is in the red in its foreign trade (see Graph 12), even though this deficit is quite small compared to total production and market size.

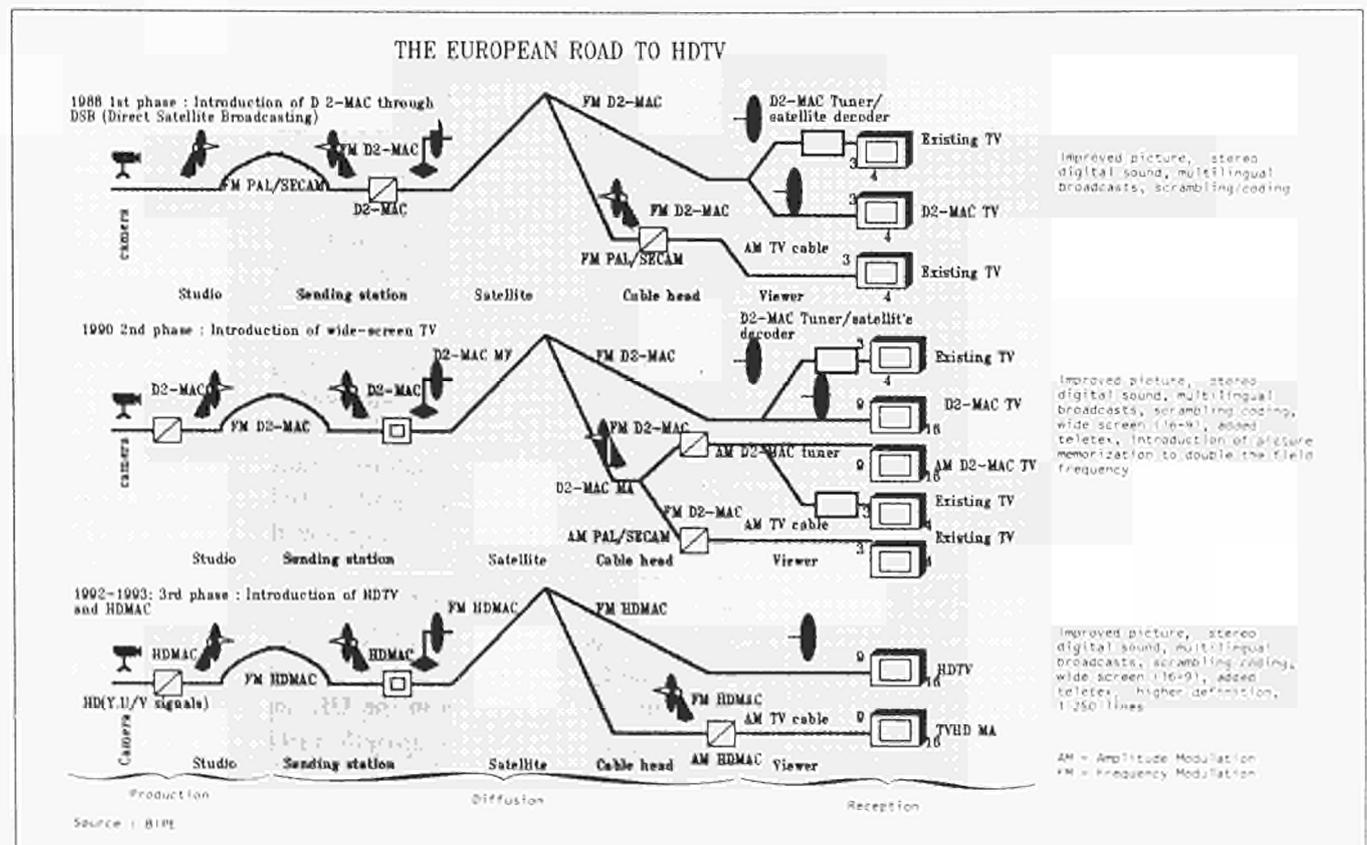
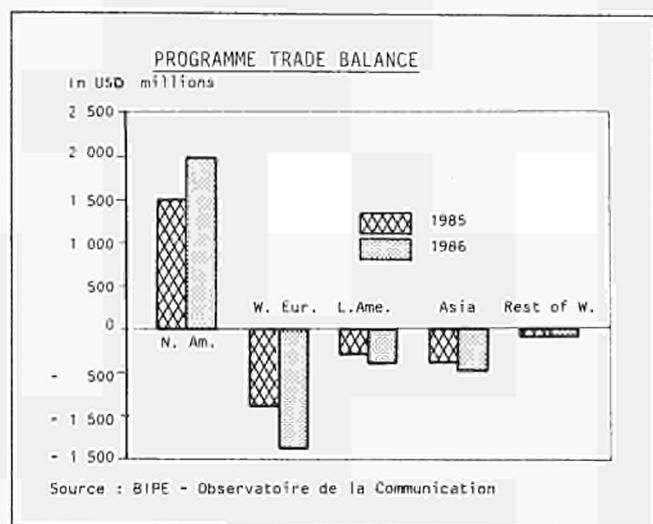


Figure 10

None the less, the sharp drop-off in national production of new fiction series and films makes joint production of programmes a precondition for the survival of European creativity. Messrs Maxwell's and Berlusconi's launch of European co-productions in 1987 can be seen as a promising development in this difficult context.



Graph 12

### New Materials

As has been pointed out, new materials are not merely the ones from the most advanced industries (ceramics, high-performance composites). They also include more traditional materials (new steels, aluminium-lithium alloys, etc.) on the way up to the high end of the market for use in the most innovative products. The Community's overall situation may look good, with the 12 Member States accounting for 30% of new materials production, but there are still some very weak points:

- **High-performance components:** the EC accounts for only 25% of the triad's production. The Americans hold 55% of the market and the Japanese have become masters of some of the precursors used in making (carbon) fibres.
- **Technical ceramics:** the Community's share of this market, worth about USD 8 billion, is under 10%, while Japan and the United States control 65% and 25%, respectively.
- **Functional materials for electronics:** in spite of the vitality of the German company Wacker, which dominates silicon production, the Community controls only 20% of the new materials used for making composite materials. This weakness can be linked to that in semiconductors mentioned above.

The situation is brighter in the field of new metal and glass materials as well as that of technical polymers. The Community controls 40% of the triad's production of high-performance plastics and elastomers.

Overall, Europe's main edge in the field of new materials comes from the vitality and power of its chemical industry, with six European groups ranking among the world's top 10 in this industry (see Table XI).

EC-based firms in the various new materials should capitalize on this edge by furthering their joint R&D efforts to develop "multi-materials" with high growth potential. The European industry is also being strengthened by Euram and some of the Eureka projects such as Carmat, which is aimed at developing the use of new materials in the cars of tomorrow.

Table XI

| The World Leaders of the Chemicals Industry |                            |                        |                            |
|---|----------------------------|------------------------|----------------------------|
| Group                                       | 1987 revenue (\$ billions) | Group                  | 1987 revenue (\$ billions) |
| BASF (GER)                                  | 23.5                       | Procter & Gamble (USA) | 17.0                       |
| Hoechst (GER)                               | 23.0                       | Dow Chemicals (USA)    | 13.6                       |
| Bayer (GER)                                 | 22.8                       | Shell Chemicals (USA)  | 12.0                       |
| ICI (UK)                                    | 21.0                       | Ciba Geigy (CH)        | 11.5                       |
| Dupont (USA)                                | 17.6                       | Rhone Poulenc (F)      | 10.0                       |

Source: La Monde, May 24, 1988

### Biotechnology

The current biotechnology markets are limited to some diagnostic tests, about 10 vaccines (including one for hepatitis-B), active pharmaceutical products and the manufacture of certain amino acids (including lysin). The breakdown of production within the triad is based on the estimated number of researchers in each zone.

The US lead is backed up by the size of their R&D budgets and the vitality of the 200 plus firms generated by venture-capital development (including Genentech and Cetus). But Japan has also boosted its R&D efforts, while at the same time its firms have signed over 180 cooperative agreements with innovative American firms seeking injections of new capital.

Some observers estimate that Europe is now three years behind Japan and the United States in the field of biotechnology and that the gap is wider in the food industry than in the health and chemical industries. Europe has probably lost the lead in molecular biology while the United States dominates genetic engineering and Japan leads the field for advanced fermentation and separation technology. None the less, the quality of European R&D is widely recognized (Pasteur Institute in France, Max Planck Institute in Germany, etc.) and Europe can rely on the vitality of medium-sized innovative firms (Celltech in the UK and Gist-Brocades in the Netherlands) backed up by the vast funding capacities of the major firms.

Therefore, it seems both crucial and fully feasible for the EC countries to boost their efforts in biotechnology. In the medium to long term it is likely to spark off a fourth technologi-

**Table XII**

| Nuclear-Generated Electricity in Industrial Service<br>Forecasts Based on Probable Commitments |      |      |      |                     |
|--|------|------|------|---------------------|
| Net Gigawatts  | 1987 | 1990 | 1995 | 1987-95<br>CAGR (%) |
| EEC (12)   | 84   | 108  | 116  | 4.1                 |
| UNITED STATES  | 91   | 106  | 108  | 2.2                 |
| ASIA   | 39   | 45   | 58   | 5.1                 |
| COMECON  | 38   | 68   | 116  | 15.0                |
| REST OF WORLD  | 31   | 33   | 38   | 2.6                 |
| WORLD TOTAL  | 283  | 360  | 436  | 5.6                 |

Source: "Les Centrales Nucléaires dans le Monde", CEA France, 1988 Edition

cal revolution of the same scope as the one currently in progress in the fields of electronics and information technology.

**Energy**

As Table XII shows, the amount of nuclear-generated electricity is on the increase in spite of the widespread concern about nuclear plant safety, which was accentuated by the Chernobyl accident.

Europe has built up a powerful nuclear industry. In 1987, some 45% of the nuclear-generated electricity within the triad was produced in the EC. Europe's share in the construction and maintenance of nuclear plants in 1986 was also estimated at 45%.

Europe also controls the nuclear fuel cycle (Cogema) and has established a position for itself in the activities of the future, from breeder reactors to, in the longer term, nuclear fusion. Fourteen countries are jointly involved in fusion research through JET (Joint European Torus), which gets 80% of its funding from the Community. The other scientific powers are encountering funding problems in this field. In October 1987, the EC, the USSR, the United States and Japan signed an agreement for the creation of an international thermo-nuclear experimental reactor (ITER). In general, Europe is playing a leading role in the field of particle and high-energy physics laboratories: JET in Culham, CERN in Geneva, ILL in Strasbourg, and the future synchrotron in Grenoble.

The Community also makes a respectable showing within the triad when it comes to other forms of energy, whether from primary sources such as petroleum, gas and hydroelectricity, or from new sources such as biomass or solar and geothermal energy, wind and tides, as well as new energy vectors such as hydrogen.

Europe may thus have the means to develop different forms of energy in the future, but the importance of environmental criteria and the management of technological risk in the selection of these forms of energy should be borne in mind. Once again, Europe probably has an important role to play in the future as the result of its technological experience in

**Table XIII**

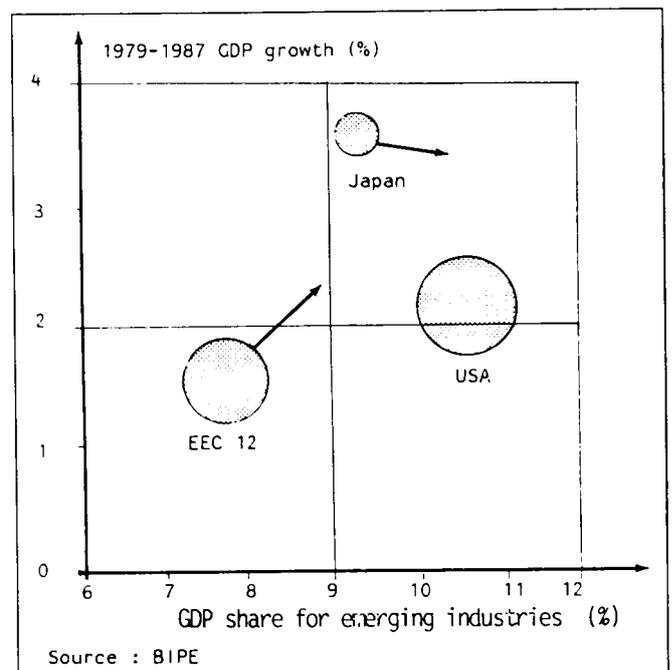
| Some European Aerospace Programmes |   |
|------------------------------------|---|
| SPACE                              | Ariane I, II, III, IV (1988)<br>Ariane V (1994 with VULCAIN engine)<br>Hermes (1996)<br>Columbus (1998) |
| CIVIL AVIATION                     | Fokker F27, F28, FO50, FO100<br>Concorde<br>Airbus A300, A310, A320, A330, A440<br>ATR 42/72            |
| MILITARY AVIATION                  | Jaguar<br>Tornado<br>Alpha-Jet<br>Transall<br>Atlantic 1-2<br>EFA                                       |
| HELICOPTERS                        | Puma<br>Gazelle<br>Lynx<br>EH 101<br>HAP - HAC / PAM2<br>NH 90<br>A 129 LAH                             |

Source: BIPE from the 1988 CESF Report

preventing and dealing with pollution and its R&D programmes in this field.

**Aerospace**

The Community's share in this field is still small, accounting for only about a quarter of the triad's 1986 production. However, Europe is increasing its share of the world's aeronautics and space markets, mainly as the result of long-standing



**Figure 11**

cooperation between firms from different Member States (see Table XIII).

The improved competitiveness of the European industry coincides with higher growth in the market. Indeed, passenger air travel is increasing by 5% to 7% a year at a time when a large proportion of fleets must be replaced. In the market for planes carrying 140 or more passengers, more than 8 000 aircraft are to be delivered between 1987 and 2000 as opposed to only 1 600 deliveries between 1980 and 1986.

None the less, American competition is still strong and future exchange rates may favour the USA. Japan also looks set to make its debut in this field. These factors constitute a major incentive for Europe in the aerospace field.

## OUTLOOK

### Europe and the Changing Technological System

Figure 11 shows the Community's position within the triad. It is based on the contribution of the emerging industries to the GDP of the 12 EC Member States, the United States and Japan. These figures were then compared to the overall economic growth recorded in the three zones since the beginning of the decade.

Europe lags behind Japan and the United States in the shift towards a new technological system, and the United States owes its strong position to its commitment to services with high added value. Furthermore, overall growth has been slower in the Community than in other regions.

None the less, the outlook for growth in the coming decade (symbolized by the arrows) is brighter. Japan is making massive investments in the emerging industries, particularly at the source end of the production circuit, and its outlook for growth is still good, although it is likely to slacken to some degree. The United States, on the other hand, is seeing its most advanced industries run out of steam, as shown by its negative foreign trade balance in high-tech since 1986 (*La grande panne de la technologie américaine*, J.C. Derian, 1988). On top of this, American economic growth should slow down sooner or later as a result of the poor foreign trade balance and the resulting debt.

Thus, the Community has a chance to close the gap in the emerging industries while boosting its growth. In so doing, it can capitalize on the mobilization of firms and national public opinion sparked off by the completion of the single European market.

Even though these results are entirely feasible, they are by no means to be taken for granted. They will call for further R&D efforts and a strengthening of EC-based firms.

## European R&D Programmes

Europe devotes a smaller portion of its GDP to R&D than the major industrialized nations. But beyond this overall shortfall, European R&D has also suffered from a degree of duplication in poorly coordinated national efforts. Community programmes are thus of crucial importance, for they should make possible the development of further synergy and cooperation.

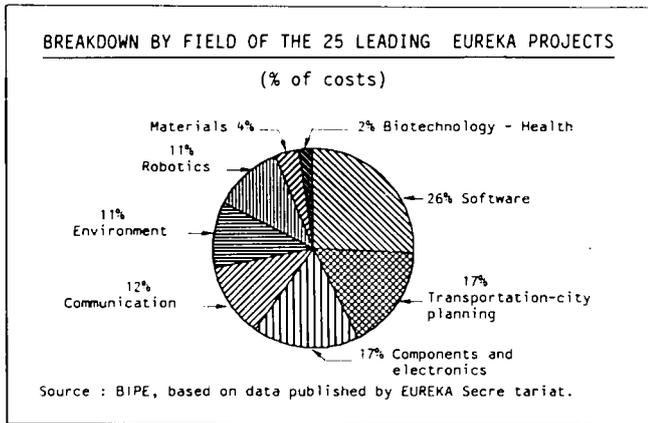
Table XIV presents the EC's framework programme for R&D between 1987 and 1991.

It shows substantially increased funding compared with the previous framework programme, even though Community programmes represent only 1% of the 12 countries' R&D spending for the same period. It also shows the drive to go from a non-binding programme to one involving firm commitments. The accent is on information technology, which is precisely where Europe's position is still vulnerable. The warm reception these programmes received - especially the Esprit programme which was launched in 1982 and has since

Table XIV

| 1987-1991 EEC Programme For R&D<br>in millions of ECUs |       |
|--|-------|
| 1. QUALITY OF LIFE                                     | 375   |
| 1.1 Health   | 80    |
| 1.2 Radioprotection                                    | 34    |
| 1.3 Environment  | 261   |
| 2. INFORMATION AND COMMUNICATION SOCIETY               | 2 275 |
| 2.1 Information technology (ESPRIT)                    | 1 600 |
| 2.2 Telecommunications (RACE)                          | 550   |
| 2.3 New services (DRIVE - DELTA - AIM)                 | 125   |
| 3. MODERNIZATION OF INDUSTRIAL SECTORS                 | 845   |
| 3.1 Manufacturing industries (BRITE)                   | 400   |
| 3.2 Advanced materials (EURAM)                         | 220   |
| 3.3 Basic materials                                    | 45    |
| 3.4 Standards and measurements (BCR)                   | 180   |
| 4. ENHANCEMENT OF BIOLOGICAL RESOURCES                 | 280   |
| 4.1 Biotechnology (BAP - BRIDGE)                       | 120   |
| 4.2 Food technology (ECLAIR)                           | 105   |
| 4.3 Agriculture  | 55    |
| 5. ENERGY  | 1 173 |
| 5.1 Fission  | 440   |
| 5.2 Thermo-nuclear fusion (JET)                        | 611   |
| 5.3 Non-nuclear energy                                 | 122   |
| 6. SCIENCE AND TECHNOLOGY FOR DEVELOPMENT              | 80    |
| 7. ENHANCEMENT OF OCEAN RESOURCES                      | 80    |
| 7.1 Ocean sciences and technology                      | 50    |
| 7.2 Fishing  | 30    |
| 8. EUROPEAN CO-OPERATION                               | 288   |
| 8.1 Stimulation of human resources (Science)           | 180   |
| 8.2 Use of major facilities                            | 30    |
| 8.3 Forecasting and assessment (FAST - SPEAR)          | 23    |
| 8.4 Exploitation of research results                   | 55    |
| TOTAL  | 5 396 |

Source: La Recherche, N° 200, June 1988, "Spécial Europe"



**Graph 13**

had its resources increased - makes the results in the coming period look promising. Beyond the Community programmes, the cooperation developing between manufacturers, especially within the framework of Eureka, should also make European industry stronger, particularly in the field of

information technology. It should be stressed that several of the major Eureka projects (see Graph 13) involve software which is probably at the very heart of the new technological system and which constitutes a field where Europe enjoys a strong position.

This set of programmes does not mean that the Community merely wants to catch up. A process seems to have been set in motion which could put Europe in first place as regards many of the emerging industries. Increasingly, the challenge is to master complex systems, whether in the form of production/service activities of the extended firm, telecommunications, urban and long-distance transport, or the environment. The new and flexible forms of cooperation between the private and public sectors which increasingly characterize the Community economy are an essential element of success.

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**Industry Reviews  
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Forecasts**



## ENERGY

### GENERAL INTRODUCTION

#### Community Energy Balance in 1987

The following provides a background to the discussion of energy policy in the EC. In 1987 total energy consumption in the Community was 1 057 million tonnes of oil equivalent (Mtoe). The breakdown was as follows:

Solid fuels: 230 (22%)

Oil: 472 (45%)

Natural gas: 199 (19%)

Nuclear: 138 (13%)

Primary electricity: 16 (1%)

Other: 2

Total: 1 057 Mtoe.

This represented a 1.2% increase in energy consumption over 1986. Solid fuels and oil consumption remained reasonably stable compared with 1986. However, consumption of natural gas increased rapidly (+ 6.5%) during 1987 due to favourable prices compared with competing fuels as well as to weather conditions and further development of the gas grid in several Member States. Whilst overall electricity demand in the Community grew by 3.3% in 1987, demand for nuclear energy slowed. Total production of nuclear heat increased by only 2.8% against 6.8% in 1986. A number of different factors explain this slower growth including a relative slackening in the pace of new plant commissioning, the Italian referendum and maintenance closures. Energy imports into the Community accounted for 45% of total energy consumption, the same level as in 1986. Import dependence, however, varied markedly among fuels:

Hard coal: 29%

Oil: 71%

Natural gas: 36%

Total energy: 45%.

Oil represented some 45% of total energy consumption whilst oil imports accounted for just below 33% of total

energy consumption. Meanwhile energy efficiency (the ratio of energy consumption to GDP) improved in 1987 by 1.3%.

#### Community Energy Policy

Energy policy at Community level is embodied in a number of energy policy objectives. The latest Community energy policy objectives, for the year 1995, were agreed upon by Energy Ministers in September 1986. These take the form of horizontal objectives which are general to the energy sector as a whole, for example the need to maximize security of supply, and vertical objectives which relate to specific energy sub-sectors, such as oil, natural gas, solid fuels, etc. The main thrust of Community energy policy is to safeguard security of energy supply by continued restructuring of the Community's energy economy. In particular, this means continued efforts to reduce the Community's dependence on oil, especially imported oil, and the drive to achieve further improvements in energy efficiency.

This year, in its monitoring role, the Commission reviewed Member States' energy policies in the light of the 1995 Community energy objectives, publishing its findings in a report to the Council (COM (88) 174 final). Two sectors are giving rise to concern in the context of the 1995 energy objectives. If present trends continue, the additional 20% improvement sought with respect to energy efficiency at Community level is unlikely to be attained. Likewise, the 1995 objective requiring an increase in the share of solid fuels in energy consumption is unlikely to be achieved. The Commission has called for action by Member States in both areas (The Community would appear to be on course to achieve its oil objective, i.e., to keep Community oil consumption down to around 40% of energy consumption). These, and other conclusions arising from the Review, received a first and full discussion at the Energy Council held on 9 June 1988.

Energy, as a vital input into the economic and social life of the Community, is expected to play a significant part in the Community's policy to complete the single market by the end of 1992. A Commission working document, published in May 1988 (COM (88) 238 final) entitled *The Internal Energy Market* sets out the obstacles to the achievement of such a market and presents a framework for action to eliminate them.

The cost to the Community economy of these barriers is estimated at between 0.5-1.0% of Community GDP, or 20-30 billion ECU per year. Their removal would lead to reduced energy costs to Community consumers, more competitive Community industry, improvements in the structure of the Community energy industry and enhanced security of supply.

Energy ministers gave their first reactions to these proposals at the Energy Council on 9 June 1988. The initial response was positive although clearly many months of hard discussion and negotiation lie ahead as proposals to remove specific obstacles are brought forward by the Commission. The internal energy market will be the Commission's main focus of attention in the energy sector in the next few years.

Other papers under preparation include one on energy prices and price transparency, a report on the situation and prospects of the refining industry and oil product imports; the annual report on the Commission decision (2064/86) with regard to State aid in the solid fuel sector; and proposals for improvements to energy efficiency in the electricity sector and energy certification of buildings. In addition, the normal range of activities will continue within DG XVII, including the work associated with the Community's hydrocarbon technology and energy demonstration project programmes, and the application of the Euratom nuclear safeguards system in the Member States concerned.

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# COAL

(NACE 11)

*The coal industry accounts for 22% to 23% of energy consumption in the EC. This figure is not likely to change very much despite competition from other sources such as oil, nuclear power and natural gas. Coal prices which tend to follow the movements in oil prices, fell in 1986 causing job losses and restructuring in the mining industry. In 1986 hard-coal production in the EC totalled 230 million tonnes and accounted for 421 000 jobs. Production decreased slightly from 1980 to 1986 while manpower levels were reduced by a third and net imports rose by more than 35%. Demand is expected to rise slightly. However, production is likely to decline over the next few years as hard-coal imports increase. The extent to which hard-coal production declines will depend largely on whether producers can improve their competitiveness in relation to imported hard-coal, but also on the maintenance or otherwise of State support policies and world price levels.*

The coal industry has two major customers: electricity generating stations which represent 65% of its market and steel industrial coking plants which account for less than 20% of demand. The remainder is made up of a range of industrial and domestic users.

The main minerals extracted are hard-coal (230 million tonnes in 1986, or 54% of production) and brown-coal (175 million tonnes in 1986, or 42%), which has only a third of the heat value of hard-coal. The remaining 4% consists mainly of black lignite and peat.

Community production centres on Germany (38% of total hard-coal produced in the Community, 65% of brown-coal), and the United Kingdom (46% of the hard-coal produced). Greece extracts 22% of the brown-coal produced in the

Community, while France and Spain together account for 13% of hard-coal and brown-coal production. The poorest countries in terms of coal resources are Italy, the Netherlands, Denmark, Ireland and Luxembourg.

## Current Situation

### Consumption Trends

Coal's share in electricity production has remained stable since 1980 as nuclear power has tended to supplant petroleum products and natural gas rather than coal. Electricity generation has shown a slight increase over the period.

The coal industry's second largest market - steel - has seen its Community business decline over the last few years because of the development of substitute products and increasing competition from newly-industrialized countries. At the same time new technologies have resulted in a drop in the amount of coke required to produce a tonne of steel.

Coal consumption rose slightly (0.5% per annum) between 1980 and 1986 in terms of tonnage, and production almost recovered to 1980 levels in 1986, after falling in 1984 and 1985. Over the same period the import balance rose from 11% to 15% of consumption (with a 20% peak in 1984). However, the drive to close unprofitable pits and improve productivity resulted in the loss jobs in the industry.

In 1985 and 1986 oil prices fell to 14 ECU a barrel bringing about a drop in world coal prices. The depreciation of the dollar in relation to EC currencies widened the gap between the price of imported coal and the cost of Community coal production, thereby increasing the deficits of companies in the sector. However, the prices of other fuels were even more affected than coal by the drop in oil prices, so that the advantage held by coal in relation to other competing fuels was

### Main Indicators Coal

| (Million tonnes)           | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  |
|----------------------------|-------|-------|-------|-------|-------|-------|-------|
| Apparent consumption       | 479.7 | 478.3 | 480.9 | 500.3 | 470.8 | 510.4 | 494.4 |
| Net export volumes         | -54.6 | -47.7 | -54.1 | -58.6 | -93.1 | -95.2 | -74.0 |
| Total Community production | 425.1 | 430.6 | 426.8 | 441.7 | 377.7 | 415.2 | 420.4 |
| Employment (1 000)(1)(2)   | 548.9 | 532.2 | 517.3 | 537.9 | 504.3 | 464.4 | 420.8 |

(1) 1980-1982: EC 9.

(2) hard-coal only

wiped out in 1986; this resulted in a 3.5% drop in solid fuel consumption in the Community (some 8 million tonnes of oil equivalent: toe) between 1985 and 1986.

The share represented by solid fuels in gross domestic energy consumption was therefore reduced to 22% as shown in Table I.

An analysis of demand by product shows that the consumption of brown-coal and peat increased by 2.5% per year while that of hard-coal decreased on average, between 1980 and 1986, by 0.5% per year, the decrease in coke supplies reaching 3.5% per year. However, if demand is analysed on an energy equivalent basis, a different pattern emerges: a 0.5% per annum drop in hard-coal consumption, and a rise of only 0.2% per year in brown-coal and peat consumption, between 1980 and 1986.

**Table I**  
**Share of Solid Fuels in Gross Domestic Energy Consumption per Country**

|                | 1980<br>% | 1985<br>% | 1986<br>% |
|----------------|-----------|-----------|-----------|
| Belgium        | 24.0      | 22.5      | 19.8      |
| Denmark        | 30.6      | 39.5      | 38.4      |
| Germany        | 30.6      | 29.6      | 29.6      |
| Greece         | 20.9      | 34.8      | 36.4      |
| Spain          | 21.3      | 28.0      | 25.6      |
| France         | 16.8      | 12.7      | 10.5      |
| Ireland        | 20.7      | 29.5      | 34.6      |
| Italy          | 8.6       | 11.5      | 10.7      |
| Luxembourg     | 50.7      | 45.5      | 42.1      |
| Netherlands    | 6.3       | 10.7      | 10.2      |
| Portugal       | 4.5       | 6.6       | 10.0      |
| United Kingdom | 35.0      | 30.8      | 31.9      |
| EC 12          | 23.2      | 22.8      | 22.3      |

Source: Commission of the European Communities.

Hard-coal accounts for 2/3 of all coal products consumed in the EC in terms of tonnage, but more than 85% in terms of energy. Hard-coal also suffered most from competition from third countries, since imports have been rising steadily and exceeded 100 million tonnes per year since 1984.

Hard-coal consumption for electricity production has remained stable. This is due to the long-term contracts that have been signed by coal producers and electricity producers and also because of a general reluctance and difficulties of switching energy sources for power stations.

The demand for hard-coal in coking plants has dropped because of falling steel and pig iron production levels and also as a result of the development of electric furnaces. Coke consumption per tonne of steel produced has also been reduced owing to the introduction of new technology. This trend has been exacerbated by the introduction of pressure working and super-oxygenated aeration. In the future, plasma may even be used. Less coke is also required with the nodulizing method.

**Table II**  
**Hard-coal Flows**

| (Million tonnes)           | 1980  | 1986  | 86/80<br>CAGR<br>(%) |
|----------------------------|-------|-------|----------------------|
| Production                 | 260.3 | 227.9 | -2.2                 |
| Imports                    | 97.2  | 106.5 | 1.5                  |
| Exports                    | 27.1  | 14.1  | -10.3                |
| Gross domestic consumption | 330.4 | 320.3 | -0.5                 |
| Transformation             | 287.6 | 272.9 | -0.9                 |
| electric power stations    | 194.2 | 195.6 | 0.1                  |
| coking plants              | 93.4  | 77.3  | -3.1                 |
| Final consumption          | 42.8  | 47.4  | 1.7                  |
| industrial                 | 16.7  | 25.6  | 7.4                  |
| domestic                   | 18.9  | 18.4  | -0.4                 |

Source: Eurostat.

Industrial hard-coal consumption rose by more than 10% per year until 1985 and then fell by the same amount in 1986 especially in Italy, France and the Netherlands, due to competition from oil and the fall in the dollar. Domestic consumption dropped slightly in favour of electricity and natural gas.

Hard-coal is therefore extremely dependent on demand from electricity producers, which represents more than 60% of its markets and is largely in the hands of the public authorities. The United Kingdom, which is the largest hard-coal producer, is also the largest consumer in the Community (35% in 1986), followed by the Federal Republic of Germany (28% of consumption and the second largest producer). Other shares are France (less than 10%), Spain (almost 8%), Italy (6.5%), Belgium and Denmark (4% each) and the Netherlands (3%). Since 1980 the demand for hard-coal has increased in Denmark, Greece, Ireland, Italy, the Netherlands, Spain and Portugal. It has decreased in France, Belgium, Germany and the United Kingdom, which are not only the largest producers but also countries with substantial steel activity.

### *Employment Trends*

The coal industry has always been labour intensive. The threats which have hung over employment in the industry over the last 30 years have been partially caused by imports from third countries which have flooded the market with better quality hard-coal, and with hard-coal which is cheaper to mine.

The process has however been contained by two factors which are characteristic of the industry: the considerable financial aid which has been made available by national governments and the Community and the strong unionization of

the industry which has enabled workers to organize and sustain strike action over months at a time.

Manpower levels fell by a third in hard-coal mines in the EC 9 from 1980 to 1986: 180 000 jobs were lost by 1986.

Despite substantial reductions in company costs, world prices are too low to make any real improvement in their situation. In the short term further jobs are likely to be shed in an attempt to limit deficits. In the medium term the competitive position of European firms may improve as prices recover and productivity increases as a result of job cuts and automation. Until now, job cuts have not been matched by equivalent improvements in output for social reasons. Output of hard-coal per worker increased from 426 kg/worker in 1980 to 532 kg/worker in 1986 in the EC 10, which is an increase of 25% over the period, but in 1986 output was only 292 kg/worker in Spain as opposed to 605 kg/worker in Germany, 512 kg/worker in the United Kingdom and 427 kg/worker in France.

### *Major Structural and Geographical Features*

Structural organization in each country is described below.

Germany has nine companies. The two smallest (Dr Arnold Schäfer and Merschweiler Werksgesellschaft) are private and the others (Ruhrkohlenwerke AG, Saarbergwerke, Eschweller Bewerks-Verein AG, August Victoria, Sofia Jacoba, Preussag Kohle and Rheinische Braunkohlenwerke AG) are held by conglomerates in association with federal or regional authorities.

In the United Kingdom the nationalized company, British Coal, known until 1985 as the National Coal Board, has a 90% monopoly on coal production. The rest is mined by small independent firms under licence from British Coal.

In France the nationalized company, Charbonnages de France controls all coal production.

In Belgium the State controls 77% of Kempenese Steenkohlenmijnen, the main coal mining company.

The situation is completely different in Spain where the market is shared by 235 companies, half of which are public and the other half private. The private ones tend to be very small. The largest company, Hunosa, is nationalized.

In Portugal coal is mined by Empresa Carbonifera do Duro, which belongs to a public holding.

In Greece brown-coal is extracted by the Public Power Corporation.

In Ireland peat is extracted by Bord na Mona, a public company.

Traditionally the State has had a large stake in coal because of its strategic importance; privatization may not be a solution because of the social and financial problems which have beset the sector.

Apart from the United Kingdom, where large-scale restructuring measures have been introduced, although not without considerable social strife - the financial situation in the industry has again worsened in the last year owing to the fact that prices quoted in Community contracts are now virtually the same as those prevailing on world markets. An estimate of company sales prices and deficits is shown in table III

**Table III**  
**Prices and Deficits**

| (ECU/tonne) | Sales prices |      |      | Deficits |      |      |
|-------------|--------------|------|------|----------|------|------|
|             | 1984         | 1985 | 1986 | 1984     | 1985 | 1986 |
| Belgium     | 73           | 78   | 63   | -34      | -43  | -57  |
| Germany     | 96           | 98   | 103  | -12      | -10  | -13  |
| France      | 67           | 69   | 60   | -32      | -36  | -40  |
| UK          | 70           | 74   | 62   | -67      | -56  | -16  |

Source: Commission of the European Communities.

The above is characteristic of the European market at present. Prices are levelling out downwards except in Germany where they are supported by the Kohlenpfennig regulations, which allow companies to maintain their deficits at less than 15% of turnover. Other countries, with the exception of the United Kingdom, recorded losses of more than two-thirds of their turnover in 1986.

Deficits in the European coal industry have led to reductions in output and widespread pit closures, especially since 1985, owing to the fall of the dollar. The restructuring process is still going on in Germany and France. In the United Kingdom production levels improved after the 1984/85 strikes and have remained high (as mentioned earlier, Britain produces almost half the Community's hard-coal).

### *Research and Development*

Vast sums have been invested in R&D in the industry, at both national and Community levels, as part of a drive to preserve employment in the spirit of the ECSC to which the industry has been linked since the inception of the EC. The annual research budget for coal in the ECSC today totals 22 million ECU and covers more than 170 projects. Research and development addresses four basic objectives:

- to reduce coal production costs by increasing productivity in the face of high mining costs
- to improve safety and working conditions
- to protect the environment
- to improve the status and use of coal industry products.

Remarkable progress has been made over the last few years. Underground mining rates have improved as a result of mechanization and automation and research is now being carried out to see how these new methods can be applied to the most difficult deposits. But to avoid bottle-necks the same improvements need to be made in areas such as tunnel construction, transport, computerized mine management, communications, monitoring techniques and prospecting.

As far as safety and working conditions are concerned, new problems have arisen because of the fact that mining has become more intensive, and pits deeper and more extensive. There are more and more problems of methane emission and ventilation and it is becoming increasingly difficult to control the seams (in order to guarantee the safety of mineworkers) and regulate climatic conditions in the mines.

Research is also being carried out to improve the status of coal as a product. With new mining techniques, coal contains more dirt, water and particles; coal preparation techniques must be improved, by automating wash houses for example. This means that fewer workers will be required to work in a noisy and dirty environment, and also that the final product will be of better quality, more uniform and easier to use for the end industrial consumer. Another reason for washing coal is to remove the extra sulphur content. As far as coke is concerned, research has concentrated on improving the profitability of production methods and the quality of the product and also reducing pollution. Other research has been devoted to improving the manufacture of electrodes for the steel and aluminium industries and developing applications for mining residues, which are becoming increasingly difficult to dispose of, in building and civil engineering. Research of a more scientific nature is also carried out to acquire a better understanding of the physical and chemical properties of coal.

There are two important programmes concerned with the development of new valorization methods. The oldest of the two deals with liquefaction and gasification of solid fuels. The channels explored so far include direct liquefaction (extraction by use of a solvent), indirect production of liquids using synthesized gases and hydrolysis. Although these methods appeared promising in the early 1970s, they have not produced any results that can be exploited on an industrial scale. Liquefaction has proved to be particularly complex and expensive. Hopes and efforts are now concentrated on a technique involving combustion on a fluid bed, which allows a wide range of fuels to be treated with minimal environmental effects. A range of methods have been investigated including stationary beds and circulating beds, under atmospheric pressure or high pressure.

## Forecast and Outlook

Overall gross energy consumption in the Community is expected to increase by less than 1% per year between 1980 and the year 2000. These forecasts and those that follow have been taken from Energy 2000, a document produced by the Commission of the European Communities and published in 1986. The trends for the long term are not likely to be seriously affected by recent events.

The share represented by solid fuels should remain relatively stable (around 23% in 1980 and in 2000). In other words, consumption will increase at the same rate of less than 1% a year, rising from 223 million toe for the EC 10 in 1980 to about 260 million toe in 2000. However these estimates may have to be revised slightly downwards if the drop in consumption recorded in 1986 (213 million toe) persists and if prices of the various fuels continue to fall over the medium and long term.

As far as future demand for solid fuels per customer sector is concerned, power station requirements are likely to increase except in a few countries such as France. Present electricity production methods are likely to undergo a number of changes under the pressure of demand and there is likely to be an increase in the number of nuclear and coal-fired stations. The latter are expected to consume mainly hard-coal and some brown-coal. Industrial consumption will increase through the development of steam power whereas the demand for coke from the steel industry should decrease due to a drop in steel production and a slight increase in the market share of electrically produced steel. The amount of coke needed to produce a tonne of pig iron in a blast furnace will also be reduced.

However, the demand for coal for non-energy purposes is expected to increase. This includes the use of coal for making oils, lubricants, asphalt, waxes and petroleum products, but carbochemistry is still a very minor activity.

The demand for heating coal will decline in the face of the growing use of natural gas and electricity.

**Table IV**  
**Forecast Energy and Solid Fuel Consumption**

| (Million toe)                             | 1980 | 2000  | CAGR (%)<br>2000/1980 |
|---|------|-------|-----------------------|
| Overall gross energy consumption          | 970  | 1 136 | 0.8                   |
| Gross energy consumption from solid fuels | 223  | 264   | 0.8                   |
| including:                                |      |       |                       |
| electricity generation                    | 130  | 178   | 1.6                   |
| industry                                  | 38   | 46    | 1.0                   |
| heating                                   | 22   | 13    | -2.6                  |

Source: "Energy 2000". Commission of the European Communities - 1986.

As European hard-coal industry earnings are based on the price of imported coals, and coal production costs in the Community are higher, losses of between 13 and 57 ECU/tonne were incurred in 1986.

Community hard-coal production levels for the period up to the year 2000 will depend on how far mining companies are able to improve their finances, by becoming more competitive in relation to imported coal and whether the various governments pursue their support policies so that unprofitable deposits can continue to be mined.

Some 15% of Community production sites can be considered prohibitive in terms of costs; these pits are therefore likely to be closed in the long run. As only 20% of Community production can be considered competitive in relation to imported coal, 65% of the coal industry is operating on a marginally unprofitable basis. It is difficult to predict what proportion of these 65% will be able to become competitive as a result of productivity improvements and what proportion will continue to be dependent on State aid. The projection shown opposite is based on the assumption that most of the non-competitive mines will remain open and that the effect of closures will be partly offset by increases in output resulting from the development of new pits and productivity increases in those already in operation. In this case Community production is likely to fall from 153 million toe in 1980 to about 137 million toe in 2000.

There are plans to develop brown-coal and peat production before 1990, but there appear to be no plans to increase production capacity after that date. Community brown-coal and peat production in 2000 can therefore be expected to remain at the 1990 levels of about 35 million toe.

Coal imports in the Community are likely to increase appreciably to cover the increasing demand from power

stations. Coal production in industrialized countries such as the USA, Australia, Canada and South Africa should rise substantially so that these countries may well increase their exports to Europe. Poland could also increase its exports.

Hard-coal imports could well double by the turn of the century, rising from 47 million toe in 1980 to 90 million toe in 2000. Import levels will depend on coal's share of the heating market in industry.

**Table V**  
**Potential Supply of Solid Fuel**

| (Million toe)   | 1980 | 2000 | CAGR (%)<br>2000/1980 |
|---|------|------|-----------------------|
| Domestic production (1)                                       | 185  | 172  | -0.4                  |
| hard-coal   | 153  | 137  | -0.6                  |
| brown-coal and peat   | 32   | 35   | 0.4                   |
| Possible net imports (1)<br>of hard-coal from third countries | 47   | 92   | 3.4                   |
| Possible total supplies (1)                                   | 232  | 264  | 0.6                   |

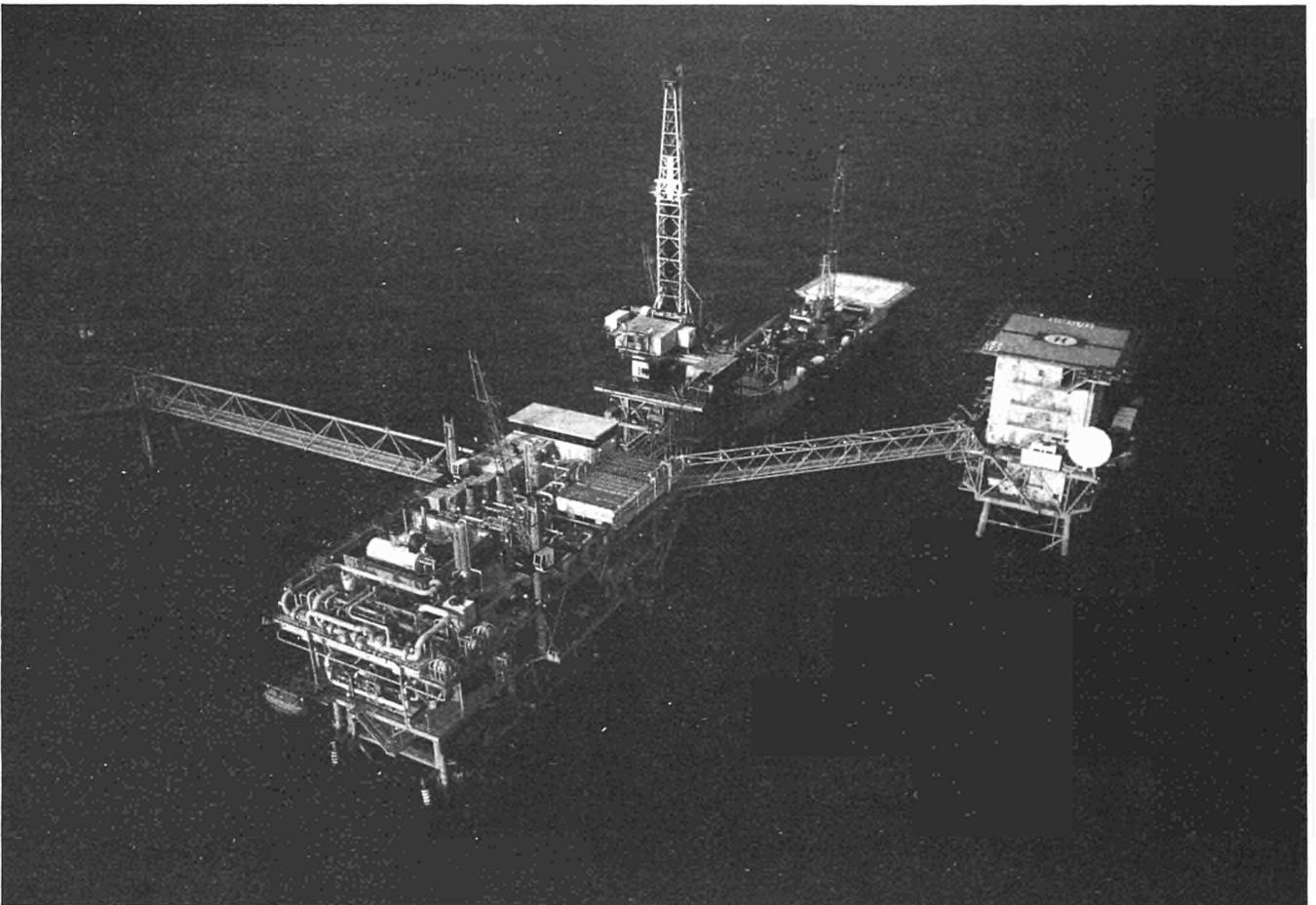
(1) EC 10  
Source: "Energy 2000". Commission of the European Communities. 1986.

About half of imports entering the Community in 2000 could come from the USA, a quarter from South Africa and the rest from Poland, Canada, Australia and perhaps the People's Republic of China.

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# EXPLORATION AND PRODUCTION OF CRUDE OIL AND NATURAL GAS

(NACE 13)

*Major changes took place in the environment for petroleum exploration and production activities in the EC countries during the 1980-1987 period: they resulted mainly from the crude-oil price evolution with large increases up to the end of 1985 followed by the abrupt 1986 fall. Activity trends for the near future assume that crude prices will probably fluctuate around an average level of USD 18/bbl.*

*Proven remaining crude-oil reserves are declining; natural gas reserves remain stable. This, together with current work programmes, will lead to a slight decrease in crude oil production in the short term, with natural gas production remaining at the current level.*

The development of petroleum exploration and production activities within the EC over the 1980-1987 period has been influenced by major changes in the oil industry environment arising from world crude price developments and also from government policies regarding direct State involvement in activities and applicable fiscal conditions.

Both crude-oil and other liquids as well as natural gas contribute significantly to the coverage of the EC's primary energy needs.

## Current Situation

The value of total EC crude and natural gas production is estimated at about 28 billion ECU (USD 38 billion) in 1980, with corresponding 1987 values being 29 billion ECU (USD 33 billion). Peaks in 1985 reached 67 billion ECU (USD 51 billion). These values are calculated on the basis of average CIF import prices.

Crude oil and other liquids production has increased by 58% since 1980, reaching 146.8 million tonnes in 1987. The UK plays a predominant role with 84% of the total EC oil production. Marketed natural gas production has remained stable, with the two main contributors being the Netherlands and the UK; production reached 165.3 billion cubic metres in 1987. Offshore activities in that year covered 93% of total crude production and 49% of the natural gas output. In sum, local crude-oil production now contributes to about 30% of total EC crude oil needs and 14% of total primary energy requirements; natural gas covers 67% of EC gas consumption and 12% of EC primary energy needs.

After continuous growth through 1985, exploration and development activities reacted to the new crude price environment with 20%-30% cuts in 1986-1987 relative to prior levels. Investment also suffered with a large decrease compared to peaks reached in 1984-1985. However, current depressed levels are still well above the 1980 mark.

OPEC prices increased in the early part of the period reaching a peak USD 34/bbl by the end of 1981 compared with USD 24/bbl at the end of 1979, then decreasing progressively until the end of 1985. Since the value of the dollar increased considerably in relation to European currencies, crude prices expressed in ECU/bbl continued their progression until 1985, peaking at about 40-41 ECU/bbl in the first quarter of 1985. This provided a strong incentive to European countries, which are very dependent upon crude imports, to conduct aggressive exploration and development programmes for local hydrocarbon production. The early 1980s were also marked - in most countries - by taxation changes increasing the government share of upstream activity profits.

## Main Indicators Crude Oil and Natural Gas

| (Million ECU)              | 1980    | 1981     | 1982     | 1983    | 1984     | 1985     | 1986    | 1987    |
|----------------------------|---------|----------|----------|---------|----------|----------|---------|---------|
| Apparent consumption       | 115 300 | 152 400  | 157 500  | 152 300 | 169 700  | 167 100  | 81 900  | 75 500  |
| Net export earnings (1)    | -87 700 | -110 200 | -107 400 | -98 100 | -105 800 | -100 600 | -46 600 | -46 800 |
| Total Community production | 27 600  | 42 200   | 50 100   | 54 200  | 63 900   | 66 500   | 35 300  | 28 700  |
| Employment (1 000) (2)     | N/A     | N/A      | N/A      | N/A     | 110      | 110      | 100     | 93.5    |

(1) Estimate based on BEICIP and BP Statistical Review sources.

(2) Approximate. Not available for the 1980-83 period.

As a result of market developments (with world-wide supply exceeding demand) and OPEC dissension, crude prices fell below USD 10/bbl by mid-1986, then recovered progressively, ranging from USD 15 to USD 18/bbl by mid-1988. Activity in the sector has obviously reacted to this new environment.

Table I shows the development of crude prices over the 1980-1987 period expressed in ECU/bbl and USD/bbl. Gas prices are also shown for perspective, reflecting (with a time-lag) oil price fluctuations.

Direct government involvement in operations has shown a declining trend; of particular significance is the privatization of the British National Oil Company - BNOC in 1981.

**Table I**  
**Average Crude Oil & Natural Gas Import Prices (CIF)**

|      | Crude oil |         | Natural gas |         |
|------|-----------|---------|-------------|---------|
|      | USD/bbl   | ECU/bbl | USD/Boe     | ECU/Boe |
| 1980 | 32.80     | 23.56   | 16.32       | 11.72   |
| 1981 | 36.52     | 32.71   | 20.02       | 17.93   |
| 1982 | 33.85     | 34.55   | 21.85       | 22.30   |
| 1983 | 30.05     | 33.76   | 20.53       | 23.06   |
| 1984 | 29.00     | 36.75   | 20.17       | 25.56   |
| 1985 | 27.59     | 36.16   | 20.61       | 27.01   |
| 1986 | 14.42     | 14.65   | 19.36       | 19.67   |
| 1987 | 18.05     | 15.75   | 13.48       | 11.76   |

Sources: Eurostat, IEA.

Currently, there is increasing competition for the awarding of exploration permits, with smaller surfaces being granted to more numerous entities, including minor independents. This has been especially marked for North Sea operations, for activities off Denmark with the end of the bulk of DUC exclusive rights, in the Paris Basin in France and elsewhere.

Tax conditions also tend to progressively recognize the changing crude-oil price environment, as well as more difficult technical conditions for finding and developing hydrocarbons, with smaller discoveries and higher development and production costs.

### *Factors behind Production Trends*

#### **Oil reserves**

Proven remaining oil reserves in the EC have fallen from about 1 330 million tonnes at the end of 1980 to 910 million tonnes by the end of 1987. This decrease essentially reflects a drop in the UK, from 1 125 million tonnes down to 690 million tonnes; reserves elsewhere remained stable, in the 200-220 million tonnes range.

The fall in the UK illustrates the trend towards intensive exploration with decreasing "yield" and higher costs.

In regard to the other EC countries, remaining reserves are declining in Germany, with numerous small discoveries not entirely offsetting production as in Spain and Greece. Reserves have been increased in Denmark and the Netherlands due to offshore discoveries, with improvements for France coming from the new discoveries in the Paris Basin.

On the basis of proven reserves only, the reserve to production (1987 base) ratio, usually expressed in years, is recorded at a low six-year average for the EC with a somewhat lower UK figure, and an average 9.5 years for the other EC countries. Of more significance are the corresponding ratios on the basis of proven and probable reserves which are set at 11.5 years and 10.5 years for the EC total and the UK respectively. However, total proven and probable reserves also show a declining trend. Sizeable reserves in Norway add very substantially to the total crude oil resource available to Western Europe and the EC.

#### **Natural gas reserves**

In contrast to crude reserves, proven natural gas reserves have slightly increased, reaching about 3 100 billion cubic metres at the end of 1987, compared with about 2 900 billion cubic metres at the end of 1980. This reflects a modest decrease for the UK, an increase in the Netherlands and a sizeable 15% increase for other EC countries.

In the future, considerable reserves could be added for both crude and natural gas. This may come from the firming up of large reserves currently in the "possible" category, especially in the UK, and from new finds, provided exploration continues at a proper level. However, this would not have any sizeable effect on current short-term production projections considering, in particular, substantial delays of four to five years or more for developing new offshore resources.

UK reserves have stabilized in the Southern Basin with declining reserves elsewhere; a large number of small gas discoveries have been added to the resource base. In the Netherlands, total numbers reflect a less conservative approach, given Groningen proven reserves, and a slight increase in offshore reserves with large finds not entirely offset by production.

In the other EC countries, proven reserve levels remained stable in Germany, increased somewhat in Denmark, Ireland and Spain, decreased in France with the depletion of Lacq field reserves and showed a substantial increase in Italy.

In total, the ratio of proven reserves to production moved from 17 years in 1980 to 18.5 years in 1987. The ratio for 1987 increases to 25 years on the basis of proven and probable reserves. Here again, the very large gas resource base in

Norway improves these numbers substantially taking into account all Western European countries.

Table II compares the crude and natural gas reserve situation in the EC, the USA and world-wide, together with production figures.

### Technological Developments

The significant share of offshore operations in overall EC activity has given impetus to large R&D programmes in this specific area. High crude price levels prevailing through 1985 also led to research in the field of enhanced recovery, with programmes now dormant. Other programmes have been aimed at improving tools and operations efficiency for both exploration and production with a view to reducing costs.

Most of these programmes have been carried on with partial EC funding. They have produced remarkable achievements and fostered, at least until 1985, a large growth of service and equipment supply activities, not only within the EC, but also elsewhere through major exports in Europe and the world. This branch of activity now plays a major role and ranks second after the American industry, well ahead of other countries. Due to the deep and severe conditions in the North Sea, European oil companies as well as the service and equipment industry have gained unique experience in offshore operations and continue to play a leading role worldwide in some advanced technologies or oilfield practices.

The following technical achievements, among many others, have been registered:

- the development of new systems for collecting, processing and interpreting geophysical data;

- the development of drilling installations on dynamically positioned vessels, capable of drilling for oil and gas at water depths of as much as 2 000 metres, and the completion in the Adriatic Sea of the first commercial horizontal drilling operation;
- the development of new platform concepts including tension leg platforms (TLP) and floating production systems for early production operations;
- the development of deep-diving techniques and of submarine vehicles for underwater works;
- the implementation of pilot projects for enhanced recovery of oil and gas (CO<sub>2</sub> injection, polymers, etc.);
- the pipelaying trials in Sicilian waters leading to the construction of the first subsea gas-line linking Africa to Europe, which is now conveying 12 billion cubic metres per year of Algerian natural gas to Italy.

### Trends in Member States

#### Liquids production

Liquids production, including crude oil, condensate and other liquids from gas-treating operations, increased sharply, reaching 146.8 million tonnes by 1987 compared with 92.6 in 1980 and representing an increase of 58%. For perspective, in 1975 total Community production was only 14 million tonnes.

The UK plays a dominant role in this overall production, with figures of 123.3 and 80.5 million tonnes respectively for 1987 and 1980. This corresponds to 84% of total EC production in 1987 compared with 87% in 1980. As a result of the impact

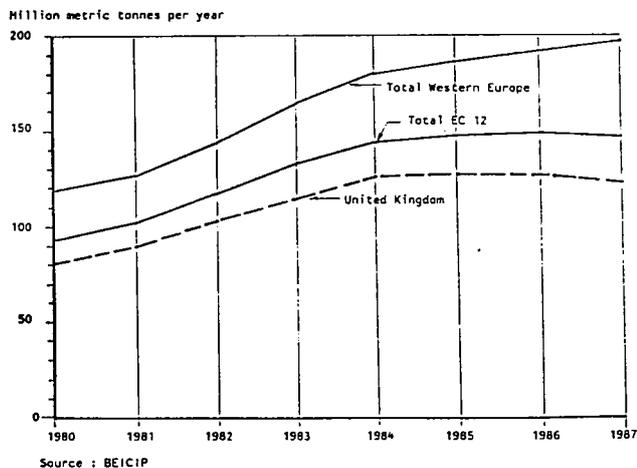
**Table II**  
**Crude Petroleum and Natural Gas:**  
**Comparison between EC, USA, World**

|  | EC    | EC    | USA   | USA   | World  | World   |
|--|-------|-------|-------|-------|--------|---------|
|  | 1980  | 1987  | 1980  | 1987  | 1980   | 1987    |
| <b>Production</b>                            |       |       |       |       |        |         |
| Crude and other liquids (Million tonnes)     | 92.6  | 146.8 | 475.6 | 460.7 | 3 081  | 2 918   |
| %  | 3%    | 5%    | 15.5% | 16%   | 100%   | 100%    |
| Natural gas (Marketed)(Billion cubic metres) | 167.6 | 165.3 | 549.1 | 462.6 | 1 531  | 1 890   |
| %  | 11%   | 9%    | 36%   | 24%   | 100%   | 100%    |
| <b>Reserves: Proven remaining year-end</b>   |       |       |       |       |        |         |
| Crude and other liquids (Million tonnes)     | 1 330 | 910   | 3 602 | 3 447 | 90 920 | 121 550 |
| %  | 1.5%  | 0.8%  | 4%    | 3%    | 100%   | 100%    |
| R/P years                                    | 14.5  | 6.2   | 7.5   | 7.5   | 29.5   | 41.5    |
| Natural gas (Billion cubic metres)           | 2 930 | 3 120 | 5 405 | 5 290 | 74 670 | 107 660 |
| %  | 4%    | 3%    | 7%    | 5%    | 100%   | 100%    |
| R/P years                                    | 17    | 18.5  | 10    | 11    | 49     | 57      |

Sources: World oil and official and statistics EC countries.

of the UK North Sea fields and other offshore developments elsewhere, 93% of the 1987 EC production comes from offshore fields, compared with 87% in 1980.

Figure I  
LIQUIDS PRODUCTION  
Crude oil, condensates & other liquids



A high level of activity has taken place in the UK North Sea continental shelf. At the end of 1987, 35 oil fields were in production with nine others under development and 19 projects at the appraisal stage; this compares with 15 oil fields in production at the end of 1980, and nine fields under development. In total, 43 platforms were in operation for oil production at the end of 1987, compared with 28 at the end of 1980. Production increases over the period have essentially been fostered by large fields developed pre-1980, such as Beryl, Brent, Forties, Ninian, Piper and the UK portion of the Statfjord field - all of which are over the 100 million tonnes reserve mark - and new development activity on pre-1980 discoveries. A small number of finds made during the 1980-1987 period were already developed by year-end 1987 but contributed only marginally (0.5 million tonnes) to 1987 production. By the end of 1987, four large oil terminals were receiving North Sea crude ashore. Eight UK on shore fields are also currently in production.

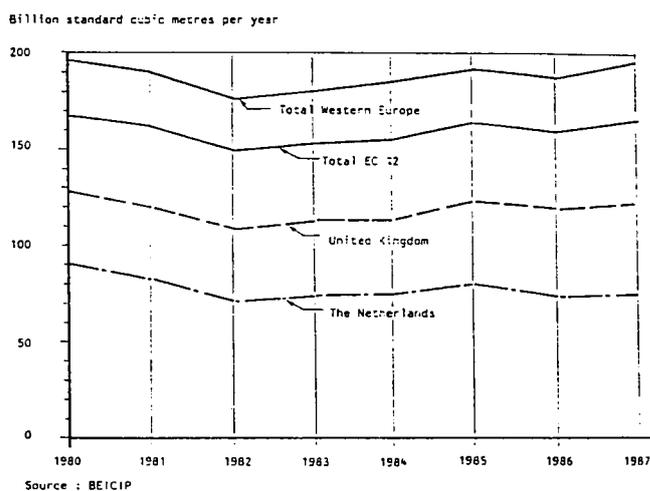
In the other EC countries, production increases have occurred in the Netherlands (from 1.6 to 4.7 million tonnes), Denmark (from 0.3 to 4.6 million tonnes), Italy (+ 1.1 million tonnes) and France (+ 1.4 million tonnes). Production has declined in Germany (-0.8 million tonnes), in offshore Spain since 1983 (Amposta, Casablanca and others, now at 1.6 million tonnes) and in Greece.

In total, production in the EC 11 (excluding the UK) reached 23.5 million tonnes in 1987, compared with 12.2 million tonnes in 1980, showing a 93% increase over the period.

## Marketed natural gas production

Natural gas production has remained very stable in the EC, at 165.3 billion cubic metres in 1987 compared with 167.6 billion in 1980. For perspective, the corresponding values for 1975 and 1970 were 171 and 77 billion cubic metres respectively. The two main contributors are the Netherlands, where production declined from 90.3 billion cubic metres in 1980 to 74.9 in 1987 (or 45% of the 1987 EC total), and the UK with production increasing from 37.3 to 47.6 billion cubic metres (29% of the total EC). Offshore gas now represents nearly 50% of the total compared with 35% in 1980.

Figure II  
MARKETED GAS PRODUCTION



In the Netherlands production from the giant onshore Groningen field (discovered in 1959) decreased from 65 billion cubic metres in 1980 (or 72% of total Dutch production) to 43 billion in 1987 (or 58% of the total). This decrease has been partly offset by other mainland production (+ 1.4 billion cubic metres) from Drenthe, Noord Friesland and others and offshore production (4.9 billion cubic metres). In total, 54 gas platforms are currently in operation.

In the UK, Southern Basin gas production has remained stable and now covers 63% of total production (80% in 1980). By the end of 1987, 16 gas fields were in production (Southern Basin, East of Scotland, East of Shetlands) with one field - Morecambe - in the Irish Sea; seven others were under development. At the end of 1980 only seven fields were in production. Nine gas-receiving terminals are in operation for offshore gas with six for the Southern Basin area.

Gas production for the other EC 10 countries has increased from 40 billion cubic metres to 42.8 billion, with production started in Denmark, Spain and Greece. Production increased in Italy and declined in Germany and France. The two main contributors to 1987 production within this group were Germany (17.7 billion cubic metres) and Italy (16.3 billion cubic metres).

## Exploration and Development Activities

The 1980-1985 period saw continuous growth of both exploration and development activities. Activities declined significantly in 1986-1987 because of the 1986 fall in crude prices. After the low levels of activity at the end of 1986 into early 1987, there was a marked tendency towards recovery, especially in the UK sector of the North Sea. In total, current depressed levels are still well above the 1980 mark. In general, the decline in activity in the EC, with a 20%-25% decrease in typical indicators, was far less marked than in the USA where falls of 50% or more were recorded in seismic and drilling rig activity

For the EC overall, the area covered by exploration and production licences has decreased from an estimated 0.9 million square kilometres at the end of 1980 to 0.73 million square kilometres at the end of 1987. About 40% of the total surface is for offshore permits. After the large increase over the 1980-1985 period, seismic activity suffered most from falling crude prices with cuts of the order of 40% comparing the 1987 level to peak activity in 1985.

The number of exploration and appraisal wells drilled over the period peaked at about 500 wells in 1985, decreasing to some 400 wells in 1987. Offshore drilling was severely cut in 1986, then recovered: the current level is 30% below the 1985 peak. Cuts in onshore drilling were only noticeable in 1987 with continuing high levels in Italy and France in 1986. Activity is split nearly 50/50 for onshore and offshore.

Development drilling activity showed a growth trend up to 1985 when a pronounced peak of about 500 wells was reached due to development of recent finds in the Paris Basin and in offshore Netherlands. Subsequently, activity declined with the 1987 level about 30% below the 1984/85 average. UK offshore activity was severely cut in 1987 but is now recovering.

Activity over the short term is likely to be stable and at levels similar to the end of 1987. This indicates a slight recovery compared with average 1986-87 levels.

The figures above show that drilling efforts depend heavily on the international market price of gas and crude oil. Table III shows the total number of wells drilled in the EC, the USA and the world over the 1980-87 period.

As regards exploration and development investments, the average 1984-1985 level of investment expenditure may be estimated at about 11.5 billion ECU/year or USD 9 billion/year, with about 65% of that total in the UK alone. Comparing the 1987 level with the 1984/1985 peak, cuts are close to 40% expressed in ECUs but reduced to about 20%, in dollar terms, due to exchange rate movements. This brings the 1987 figure down to about 6.3 billion ECU or USD 7.2 billion. Exploration expenditures alone would correspond to some 35% of this total.

United Kingdom offshore operating costs are given at a current USD 3/bbl level. The average cost of producing oil, including related exploration, development and operation, including a 10% return on investment before taxes, is given at a rounded figure of 1987 USD 11/ bbl for larger fields developed prior to 1980. Costs for more recent developments of smaller fields are much higher: USD 16/bbl for fields which started production between 1980 and 1987. This results in an average USD 13/bbl for all fields currently under production. Cost reductions are being achieved as a result of more efficient operations and decreasing service costs; therefore, short term developments are projected at USD 10 - 12/bbl, this also reflecting screening of development projects.

For other EC countries, total producing costs, including depreciation, are reported in a USD 9 - 15/bbl range. The crude price fall in 1986 has led to non-economic conditions for the exploitation of marginal onshore fields and wells. It is estimated that, at the end of 1987, some 1 200 to 1 300 wells, the bulk of them in Germany, were shut-in as a result of new crude price levels; however, this only represented a marginal decrease in production.

## Employment Trends

A rough estimate of direct employment in oil and natural gas exploration and production sectors stood at 100 000 to 120 000 persons in 1984-1985. A decrease of about 15% is likely to have resulted from measures taken after the fall of crude prices in 1986.

In addition, the service and equipment supply industry in the EC ranks second immediately after that of the USA with an estimated 20% share of the world market, compared with

**Table III**  
**Number of Wells Drilled (exploration, appraisal, development)**

| (Thousands) | 1980 | 1981 | 1982 | 1983 | 1984  | 1985 | 1986 | 1987 |
|-------------|------|------|------|------|-------|------|------|------|
| EC          | 0.62 | 0.73 | 0.83 | 0.78 | 0.88  | 1.00 | 0.85 | 0.72 |
| USA         | 64.8 | 80.6 | 79.5 | 67.1 | 83.6  | 69.7 | 39.4 | 40.4 |
| World       | 85.3 | 98.7 | 99.9 | 87.6 | 107.2 | 96.6 | 59.5 | 60.2 |
|             | 100% | 100% | 100% | 100% | 100%  | 100% | 100% | 100% |

Source: BEICIP.

Figure III

EXPLORATION DRILLING  
Number of wells drilled per year (1)

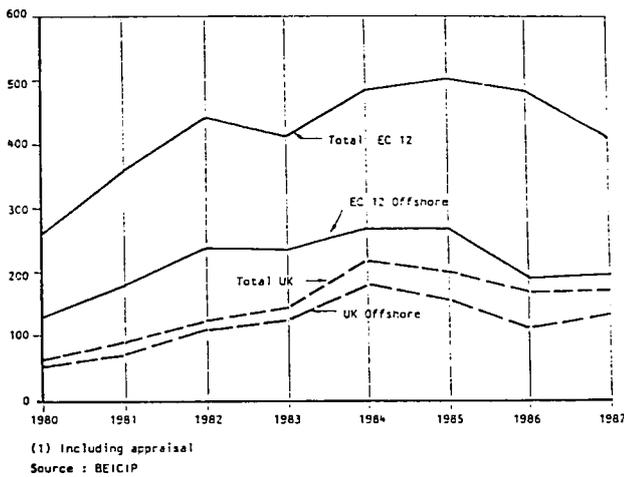
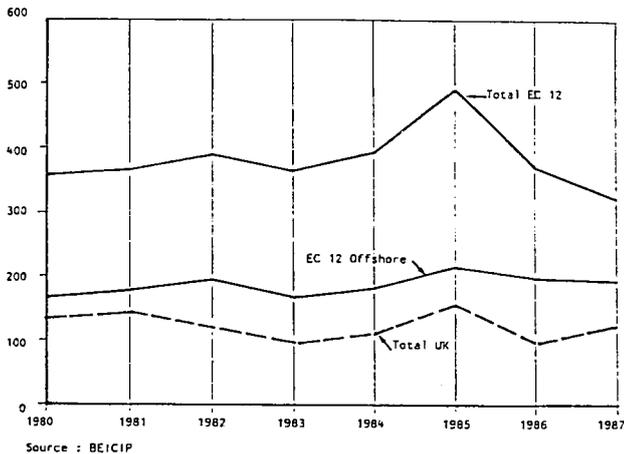


Figure IV

DEVELOPMENT DRILLING  
Number of wells drilled per year



60% for the USA. Employment for the period 1984-1985 is estimated at over 200 000 people (100 000 to 120 000 for the U.K. alone, where indirect employment is around three to four times higher than direct employment). Large decreases,

of 30-35% or more, have been quoted as resulting from the fall in activity after the 1986 crisis.

Nevertheless, exploration and production activities, including related and induced activities, play a major role in the EC in terms of employment of highly qualified and experienced personnel. In addition, due to the emphasis given to innovative research and development programmes, EC firms have an internationally recognized expertise regarding exploration and production technology. Consequently, the volume of EC exports of related equipment and services, both to developed and developing countries, should increase in the future, provided that R&D efforts are maintained.

## Forecast and Outlook

Medium-term projections anticipate crude and other liquids production below current levels with a value for 1990 of about 130 to 135 million tonnes; this is supported by current reserve levels and continuing offshore development programmes, especially in the United Kingdom. In the latter, it is expected that there will be a production decline from fields already in production, a number of them since the mid-1970s. Natural gas production is likely to remain stable through 1990, at about 166 billion cubic metres per year, taking into consideration a reserve situation more favourable than for crude, as well as recent discoveries and current development activities.

Other Western European countries will play an important supply role for EC countries. Continuous growth can be expected in Norway through 1990 for crude production, with the impact of current programmes on natural gas production and supplies being felt after 1990.

The above is based on the assumption that crude prices will probably remain at current levels - between USD 15/bbl and USD 18/bbl in constant USD/bbl terms - through 1990.

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# REFINING AND DISTRIBUTION OF OIL PRODUCTS

(NACE 140)

Since the second oil crisis, the Community has taken measures to increase energy conservation and to promote the use of alternative energy sources in place of oil. As a result of these measures and the rise in oil prices, and in a context of reduced economic growth, consumption of petroleum products in the Community has decreased. This trend was reversed with the spectacular fall in crude-oil prices in 1986, when consumption rose by 4% to 500 million tonnes (Mt) compared with 481 Mt in 1985 but 13% lower than 1980 (572 Mt). The reduction in demand since 1980 has affected petroleum products, particularly heavy fuel oil and heating oil. At the same time, consumption of gasoline, diesel oil and jet fuel has continued to rise. The increasing share of light and middle fractions has meant that the refining industry has had to adapt through closure of the least efficient refineries and investment in conversion units.

Lower demand and reduced refining capacity has been accompanied by an increase in imports of petroleum products from third countries.

In order to be complete, analysis of the European oil industry has to be carried out on three levels: the oil market, refining and distribution. These three levels will be successively examined below.

Crude oil prices, expressed in USD, reached their peak in the second half of 1980 (USD 41/bbl for Arabian light on the spot market).

In consumer countries, this second oil crisis brought on an economic recession and reinforced fears of energy shortages

and new price rises. As a consequence, measures were taken in the Community to increase energy conservation and to promote the use of alternative energy sources: coal, gas and nuclear power. As a result of these measures and the rise in oil fuel prices combined with economic stagnation, oil consumption in the Community fell from 572 Mt in 1980 to 486 Mt three years later, a fall of 15%. This fall affected petroleum products in competition with other fuels, more especially heavy fuel oil and heating oil. At the same time gasoline consumption stabilized, as did consumption of petroleum products for petrochemical industries, while diesel and aviation fuel continued to increase.

This trend was reversed following the spectacular fall in prices in 1986, during which a low was reached of USD 10/bbl, accentuated by economic upturn and weakness of the dollar against European currencies. Consumption increased by 3% in 1986 over the previous year and is currently running at around 500 Mt per year. No great increase in demand is expected over the medium term, given unchanged levels of taxation and oil prices at around USD 17 to USD 20/bbl. On the contrary, heavy fuel oil needs for electricity generating plants should fall, other things being equal.

However, the Community refining industry has had to face more than a decline in internal consumption. Outlets have been cut off by a strong increase in imports from outside, some of which are made up of semi-refined products bought by refiners themselves, although statistics are not reliable. Under current market conditions, it is often cheaper to supply transformation units with these semi-refined products than to distill additional crude oil. The amount of crude oil refined has fallen much more than consumption.

## Main Indicators Mineral Oil Refining

| (Million tonnes)               | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  | 1987  |
|--------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Apparent consumption (1)       | 572.1 | 526.8 | 502.2 | 486.3 | 495.4 | 481.1 | 500.4 | 503.0 |
| Net exports (2)                | -21.0 | -19.3 | -37.8 | -37.3 | -45.7 | -46.5 | -46.8 | -59.7 |
| Total Community production (3) | 531.9 | 476.1 | 443.1 | 430.6 | 432.5 | 419.7 | 445.6 | 437.1 |
| Employment (1 000) (4)         | 157.9 | 149.5 | 151.6 | 145.4 | 144.0 | 140.0 | 126.6 | N/A   |

(1) Including bunkers and refineries' own consumption.

(2) Exports - imports of refined products, all destinations and all sources.

(3) Net refinery production.

(4) Estimates for Greece and Portugal and for Italy in 1986.

In this context, the refining industry has been going through a period of profound adaptation, and this period is probably not over. Fifty-one refineries have closed since 1977, 45 of them since 1980. Distillation capacity has been reduced from about 900 Mt per year to 600 Mt per year, and reforming capacity has fallen by about 20%.

At the same time as this disinvestment has been taking place, new equipment has been constructed to adapt product supply to the new structure of demand, that is, to reduce the proportion of heavy fuel oil in total production. Investment has also been necessary to improve the quality of products in line with users' demands and to protect the environment. As certain companies have withdrawn from several markets, so new operators have appeared. These are for the most part the national companies of petroleum exporting countries keen to secure stable outlets for their production.

The Community refining industry has been deeply in the red over the whole of the period 1980-1988 apart from the first half of 1986, when unusual circumstances prevailed.

Changes in distribution since 1980 have been no less spectacular in some ways. This sector, however, is more diversified, depending on the domestic constraints in different countries: taxation levels, professional practices, retail developments and cooperation of the banking sector.

In general, distribution networks have been radically restructured since 1980 under the pressure of competition. The number of retail outlets has fallen from 160 000 to about 130 000, a drop of 20% on average for the EC, and reaching some 30% in some countries such as France.

## THE OIL MARKET

### Current Situation

#### *Crude Oil and Petroleum Products Pricing*

##### Crude oil prices

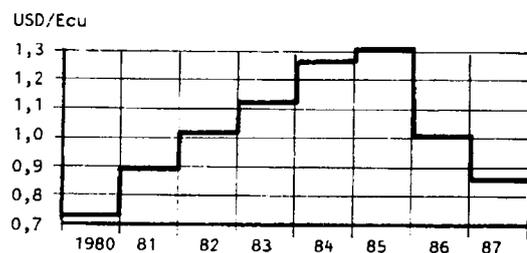
The oil crisis in late 1973 and early 1974 resulted from the joint decision of OPEC members to increase crude oil prices. And yet, the second wave of increases between September 1979 and October 1980 after five years of more or less stable prices, originated in increases in the price of refined products on international markets. Crude oil prices, pushed upwards by panic buying triggered off by political events in the Middle East and imitating prices for refined products, almost tripled, from USD 12 to USD 34/bbl, with spot prices sometimes even exceeding USD 40/bbl. Thus the period under examination begins in the middle of the oil crisis.

From 1982, these high price levels accelerated the restructuring of the oil market. Three main factors, the marked drop in

the production of OPEC countries, which led them to set production quotas, the growing importance of non-OPEC producers, and the fall in world demand, led to the decision on 14 March 1983 at the OPEC conference in London to lower the market price of Arabian Light by USD 5/bbl, setting it at USD 29/bbl.

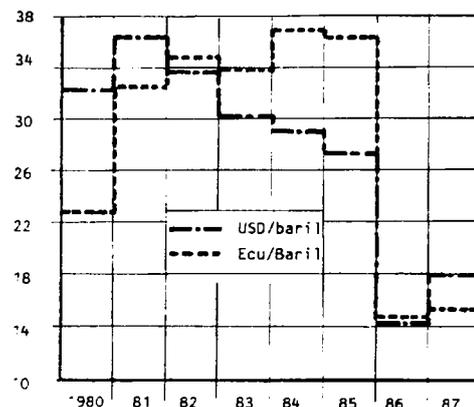
For oil-importing countries, however, the rapid and sustained rise of the dollar between the second half of 1980 and early 1985 not only wiped out the drop in crude prices but on the contrary made oil prices expressed in ECU even higher, to the point where the dollar effect could be regarded as a third oil crisis.

Figure I  
EXCHANGE RATES



Source : CPDP

Figure II  
SUPPLY COSTS



Source : CPDP

1985 was a key year. The dollar fell rapidly over the second half of the year and crude-oil prices began to fall at the end of the year following Saudi Arabia's decision to stop being a swing producer and to find again its right market share. This led to OPEC giving up production controls and the grid of official prices. From then on, with crude supply far outstripping demand, the fall in prices accelerated to reach bottom point in July 1986 at about USD 8/bbl.

From this very low level, crude-oil prices began to rise again in two steps:

- firstly, the decision taken by OPEC at their conference in Geneva (28 July - 5 August, 1986) to reduce production by returning to the quota system allowed crude-oil prices to rise quickly to around USD 15/bbl;
- secondly, the OPEC conference in early December 1986 in Geneva set up a price objective of USD 18/bbl accompanied by a reduction in quotas, set with the exclusion of Iraq. (The rise in prices was helped by dropping the practice of purchase contracts with guaranteed margins, known as "net-back" contracts.)

The USD 18/bbl price was reached in early 1987. Since then, crude prices have varied between USD 15 and USD 18/bbl depending on fluctuations in OPEC production and political events in the Persian Gulf.

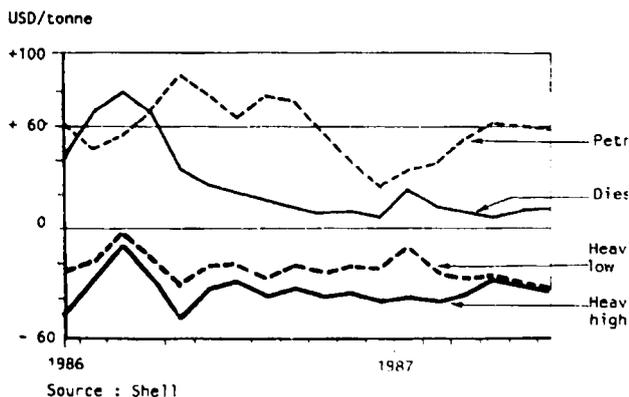
### Petroleum products

Changes in prices of refined products seems less regular than for crude oil, partly because they are more reactive to changes in market conditions resulting from an increase in the number of operators and partly because of seasonal variations in demand, gasoline demand being stronger in summer and heavy fuel oils in winter. Prices of heavy fuel oil intended mainly for industrial use are less subject to sudden changes, while prices of heating fuel oil are more reactive to climatic conditions.

Figure III

#### RELATIVE PRICES OF PETROLEUM PRODUCTS

Platts average bulk price compared to f.o.b. Rotterdam price of



After five years of relative stability, the prices of petroleum products on free markets rose steeply from the beginning of 1979 due to growing tension between Iran and Iraq; this rise later led to the rise in crude-oil prices. Prices for premium gasoline and diesel oil were practically at their peak at the beginning of 1980 (USD 400/tonne for premium gasoline and USD 245/tonne for diesel oil). The general trend in

prices for these two products, taking into account seasonal and climatic variations and typical anticipations on the spot markets, is fairly close by the trend of crude-oil prices. The price of HSC heavy fuel oil on the other hand, starting at around USD 170/tonne, rose very sharply at the end of 1980 due to the purchase of fractional residues for cracking which, coming on top of normal heavy fuel oil purchases, pushed prices up further than crude oil price increases.

The coal miners' strike in Britain (March 1984 - March 1985) kept HSC heavy fuel oil prices high at a time when prices for other petroleum products were falling, the British Central Electricity Generating Board having become Europe's major purchaser. Price differentials between HSC and LSC heavy fuel oils gradually disappeared during the strike period. When it ended, HSC heavy fuel oil prices fell by some USD 60 in a few months.

The fall in crude-oil prices in late 1985 and early 1986 had similar effects on the prices of refined products. In July 1986 monthly average prices on the Rotterdam free market had fallen to USD 180/tonne for premium gasoline, USD 90/tonne for diesel oil and USD 50/tonne for HSC heavy fuel oil.

The trend in Community supply costs, expressed in dollars per tonne, was very close to that of refined products on international markets. The effect of the rise in the dollar, however, was keenly felt in terms of supply costs calculated in ECU per tonne. Differentials between refined products and crude oil, however, showed large variations, as can be seen from the graph.

Changes in the differential between heavy fuel oil and premium gasoline on the one hand and heavy fuel oil and diesel oil on the other hand depend on the profitability of catalytic cracking and visbreaking plants.

### Crude and Petroleum Products Supply

#### Crude oil

For the majority of Community members, crude-oil supply depends on imports from third countries. The United Kingdom, which produces more than its own needs, nevertheless imported some 37 Mt from third countries in 1987 (41 Mt from all origins) and exported 30 Mt (83 Mt to all destinations).

Table I summarizes the situation between 1980 and 1987.

The level of self-sufficiency in crude oil in the Community has considerably increased. Community production now represents 30% of crude processed due to North Sea oil (UK production has increased from 78 Mt to 118 Mt). The production of crude oil in countries other than the United Kingdom has

grown considerably (23 Mt in 1987 compared with 12 Mt in 1980), owing to the efforts in research and development.

**Table I**  
**Production and Foreign Trade**

| (Million tonnes)                                 | 1980 | 1987 | % Variation |
|--|------|------|-------------|
| Production of crude oil (excluding condensates)  | 90   | 141  | + 57        |
| Imports from third countries                     | 488  | 347  | - 29        |
| Exports to third countries                       | 13   | 31   | + 138       |
| Processed crude (1) (including other feedstocks) | 570  | 479  | - 16        |

(1) The difference between crude-oil resources and crude processed is due to the fact that imports of feedstocks (which are counted as processed crude) are not counted as imports of crude oil in customs statistics but as imports of refined products.

Source: Eurostat.

Imports by value of crude oil have plunged by over 50% between 1985 and 1986 as a result of the fall in the dollar price of crude, reinforced by the fall of the dollar against the ECU. Import trends from third countries are very different from one country to another. They have fallen by about a half in Germany and France, by 25% in Belgium and by 10% to 15% in Italy, Spain and the Netherlands. United Kingdom imports have fallen by only 18% despite a marked increase in production, but exports to third countries have risen from 13 Mt to 30 Mt over the same period. The importance of the Near East in European supply has considerably diminished: from two thirds of the imports from third countries, it represented less than 40% in 1987, the OPEC share falling from 85% in 1980 to around 60% in 1987.

The tonnage processed has decreased by 16% in seven years, with feedstocks representing a growing share of this total. The link with changes in exports of refined products and consumption of petroleum products over the same period will be discussed later.

Although they have grown, exports of crude oil from the Community to third countries remain modest: from 13 Mt in 1980, they reached 31 Mt in 1987 with the United Kingdom accounting for almost the whole of this figure (30 Mt). The United Kingdom exported a total of 83 Mt in 1987, including supplies to its Community partners.

### Petroleum products

The trend in imports of refined products is totally different from that of crude oil. Whereas crude processed and imports of crude oil decreased significantly, imports of refined products did the opposite. From 127 Mt in 1980 they rose to 164 Mt for the EC as a whole, all origins and all products included (thus including trade within the Community), an increase of 37 Mt or 29%.

Table II summarizes developments for the EC as a whole.

**Table II**  
**EC Imports of Refined Products**

|                                | 1980 | 1987 | Variation Mt | Variation % |
|--------------------------------|------|------|--------------|-------------|
| Imports from third countries   | 66   | 108  | + 42         | + 64        |
| Including:                     |      |      |              |             |
| industrialized third countries | 14   | 22   | + 8          | + 57        |
| developing countries           | 31   | 45   | + 14         | + 45        |
| State-trading countries        | 21   | 41   | + 20         | + 95        |
| Imports from third countries   | 66   | 108  | + 42         | + 64        |
| Including:                     |      |      |              |             |
| light oils (1)                 | 16   | 21   | + 5          | + 31        |
| middle oils (1)                | 1    | 1    | -            | -           |
| diesel                         | 15   | 30   | + 15         | + 100       |
| fuel oils                      | 26   | 43   | + 17         | + 65        |
| other products                 | 8    | 13   | + 5          | + 63        |

Variations are not entirely significant in so far as 1987 results are for EC 12 and 1980 results for EC 9.

(1) Light distillates include naphtha and automobile and aviation fuel; middle distillates include kerosene and jet fuel; fuel oils include occasionally important feedstock tonnages.

Source: Eurostat.

Key factors in the development of imports of refined products were as follows:

- a sharp rise over the period in imports of refined products, particularly diesel oil, for which imports from third countries doubled (imports of fuel oils rose by 65% and light products - naphtha and gasolines - by 30%);
- growth in the share of third countries, particularly developing countries and central planned countries, supplying Community members with refined products; in 1987, 56% of total imports came from third countries compared with 51% in 1980 and out of this figure almost 21% were from developing countries compared with 16% in 1980;
- a sharp fall in 1986 in the cost of imports of refined products with a total of 13 billion ECU for all imports from third countries to the EC compared with 29 billion ECU in 1985 and about 13 billion in 1980; (the bill for-crude oil imports from third countries in 1986 was 36 billion ECU for EC 12 compared with 76 billion in 1985 and about 70 billion in 1980);
- by country, a particularly marked growth for Italy, when imports from third countries doubled (from 16 Mt to 32 Mt) between 1980 and 1987, and for the United Kingdom, up from 4 Mt to 13 Mt over the same period.

## Petroleum Products Exports

Total exports (including trade within the Community) for the EC, which rose from 118 Mt in 1980 to 133 Mt in 1983, reached the 137 Mt level in 1987. Over this period exports decreased by 3 Mt in France and by 2 Mt in the Netherlands, and increased sharply in Spain (8 Mt).

The trade balance (feedstocks excluded), which was negative by some 10 Mt for the EC in 1980, dropped to about 27 Mt in 1987. The main countries in deficit were Germany (35 Mt), France (about 19 Mt) and Italy (9 Mt); countries in surplus were the Netherlands and, to a lesser extent, the United Kingdom and Belgium, Spain and Greece.

### Refinery production

Total net production (i.e. excluding refinery consumption) in the European Community fell significantly over the period, from 532 Mt in 1980 to 437 Mt in 1987. The breakdown by products is shown in Table III.

**Table III**  
Breakdown by Principal Products of Total Refinery Production

| (Million tonnes)   | 1980 | % Share | 1987 | % Share | % Variation |
|--------------------|------|---------|------|---------|-------------|
| Total production   | 532  | 100.0   | 437  | 100.0   | -18         |
| Including:         |      |         |      |         |             |
| LPG                | 12   | 2.3     | 14   | 3.2     | +17         |
| Naphtha            | 19   | 3.6     | 15   | 3.4     | -21         |
| Motor fuels        | 95   | 17.9    | 103  | 23.6    | +8          |
| Kerosene/jet fuel  | 27   | 5.1     | 30   | 6.9     | +11         |
| Total diesel       | 178  | 33.5    | 151  | 34.6    | -15         |
| Residual fuel oils | 170  | 32.0    | 95   | 21.7    | -44         |
| Lubricants         | 6    | 1.1     | 6    | 1.4     | -           |

Source: Eurostat.

The essential feature shown by this table is the fall in residual fuel oils, where production was halved, and the drop of 15% in the gas oil fraction. Production of motor gasoline on the other hand rose slightly and now represents 24% of total production compared with 18% in 1980. This trend is of course linked to that of consumption, which will be examined later.

The situation differs significantly from one country to another depending on the energy context and policies for electricity production, energy conservation and so on. The following features may be noted:

- a sharp fall in net refinery production between 1980 and 1987 in France (about 40%), Germany (about 30%), Italy and Belgium (about 20%), remaining more or less stable in other countries;
- a production structure in which the share of residual fuel oils was particularly small in 1987 in Germany, France and the United Kingdom and a correspondingly high

proportion of motor gasoline compared with other countries; (the share of gasoil was smaller than the average in the United Kingdom - 28% against 35% - and larger than the average in Germany at 43%).

**Table IV**  
Breakdown by Consumers of Petroleum Products

| (Million tonnes)  | 1980 | 1986 | % Variation |
|-------------------|------|------|-------------|
| Total all sectors | 572  | 500  | -13         |
| Including:        |      |      |             |
| Power plants      | 74   | 37   | -50         |
| Industry          | 93   | 54   | -42         |
| Transport         | 162  | 182  | +12         |
| Households        | 124  | 109  | -12         |

Source: Eurostat.

**Table V**  
Breakdown by Products

| (Million tonnes)         | 1980 | % Share | 1987 | % Share | % Variation |
|--------------------------|------|---------|------|---------|-------------|
| Total petroleum products | 510  | 100.0   | 443  | 100.0   | -13         |
| Including:               |      |         |      |         |             |
| LPG                      | 18   | 3.5     | 22   | 5.0     | +22         |
| Motor gasoline           | 91   | 17.8    | 98   | 22.1    | +8          |
| Kerosene/Jet fuel        | 21   | 4.1     | 24   | 5.4     | +14         |
| Diesel /Heating oil      | 171  | 33.5    | 168  | 37.9    | -2          |
| Heavy fuel oils          | 155  | 30.4    | 71   | 16.0    | -54         |
| Lubricants               | 5    | 1.0     | 4    | 0.9     | -20         |
| Other                    | 49   | 9.6     | 56   | 12.6    | +3          |

Source: Eurostat.

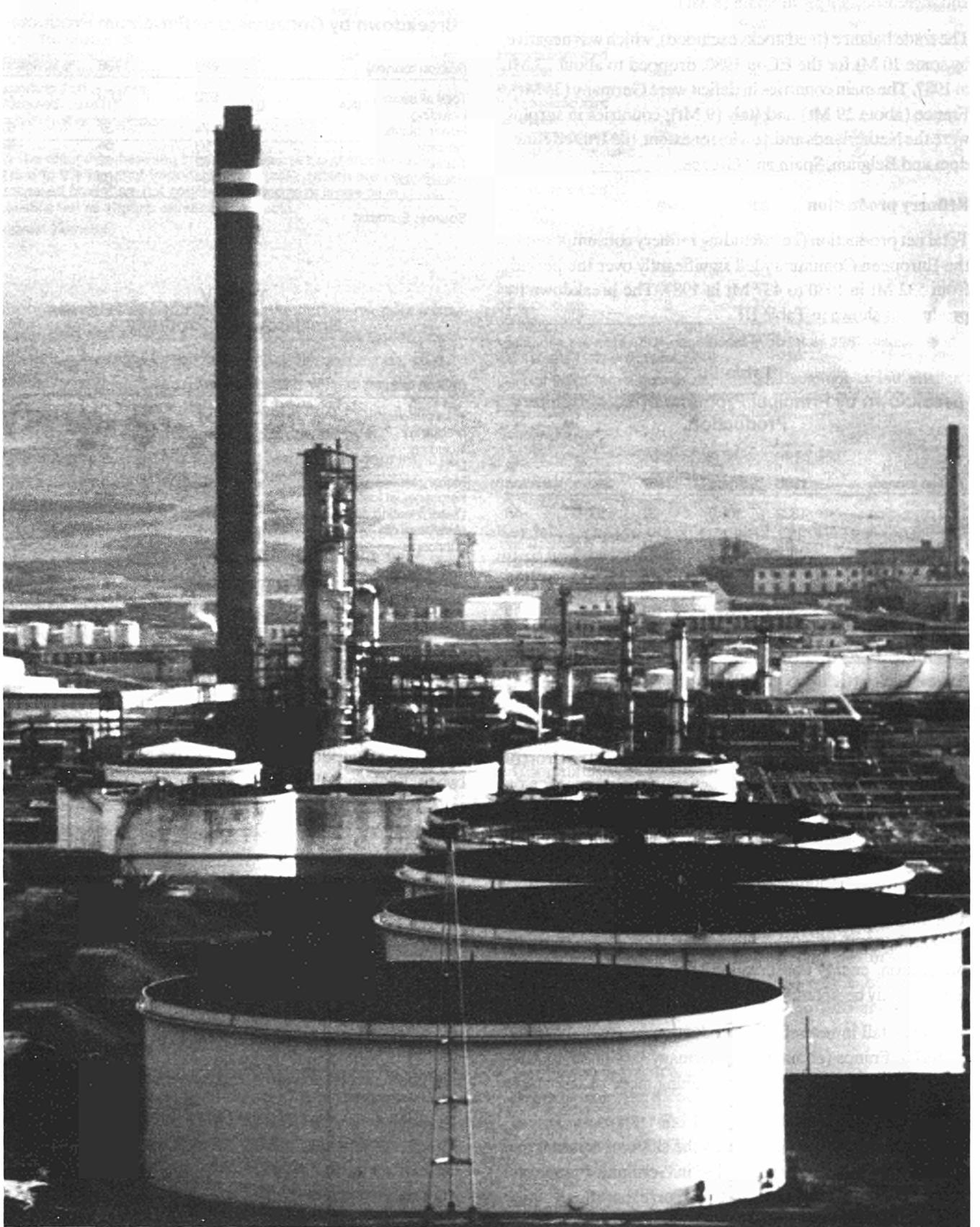
## Consumption Trends

The overall trend including deliveries to bunkers and refineries consumption shows a reduction of 70 Mt (-12%) between 1980 and 1987. By sector, between 1980 and 1986 tonnages delivered to power plants were halved; industry consumption was down 42%; household consumption was down 12%; consumption in the transport sector, where there is no competition from other fuels, increased by 12% despite the drop in the specific consumption of vehicles, reflecting the growth in the number of cars (particularly diesel-engine vehicles) and in road and air traffic.

For this reason, the transport sector now represents 36% of total consumption (including bunkers and refinery consumption) compared with 28% in 1980.

Developments by product reflect the same features:

- a fall in heavy fuel oils due to the growth in nuclear electricity production and the substitution in industry of gas, electricity or even coal in some cases, without reference to energy conservation;



- a growth in diesel oil for road transport and, to a lesser extent, in motor gasoline and jet fuel, linked to the growth in the number of vehicles and road and air traffic in general;
- a decrease in heating oil under competition with electricity and gas.

Table VI summarizes these changes for the domestic market of the Community (excluding storage tanks and refinery consumption).

**Table VI**  
**Consumption Trends by Country**

| (Million tonnes) | 1980 | 1987 | % Variation |
|------------------|------|------|-------------|
| Belgium          | 21   | 17   | -19         |
| Denmark          | 13   | 9    | -31         |
| Germany          | 121  | 110  | -9          |
| Greece           | 11   | 10   | -9          |
| Spain            | 46   | 37   | -20         |
| France           | 98   | 77   | -21         |
| Ireland          | 6    | 4    | -33         |
| Italy            | 88   | 83   | -6          |
| Luxembourg       | 1    | 1    | 0           |
| Netherlands      | 24   | 17   | -29         |
| Portugal         | 7    | 9    | +29         |
| United Kingdom   | 71   | 68   | -4          |
| Total            | 507  | 442  | -13         |

Source: CPDP, National Statistics.

Lastly, it should be noted that changes in demand have been very variable from one country to another, depending on their energy and energy conservation policies.

For each country in the Community, developments in overall demand for petroleum products (internal market only) and the share in this demand of motor gasoline, diesel oil and light and heavy fuel oils (if maritime bunkers were included, the share of residual fuel oils would be greater by some 2 to 3 points) show for each country, and with slight variations: a fall in heavy fuel oils (16% compared with 30%); relative growth in gas oil totals (38% compared with 34%) and motor gasoline (22% compared with 18%). In some countries, such as Italy and Portugal, the share of heavy fuel oils remains relatively high as these products are used in power plants; at present it is on the contrary low in France and Germany, representing less than 10% of total demand for petroleum products.

## REFINING

### Current Situation

#### *Refineries Restructuration*

Even before 1980 the refining industry, which was already suffering from chronic distillation overcapacity, had begun

adaptation, with a few closures and the commissioning of several conversion units. These developments accelerated after the second oil crisis: a substantial number of sites were closed down and distillation units discontinued and a number of conversion installations were built.

#### *Refineries Closures and Distillation Capacity Reductions*

Out of 146 sites existing at the end of 1980 in the 12 current Community members, 45 have been closed, resulting in a reduction in distillation capacity of 190 Mt per year. At the same time, distillation units have been closed on active sites, leading to an additional reduction in capacity of some 100 Mt per year. Thus total capacity in use in the Community fell from 891 Mt per year at the end of 1980 to its current level (June 1988) of 601 Mt per year. These figures include the recent re-opening (in 1986, 1987 and 1988) of four previously closed refineries, which restarted production after a change in ownership and with special conditions of supply.

This reduction in production within the Community has no equivalent anywhere else in the world. In the United States, more sites were closed down over the same period (120) but capacity fell by only 150 Mt per year, going from 900 Mt to 750 Mt per year. In Japan the reduction was about 16%, while in the rest of the world production capacity increased by 145 Mt per year and even 250 Mt per year if countries with centralized planning are included. Within the Community, reductions have been unevenly distributed as shown in Table VII.

Site closures have affected only six countries so far: Germany, France, Belgium, the UK, Italy and the Netherlands. There have been no site closures in other non-Community countries in Europe. The rate of distillation capacity reductions is 29% for all European OECD countries.

#### **Construction of conversion units**

Classic conversion units are of two types: catalytic processes (catalytic cracking and hydrocracking) and thermal processes including visbreaking, thermal cracking and coking.

Between 1980 and 1988, 15 refineries added catalytic cracking equipment where they previously had none, while four refineries with existing equipment replaced or rebuilt it, or added a new unit. One unit in a site which had been closed down was transferred to another site. At the same time, seven obsolete installations were demolished. Altogether, the catalytic cracking capacity in the Community went from 55 to 82 Mt per year, an increase of 50%.

Hydrocracking (of distillates) capacity more than doubled, increasing from 4.7 to 10.5 Mt per year, mainly by extension and renovation, with only one site being newly constructed. These figures only include so-called "soft" hydrocracking, i.e.

**Table VII**  
**Reduction in Distillation Capacity by Country**

| ((Million tonnes) | End 1980 | June 1988 | Variation |
|-------------------|----------|-----------|-----------|
| Belgium           | 54       | 34        | -37%      |
| Denmark           | 11       | 9         | -18%      |
| Germany           | 150      | 83        | -45%      |
| Greece            | 20       | 19        | -5%       |
| France            | 168      | 97        | -42%      |
| Ireland           | 3        | 3         | -         |
| Italy             | 177      | 125       | -29%      |
| Netherlands       | 90       | 70        | -22%      |
| United Kingdom    | 130      | 84        | -35%      |
| EC 10             | 803      | 524       | -35%      |
| Spain             | 70       | 62        | -11%      |
| Portugal          | 18       | 15        | -17%      |
| EC 12             | 891      | 601       | -33%      |

(1) Figures rounded to nearest Mt per year.

Source: CPDP.

hydrofining intended to desulfurize hydrocarbon fractions and rid them of metallic impurities.

The number of visbreakers has increased most in the industry, a lower cost for equal charge capacity making them more accessible, although they are less efficient. Twenty-seven units of this type have been built and one unit moved from a closed refinery to another site; two others have been converted into thermal crackers and five installations have been demolished or stopped. Visbreaking capacity has more than doubled, going from 26 to 58 Mt per year.

Thermal crackers are similar to visbreakers, but they work at higher temperatures and pressures giving better cracking. Thermal crackers have progressed less rapidly within the Community. Four have been constructed, of which two are converted visbreakers, while three units have been stopped. Total capacity rose from 8.7 to 9.5 Mt per year, an increase of 10%. These figures are for thermal crackers only. Some statistics include both visbreakers and thermal crackers under a single heading, others break them down into the two categories.

Coking goes much further in the conversion process. Its use is widespread in the United States owing to the very strong demand for gasoline there, but it is less used in Europe. Within the Community, it is considered appropriate either for processing very heavy locally produced crude oils (Emsland, Sicily) or for the manufacture of electrodes, artificial graphite, pigments and other chemical products. Only one new, called "delayed coking" unit has been running since 1980 (Karlsruhe). The new "flexi-coking" unit initiated in October 1986 in Rotterdam can also be included in this category. This very costly (2 billion florins for a capacity of 1.6 Mt per year) deep conversion unit is special in that it can process very heavy residues and gasify carbon. It is the first of its kind in Europe. If this "flexi-coker" is included the coking capacity

in the Community will rise from 9.1 to 11.7 Mt per year, a rise of 30%.

Coking enables light products to be obtained by separating carbon from heavy molecules. Hydroconversion consists, on the contrary, in adding hydrogen. It allows heavy residues to be processed, whereas hydrocracking (mentioned above) transforms gas oils obtained by vacuum distillation of fractional residues. Flexi-coking and hydroconversion are deep conversion processes. Deasphalting should also be mentioned in the same category. Like hydroconversion, it is the subject of extensive research with Community support. This process looks to be less expensive than the previous two but there are no plans to apply it in Europe at present, given the lack of profitability under current and foreseeable market conditions.

**Table VIII**  
**Cracking Capacity and Distillation Capacity**

|                | End 1980      |       | June 1988     |       |
|----------------|---------------|-------|---------------|-------|
|                | %<br>in CC eq | CC/FD | %<br>in CC eq | CC/FD |
| Belgium        | 4.5           | 8.3   | 6.7           | 19.4  |
| Denmark        | 1.7           | 15.6  | 1.2           | 14.1  |
| Germany        | 25.7          | 17.0  | 29.5          | 34.7  |
| Greece         | 1.1           | 5.4   | 3.0           | 16.5  |
| France         | 13.3          | 7.9   | 19.9          | 20.4  |
| Italy          | 14.6          | 8.3   | 28.2          | 22.5  |
| Netherlands    | 6.5           | 7.2   | 12.6          | 18.1  |
| United Kingdom | 19.1          | 14.7  | 28.8          | 34.3  |
| EC 10          | 86.5          | 10.8  | 129.9         | 24.8  |
| Spain          | 3.2           | 4.6   | 11.9          | 19.2  |
| Portugal       | 1.2           | 6.6   | 1.2           | 8.1   |
| EC 12          | 90.9          | 10.2  | 143.0         | 23.8  |

Capacities are given in CC eq.: catalytic cracking equivalents. The CC/FD indicator in % is the relationship between this conversion capacity and fractional distillation capacity.

Source: CPDP.

Total conversion capacity in the Community is calculated in catalytic cracker equivalents according to coefficients generally used in the EC (they are as follows: visbreaker 0.33; thermal cracker 0.65; hydrocracker 1.3; carbonization 1.7; flexi-coking 2.1.). This capacity rose from 90 Mt per year at the end of 1980 to a current level of 142 Mt, an increase of 58%. The degree of conversion achieved by refining can be measured by the relation between cracker-equivalent conversion capacity and distillation capacity. The current Community average is approximately 24% (compared with 10% at the end of 1980) with variations by country between 16.5% and 34.7%.

The relation between conversion capacity and the amount of crude processed is an even more significant indicator. This has doubled for the Community as a whole, rising from 16% in 1980 to 32% in 1987. This development has led to a growing

complexity in the industry, which has had to remodel itself according to the new barrel structure, i.e. according to the proportion of products in demand. The first part indicated changes in deliveries on the internal market, but what counts for the refiner is the whole of its needs: the internal market, bunkers and its own consumption. Proportions for the Community as a whole have changed as shown in Table IX.

**Table IX**

| (%)                    | 1980 | 1985 | 1987 |
|------------------------|------|------|------|
| Light products (1)     | 26   | 31   | 31   |
| Middle distillates (2) | 35   | 40   | 41   |
| Heavy products (3)     | 39   | 29   | 28   |

1987 Estimate.

(1) Refinery gas, liquefied gases, naphtha, motor gasoline, aviation gasoline, special gasoline, white spirit.

(2) Kerosene, jet fuel, diesel oil and light fuels.

(3) Heavy fuel oil, lubricants, asphalts, petroleum coke, waxes and paraffins, etc.

Source: CPDP.

Most changes came about between 1980 and 1985; since 1985 changes have been modest. Due to the technical adaptation described above, the proportions between different types of refineries have also changed (see Table X).

**Table X**  
**Complexity of Refineries**

|                | Simple | Semi-complex | Complex | Total |
|----------------|--------|--------------|---------|-------|
| Number in 1980 | 76     | 18           | 52      | 146   |
| Closed         | -33    | -5           | -7      | -45   |
| Transformed    | -20    | +6           | +14     | -     |
| Number in 1988 | 23     | 19           | 59      | 101   |

Simple refinery: distillation-reforming, no conversion unit.

Semi-complex refinery: distillation-reforming + visbreaking or thermal cracking.

Complex refinery: distillation-reforming + catalytic cracking or hydrocracking or coking.

Source: CPDP.

Out of the 23 so-called simple refineries still working (49 Mt per year), 10 are small specialized refineries (lubricants or asphalt) with a total capacity of 3.7 Mt per year. Out of the remaining 13, with a total capacity of 23 Mt per year, two are lubricant plants, one is an asphalt plant and four are connected to petrochemical plants. Thus there are only six simple refineries in the strict sense of the term, with a capacity of 22 Mt per year.

### *Major Structural and Geographical Features*

This large-scale adaptation has not happened in the same way for all the companies involved. The biggest companies, with several refineries and large investing capacity, were more easily able to close down sites, reduce capacity and

build costly new units. For the independents, with just one site, the problem was one of survival, indebtedness and access to credit. This could have led to greater concentration. However, this has not been the case, as can be seen from Table XI, indicating the share of installed capacity of the "majors", European companies, companies in oil-producing countries and the rest.

In this table, the majors include the Seven Sisters (Shell, Exxon, BP, Texaco, Mobil, Chevron, Gulf), reduced to six following the Chevron-Gulf merging. These six still maintain refining and distribution activities in the EC, but several of them have withdrawn from the markets of certain member countries (notably Denmark, Germany and Italy). It can be seen that the share of this group in all categories has been reduced, with the exception of coking (costly deep conversion); its share in conversion has fallen by a little more than in distillation.

The group of European companies includes five companies whose refining and distribution activities are predominantly within the Community and which have retail networks - if not refineries - in several member countries. They are Elf-Aquitaine, ENI (trade name AGIP), Petrofina, Total-CFP and Veba-Oel (trade name ARAL for motor fuel). This group's share in distillation decreased in a similar proportion to that of the majors (4 points lower than an initial 25%), but increased slightly in conversion activity.

Companies from oil-producing countries which have invested in the Community are Kuwait Petroleum Company, whose European subsidiary retails under the name Q8; Pemex, which has a share in the Bilbao refinery; Petroleos de Venezuela SA, associated with VEBA and Nynas AB; Tamoil in Italy, controlled by Libya's NOC; and Statoil in Denmark. Only financial interests acquired in European oil companies are not taken into account.

The rest of the group includes 33 companies: 10 private European refiners, 3 subsidiaries of US independents, 2 petrochemical companies, 3 refining companies linked to shipping companies, 3 subsidiaries of industrial or financial foreign groups, 5 State-owned companies and 7 small-scale oil and asphalt facturers.

Among the private European refiners, several are entirely or predominantly "jobbers". They are generally paid a fee per tonne processed, either in cash or in products. For this reason the share of oil-producing countries is higher than it appears from the table above, as most job work is carried out for these countries

### **Upstream and downstream integration**

The majors are almost by definition integrated companies which are present at all steps in the industry, upstream and downstream as well as in the petrochemical industry.

However, their degree of integration has deeply changed since the late 1970s. Before nationalizations in several exporting countries, their upstream activities constituted a privileged channel for disposing of their crude oil resources either from direct exploitation of their own fields or from long-term purchase contracts with other majors. Since government take-overs of fields in several Arabian and Persian Gulf States, in Venezuela and after nationalization in Iran, the situation is no longer the same. That is why the split of upstream and downstream activities has become so important. This notion should not be confused with disintegration. It applies to a new management rule within integrated groups by which downstream activities have become practically independent for their supply; they choose their own crude suppliers and are free to make their own decisions about product purchases. In general, the majors which used to be sellers of crude on the market, have become buyers. After the slump in oil prices in 1986, their strong positions in refining and distribution enabled them to compensate, at least partly, for a drop in upstream receipts.

European companies are in a similar position. ENI, VEBA, Petrofina and Total, with integrated up- and downstream activities, are overall net buyers of crude. Elf-Aquitaine is relatively balanced although, like most of the others, it is a net buyer of refined products. These five companies also have strong positions in the European petrochemical industry.

The group of other companies is of course more heterogeneous. Firstly there are those companies with traditional upstream activity: the three American independents Amoco, Conoco (a branch of Du Pont de Nemours) and Philips; European independents such as Wintershall (a branch of

BASF) and Union Kraftstoff, a branch of RWE (Rheinische-Westfälische Elektrizität), which has recently bought the assets of Deutsche Texaco (June 1988); and the oil subsidiary of the Italian petrochemical group Montedison. All these companies are also active in distribution, either directly under their own brand names (e.g. Jet for Conoco), or through interests in other companies. This is the case for Wintershall (ARAL) and Montedison which, after acquiring the Total network in Italy, has recently agreed on a 50/50 deal with Shell, back on the Italian market after an absence of some 15 years. The Spanish groups Repsol and CEPSA have also integrated to a varying degree in upstreams activities and have acquired distribution interests in CAMPSA, the only retail distributor present in Spain until now. A sub-group is formed by companies with practically no upstream activities but integrated in distribution. These include Petrogal, a State-owned company with some 60% of the Portuguese motor fuel market; the privately-owned Italian group ERG (Garrone) which has bought the Elf and Chevron networks in Italy; and API, which owns the Falconara refinery and distributes motor fuels under its own brand name.

Companies from oil-producing countries now also have several networks in the Community. Statoil has bought Exxon's distribution activity in Denmark and may enter into association with Union Kraftstoff in Germany; KPC has acquired Gulf networks on the Continent (Scandinavia, Benelux and Italy); Libya's NOC controls Tamoil, made up of the former Amoco and Texaco networks in Italy; Pemex has rights of supply to CAMPSA on account of its interest in the Petronor refinery in Bilbao; and Venezuela's Petroleos is associated with Nynas for the supply of lubricants and asphalt while

**Table XI**  
**Share of the Groups of Companies in Refining Capacity**

| (%)                  |           | Majors | European firms | Firms from oil-producing countries | Other firms | Total |
|----------------------|-----------|--------|----------------|------------------------------------|-------------|-------|
| Distillation         | end 1980  | 51     | 25             | 0.5                                | 23.5        | 100   |
|                      | June 1988 | 41     | 21             | 6                                  | 32          | 100   |
| Visbreaking          | end 1980  | 70     | 9              | -                                  | 21          | 100   |
|                      | June 1988 | 25     | 25             | 12                                 | 38          | 100   |
| Thermal cracking     | end 1980  | 91     | -              | -                                  | 9           | 100   |
|                      | June 1988 | 63     | 17             | 12                                 | 8           | 100   |
| Coking               | end 1980  | 6      | 24             | -                                  | 70          | 100   |
|                      | June 1988 | 20     | 19             | 6                                  | 55          | 100   |
| Catalytic cracking   | end 1980  | 60     | 26             | -                                  | 14          | 100   |
|                      | June 1988 | 48     | 26             | 3                                  | 23          | 100   |
| Hydrocracking        | end 1980  | 45     | 12             | -                                  | 43          | 100   |
|                      | June 1988 | 37     | 14             | 7                                  | 42          | 100   |
| Conversion in CC eq. | end 1980  | 52     | 22             | -                                  | 26          | 100   |
|                      | June 1988 | 40     | 23             | 6                                  | 31          | 100   |

Source: CPDP.

entrusting the sale of products from its refining interests in Germany to its partner VEBA Oel. Other companies, some of them are very large (SARAS in Sardinia, for example), do mainly jobwork, though they may have small-scale distribution networks and operate on their own account if the circumstances are favourable or sell as traders on the international market. The capacity of these jobbers, whether it be their principal activity or an accessory activity, is an estimated 40 Mt per year.

In the market, four categories of operators can be defined:

- majors, European companies and integrated European independents; results from refining and distribution in Europe should now be balanced without the help of upstream activities;
- companies from oil exporting countries (these are seeking stable outlets for their crude oil production and, because OPEC has not fixed any price regulations for refined products, they sub-contract processing for part of their crude-oil production, integrating their downstream activities so as to compensate for refining losses);
- jobbers, able to survive thanks to their customers, who are oil-producing countries and traders acting on their own account or on behalf of their crude-oil suppliers;
- importers and distributors of refined products (these products usually come from oil exporting or Eastern bloc countries, and suppliers to importers and distributors are usually more interested in the quantities they can move than in balancing their refining costs).

### Employment Trends

According to Eurostat statistics, the European Community refining industry employed some 126 000 people in 1986 (latest available figure), compared with almost 158 000 in 1980, a drop of 20%. These figures require some comment. Firstly,

the figures appear to correspond more to the total number of employees in integrated refining groups than to jobs involved in the refining activity. Secondly, only the balance of employment is indicated whereas the adaptation of refining structures by the construction of conversion units has generated employment, thus partly masking the drop due to site closures or reduction in capacity. Thirdly, the overall decrease of 20% for the period 1980-1986 covers differentiated developments in the Member States. The UK shed 13 500 jobs (-45%) and Belgium 1 900 jobs (-34%) whereas the drop in Italy and the Netherlands was only 2% to 3%. Germany (-17%) and France (-23%) are close to the Community average. Lastly, fluctuations in figures over the period for certain countries such as Spain and the UK seems to be due more to differences in statistical methods than to an effective change in employment levels.

### Costs and Product Valorizations

The refining margins evolution call for the following comments:

The peak, at the beginning of 1986, is explained by a drastic drop of crude-oil prices. Finished product prices decreased more slowly; refining margins increased appreciably for a short time, before beginning to decrease quickly the second quarter of the year. At the end of the year, the reverse situation occurred: crude-oil prices strengthened more quickly than those of finished products and, then, refining margins dropped to their lowest level since 1981. However, the 1986 financial year remains the only profit generating year since the second oil crisis.

Refining margins, which were negative in 1983, progressively recovered but have never taken off from variable costs level (situation observed in 1986, is considered as an "accident").

Conversion margins (visbreaking and catalytic cracking) rather generous at the beginning of this period, declined under the impact of the coal industry strike in Britain.

**Table XII**  
**Retail Outlets**

|                 | 1980    | 1981    | 1982    | 1983    | 1984    | 1985    | 1986    | 1987    |
|-----------------|---------|---------|---------|---------|---------|---------|---------|---------|
| Belgium         | 8 637   | 8 258   | 7 575   | 7 068   | 6 742   | 6 207   | 5 633   | 5 448   |
| Denmark         | 4 397   | 4 208   | 3 985   | 3 631   | 3 733   | 3 622   | 3 515   | 3 364   |
| Germany         | 26 145  | 24 864  | 23 219  | 21 049  | 19 288  | 18 448  | 20 320  | 19 501  |
| Spain           | 4 606   | 4 602   | 4 608   | 4 621   | 4 622   | 4 616   | 4 799   | 4 855   |
| France (1)      | 40 400  | 39 500  | 38 600  | 37 100  | 36 000  | 34 600  | 33 200  | 31 500  |
| Italy           | 38 570  | 38 255  | 37 672  | 36 716  | 38 500  | 35 800  | 35 300  | 35 000  |
| Netherlands (2) | 10 800  | 10 500  | 9 800   | 9 400   | 9 200   | 9 000   | 8 500   | 7 500   |
| Portugal        | 2 600   | 2 600   | 2 600   | 2 600   | 2 600   | 2 600   | 2 600   | 2 600   |
| United Kingdom  | 25 527  | 24 760  | 24 108  | 23 097  | 21 705  | 21 140  | 20 641  | 20 197  |
| Total EC 9      | 161 682 | 157 547 | 152 167 | 145 282 | 142 390 | 136 033 | 134 508 | 129 965 |

(1) These figures still include some double-counting.

(2) Estimated figures.

Sources: National sources.

They recovered in 1985, then decreased through 1986 and reached, in 1987, a level lower than total costs. In 1988, a rise has been observed generating costs at a comparable level. Evolution of these margins essentially depends on price differentials between premium gasoline and heavy fuel-oil (case of catalytic cracking) on the one hand, or between gasoil and heavy fuel-oils (case of visbreaking) on the other hand. For the time being, compared to variable costs, they stay at a significant upper level and allow to cover fixed costs. As a consequence, full capacity running of these units brings refining companies, to profits in the best cases, and at least to improvements in loss reductions and autofinancing gross margins.

As a conclusion, it appears that margins of simple refineries have been negative for the whole period - except the 1986 "accident" - and that the complex refineries, with a gross margin fluctuating around 10 dollars per tonne, show, on the average, a deficit situation.

## DISTRIBUTION

This section deals with gasoline and automotive gasoil marketing. Available data concerning the distribution of other products and the distribution infrastructure are limited.

Gasoline and automotive gasoil are delivered either through a network (particularly for gasoline) or directly to the end user (particularly automotive gasoil, mainly to hauliers).

The respective share of these channels varies according to product and country. Network distribution of gasoline, for example, runs at 98% in France, 94% in the United Kingdom and 83% in Belgium. Network distribution of automotive gasoil represents 67% of total sales in France, 44% in Belgium and 34% in Germany and the United Kingdom.

There has been a slight upward trend in the share of network distributed automotive gasoil in recent years, due to growth in the number of diesel-engined cars, which has meant a growing percentage of automotive gasoil sales.

In 1987 there were some 131 000 retail outlets in EC 9, 20% less than in 1980 and 30% less than in 1975, when networks reached their maximum number.

The restructuring of distribution networks started earlier and has been more or less intensive depending on the country.

It started as early as 1968 in Germany, when the German network was at its peak with 46 860 retail outlets compared with 19 500 in 1988, a reduction of 58%. As the German market was free at a time when markets in most European countries were controlled, competition led to tighter margins and encouraged companies to rationalize their networks.

**Table XIV**  
**Average Annual Volume per Point of Sale**  
**by Country**

| (Cubic metres) |       |
|----------------|-------|
| Belgium        | 820   |
| Denmark        | 930   |
| Germany        | 1 950 |
| Spain          | 3 412 |
| France         | 1 092 |
| Italy          | 752   |
| Netherlands    | 890   |
| United Kingdom | 1 363 |

Source: CPDP.

A strong movement towards restructuring has also characterized distribution in France. There were 31 500 retail outlets in the French network in 1987 (though this figure probably includes some double-counting), 1 700 less than in the preceding year and 8 900 less than in 1980. This trend has two major causes:

- strong competition from supermarket chains, which have taken a growing share in the fuel market in France (see below);
- French regulations intended to limit the creation of petrol stations, which allowed one new retail outlet to be created for the suppression of three former retail outlets (these regulations were cancelled in October 1985).

**Table XIII**  
**Average Volume Sold (Gasoline and automotive gasoil)**

| (Cubic metres/year) | 1980 | 1981 | 1982  | 1983  | 1984  | 1985  | 1986  | 1987  |
|---------------------|------|------|-------|-------|-------|-------|-------|-------|
| France              | 624  | 648  | 672   | 720   | 900   | 924   | 996   | 1 092 |
| Italy               | 607  | 620  | 643   | 651   | 681   | 716   | 752   | N/A   |
| United Kingdom      | 957  | 963  | 1 027 | 1 089 | 1 189 | 1 256 | 1 363 | 1 440 |

Source: CPDP.

The Belgian network, numbering 5 448 retail outlets at the end of 1987 compared with 8 637 in 1980 (-37%), has also been heavily rationalized. Since 1973 there has been a sharp drop in the number of distribution points where the sale of petrol was secondary to another activity (garages, shops, etc.), and new, "sophisticated", automated self-service stations have been built.

The European country with the highest number of retail outlets is Italy: 35 000 now despite a reduction of 8 600 (-22%) since 1980. This situation is no doubt due to the fact that pump prices are still controlled and that the network represents some 80 000 jobs. Restructuring raises social and political problems.

The relatively meagre networks in the two other Southern European countries, Spain and Portugal, are set to develop in coming years due to new possibilities for international companies and the economic growth which entry into the Common Market ought to stimulate. There were 4 855 retail outlets in Spain in 1987, 1 306 belonging to the State company CAMPSA and the rest belonging to private retailers bound to CAMPSA by long-term supply agreements. During 1986 and 1987, CAMPSA bought a number of service stations.

### Consumption

The average annual volume moved per retail outlet varies widely from country to country. It currently ranges between 750 cubic metres in Italy and 3 400 cubic metres in Spain, as is shown in Table XIV.

In general, average annual volume per outlet increased considerably between 1980 and 1987 (+ 75% in France, + 50% in the United Kingdom) as a result of concentration in the networks and the increase in demand for gasoline and automotive gasoil. In Germany, the average annual volume of gasoline alone (excluding gasoil) increased fivefold in 20 years, rising from 340 cubic metres in 1968 to a current level of 1 640 cubic metres. The increase is smaller in Italy (+ 24%), where network restructuring has been much more limited by government constraints on distribution.

### Unleaded gasoline

In recent years distribution networks have had to adapt to the introduction of unleaded gasoline. New logistic structures have had to be set up entailing extra distribution costs, although volumes sold have remained low in most countries. Western Europe is the latest major oil market where unleaded gasoline appeared. It is however the first major market where sales of this type of gasoline has been launched before the imposition of strict compulsory regulations, as was the case in the United States and Japan.

Public opinion is most sensitive to environmental protection in Northern European countries, and it is here that sales of unleaded gasoline represent the highest percentages of total gasoline: 25.3% in Germany, 29.7% in Denmark and 20.0% in the Netherlands.

**Table XV**  
**Outlets Distributing Unleaded gasoline in 1987**

|                | Total outlets | Unleaded-gasoline | Gasoline sales million m3 | Unleaded gasoline % tot. sales |
|----------------|---------------|-------------------|---------------------------|--------------------------------|
| Belgium        | 5 448         | 105               | 3.8                       | 0.20                           |
| Denmark        | 3 364         | 2 000             | 1.9                       | 29.70                          |
| Germany        | 19 501        | 19 167            | 33.5                      | 25.30                          |
| France (1)     | 31 500        | 330               | 25.1                      | 0.04                           |
| Italy          | 35 000        | 769               | 16.6                      | 0.20                           |
| Netherlands    | 7 500         | 7 500             | 4.5                       | 20.00                          |
| United Kingdom | 20 197        | 715               | 30.8                      | 0.08                           |

(1) Unleaded gasoline: 925 by summer 1988.

Sources: National sources.

Other major markets such as the UK, France and Italy have been slower to adopt this new product and networks; although developing rapidly at present, they do not have as many outlets as in Germany or the Netherlands. Regulations limiting polluting vehicle exhaust emissions, adopted by the EC in July 1987, will come into force between 1989 and 1993 and will lead to growth in sales of unleaded gasoline. Current development of this product depends for the most part on fiscal incentives agreed upon by governments, as has been the case for several years in Germany, Denmark and the Netherlands and more recently in the United Kingdom, Luxembourg and Ireland. There has been a considerable increase in the number of service stations offering unleaded gasoline in Germany. This is now available over almost the entire network, whereas it was sold in only 1 060 service stations in 1986. Unleaded gasoline is available in all Dutch service stations and in almost all Danish outlets.

### Major Structural Features

The development of the distribution network has been characterized in recent years by two major trends: a growth in self-service and automation. The number of self-service points of sale varies a great deal depending on the Member States. 87% of German service stations have self-service pumps, 45% in the United Kingdom, 44% in Belgium and 25% in France. This figure is only 9% for Italy on the other hand, and even lower for Spain and Portugal. The advantages of self-service, apart from reducing running costs, are to prolong opening hours and to increase sales of non petroleum products in service stations.

**Table XVI**  
**Points of Sale with Self-service Facilities**

|                                | Germany<br>1986 | 1987   | France<br>1986 | 1987   | UK<br>1986 | 1987   | Italy<br>1986 | Belgium<br>1987 |
|--------------------------------|-----------------|--------|----------------|--------|------------|--------|---------------|-----------------|
| Total points of sale           | 20 320          | 19 501 | 33 200         | 31 500 | 20 640     | 20 197 | 35 400        | 5 448           |
| with self-service facilities   | 16 916          | 17 016 | 7 500          | 8 000  | 8 900      | 9 088  | 3 200         | 2 400           |
| % with self-service facilities | 83              | 87     | 23             | 25     | 43         | 45     | 9             | 44              |

Sources: National sources.

Automation of management and payment are being gradually adopted, at different rates in different countries, in order to increase security, allow 24-hour opening and reduce running costs. There were 120 service stations with automatic pumps in France at the beginning of 1986 and 445 at the beginning of 1988. In Belgium, oil companies have tended to invest in modern, sophisticated service stations with a large number of pumps and automatic payment equipment. There are some 400 of these, 7% of the total number of outlets. This relatively high rate in relation to the rest of Europe has been made possible by particularly dynamic collaboration from the banking sector. The percentage of automated service stations in the United Kingdom is low (less than 1%). The emphasis in the British network is on modern self-service equipment and diversification in sales.

The last salient feature is the trend towards diversification, already present in most countries, which is currently developing through associations between oil companies and various catering or service companies (fast food, hotels, key cutting, etc.). Faced with reduced distribution margins linked to the freeing of prices and the discounts offered by new distributors, European oil companies have had to diversify the activity of their points of sale.

The breakdown of motor fuel sales by company is practically unknown. From available information, it appears that national companies with a European or international dimension are often in first position on their home markets. This is true for ARAL in Germany, Total and Elf in France, AGIP in Italy, Fina in Belgium, CAMPSA in Spain and Petrogal in Portugal. Next are the international groups (BP, Exxon, Shell, Mobil, Texaco).

However, over the last few years some international companies have withdrawn from several European markets judged to be unprofitable, conceding their networks to oil producing countries, as was the case for Gulf, which conceded its networks in Belgium, the Netherlands and Denmark to Kuwait in 1983-1984. BP sold its Danish network to Kuwait in 1987 and in the same year Hays, Naphta and Ultramar conceded their United Kingdom network to KPC. As a result of these various acquisitions KPC has now become an influential distributor in several European countries. It controls 3% to 5% of the markets in the United Kingdom, the

Netherlands and Italy, almost 10% in Belgium and over 20% in Denmark (before acquisition of the BP network). This growth has led the company to launch a single brand for Europe, Q8. It is also currently opening specialized points of sale for road hauliers including all the necessary ancillary facilities in addition to gasoil sales.

Also to be noted is the sale by Texaco of its Italian network to Tamoil (Libyan interests) in 1987. Independents (Cameli and Garone) have entered the Italian market under the brand name ERG, first acquiring the Elf then the Chevron networks; similarly, Total disposed of its refining and distribution assets in favour of Montedison.

The distribution of fuel by supermarket chains is an essentially French phenomenon. Their market share in most European countries is negligible, at most a few percent of the total. In France however, supermarket chains accounted for 31% of retail petrol sales in 1987. This share is increasing: it has grown from an estimated 14% in 1983, 19% in 1985 and 25% in 1986 to a current level of as much as 35%.

## Conclusion

Two conclusions may be drawn from the historical survey of the two sectors discussed above.

Firstly, distribution margins are still under constant pressure from competition and the consequent rationalization in most countries. This has resulted in different situations depending on the countries and operators. Some independent companies which have been able to obtain supplies under favourable conditions and avoid losses on stocks due to price fluctuations have managed to cover their costs. Others have been placed in difficulty or even disappeared.

Refining, on the other hand, despite intense efforts by the industry over the last eight years, still has severe deficits. The question is raised to know when and how conditions will again prevail, allowing this industry sector to overtake its activity in satisfactory economic conditions.

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# NATURAL GAS

(NACE 162)

*The role of natural gas within the Community has developed rapidly. Its share in energy consumption more than doubled between 1971 and 1985. Presently, natural gas accounts for about 18 % of total energy consumption. The most rapid growth has taken place in the residential and commercial sector. In only two Member States is the natural gas industry undeveloped; however, Greece and Portugal both have plans for development in the near future.*

The natural gas industry is a highly integrated Community industry in which three principal activities may be distinguished: exploration and production, transmission, and distribution. Exploration and production are generally considered to be outside the gas sector in the strictest sense, as they are largely the province of major international and national oil companies, although a few gas companies have exploration and production branches.

Within the Community, different organizational structures have evolved to enable transmission and distribution of gas to be carried out. The term transmission is used to apply to a range of activities:

- the purchase of gas from producers or from other transmission companies;
- the actual carrying of the gas, its storage and load management;
- the sale of gas to other transmission companies, to industrial consumers and power stations and to local distribution companies.

The distribution activity is concerned with the supply of gas by a local network, to domestic and non-domestic consumers linked to this network.

## Current Situation

### Organization

Despite the diversity of the organizational forms which the gas industry takes in the Member States, an important measure of cooperation on a European level has developed over the years, especially in the following areas:

- the European transmission network;
- buying consortia;
- a policy of mutual assistance.

The European Transmission Network is described below. Some major pipelines are in joint ownership of companies from two or more Member States, the strongest indications of the tradition of cooperation in the gas industry. From the outset, other practical policies have been pursued to ensure that the system of transmission and distribution of gas of one country is compatible with that of another. In designing and building the network, the organizations follow standard engineering practices and a shared technology. In sizing pipelines, determining pressures and assessing the needs for compressor stations and other equipment, decisions are made on a similar basis. Technically, the interconnected grid may be considered as one system.

The gas companies come together for supply purposes, since the development of important new sources of gas is often on such a scale that the viable production level is far beyond the take-up capacity of one buyer.

The most recent example of such cooperation was the agreement reached in 1986 by Norway with a group of Community gas companies to sell gas from the Troll field.

Community members have developed policies of mutual assistance. There are various ways of arranging cooperation be-

### Main Indicators Natural Gas

| TJ (GCV)             | 1982      | 1983        | 1984        | 1985        | 1986        |
|----------------------|-----------|-------------|-------------|-------------|-------------|
| Apparent consumption | 6 253 451 | 6 616 764   | 703 154     | 7 367 077   | 7 660 645   |
| Net exports          | - 857 899 | - 1 037 282 | - 1 451 353 | - 1 453 575 | - 1 867 382 |
| Primary production   | 5 395 552 | 5 579 582   | 5 580 187   | 5 913 502   | 5 798 263   |

TJ = 10<sup>9</sup> KJ; GVC = gross calorific value.

**Table I**  
**Trends In Consumption And Uses**

| TJ (GCV)                           | 1982      | 1983      | 1984      | 1985      | 1986      |
|------------------------------------|-----------|-----------|-----------|-----------|-----------|
| Gross inland consumption           | 7 458 597 | 7 792 084 | 8 217 041 | 8 592 260 | 8 691 966 |
| % of total energy consumption      | 16.6      | 17.4      | 17.8      | 17.9      | 17.9      |
| Final non-energy consumption       | 524 778   | 568 972   | 646 259   | 626 635   | 529 665   |
| Transformed in power stations      | 962 358   | 1 046 752 | 1 152 422 | 1 055 023 | 1 020 044 |
| Final energy consumption of which: | 5 690 636 | 5 807 524 | 6 135 374 | 6 536 730 | 6 700 286 |
| industry                           | 2 175 507 | 2 160 895 | 2 341 932 | 2 376 718 | 2 341 883 |
| households, etc.                   | 3 515 129 | 3 646 629 | 3 793 442 | 4 160 012 | 4 358 403 |

Source: Eurostat.

**Table II**  
**Trends in Natural Gas Consumption by Country**

| TJ (GCV)       | 1982      | 1983      | 1984      | 1985      | 1986      |
|----------------|-----------|-----------|-----------|-----------|-----------|
| BLEU           | 328 298   | 343 315   | 354 781   | 355 019   | 317 728   |
| Denmark        | -         | 562       | 4 589     | 26 334    | 50 239    |
| Germany        | 1 781 835 | 1 843 049 | 1 896 113 | 1 918 249 | 1 908 474 |
| Greece         | 3 470     | 3 215     | 3 536     | 3 322     | 4 554     |
| Spain          | 97 319    | 99 510    | 94 834    | 109 409   | 118 803   |
| France         | 981 807   | 1 042 585 | 1 090 163 | 1 129 114 | 1 131 847 |
| Ireland        | 77 124    | 82 605    | 87 798    | 90 535    | 63 227    |
| Italy          | 1 022 813 | 1 048 591 | 1 234 011 | 1 265 190 | 1 343 315 |
| Netherlands    | 1 274 208 | 1 356 745 | 1 433 730 | 1 503 729 | 1 512 937 |
| United Kingdom | 1 891 723 | 1 971 907 | 2 017 486 | 2 191 359 | 2 240 842 |
| Total EC 11    | 7 458 597 | 7 792 084 | 8 217 041 | 8 592 260 | 8 691 966 |

These data are on the basis of Gross Inland Consumption.

Source: Eurostat.

tween companies if any difficulties arise which could potentially affect the security of the gas supply to consumers.

#### The European gas network

In total, the gas network of the European Community consists of pipelines with an aggregate length of about 768 833 km, of which 646 340 km are distribution pipes.

The Benelux countries, and Germany, France and Italy have been linked by a supply network for a long time. Austria and Switzerland are also part of this network. Denmark has been linked with the German network since the early 1980s. The cross-border connections of the individual countries of the Community are summarized below:

- Germany - in the north with Denmark and in the west with the systems of the Netherlands and France;
- The Netherlands - in the north and east with Germany, the eastern link being routed through to Italy and in the south with the Belgian system which is routed through to France;
- Belgium - in the north with the Dutch grid and in the south with France;
- France - in the north with Belgium and in the east with Germany;
- Italy - in the north through Switzerland to Germany.

**Table III**  
**(Pipeline Lengths) in 1984-1985**

| (Kilometres) | Transmission | Distribution | Total   |
|--------------|--------------|--------------|---------|
| Belgium      | 3 377        | 29 973       | 33 350  |
| Denmark      | 931          | 9 328        | 10 259  |
| Germany      | 49 777       | 124 851      | 174 628 |
| Spain        | 1 028        | 448          | 1 476   |
| France       | 25 764       | 102 066      | 127 830 |
| Ireland      | 500          | 3 200        | 3 700   |
| Italy        | 18 000       | 77 000       | 95 000  |
| Netherlands  | 5 391        | 83 762       | 89 153  |
| UK           | 17 725       | 215 712      | 233 437 |
| Total        | 122 493      | 646 340      | 768 833 |

Source: Industry sources.

There is a planned link of the Spanish gas grid with the French network.

The transmission systems have been developed and extended on an economic and commercial basis in accordance with supply and demand factors, out of the interplay of sources and markets. If supplies are not indigenous, the sources determine the routes and points at which gas enters a Member State. From where it is available, it has to be carried to the markets. As sources have changed or new markets developed, the grid has been extended as necessary to handle gas from either new indigenous sources or external supplies. The decision of the Spanish gas industry to establish a link with France is connected with their decision to buy gas from

**Table IV**  
**Investment by Gas Industries**

| (Million ECU)               | 1982    | 1983    | 1984    | 1985    | 1986    |
|-----------------------------|---------|---------|---------|---------|---------|
| Production and conditioning | 205.4   | 232.1   | 240.1   | 307.3   | 365.8   |
| Transmission                | 1 653.8 | 1 594.2 | 1 480.7 | 1 391.4 | 1 400.0 |
| Distribution                | 2 169.9 | 2 265.7 | 2 640.5 | 3 007.0 | 3 217.0 |
| Total                       | 4 029.1 | 4 092.1 | 4 361.4 | 4 705.8 | 4 982.8 |

Source: Industry sources.

Norway, which will be transported on the north-south axis from Belgium, and through France. The configuration of the interconnected grid and the efficient management of the networks make an important contribution to the security of the gas supply system in the European Community.

### *Consumption Trends*

In 1986 natural gas accounted for about 18 per cent of total energy consumption, an increase of 1.3% over 1982. During the same period, gross inland consumption of natural gas increased by about 16.5 %.

The pattern of gas consumption in power stations is different. Over the five years, consumption peaked in 1984, which showed an increase of about 20 % over 1982, but then fell back, and 1986 consumption was only 6 % higher than that in 1982.

For all but a few of the Member States, gross inland consumption of natural gas increased in absolute terms as well as in the percentage of total energy consumption, both of which ended higher in 1986 than in 1982. In Belgium and Ireland, however, there was a decline of consumption in 1986 in absolute and percentage terms over 1982. In a number of Member States the share of natural gas peaked in 1984/1985, then fell off slightly. The middle of the decade saw Denmark begin to use natural gas and between 1984 and 1986 increase its share from 0.6 to 5.7 %.

### *Investment*

The physical infrastructure of the gas industry consists of pipelines and of other equipment needed to regulate the

passage of the gas through the pipelines - notably compressors - as well as for storage and gas treatment. The gas industry is a very capital intensive industry. Table IV shows the investment undertaken in recent years in ECU. The data given concern production and conditioning (production does not refer to the production of natural gas, which was considered to be outside the sector, but to manufactured gas) as well as transmission and distribution.

The total outlay on investment in ECU has risen steadily from 4 029 113 in 1982 to 4 982 817 in 1986, an increase of 24%. Within that overall figure, however, investment in transmission activities has fallen by about 16%, while that in distribution activities has increased by 48%.

### *Prices*

Most Member States exhibit a downward trend in gas pricing from 1985/86. In Belgium, for example, the annual cost of gas consumption of 10 GJ rose by about 5.5% in 1985 over 1984 and then declined by over 20% by 1988. In Germany prices were relatively stable until 1986, and then declined sharply in 1987 and 1988, as gas prices adjusted to oil prices, following the sharp falls in the oil market. A similar pattern is found in the Netherlands. In other countries, for example Denmark and the UK, prices held relatively steady for the domestic consumer or even increased slightly, but showed a sharp decline for the industrial consumer.

### *Foreign Trade*

The principal Member State gas supplier is the Netherlands, which in 1986 exported 1 160 950 GJ to the other Member

**Table V**  
**1986 Investments**

| (Million ECU)                   | B   | DK  | D     | E   | F   | IRL | I     | NL  | UK  |
|---------------------------------|-----|-----|-------|-----|-----|-----|-------|-----|-----|
| Production and conditioning (1) | 148 | 1   | 179   | 33  | -   | -   | 5     | -   | -   |
| Transmission                    | 22  | 42  | 403   | 79  | 159 | 37  | 397   | 193 | 105 |
| Distribution                    | 75  | 256 | 1 056 | 81  | 431 | 16  | 739   | 204 | 375 |
| Total                           | 245 | 299 | 1 638 | 193 | 590 | 53  | 1 141 | 397 | 481 |

(1) Excluding natural gas production.

Source: Industry sources.

**Table VI**  
**Trade by Origin**

| (TJ GVC)   | 1982      | 1983      | 1984      | 1985      | 1986      |
|--|-----------|-----------|-----------|-----------|-----------|
| Primary production                                     | 5 395 552 | 5 579 582 | 5 580 187 | 5 913 502 | 5 798 263 |
| Supplies from EC 12                                    | 1 297 422 | 1 306 237 | 1 206 978 | 1 307 179 | 1 108 997 |
| Imports from third countries                           | 2 226 345 | 2 435 960 | 2 777 863 | 2 858 822 | 3 101 392 |
| Norway   | 1 007 794 | 1 005 097 | 1 090 644 | 1 036 141 | 1 042 060 |
| USSR   | 841 695   | 823 808   | 949 374   | 979 809   | 1 216 860 |
| Algeria  | 333 665   | 529 993   | 684 357   | 793 441   | 800 370   |
| Other  | 43 191    | 77 062    | 53 488    | 49 431    | 42 102    |
| Third country imports as % of gross inland consumption | 29.8      | 31.3      | 33.8      | 33.3      | 35.7      |
| Exports to third countries                             | 1 368 446 | 1 398 778 | 1 326 510 | 1 405 247 | 1 239 010 |

Source: Eurostat

States. In 1982, Community production accounted for 72% of gross inland consumption, and imports from third countries 28%. By 1986, production had declined slightly to 67%. Imports stood at 36%. The major third country until 1986 was Norway at 36% in 1985 but in 1986 the USSR supplied 39% and Norway 33.6%.

### *Technological Trends*

#### **Environment**

Natural gas justifiably earns the epithet "environment friendly". Gas is a clean fuel which does not produce any ash, dust, or smoke. Only negligible amounts of sulphur dioxide (SO<sub>2</sub>) are produced. Tables VIII and IX show the natural advantages enjoyed by gas by comparison with other conventional fuels. In addition, gas produces only half as much CO<sub>2</sub> as coal for the same amount of energy. Urban smoke and sulphur emissions throughout Western Europe have been considerably reduced in recent years, largely because of the beneficial impact of moving away from direct use of coal and towards new and cleaner conventional forms of energy.

Gas combustion produces only one significant pollutant, nitrogen oxides (NO<sub>x</sub>), but the quantity of NO<sub>x</sub> produced is small per unit of energy and in this respect too, natural gas compares favourably. For five countries which account for 90% of gas consumption in the European Community, gas con-

tributes less than 8% of the total NO<sub>x</sub> emitted while producing 23% of the energy (see Table X).

The commitment of the gas industry to maximize the environmental benefits of natural gas is considerable. Environmental protection is accorded a high priority and the gas industry continues to look at ways of reducing emissions, without detracting from the other advantages of gas.

A considerable number of new gas-saving techniques have been developed as a result of research and development activities of the gas industry. Central heating boilers with higher efficiencies are coming on the market. Condensing boilers, which are about 90% efficient, are a well-known development and gas consumers have been encouraged to change to this new type of boiler.

Gas heat pumps, whether the engine driven or absorption type, are also well established on the market, with a large number already installed or expected to be installed in the near future. A typical coefficient of output of these pumps is 1.2 to 1.5. They are used for heating buildings, replacing oil as a fuel, and in swimming pools.

Units to produce combined heat and power have been installed with a wide range of applications and are usually around 80% efficient. Shaft horsepower is used in compressor and storage applications where the coefficient of performance is around 40% but can be up to 65%. Other novel applications include direct gas-fired heating of a pilot-scale

**Table VII**  
**Trends in Foreign Trade**

| TJ (GVC)         | 1982      | 1983      | 1984      | 1985      | 1986      |
|------------------|-----------|-----------|-----------|-----------|-----------|
| Imports extra-EC | 2 226 345 | 2 435 960 | 2 777 863 | 2 858 822 | 3 101 392 |
| Index            | 100.0     | 109.4     | 124.8     | 128.4     | 139.3     |
| Exports extra-EC | 1 368 446 | 1 398 778 | 1 326 510 | 1 405 247 | 1 239 010 |
| Index            | 100.0     | 102.2     | 96.9      | 102.7     | 90.5      |

(EC 9 excluding Greece, Ireland and Portugal).

Sources: Eurostat.

drier using natural gas for milk-powder manufacture where there is scope for conservation of energy through the elimination of heat-transfer losses that occur in air/air and liquid/air heat exchangers.

**Table VIII**  
**Solid Impurities of Various Fuels**

| (Microgrammes/megajoule)     | Coal        | Oil       | Natural gas (1) |
|------------------------------|-------------|-----------|-----------------|
| Ash (%)                      | 7-20        | 0-0.4     | -               |
| Arsenic                      | 80-2 900    | 0.5-2     | .000 03         |
| Cadmium                      | 400         | 0.2-0.7   | .04             |
| Cobalt                       | 80-1 600    | -         | -               |
| Mercury                      | 400         | 0.09-0.16 | .004            |
| Chromium                     | 120-1 800   | 0.06-1.2  | .003            |
| Manganese                    | 400-1 200   | -         | -               |
| Nickel                       | 320-3 200   | -         | -               |
| Lead                         | 1 200-4 000 | 3.0-25    | .006            |
| Vanadium                     | 320-6 000   | 2.0-1 300 | .0003           |
| Zinc                         | 1 200-8 000 | 2.0-20    | .003            |
| Other inorganic trace metals | 5-20        | -         | -               |

(1) not greater than the figures below.

Source: Vattenfall: Natural Gas, Health, Environment, September 1984, Environmental Impact of Future Coal Production and Use in the EEC - Environmental Resources Ltd: Graham & Trotman for CEC.

Improving the efficiency of gas utilization in industrial applications has been the main driving force behind the development of new heating-plant technology over the past few years. Even in well-constructed and well-operated furnaces, the major source of heat loss is in the flue gases, which often leave the furnace chamber at a temperature above that of the process. Although the flue gases have sometimes been used to pre-heat the incoming material on continuously operating plant, even when this is done, thermal efficiencies of 40% are rarely achieved and 10% is typical on batch furnaces.

There are now a number of techniques emerging from gas industry R&D which improve fuel use on high temperature processes. These either recover waste heat from the flue gases by air or load pre-heat, or minimize gas consumption by reducing thermal inertia, hence allowing plant to be switched on and off at will to suit requirements. They exist as both direct and indirect heating methods. Apart from increasing energy efficiency, they also improve the product.

Recuperative ceramic tube technology has been successfully developed as an immersion tube for heating non-ferrous metals. Dramatic fuel savings of between 50% and 70% are being achieved, particularly when this technique is combined with modern bath design with good insulation. Gas-fired rapid heaters exploit the clean high-temperature combustion products from a natural gas flame to promote direct convective heat to the stock, thus producing a very low-inertia heating system. This involves the use of high-velocity burners and/or furnace/stock matching to increase hot gas velocities. Many heaters of this kind have been installed, giving very large reductions in energy consumption.

**Table IX**  
**Emissions of Sulphur Dioxide per Unit of Energy**

| Fuel                          | Sulphur content % | Caloric value MJ/kg | SO <sub>2</sub> emission mg/MJ |
|-------------------------------|-------------------|---------------------|--------------------------------|
| Coal                          | 1                 | 25                  | 720                            |
|                               | with FGD          | -                   | 72                             |
| Heavy fuel oil (High sulphur) | 4.5               | 42                  | 2 100                          |
|                               | with FGD          | -                   | 210                            |
| Low sulphur Fuel oil          | 1                 | 42                  | 480                            |
|                               | with FGD          | -                   | 48                             |
| Gas oil                       | 0.3               | 43                  | 140                            |
| Natural gas                   | 0.002             | 53                  | 0.73                           |

MJ/kg = megajoules per kilogramme.

mg/MJ = milligrams per megajoule.

Coal SO<sub>2</sub> figures assume 10% of sulphur remains in ash.

FGD - flue gas desulphurization.

Source: Cometec-Gaz brochure, Gas and the Environment.

**Table X**  
**NO<sub>x</sub> Emission**

| (Microgrammes/megajoule)     | Natural gas | Oil    | Solid fuel |
|------------------------------|-------------|--------|------------|
| Domestic space/water heating | 40          | 65     | 135        |
| Industrial processes         | 40-125      | 70-160 | 245        |
| Power stations               | 115         | 155    | 245        |

Source: Based on Centraal Bureau voor de Statistiek, the Netherlands.

## Outlook

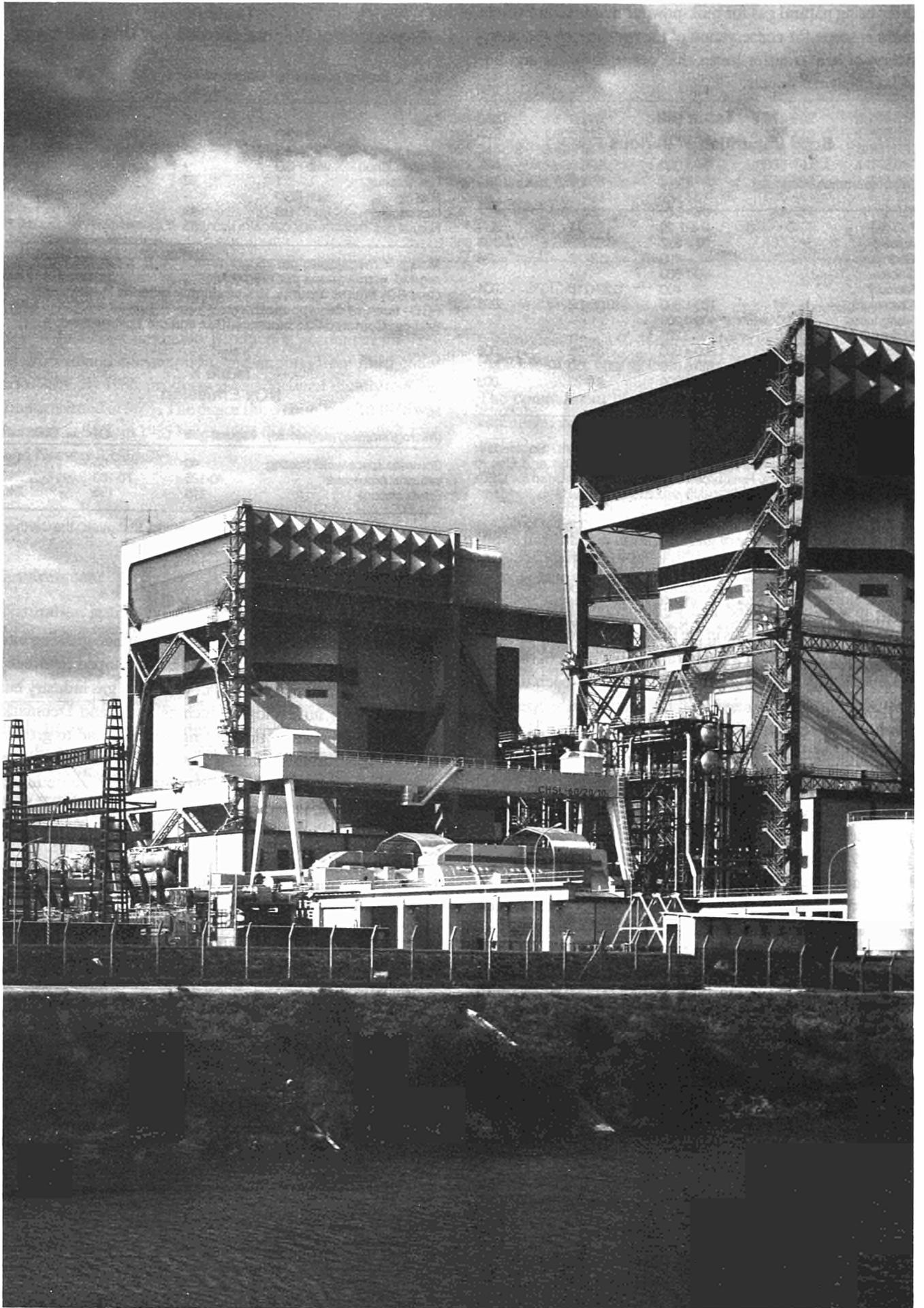
Demand for natural gas is forecast to continue growing into the next century. New markets will be developed in Greece and Portugal, and in countries in which the gas industry has been relatively undeveloped, such as Spain and Denmark, important additions to the existing grid will lead to greater market penetration of natural gas. Various factors will influence the rate and extent of a continuing increase in demand in Europe, including:

- environmental legislation on air pollution, and the consequences it has for the pattern of fossil fuel use;
- persistent questions about the future of nuclear power in some Community countries;
- the encouragement to greater energy saving measures, to which technological advances in the use of natural gas will make an important contribution;
- developments in the oil market, especially as regards prices;
- continuing competition between various fuels in the end market, which will intensify as the above factors come into play, and the various fuel industries respond to developments.

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# ELECTRICITY

(NACE 161)

*Electricity consumption has grown relatively faster than the consumption of other fuels, including during the period of the energy crisis, and it occupies an increasingly important place in the Community energy balance sheet. The average rate of growth has slowed down since 1973, but this phenomenon may be partly due to the state of development on the market since growth continues to be considerably higher in the relatively less advanced Mediterranean countries than in the North. The main effect of the crisis has been on production methods. In the main producing countries there has been a radical and continuing shift towards nuclear production at the expense of conventional thermal production.*

The electricity sector in all European countries is under significant government control because the production, distribution and transmission of electricity to customers for whom it makes no economic sense to produce for themselves is considered part of governmental responsibility. Electricity produced by industrial companies for their own use represents about 8% of total electricity production in the European Community. Only a fraction of this is sold to the grid and therefore this "auto-produced" electricity is excluded from our definition.

The majority of the sector is fully owned by governments. Private ownership is concentrated in Germany, Belgium, Spain and Luxembourg. Many laws and regulatory mechanisms exist which grant electricity companies their right of existence and control their operating environments. In particular, critical operational aspects such as pricing and investment are heavily regulated in all countries.

Many companies are involved in the electricity sector in the European Community but a few large companies dominate

the sector in terms of size and these tend to be national monopolies. In general there are few companies in the production and transmission sub-sectors; over 75% of companies are involved in the distribution sub-sector. In France, Germany, Greece and Ireland operations are fully integrated across the sub-sectors. Germany and Spain have the largest number of individual companies.

## Current Situation

Electricity generation in the EC is of the order of 1 600 billion kWh which places it in third place in world production, just short of the Soviet Union but a long way behind the United States. The EC share of world production is around 17%; it has diminished over the past 30 years, as it has done in all developed countries, because of the rapid growth of electricity production in the Third World, the Soviet Union and in the countries of the Eastern bloc. At the end of the 1950s, the 12 members of the Community accounted for 20% of world production and the United States almost 40%.

During the post-war growth boom, electricity production in the EC grew at a rapid rate, stimulated by industrial and urban development and by the expansion of the electric railway networks but most of all by the rapid growth in the use of domestic electrical appliances. During the 1960s the annual growth in production was slightly more than 10%; production doubled in less than a decade. During the past 15 years this rapid rate of growth has slowed; from 1975 to 1986 the annual growth in production was just below 4%. The economic crisis was responsible for this fall in the rate of growth but it is possible that growth in electricity consumption would have slowed down in any case as households became relatively well-equipped with domestic electrical appliances and in the absence of significant population growth.

## Main Indicators Electricity Supply Industry

| (Billion kWh)  | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  |
|--|-------|-------|-------|-------|-------|-------|-------|
| Apparent consumption                                     | 1 418 | 1 424 | 1 422 | 1 460 | 1 519 | 1 586 | 1 620 |
| Net production (1)                                       | 1 209 | 1 206 | 1 203 | 1 230 | 1 420 | 1 487 | 1 524 |
| Electricity consumption as % of final energy consumption | 14.7  | 15.3  | 15.7  | 16.2  | 16.6  | 16.7  | 16.8  |

(1) Electricity delivered to market (excludes electricity consumed - as well as losses - within power stations).

1980-1983: EC 10.

## Consumption Trends

In 1986 the average per capita consumption of electricity was 4 702 kilowatt-hours compared with 3 719 in 1973. During the same period overall per capita energy consumption diminished slightly. The economic crisis has therefore reinforced the position of electricity in the overall energy market, both within households and in industry.

There are considerable differences in the per capita consumption between different members of the EC. The per capita consumption in Luxembourg is 5.5 times greater than that in Portugal. Countries such as Greece, Spain and Portugal now have a per capita consumption similar to that of the United Kingdom in 1960, where per capita consumption was already 2 220 kilowatt hours. However, the differences between per capita consumptions are narrowing, growth rates for consumption in the less-developed countries being much higher than in the more developed countries.

**Table I**  
Share of Electricity in Final Energy Consumption

|                | 1980 | 1986 | Variation 1980-1986 |
|----------------|------|------|---------------------|
| Belgium        | 11.7 | 14.3 | +2.6                |
| Denmark        | 12.8 | 16.6 | +3.8                |
| Germany        | 15.2 | 16.8 | +1.6                |
| Greece         | 16.1 | 18.2 | +2.1                |
| Spain          | 17.6 | 20.5 | +2.9                |
| France         | 14.2 | 18.5 | +4.3                |
| Ireland        | 12.9 | 13.6 | +0.7                |
| Italy          | 14.3 | 16.2 | +1.9                |
| Luxembourg     | 8.9  | 11.1 | +2.2                |
| Netherlands    | 11.4 | 12.4 | +1.0                |
| Portugal       | 17.3 | 21.9 | +4.6                |
| United Kingdom | 15.8 | 16.3 | +0.5                |
| EC             | 14.7 | 16.8 | +2.1                |

Source: Eurostat.

The importance of industries which are heavy consumers of electricity within an economy (e.g. the steel and chemical industries) explains, in part, the differences in overall per capita electricity consumption. However, household consumption taken alone is a good indicator of the economic and social development of a country; this ranges from 470 kWh per capita in Portugal to 1 709 kWh in Denmark. Three categories of countries can be distinguished:

- countries consuming more than 1 500 kWh per capita, including Denmark, France, the United Kingdom, Germany and Luxembourg;
- countries consuming between 1 000 and 1 500 kWh per capita, including Belgium, the Netherlands and Ireland. (in Belgium and the Netherlands, less electricity is used for heating than in neighbouring countries, and Ireland has a lower level of domestic appliances);

**Table II**  
Electricity Consumption per Capita

| kWh                 | Domestic market |        | Households |       |
|---------------------|-----------------|--------|------------|-------|
|                     | 1980            | 1986   | 1980       | 1986  |
| Belgium             | 4 556           | 5 155  | 1 157      | 1 403 |
| Denmark             | 4 319           | 5 256  | 1 428      | 1 709 |
| Germany             | 5 472           | 6 092  | 1 389      | 1 599 |
| Greece              | 2 115           | 2 492  | 589        | 786   |
| Spain               | 2 652           | 2 804  | 523        | 618   |
| France              | 4 310           | 5 319  | 1 145      | 1 628 |
| Ireland             | 2 534           | 2 912  | 1 048      | 1 150 |
| Italy               | 2 867           | 3 194  | 667        | 799   |
| Luxembourg          | 9 578           | 10 158 | 1 274      | 1 599 |
| Netherlands         | 4 164           | 4 414  | 1 105      | 1 118 |
| Portugal            | 1 504           | 1 858  | 330        | 470   |
| United Kingdom      | 4 334           | 4 577  | 1 537      | 1 620 |
| EC                  | 3 922           | 4 703  | 1 073      | 1 257 |
| Max./min. variation | 6.3             | 5.5    | 4.7        | 3.6   |

Source: Eurostat.

- the four Mediterranean countries have a level of consumption considerably lower than in Northern Europe: 799 kWh per capita in Italy, 786 kWh per capita in Greece, 618 kWh per capita in Spain and 470 kWh per capita in Portugal (this is due to a lower level of domestic appliances, particularly in rural areas. It is to be expected that these countries will gradually align themselves with other EC members and that significant investment in electricity production will be required. This investment is already underway in Spain).

The proportion of EC electricity production used by industry has fallen during the past 15 years. This is mainly because of the effects of the recession on large-scale consumers such as the chemical, steel, metal working, food and textile industries but also because technological progress has enabled these industries to use electricity more efficiently. During the same period electricity has replaced other sources of fuel in many industries, thus electricity now covers 50% of industry's energy needs in France compared to 33% in 1960. This has enabled the consumption by industry to increase slightly in absolute value from 557 billion kWh in 1980 to 587 billion kWh in 1986.

**Table III**  
Final Electricity Consumption by User

| (%)        | 1973 | 1980 | 1986 |
|------------|------|------|------|
| Industry   | 48.3 | 47.0 | 41.6 |
| Transport  | 2.6  | 2.5  | 2.2  |
| Households | 25.7 | 28.9 | 28.7 |
| Other      | 23.4 | 21.6 | 27.5 |

1973: EC 10 (excluding Spain and Portugal).

Source: Eurostat.

The proportion of electricity consumed by the household and "other" sectors have both increased over the past 15 years. In the household sector, this is due to the increase in the stock

**Table IV**  
**Final Energy Consumption by User - 1986 (%)**

|           | B    | DK   | D    | GR   | E    | F    | IRL  | I    | L    | NL   | P    | UK   |
|-----------|------|------|------|------|------|------|------|------|------|------|------|------|
| Industry  | 51.1 | 29.8 | 42.8 | 44.6 | 53.7 | 34.4 | 36.8 | 52.0 | 63.0 | 44.6 | 48.6 | 33.7 |
| Transport | 2.3  | 0.6  | 3.0  | 0.1  | 2.7  | 2.5  | 0.2  | 2.7  | 1.2  | 1.8  | 1.4  | 1.2  |
| Domestic  | 27.2 | 32.5 | 26.2 | 31.5 | 22.0 | 30.5 | 39.5 | 25.0 | 15.8 | 25.3 | 25.3 | 35.3 |
| Other     | 19.4 | 37.1 | 28.0 | 24.2 | 21.6 | 32.6 | 23.5 | 20.3 | 20.0 | 28.3 | 24.7 | 29.8 |
| Total     | 100  | 100  | 100  | 100  | 100  | 100  | 100  | 100  | 100  | 100  | 100  | 100  |

Source: Eurostat.

of domestic appliances and to an extension of electricity heating to replace oil- and coal-fired heating. The "other" sector covers essentially agriculture and the service sector and the growth here is accounted for by growth in the latter.

### Electricity Prices

Electricity remains expensive compared with other sources of fuel. But there are considerable differences in the price of electricity to both domestic and household users between Member States partly because of the differences in primary fuels used to produce electricity and partly because of government intervention. For example, the largest drop in electricity prices between 1986 and 1987 was in Italy, Ireland and the Netherlands, countries in which over 50% of electricity is generated from natural gas and/or fuel oil (the prices of which dropped over this period). Electricity prices fell only slightly in France and Belgium where nuclear power accounts for over 60% of fuel generation, as fuel prices are an insignificant factor in nuclear-based generating costs.

In those countries in which coal-fired power stations have an important role, generating costs and electricity prices depend on the origin of the coal and the administrative provisions in force. Thus Danish power stations benefited in full from the extremely low price of coal from non-Community countries. However, this highly favourable situation with regard to input costs was more than balanced by a sharp increase in the special tax on electricity consumption by domestic users (for industrial consumers this tax is deductible). In Germany, electricity consumers bore the cost increases resulting from the combustion of domestic coal in power stations and from environmental protection measures. Other Member States, notably the United Kingdom, also insist on the use of the more expensive domestic coal, but arrangements linking the price more or less closely to the price of imported coal limit the burden passed onto electricity customers in the price per kilowatt hour.

### Factors behind Production Trends

Three countries are responsible for two-thirds of total electricity production in the EC - Germany (25%), France (23%)

and the United Kingdom (18%) - while they only account for 53% of the total population. Adding Italy and Spain (12% and 8% respectively of total production), it is evident that five countries account for nearly 90% of total EC production.

**Table V**  
**Electricity Prices in January 1987**

| ECU                     | Domestic electricity |                | Industrial electricity |           |
|-------------------------|----------------------|----------------|------------------------|-----------|
|                         | Tax excl.            | With all taxes | Tax excl.              | VAT excl. |
| Belgium                 | 0.0632               | 0.0738         | 0.0553                 | 0.0553    |
| Denmark                 | 0.0379               | 0.0930         | 0.0278                 | 0.0278    |
| Germany (Hamburg)       | 0.0623               | 0.0745         | 0.0641                 | 0.0674    |
| Greece                  | 0.0487               | 0.0574         | 0.0590                 | 0.0590    |
| Spain                   | 0.0590               | 0.0662         | 0.0581                 | 0.0581    |
| France (Paris)          | 0.0670               | 0.0844         | 0.0477                 | 0.0477    |
| Ireland (Dublin)        | 0.0580               | 0.0580         | 0.0558                 | 0.0558    |
| Luxembourg              | 0.0618               | 0.0655         | 0.0500                 | 0.0500    |
| Netherlands (Rotterdam) | 0.0605               | 0.0726         | 0.0530                 | 0.0535    |
| Portugal                | 0.0753               | 0.0813         | 0.0681                 | 0.0681    |
| U.K. (London)           | 0.0450               | 0.0450         | 0.0506                 | 0.0506    |

Domestic electricity prices per kWh, 13 000 kWh per year of which 9 500 at night except in Denmark.

Industrial electricity prices per kWh, 24 GWh per year (4 000 kW - 6 000 h).

Source: Bulletin of Energy Prices, EC.

The average rate of growth of production in the EC slowed after the oil crisis, but this average masks important differences between countries. The countries in which the rate of growth has been the fastest are those in which electricity consumption was the least developed at the end of the 1970s. The Mediterranean countries (excluding Italy) and Ireland are in this group. It is not surprising to find that growth accelerated fastest in Portugal (33.3% between 1980 and 1986) where there is still much progress to be made in establishing an optimum infrastructure for electricity consumption. France is an exception; the massive choice for nuclear electricity and "all electric" as a substitute for oil imports, accounts for this. The other members of the Community were already well-equipped at the end of the 1970s; consequently, growth in production has been more modest.

The main sources of fuel for electricity production in the EC are conventional thermal, coal, gas and oil (56% in 1986) and

nuclear (32% in 1986) with a smaller hydroelectric production (11.7% in 1986). Until the oil crisis in 1973, conventional thermal production was the fastest growing sector. After the crisis, this energy source started to decline slowly; there was a slight increase in hydroelectric production and nuclear programmes started to get under way. In the 1980s, the reduc-

each country has concentrated on using the most available domestic sources of fuel or on developing sources which allow for a degree of autonomy in energy policy.

### Community Trade

In the past there has been only limited intra-Community trade in electricity, but it has grown since the beginning of the crisis. In 1973 it represented 58 billion kW, which grew to 110 billion kW in 1980 and 140 billion kW in 1986. The EC has an external deficit of around 15 billion kW, which represents electricity supplied from Switzerland and Austria to Italy and Germany.

**Table VI**  
**Net Electricity Production by Country**

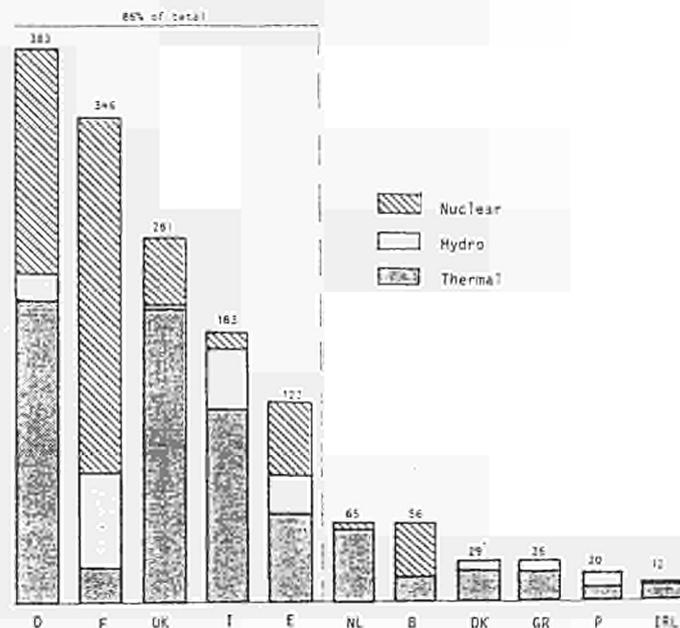
| (Billion kWh)  | 1980 | 1986 | % change |
|----------------|------|------|----------|
| Belgium        | 51   | 56   | 9.8      |
| Denmark        | 26   | 29   | 11.5     |
| Germany        | 347  | 383  | 10.4     |
| Greece         | 21   | 26   | 23.8     |
| Spain          | N/A  | 122  | N/A      |
| France         | 247  | 346  | 40.1     |
| Ireland        | 10   | 12   | 20.0     |
| Italy          | 177  | 183  | 3.4      |
| Luxembourg     | 1    | 1    | 0        |
| Netherlands    | 62   | 65   | 4.8      |
| Portugal       | 15   | 20   | 33.3     |
| United Kingdom | 266  | 281  | 5.6      |

Source: Eurostat.

tion in the proportion of conventional thermal production has been much more rapid and nuclear production has increased sharply as plants planned in the immediate aftermath of the crisis have come into service.

There has thus been a major redistribution in the methods of production of electricity; however, this overall view masks considerable differences in the situation between Member States. While conventional thermal production has declined in most Member States, it is still practically the only form of production in Denmark and represents 94% of production in the Netherlands, compared with only 12% in France. On the other hand, nuclear production, which represents 70% of

**Figure 1**  
**NET ELECTRICITY PRODUCTION BY FUEL TYPE**  
1986 - 1 524 Twh



Source: Eurostat.

**Table VII**  
**Total EC Net Electricity Production (TWh)**

| (Billion kWh) | 1973 (%) | 1980 (%) | 1986 (%) |
|---------------|----------|----------|----------|
| Hydro         | 11.5     | 12.3     | 11.7     |
| Nuclear       | 5.4      | 12.4     | 32.3     |
| Thermal       | 83       | 75.3     | 56       |
| Total         | 98       | 120      | 152      |

1973-1980: EC 10.

Source: Eurostat.

production in France and two-thirds of production in Belgium, has not been developed in five out of the 12 Member States. Member States have thus reacted very differently to the crisis ranging from a maintenance of the status quo to a complete re-conversion of production methods. In general,

Within the Community, France is the only large net exporter of electricity to other Member States. Because domestic demand has not been as high as predicted, France has considerable excess nuclear production capacity and has adopted an export policy. In 1986, France exported 33 kWh, valued at approximately 1.03 billion ECU. This was exported mainly to Italy, Switzerland and the United Kingdom (by means of cross-channel cable) with smaller quantities delivered to Germany, Luxembourg and Spain.

There is at present considerable over-capacity in the electricity production industry elsewhere (notably in the thermal and hydro sector) and with the development of improved distribution systems, the opening up of the single market in 1992, and the tendency towards privatizations, intra-Community trade is likely to increase. In the longer term, this could substantially change the economics of electricity production in the EC.

**Table VIII**  
**Evolution of Maximum Net Capacity in the Community**

| (Megawatt) | Nuclear | Thermal | Hydro  | Other  | Total   |
|------------|---------|---------|--------|--------|---------|
| 1985       | 73 457  | 228 031 | 71 751 | 15 755 | 388 994 |
| 1986       | 85 578  | 227 312 | 73 866 | 15 331 | 402 087 |
| 1987       | 92 431  | 228 771 | 74 869 | 15 215 | 411 286 |
| 1988       | 100 690 | 228 314 | 76 399 | 15 637 | 421 040 |
| 1995       | 117 473 | 243 314 | 82 113 | 17 580 | 460 480 |

Source: UNIPEDE.

**Table IX**  
**Maximum Net Capacity in 1985 by Country (MW)**

|                | Nuclear | Thermal | Hydro  | Other  | Total   |
|----------------|---------|---------|--------|--------|---------|
| Belgium        | 5 426   | 5 868   | 1 326  | 919    | 13 539  |
| Denmark        |         | 7 917   |        | 276    | 8 193   |
| Germany        | 16 095  | 63 839  | 6 669  | 6 203  | 92 806  |
| Greece         |         | 4 412   | 2 032  | 667    | 7 111   |
| Spain          | 5 524   | 17 619  | 14 101 |        | 37 244  |
| France         | 37 487  | 26 164  | 21 829 | 1 082  | 86 562  |
| Ireland        |         | 1 873   | 513    | 642    | 3 028   |
| Italy          | 1 273   | 34 380  | 18 255 | 1 718  | 55 626  |
| Luxembourg     |         | 95      | 20     | 5      | 120     |
| Netherlands    | 508     | 14 590  |        | 472    | 15 570  |
| Portugal       | 2 111   | 2 812   | 329    | 5 254  |         |
| United Kingdom | 7 144   | 49 161  | 4 194  | 3 442  | 63 941  |
| Total          | 73 457  | 228 031 | 71 751 | 15 755 | 388 994 |

Source: UNIPEDE.

## Forecast and Outlook

Electricity consumption is expected to grow more slowly in the future than in the recent past; the BIPE estimates that it could grow by 2.8% per annum over the period 1986-1992. This expected growth rate is higher than the expected growth rates for other fuels. Consumption of oil and gas is forecast to grow by only 0.8% and consumption of coal is expected to remain stagnant over the same period. This is because favourable investment prospects in industry in general should accelerate the modernization of production methods. The tendencies towards mechanization, automation, and better control of installations should increase the consumption of electricity at the expense of energy supplied by other fuels. Thus the relatively higher growth of electricity consumption will be due to a significant increase in use by the industrial sector.

Consumption in the domestic sector will also increase, but at a slower rate. However, within this average, domestic

consumption will continue to grow much faster in the Mediterranean countries than elsewhere as they continue to improve their basic infrastructures and to equip households with more domestic appliances.

Nuclear production of electricity will continue to increase its share of total production, growing from 30% in 1985 to 37% in 1992. The power stations for this production are now either completed or near completion. Coal should maintain its share of production at 41%. In consequence, the growth of production in France is expected to be considerably higher than the Community average (it could be around 3.4% per annum for the period 1986-1992). Forecast growth over the same period is 2.6% in Italy, 2.5% in Germany and 1.8% in the United Kingdom.

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# NUCLEAR FUELS

(NACE 15)

*In 1987 nuclear energy accounted for 14% of the total energy production and 32% of electricity production in the EC. The national situations, however, vary considerably: in France and Belgium almost 70% of the electricity is generated by nuclear-power stations, while Denmark, Greece, Ireland, Luxembourg and Portugal do not use this form of energy.*

The Community's energy objectives for 1995 take into account the importance of the nuclear industry to the Community's energy supplies and place emphasis on the need to ensure that all aspects of the planning, construction and operation of nuclear installations meet optimum safety standards.

To a greater extent than other energy sources, nuclear energy has to be backed up by a complex combination of industrial activities. These relate to the mining of natural uranium, the preparation of nuclear fuel and the construction of sophisticated power stations. These characteristics are reflected in the electricity cost structure. Only 28% of the cost is accounted for by expenditure on fuel: 11% for natural uranium and 17% for the various conversion stages of the nuclear fuel cycle. However, the greater part, or 57%, arises from amortization of the investment cost of the nuclear-power stations. The remainder, or 15%, is accounted for by the station operating costs.

## Current Situation

### Uranium Production

The annual consumption of uranium in the EC is around 15 000 tonnes (of natural uranium, i.e. tU). Uranium requirements in the Community will remain more or less constant throughout the coming decade, despite the moderate increase in the installed nuclear-power capacity. This phenomenon is due both to better fuel management and to the recycling of reprocessed plutonium and uranium. The annual production of uranium in the Community amounts to about 3 600 tU. The remainder is imported from eight countries.

The electricity-producing companies have made it a practice to diversify sources of supply and have built up stocks which may vary from two to four years' consumption and ensure security of supply. It should be emphasized that nowadays it is just as expensive to store the equivalent of three months' consumption of petroleum or coal as to store the equivalent of two years' natural uranium requirements.

Uranium is produced in five Member States: France, Spain, Portugal, the Federal Republic of Germany and Belgium. France is by far the leading producer, with an annual production of over 3 200 tU (tU/yr). Spain produces just over 200 tU/yr and Portugal about 120 tU/yr. The 40 tU/yr produced in Germany is derived from underground exploration (as opposed to industrial-scale mining), while the entire quantity of 40 tU/yr produced in Belgium results from the processing of imported phosphates.

In 1987 the Community paid approximately 28.25 ECU/lb U308 (USD 32.50/lb U308) for its uranium under long-term contracts (source: Euratom Supply Agency Annual Report

**Table I**  
**Installed Nuclear Power Capacity and Nuclear Share in Electricity Production**

|             | 1987 |      | 1990  |      | 1995  |      |
|-------------|------|------|-------|------|-------|------|
|             | GWe  | %    | GWe   | %    | GWe   | %    |
| Belgium     | 5.5  | 66.0 | 5.5   | 65.0 | 5.5   | 62.0 |
| Germany     | 18.9 | 31.3 | 23.0  | 35.0 | 23.0  | 33.0 |
| Spain       | 6.6  | 31.2 | 7.6   | 34.0 | 7.6   | 32   |
| France      | 49.7 | 69.8 | 54.0  | 76.0 | 61.0  | 79.0 |
| Italy       | 1.1  | 0.1  | 1.1   | 3.0  | 1.1   | 3.0  |
| Netherlands | 0.5  | 5.2  | 0.5   | 5.0  | 0.5   | 5.0  |
| UK          | 10.3 | 17.5 | 12.4  | 21.0 | 11.5  | 21.0 |
| EC          | 92.6 | 32.4 | 104.1 | 36.0 | 110.2 | 37.0 |

Source: DG XVII.

for 1987). At that price, the value of the uranium mined in the Community is approximately 260 million ECU.

### France

There are six uranium production plants in France, details of which are presented in Table II. These plants extract uranium from ores mined from 15 to 30 different deposits, usually within the region in which the plants are located. The former interests of the Société Nationale Elf/Aquitaine/Production (SNEA/P) in uranium exploration have now been taken over by a subsidiary of EDF.

Already discovered uranium resources, recoverable at costs of up to USD 80/kgU (USD 30/lb U308), could support production at the present level for a further 20 to 30 years. There are currently no plans to increase the annual rate of production.

### Spain

In 1987 uranium production in Spain amounted to about 220 tU. Nearly all this uranium (200 tU) was produced at the Saelices el Chico plant in Ciudad Rodrigo from ore mined from the Fe uranium deposit. The remainder was produced at the small experimental La Haba production plant (with a capacity of 30 tU/yr) in Don Benito. The government agency Empresa Nacional del Uranio S.A. (ENUSA) owns and operates the uranium production centres. Already discovered resources in Spain, which could be recovered at costs of up to USD 80/kgU, total nearly 27 000 tU. Most of these resources are located at or near the Saelices el Chico production plant. There are plans to increase the capacity of this plant to about 800 tU/yr by 1991.

**Table II**  
**Uranium Production Centers in France**

| Name               | Location     | Annual<br>(Capacity tU/yr) | Owner |
|--------------------|--------------|----------------------------|-------|
| L'Ecarpière        | Vendée       | 650                        | SIMO  |
| Bessines           | Haute-Vienne | 1 500                      | SIMO  |
| Le Cellier         | Lozère       | 200                        | CFM   |
| Bertholène         | Aveyron      | 70                         | TCMF  |
| Mailhac/Bernardan  | Haute Vienne | 500                        | TCMF  |
| St. Martin du Bosc | Hérault      | 900                        | SIMO  |

SIMO - Société Industrielle des Minerais de l'Ouest - is a 100% subsidiary of Cogema

CFM - Compagnie Française de MOKTA is a 100% subsidiary of Cogema

Cogema - Compagnie Générale des Matières Nucléaires - is entirely owned by the Commissariat à l'Énergie Atomique (CEA).

TCMF - TOTAL Compagnie Minière France - is TOTAL's mining operator in France.

Source: DG XVII.

### Portugal

Uranium production in Portugal in 1987 was estimated to be about 120 tU. All the uranium was produced at the Urgeiriça

plant from ore mined from several small deposits in the Beira Alta area. Plant capacity is 170 tU/yr.

Work has been started on the construction of a new production centre, Nisa, in the Alto Alentejo region. This plant, which will process ore from a number of deposits in the area, should have a capacity of 200 tU/yr. Start-up is scheduled for 1990.

The public company Empresa Nacional de Uranio (ENU) is responsible for uranium production in Portugal. Any other company wishing to conduct uranium exploration or mining activities in Portugal must first conclude an agreement with ENU.

Discovered uranium resources in Portugal, which could be recovered at a cost of USD 80/kgU or less, are sufficient to support an expected production capacity of 370 tU/yr for at least 20 years. Since Portugal does not have a nuclear programme, it exports the uranium it produces, some of it to other Member States.

### Germany

About 40 tU/yr are produced in Germany at the Ellweiler plant which processes ore derived from underground exploration activities at the Menzenschwand and Grosschlophen uranium deposits. The production capacity of the Ellweiler plant is 125 tU/yr, but it operates below this capacity owing to the limited supply of ore.

The plant is operated by the company Gewerkschaft Brunhilde, which also extracts the ore from the Menzenschwand deposit. Another company, Interuran (formerly Saarberg Interplan Uran), is actively exploring the Grosschlophen deposit. There are no plans to expand uranium production in Germany, although the Grosschlophen deposit could support a production facility with a capacity of 250 tU/yr. Discovered resources recoverable at costs of up to USD 80 kgU amount to about 2 500 tU.

### Belgium

Approximately 40 tU/yr are produced in Belgium from imported phosphates. Belgium has no known uranium resources.

### Nuclear Fuels

After the mining and refining operations, the nuclear materials undergo many processing stages before they are loaded as nuclear fuel into the reactor: conversion, enrichment and fuel-assembly fabrication. After having been irradiated in the reactor, the fuel is then stored or reprocessed with a view to recovering the recyclable materials and separating the radioactive waste. The firms within the Community have developed industrial know-how which is applicable to all these activities.

## Uranium conversion

Conversion results in a uranium compound (uranium hexafluoride) which is suitable for the subsequent processing (enrichment and fabrication) and possesses the requisite chemical purity. Conversion accounts for a small part of the discounted fuel cost, around 3%.

Two firms are currently carrying out conversion operations in the Community: British Nuclear Fuels Ltd in the United Kingdom and Comurhex in France. The other converters in the Western World are in Canada and the United States. The production capacities are presented in Table III.

The Community's conversion requirements are almost the same as those for natural uranium which amount to about 15 000 tonnes/year. They will remain stable throughout the coming decade. The firms within the Community meet about 75% of the requirements. The conversion sector is characterized at world level by considerable and persistent excess capacity (about 45%).

**Table III**  
**Conversion Capacities and Requirements**  
**in the EC (tU)**

|              | 1987   | 1990   | 1995   |
|--------------|--------|--------|--------|
| Comurhex     | 12 000 | 14 000 | 14 000 |
| BNFL         | 9 000  | 9 000  | 9 000  |
| Total        | 21 000 | 23 000 | 23 000 |
| Requirements | 15 000 | 15 000 | 15 000 |

Source: DG XVII.

Also, one uranium producing country has a policy of only exporting uranium in a converted form. This limits the share of the Community market accessible to domestic suppliers. However, in spite of intense competition, they have been able to obtain a significant market share in non-EC Europe and outside Europe and to ensure a satisfactory rate of utilization of their installations.

The average cost of conversion is about 6.5 ECU/kg U and the turnover on the Community market is approximately 100 million ECU.

The issue of converting reprocessed uranium is receiving increased attention in Europe. In France, Comurhex and Cogema have jointly formed the marketing company, Urep, with the aim of offering utilities their range of services in the field. In the United Kingdom, BNFL has converted the reprocessed uranium recovered from Magnox fuel in its existing plant.

## Enrichment

Enrichment is a stage in the fuel cycle which consists of increasing the fissile isotope content of the uranium. This stage is obligatory in the case of fuel for light-water reactors (either

pressurized-water or boiling-water) and for advanced gas-cooled reactors. These types of reactors fuelled with enriched uranium account for 85% of the Community's installed nuclear capacity.

Uranium enrichment is an important stage because, on the one hand, it involves advanced technology which requires the development of a high level of expertise and, on the other hand, the operation accounts for about 27% of the total discounted cost of the fuel cycle. Thus, a secure supply of enriched uranium at acceptable prices is a major factor in the implementation of nuclear programmes. Production is carried out in the Community by two competing multinational groups, Eurodif and Urenco.

Cogema is in charge of marketing the enrichment services produced by Eurodif. In the Eurodif plant, use is made of the gaseous diffusion process, developed by the CEA, France. France associated various European partners, Belgian, Italian and Spanish, with the 1973 decision to construct a large-scale plant. A large capacity was adopted with the aim of obtaining the maximum benefit from economies of scale, which are important in the case of gaseous diffusion. The choice was also influenced by the optimistic forecasting climate concerning the development of nuclear energy which prevailed in the immediate wake of the initial oil crisis in 1973.

The plant at Tricastin, now named after its founder, Georges Besse, is one of the largest in the world with a capacity of 10.8 million separative work units per year (SWU/y) (Enrichment capacity is measured in separative work units per year. Fuelling a 1-GWe LWR reactor with a load factor of 70% requires annually about 25 tonnes of uranium enriched to 3% U235 which, in its turn, requires about 150 tonnes of natural uranium and 95,000 SWU). Products originating from the Tricastin plant presently satisfy around 40% of world needs. After the plant achieved full production capacity in 1982, it had to adapt its production rate in line with market requirements. Significant production modulations were achieved. The intrinsic flexibility of the process allows the adaptation of the plant to lower market demand. This flexibility will be further enhanced in the coming years. After modernization work that will be undertaken in the near future, the plant could remain in operation until 2010.

**Table IV**  
**Enrichment-service Requirements and Capacity in**  
**the European Community**

| (Thousand SWU) | 1987   | 1990   | 1995   |
|----------------|--------|--------|--------|
| Eurodif        | 10 800 | 10 800 | 10 800 |
| Urenco         | 2 000  | 2 500  | 3 000  |
| Total          | 12 800 | 13 300 | 13 800 |
| Requirements   | 9 500  | 10 000 | 10 500 |

Source: DG XVII.

The firm Urenco Ltd (United Kingdom) was set up on an equal shares basis by Uranit GmbH, Germany, British Nuclear Fuels plc-BNFL, United Kingdom, and Ultracentrifuge Nederland-UCN, the Netherlands. Its purpose was to develop and apply the technique of enrichment by means of ultra-centrifugation on an industrial scale; Urenco Limited coordinates the production of the consortium and the marketing of the enrichment services. The firm CENTEC is responsible for coordinating the research and development programmes and for the exchanges of technological information between the partners. The construction and operation of the installations in each of the countries are in the hands of three national firms comprising the partners in Urenco Limited, with the national partner in each case taking the majority shareholding. The present capacity of the installations of the Urenco group amounts to two million SWU/y and it is planned to increase to 2.5 million in 1990 and to continue to increase as a function of the orders obtained.

Centrifugation technology does not require the construction of large-scale plants. The capacity of the plants can be increased gradually by successively adding modules, relatively rapidly if necessary. This feature makes it possible to plan investments as a function of the contracts concluded and hence to ensure that the installations enjoy a high utilization rate.

Requirements for enrichment services within the Community should expand gradually from 9.5 million SWU in 1987 to 10.5 million SWU in 1995. In contrast to uranium requirements, there should therefore be a moderate increase in enrichment requirements. Technological advances in respect of better uranium utilization in reactors do not, in fact, reduce requirements for enrichment services as much as they do for the consumption of natural uranium.

Furthermore, the recycling of reprocessed uranium does not have an appreciable impact on enrichment requirements. At present 15% of the Community's requirements are covered by imports from the United States and the USSR under long-term contracts of very long standing. In future it will be possible to cover requirements under advantageous economic conditions by making use of the enrichment plants located in Europe.

The present world-wide production capacities are considerable and will continue to exceed requirements beyond the turn of the century. This situation sharpens competition. The price of enrichment services is gradually decreasing in real terms as a result of the amortization of old plants and of commercial competition. The weakness of the American currency is at present handicapping the enrichment industry in the Community, which is finding it difficult to increase its already substantial share of the export markets. The value of the SWU is estimated at about 130 ECU/SWU and the turnover on the Community market is hence about 1 250 million ECU. Application on an industrial scale of the laser

enrichment process which is being developed in the United States, Japan, France and other countries in Europe could alter the conditions on this market towards the end of the century.

#### **Fuel-element fabrication**

This stage comprises the operations in which uranium fluoride, whether enriched or not, is used to produce complete fuel elements ready to be inserted into reactors. It accounts for about 11% of the discounted cost of the fuel.

The industrial structures at Community level are predominantly national. In Germany the firm RBU, of which Siemens-KWU is a majority shareholder, is capable of fabricating 900 tU of LWR fuel per year in its Hanau and Karlstein plants. Siemens-KWU acts as the designer and vendor of the fuel elements fabricated by RBU. Siemens-KWU also possesses a fabrication plant with a capacity of 300 tU/yr at Linggen (ANF). The highly enriched uranium fuel used for the prototype high-temperature THTR reactor is fabricated in a special pilot installation managed by Nukem.

In Spain the firm ENUSA has a plant at Salamanca with a capacity of 200 tU/yr.

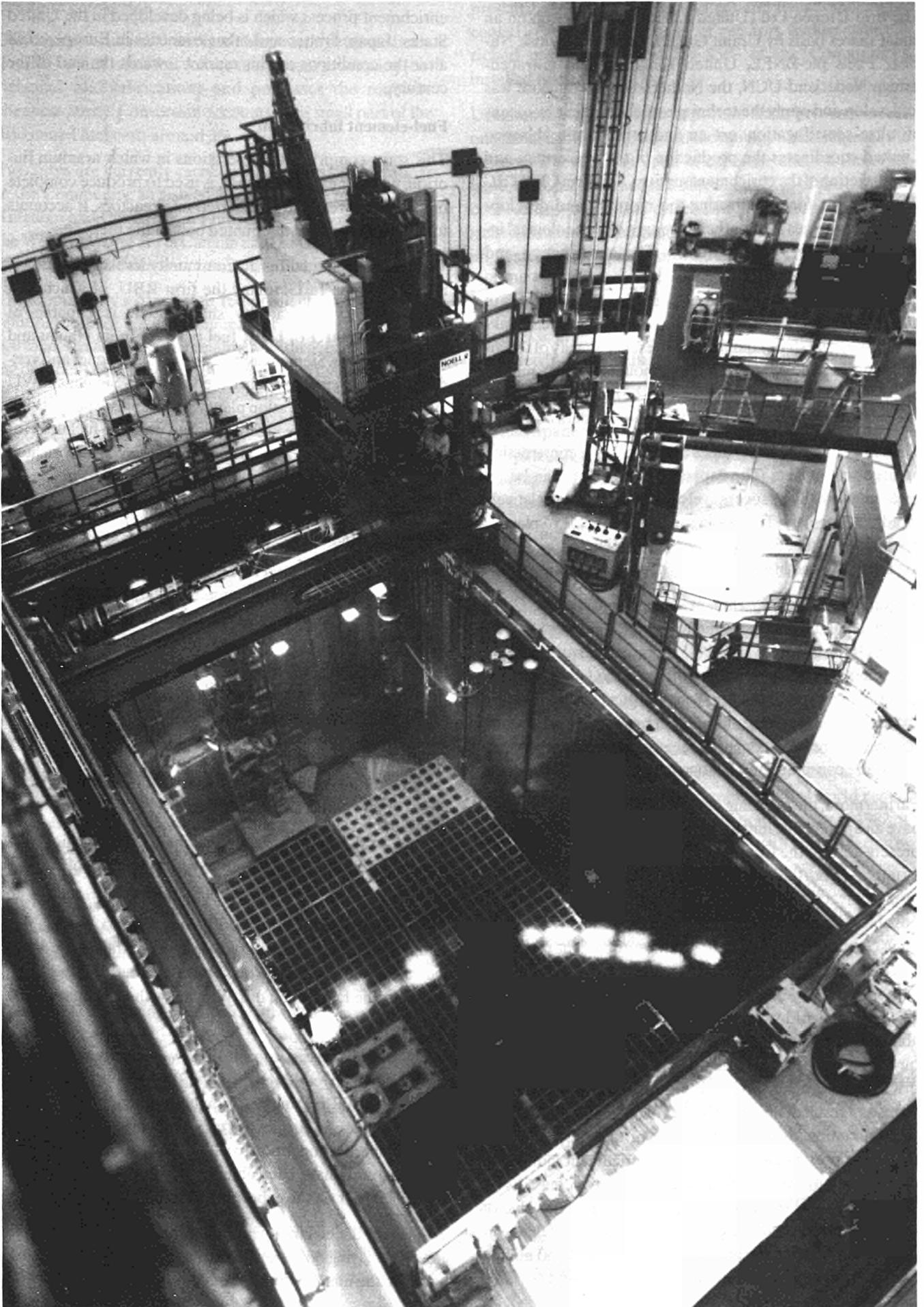
In France the firms Cogema, Framatome and Pechiney are associated in the fuel fabrication industry. Framatome is in charge of design, while Framatome and Cogema and owned in equal proportions by them, is responsible for marketing reloads. Fabrication is carried out in the FBFC plants Romans and Pierrelatte in France and at Dessel in Belgium. The total capacity of the plants is 1 600 t/yr. The plant at Dessel is owned by FBFC International, a subsidiary (100%) of the French firm, FBFC, in which Cogema and Framatome are associated with Pechiney (25%-25%-50% respectively).

In Italy AGIP controls Fabbricazione Nucleari, which possesses a plant at Bosco Marengo with a capacity of 200 t/yr and a plant at Saluggia with a capacity of 50 t/yr.

In the United Kingdom, BNFL has hitherto been active mainly in the fabrication of fuel for British Magnox and Advanced Gas-cooled Reactors. However, the firm also has a plant for the fabrication of LWR fuel with a capacity of 200 t/yr.

A considerable excess capacity is now evident in the fabrication sector. The total capacity is 3 450 t/yr, while the requirements for LWR fuel in the Community are in the region of 2 000 t/yr. There is also excess capacity world-wide. Despite the very sharp competition to which this gives rise, European manufacturers have been able to obtain orders for approximately 200 t/yr on the export markets.

At present the electricity producers are to an ever-increasing extent laying down varied and special requirements in respect of the manufactured product in order to keep up with



load-following and achieve higher burnup rates. These requirements call for continuous innovation on the part of the manufacturers, but enable the operators to achieve savings in the cost of the cycle. However, the gradual trend towards high burnup results in a reduction in the number of fuel elements required to produce a given quantity of energy and this limits the growth rate of the fuel market.

The average cost of fuel-element fabrication amounts to approximately 230 ECU/kg and the turnover on the Community market corresponds to about 480 million ECU.

**Table V**  
**Requirements and Capacities for the Fabrication of LWR Fuel Elements in the European Community**

|              | 1987  | 1990  | 1995  |
|--------------|-------|-------|-------|
| FBU          | 900   | 900   | 900   |
| ENUSA        | 200   | 200   | 200   |
| ANF          | 300   | 300   | 300   |
| FBFC         | 1 600 | 1 600 | 1 600 |
| AGIP         | 250   | 250   | 250   |
| BNFL         | 200   | 200   | 200   |
| Total        | 3 450 | 3 450 | 3 450 |
| Requirements | 2 200 | 2 400 | 2 500 |

Source: DG XVII.

Dependent upon the development of plutonium reprocessing and recycling, the fabrication of plutonium fuel elements is increasing in importance. The special plants set up in Germany, Belgium, France and the United Kingdom have a total capacity of about 100 tU of mixed oxides per year. They have made it possible to acquire the technical experience needed for construction of the larger-scale units required for development of the programmes for the thermal recycling of plutonium which are not at the planning stage. A total capacity of over 200 t of MOX fuel will be needed by the turn of the century.

#### Storage and reprocessing of spent fuel

Reprocessing is a complex operation involving the spent fuel discharged from nuclear power stations; this spent fuel is a mixture of reusable products (unconsumed uranium and plutonium created during radiation of the fuel in the power-station reactor) and of highly radioactive fission products that may be considered as the ashes arising from combustion of the fissile material. The reprocessing operation enables these different products to be separated.

In the medium term, it ensures that a decrease in requirements for natural uranium will be brought about by the recycling of recovered materials in thermal nuclear-power stations. In the long term it provides the prospect of achieving almost total independence from external uranium supplies with the fast-breeder concept, that is to say, by reusing plutonium in fast-breeder reactors.

Finally, by separating out the fission products in the spent fuel elements, it makes it possible to treat and condition them with a view to their safe disposal.

Most of the countries in the EC (France, the United Kingdom, Germany, Belgium, Italy and the Netherlands) have chosen the option of fuel reprocessing after a period of interim fuel storage either at the power-station sites or in special installations for dry storage or storage under water. Spain and a number of countries outside the Community have chosen longer-term interim fuel storage (from 20 to 50 years) pending reprocessing or direct disposal of spent fuel elements in deep-lying geological formations.

Fuel reprocessing and waste management account for a considerable proportion of the discounted cost of the fuel: close to 20% if account is taken of the value of the recovered fissile materials and 30% if it is not taken into account.

Present experience in reprocessing has been derived mainly from the reprocessing of metal fuels from natural-uranium-fuelled gas-cooled reactors, a type of reactor which was initially adopted by France and the United Kingdom but is now no longer being constructed. So far, about 40 000 tonnes of uranium from spent fuel of that type have been reprocessed.

In the case of uranium-oxide fuel from LWR and AGR reactors, the tonnage reprocessed amounts to 2 500 tU. Of this, 2 100 t was dealt with in the only commercial plant in service at present, namely the UP 2-400 plant at La Hague, France, operated by Cogema. The capacity of this plant is 400 t/yr. In France a decision was taken to carry out large-scale extensions at the La Hague installations. The current construction work involves two plants, each with a capacity of 800 tU/yr. There is the reconstruction of the UP 2 plant with an increase in its capacity to 800 tU/yr and construction of a new plant, UP 3. The civil engineering work on the UP 3 plant began in mid-1982 and the plant is planned to be in service in 1989. The first new workshops forming part of the extension of the UP 2 plant are also under construction. The extension will come into service in 1992.

Reprocessing capacities over and above those needed to cover national requirements will be allocated to the provision of services for other electricity producers in both Community countries (Germany, Belgium and the Netherlands) and non-Community countries (Japan and Switzerland).

In the United Kingdom, BNFL is constructing a reprocessing plant, Thorp, at Sellafield, which will be capable of reprocessing 6 000 tonnes of irradiated fuel during its first 10 years of operation. Entry into service is scheduled for 1992. Its capacity is intended to cover both national requirements and those of electricity producers in Community countries (Germany, Italy and the Netherlands) and non-Community countries (Japan, Switzerland and Sweden).

To these installations can be added the German plant at Wackersdorf with a capacity of 350 tU/yr, the construction of which was started in 1985 and which is scheduled to enter service towards 1995.

On the basis of the start-up schedules of the three installations referred to above, it may be expected that about 12 000 tU and 27 000 tU of oxide fuel will have been reprocessed in the Community by the end of 1995 and 2000 respectively.

The total quantities of fuel discharged from nuclear-power stations in the Community by the end of those years will amount to about 25 000 tU and 38 000 tU respectively. If the quantities for reprocessing from non-Community countries are taken into account, it can be estimated that the provisional storage requirements will be about 20 000 tU during the 1995-2000 period. Storage capacity covering such requirements is already virtually available today.

The reprocessing contracts provide for a financial contribution from the customers as soon as construction of the plants is started. As a result of this practice, the average discounted cost in the Community is presently in the order of 950 ECU/kg U, including the waste transport and conditioning costs.

### *Nuclear-power Station Construction*

This analysis mainly concerns the industry which constructs nuclear-power stations of the LWR type, which is the most common type in the Community and has accounted for

almost all international trade in nuclear-power stations since 1970.

**Table VI**  
**Reprocessing Requirements and Capacities in the European Community**

|                  | 1987  | 1990  | 1995  |
|------------------|-------|-------|-------|
| Cogema UP2       | 400   | 400   | 800   |
| Cogema UP3       | -     | 800   | 800   |
| BNFL-Thorp       | -     | -     | 600   |
| Wackersdorf      | -     | -     | 350   |
| Total            | 400   | 1 200 | 2 550 |
| Requirements (1) | 2 100 | 2 350 | 2 500 |

(1) Tonnage of fuel discharged annually.

Source: DG XVII.

The nuclear-power station construction industry presents a very varied picture within the Community. A distinction should be made between the following functions:

- the function of industrial architect, which corresponds to design services, often for complete power stations, and to general project coordination services. Industrial architects play an important role as intermediaries between all the parties concerned, principally the electricity producer, the other suppliers and the authorities responsible for safety;
- the supply of the nuclear island, that is to say, the supply of the specifically nuclear part of a power station, including

**Table VII**  
**The LWR Power-plant Industry in the European Community**

|                       | Architect-engineer | NSSS | Heavy nuclear components | Balance of Plant<br>Heavy equipment<br>Steam Alternator<br>turbine |
|-----------------------|--------------------|------|--------------------------|--|
| Belgium               |                    |      |                          |  |
| Tractebel             | *                  |      |                          |  |
| CMI                   |                    |      | *                        |  |
| ACEC                  |                    |      | *                        | *  |
| Germany               |                    |      |                          |  |
| KWU-Siemens           | *                  | *    | *                        | *  |
| GHH                   |                    |      | *                        |  |
| Spain                 |                    |      |                          |  |
| Empresarios Agrupados | *                  |      |                          |  |
| Initec                | *                  |      |                          |  |
| Ensa                  |                    |      | *                        |  |
| France                |                    |      |                          |  |
| Framatome             | *                  | *    | *                        |  |
| Alsthom-Atlantique    |                    |      | *                        | *  |
| Italy                 |                    |      |                          |  |
| Ansaldo               | *                  | *    | *                        |  |
| United Kingdom        |                    |      |                          |  |
| G.E. Ltd              |                    |      |                          | *  |
| NEI                   |                    |      | *                        |  |
| Babcock Power         |                    |      | *                        |  |

Source: DG XVII.

the nuclear steam supply system in which most of the nuclear technological know-how is concentrated

- the manufacture of major non-nuclear equipment, e.g. steam turbine, alternator and other conventional equipment, which represents in weight twice the amount of nuclear equipment and whose quality is essential for the availability of the plant.

To these major supplies can be added the supply of a host of varied services and equipment by a large number of companies of varying size, sometimes very diversified or very specialized. These companies possess skills in such fields as soil mechanics, civil engineering, piping, electrical equipment (cables, motors, etc.) and mechanical equipment (valves, pumps, etc.) handling equipment, project management, construction-site management and quality assurance and control.

The principal companies active in the nuclear sector are listed in Table VII. Their activities are not necessarily limited to the nuclear sector; in particular, they can be extended to the construction of conventional power stations and the manufacture of heavy mechanical components, an area in which such companies were often originally active. A special monograph is devoted to this area. These industries hence possess a real diversification capacity and are therefore protected to a certain extent against possible market fluctuations. Nevertheless, nuclear energy is characterized by such technological specificity that it deserves a special study.

Nowadays, the production capacities of the European nuclear-station construction industry seem likely to remain in excess of European requirements for a long time, even if the most favourable growth rates are assumed. The same is true at world level.

Despite the sharp competition on the export markets, the main European companies have succeeded in penetrating

them and in competing with the American companies there, although the latter originally developed the basic skills of the nuclear industrial sector (see Table VIII). At the production stage, the technological quality and reliability of the EC industry's planning are fully satisfactory. European industry has also been capable of making optimum use of its knowledge by occupying a place on the international market for specialized nuclear-power stations' maintenance operations.

Finally, in order to put its development on firm ground, the European nuclear industry has undertaken and brought to fruition extensive research, development and demonstration work. In particular, this will be of prime importance to satisfy the demand surge likely to occur when the present generation of nuclear-power plants have to be replaced. The achievements in the field of fast-breeder reactors, where the European industry is far ahead of the USA and Japan, could play a major role in this respect.

European industry, however, has hitherto remained almost entirely walled off at the national level, except in the sector of fast-breeder reactors, and has not succeeded so far in achieving the integration and developing the cooperation mechanisms which a great European market requires. Even the equipment sub-contracting market is bringing about only a relatively small volume of intra-Community trade and this is now in decline. Furthermore, certain European electricity producers have preferred to acquire equipment from American firms or equipment manufactured by national companies under American licence. All this explains why the situations differ so greatly among the different countries.

In Belgium, detailed design, construction management and nuclear-power stations start-up are entrusted to the design offices associated with the electricity producers, now merged in Tractebel. Design work relating more specifically to the nuclear steam-supply system is entrusted to a foreign supplier, hitherto Framatome or Westinghouse. The Belgian manufacturing industry, in particular CMI and ACEC,

**Table VIII**  
**Structure of Exports of Nuclear-power Stations**  
**during the 1975-1987 period**

| Importing Country | Reactor Type | Project         | Mwe (gross) | Date of Order | Exporting Company NSSS |
|-------------------|--------------|-----------------|-------------|---------------|------------------------|
| Argentina         | PHWR         | Atucha 2        | 745         | 80            | KWU                    |
| Belgium           | PWR          | DOEL 4          | 1059        | 75            | WEST. (ACECOWEN)       |
|                   | PWR          | TIHANGE 3       | 1 048       | 75            | WEST. (ACECOWEN)       |
| Brazil            | PWR          | Angra 2/3       | 2x1 325     | 76            | KWU                    |
| China             | PWR          | GUANDONG 1/2    | 2x936       | 86/86         | FRAMATONE              |
| Korea             | PWR          | KORI 3/4        | 2x950       | 78/80         | WESTINGHOUSE           |
|                   | PWR          | Y'WANG 1/2      | 2x996       | 79/79         | WESTINGHOUSE           |
|                   | PWR          | ULJIN 1/2       | 2x950       | 82/82         | FRAMATOME              |
| South Africa      | PWR          | KOEBERG 1/2     | 2x965       | 76/76         | FRAMATOME              |
| Spain             | PWR          | VANDELLOS 2     | 982         | 75            | WESTINGHOUSE           |
|                   | BWR          | VALDECABALLEROS | 2x975       | 75            | GE                     |
|                   | PWR          | TRILLO 1        | 1 040       | 75            | KWU                    |
| Taiwan            | PWR          | MAANSHAN 2      | 951         | 77            | WESTINGHOUSE           |
| United Kingdom    | PWR          | SIZEWELL 8      | 1 182       | 87            | WESTINGHOUSE           |

Source: DG XVII.

participates in the production of equipment for this system by entering into a temporary association with the supplier of the nuclear steam-supply system (FRAMACECO or ACECOWEN, as the case may be). The turbines are imported mostly from ALSTHOM and the alternators are manufactured under foreign licence by ACEC.

In Spain, the function of industrial architect was developed on the basis of the American example and several firms are active in this sector, the most important being the nationalized company ENITEC (Empresa Nacional de Ingeniería y Tecnología). The nuclear islands were initially supplied by the American companies General Electric and Westinghouse and then by the German firm KWU. The principal manufacturer of large equipment, ENSA (Equipos Nucleares), is also a nationalized company.

In France the power-station market is characterized by effective centralization in the hands of the electricity producer EDF, which is responsible for all the functions of industrial architect. The volume of the French nuclear programme has brought about autonomous technological development of high quality and appreciable economies of scale. Framatome is the sole supplier of nuclear islands and the manufacturer of the major nuclear components. Alsthom is the sole supplier of turbo-alternators and associated services. It is also a major company in fossil fired power station construction. The saturation of the French power-station market has led to a significant slowing-down in the rate of orders, which is likely to last until the end of the century. The French nuclear industry is hence subject to pressure to diversify.

In Italy, in the case of the two most recent power stations (Caorso and Montalto), the State-controlled company Ansaldo, supported by an American firm, combined the functions of industrial architect with supply of the BWR nuclear island and the main nuclear components under a licence from General Electric. It also supplied the turbo-alternator. Furthermore, Ansaldo has acquired the PWR licence from Westinghouse. Since the present moratorium on the Italian nuclear programme began, the national industry has had limited prospects in the nuclear sector, but could benefit from a revival of the conventional power-station market, on which it has already achieved export successes.

In the Federal Republic of Germany, the nuclear-power station industry is grafted onto the conventional power-station industry around Siemens-KWU. Practically all the Siemens-KWU nuclear-power stations have been built on a turnkey basis. Siemens-KWU performs the functions of industrial architect and is also the supplier of the nuclear island, but sub-contracts the manufacture of heavy mechanical components to a highly qualified and very diversified manufacturing

industry which it supervises. This practice is a major argument in favour of penetrating the markets of countries which are capable of constructing, but are not sufficiently advanced in the field of design. Siemens-KWU benefits from the experience acquired by Siemens in the conventional power-station sector which relates to the conventional aspects of the power station, i.e. turbine and alternator.

In the United Kingdom, after having developed the national reactor concepts Magnox and AGR, the industry, with American cooperation, is in the process of developing know-how with the PWR concept. The CEBG is assuming the function of industrial architect for the Sizewell power station, while Westinghouse is supplying the nuclear island. Framatome is supplying the reactor vessel and the other major nuclear components are being sub-contracted by Westinghouse to the UK manufacturing industry. The turbine and the alternator are being supplied by General Electric. The UK industry is very actively involved in the export of conventional power stations and has entered into partnership with foreign suppliers of nuclear islands (Westinghouse and Framatome) for the purpose of supplying the conventional part of nuclear power stations.

## Forecast and Outlook

In the medium-to long-term, the European nuclear fuel and power station construction industry will continue to adapt to the requirements of the electricity generating industry. The share of nuclear-generated electricity is expected to increase from now to 1990 and to a lesser degree up to 1995 (see table 1). At that time, nuclear capacity should amount to 110 GWe.

The nuclear fuel industry should globally benefit from this moderate increase of requirements on the EC market and should continue to cover most of those under advantageous conditions. It should maintain its technological development and know-how in order to strengthen its share of the world markets.

The nuclear power station construction industry, although it has shown itself capable of developing remarkable industrial technological know-how and has been able to do even better than American and Japanese companies, will be submitted to a certain pressure to diversify and simplify structures, following the continuing low level of orders for equipment in Europe and through the world. In this respect, the prospects for the nuclear sector are similar to those for the conventional power station construction sector.

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## CRYSTALLIZED SALT

(NACE 233)

*In 1987, Community production of crystallized salt was between 23 and 24 Mt. Consumption reached 20 Mt. Overcapacity is one of the main features of the salt sector together with the sluggishness of demand in the EC and abroad. In this context production is likely to stagnate up to 1990.*

Salt (NaCl) is a common, low value, traded commodity. It has numerous end uses, the main one being the manufacture of chloralkalis. Demand for salt comes from a variety of sectors:

- chemicals;
- de-icing;
- various industries (including water softening);
- agriculture;
- food industries and households.

### Current Situation

Salt production basically involves either dry mining (rock salt), solution mining (vacuum salt) or solar evaporation, i.e. sun and wind (sea salt).

As far as salt production is concerned, the figures included in Table II show variations which need to be examined with the following considerations in mind:

- weather has a direct influence on solar salt production and on sales of de-icing salt;

- energy, with its increasing costs after the second oil crisis, plays an important part in vacuum salt processing (solution mining);
- the impact of market trends depends either on technological factors (diaphragm cells have paved the way of chloralkalis for salt in brine) or psychological factors (anti-salt campaigns for health or environmental reasons).

The following information and statistics cover salt production and factors affecting the salt markets. Salt in brine will not be taken into consideration except when otherwise specified.

As salt is widely found throughout the EC, production tends to be mainly limited by demand rather than capacity. Current production capacity is shown in Table I. It represents about

**Table I: Current Production Capacity**

| (Million tonnes)  | Rock salt | Solar salt | Vacuum salt | Total  |
|-------------------|-----------|------------|-------------|--------|
| Belgium           | -         | -          | 600         | 600    |
| Denmark           | -         | -          | 600         | 600    |
| Germany           | 13 950    | -          | 893         | 14 843 |
| Greece            | -         | 250        | 250         | 500    |
| Spain             | 1 005     | 1 612      | 333         | 2 950  |
| France            | 1 700     | 1 569      | 1 452       | 4 721  |
| Italy             | 2 850     | 1 450      | 1 100       | 5 400  |
| Netherlands       | -         | -          | 4 100       | 4 100  |
| (Austria) (1)     | 1         | -          | 445         | 446    |
| Portugal          | 480       | 269        | 185         | 934    |
| (Switzerland) (1) | -         | -          | 672         | 672    |
| United Kingdom    | 2 900     | -          | 2 179       | 5 079  |
| (Turkey) (1)      | 160       | 2 015      | 145         | 2 320  |
| Total             | 23 046    | 7 165      | 12 954      | 43 165 |
| %                 | 53        | 17         | 30          | 100    |
| EC                | 22 885    | 5 150      | 11 692      | 39 727 |
| %                 | 57        | 13         | 30          | 100    |

Source: European Committee for the Study of Salt.

(1) other European countries for comparison purposes

### Main Indicators Crystallized Salt

| (Million tonnes)          | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 |
|---------------------------|------|------|------|------|------|------|------|------|
| Apparent salt consumption | 19.8 | 18.6 | 17.4 | 16.3 | 17.4 | 20.7 | 19.5 | 19.6 |
| Production (1)            | 24.7 | 25.5 | 23.3 | 21.4 | 22.3 | 24.6 | 23.8 | 23.0 |

(1) 1987 estimated.

40 million tonnes in the EC but capacity utilization amounts to only 60 %.

Crystallized salt production in the EC amounted to 23.8 Mt in 1986. This quantity is compared with about 20 Mt produced in the United States in the same year. The production of salt does not exceed 1.3 Mt in Japan. Imports from Australia and Mexico are meeting the huge requirements of the Japanese chloralkali industry.

**Table II**  
**Crystallized Salt Production**

|                                       | Rock salt | Solar salt | Vacuum salt | Total  |
|---------------------------------------|-----------|------------|-------------|--------|
| 1980                                  | 12 156    | 3 832      | 8 665       | 24 653 |
| 1981                                  | 12 330    | 4 360      | 8 811       | 25 501 |
| 1982                                  | 10 536    | 4 145      | 8 604       | 23 285 |
| 1983                                  | 9 367     | 3 896      | 8 152       | 21 415 |
| 1984                                  | 10 060    | 3 901      | 8 313       | 22 274 |
| 1985                                  | 12 049    | 3 697      | 8 814       | 24 560 |
| 1986                                  | 11 749    | 3 725      | 8 284       | 23 758 |
| 1987 (1)                              | 11 800    | 3 500      | 8 300       | 23 600 |
| Average                               | 11 250    | 3 900      | 8 500       | 23 650 |
| Share of the production capacity used | 49%       | 76%        | 74%         | 60%    |

(1) Estimate.

(Source: European Committee for the Study of Salt.

### Consumption Trends

The salt markets in the developed economies of Europe, North America and Japan have reached maturity. Demand fluctuates mainly with economic and meteorological conditions. Data on salt sales are given in Table III.

Weak demand for de-icing due to a mild winter will curtail the sales of road salt. On the other hand, a severe winter will boost demand for all types of salt. In several countries, mainly in Germany, negative assessments in the media regarding the use of this type of salt have resulted in lower consumption even if the winter is severe.

The chloralkali industry has been experiencing difficult times in the recent past. Chlorine demand slowed down in the early 1980s, bottoming out in late 1982. Salt sales for this sector recovered slightly in 1984-1985. Chlorine markets are currently firm strong sales in PVC. But membrane cell technology is still negligible and the low level of prices prevailing for oil is delaying any significant switch from diaphragm to membrane which would benefit crystallized salt.

The decreasing trend affecting table salt consumption has been confirmed; it has not kept pace with population growth. This negative development relating to food preparation and preservation results from:

- development of food preservation by freezing;
- technological changes in the food industry;
- changes in diet consequent on urbanization;
- processed food with low salt content;
- health concern and anti-salt campaigns.

It is difficult to judge what effect such concern has had or will have on salt intake. Should dietary recommendations aimed at low salt intake (5 g/day) or nutrition labelling (salt or sodium content) be introduced in regulations on foodstuffs, a further shrinkage of demand could be expected. On the contrary, however, with the addition of iodine or fluoride to table salt in certain Member States, the image of salt is more favourable with consumers.

**Table III**  
**Salt Consumption in the EC**

| (Million tonnes) | A   | B   | C   | D    | E   | F    |
|------------------|-----|-----|-----|------|-----|------|
| 1980             | 2.4 | 2.9 | 9.7 | 15.0 | 4.8 | 19.8 |
| 1981             | 2.5 | 2.6 | 8.3 | 13.4 | 5.2 | 18.6 |
| 1982             | 2.5 | 2.6 | 7.9 | 13.0 | 4.4 | 17.4 |
| 1983             | 2.5 | 2.7 | 8.3 | 13.6 | 2.7 | 16.3 |
| 1984             | 2.2 | 2.8 | 8.6 | 13.6 | 3.5 | 17.4 |
| 1985             | 2.3 | 3.1 | 9.3 | 14.7 | 6.0 | 20.7 |
| 1986             | 2.2 | 3.0 | 9.1 | 14.3 | 5.2 | 19.5 |
| 1987             | 2.1 | 3.1 | 9.2 | 14.4 | 5.2 | 19.6 |

A: Food grade salt.

B: Miscellaneous industries.

C: Chemical industry.

D: A + B + C.

E: De-icing.

F: Total consumption (D + E).

Source: European Committee for the Study of Salt.

In water softening, salt is used as a regenerating agent for the ion exchange resins which are used to decrease the hardness of water. Amongst the disadvantages of hard water are that scale increases energy consumption and the quantity of washing agents. Within the EC, the various countries have differences in water quality and equipment (softeners, washing machines, dishwashers, etc.) Ion exchange is the best method to reduce scaling.

From a statistical point of view, it is difficult to provide a clear outlook for this sector. The discussion on salt for water softening in households which took place in Germany in 1987 shows that environmental matters may raise complications.

### *Trade Trends*

Compared with the name plate capacity existing in the EC and due to market trends, the sales level is not encouraging (see Table III). As stated earlier, overcapacity is a main feature of the salt sector; the sluggishness of demand either in the EC or abroad is another.

Even if the building of a new salt-works in Alsace seems to have been put on permanent hold because of the existing overcapacity, inroads of extra quantities at low prices are a key factor. In Northern Europe, competition from State-trading countries is already tough. Crystallized salt production exceeds 25 Mt in Eastern Europe where salt-producing countries have significant export potential:

- FDR 1.5 Mt;
- Romania 800 000 t;
- USSR 500 000 t;
- Poland 350 000 t.

Turkey and Egypt are also known to be developing their respective capacities and supplying the market with solar salt at very competitive prices. The Turkish monopolies are investigating ways to increase their production and export strength. The latter could reach 1 Mt. It is likely that the achievement of the single market in 1992 will be considered as a new opportunity by various non-EC countries considering salt as an export commodity.

Salt trade is not subject to quantitative restrictions. The CCT duties corresponding to salt (25 01 00) no longer have a protective effect and a lot of countries are exempted from duties. Customs duties still exist, however, and these constitute the only item to be negotiated in the future.

There are two cross-border trade routes operating within Europe:

- the Scandinavian market imports 2-2.5 Mt per year, mainly from the Netherlands, Germany, East Germany, Poland;

- some 2 Mt move between Germany, Benelux and Northern France, where it is cheaper to transport large amounts of salt from neighbouring countries.

Compared to the level for previous years, exports decreased in 1986. Intra-Community trade lost its buoyancy due to the shrinkage in demand, especially for road salt. In addition, a salt works which had temporarily stopped production resumed work in mid-1986. As far as third countries are concerned, especially the United States, the declining value of the dollar affected EC exporters while Canadian competitors maintained their strong position (low freight rates, good river communication).

Exports average about 6 million tonnes per year. Transport is a prime factor in determining salt trade patterns. Where a longer shipping distance is required, companies involved in the salt business have to handle larger quantities. The location of salt plants also plays a substantial role, because of the requirements to be met in regional markets where demand fluctuates.

### *Major Structural and Geographical Features*

Salt is geographically widespread in most of the EC Member States. The high degree of concentration is the main feature of the salt sector from a structural point of view.

The industry structure is indicated by the following:

- chemical companies or subsidiaries of chemical companies having a salt department (about half of the salt used in the EC is consumed as a raw material for chloralkalis):  
Solvay & Cie  
AKZO  
ICI - C & P Ltd  
Kali und Salz (BASF: 71.7%)  
Wacker-Chemie (Hoechst: 50%);
- privately-run companies:  
Union Salinera de Espana  
Compagnie des Salins du Midi et des Salines de l'Est  
British Salt;
- State-owned companies:  
Südwestdeutsche Salzwerke  
Bayerische Berg-, Hütten- und Salzwerke (Freistaat Bayern  
Monopoli di Stato  
Alikai Mesologgiou;
- small companies (1 000 tpa):  
Saline Luisenhall  
Saline d'Einville  
Salt producers operating salt gardens on the Atlantic or on the Mediterranean coast (2 tpa).

Solvay & Cie has salt operations in Germany (where their rock salt mine in Borth has a capacity of 4 Mt), France, Italy, Spain, Portugal and Belgium. Akzo Zout Chemie bv and its subsidiaries or joint ventures (Norddeutsche Salinen and Dansk Salt) have a capacity of about 5 Mt in the EC. Union Salinera and Compagnie des Salins du Midi et des Salines de l'Est operate very large sea salt facilities at Torreveja (1 Mt) and at Salin de Giraud (1 Mt). Within the EC only one company produces the three types of crystallized salt (sea salt, rock salt, vacuum salt).

## Forecast and Outlook

Attempting to produce an estimate or forecast for the 1988-1989 period is difficult. Demand in salt markets fluctuates with the weather and economic developments. Within the EC, capacities are designed to meet the fluctuations in demand. The weakness of the US dollar means less profitable exports. With supply exceeding demand, salt sales will not remain steady due to price effects.

In 1987-1988 the demand for road salt shrank in most of the Member States due to a very mild winter. Winter maintenance involved small quantities of de-icing agents. Sales are expected to show a downward trend in 1988. The large quantities of salt remaining stockpiled will be available again for the next winter and thus have a restrictive impact on both production and marketing.

Current trends characterizing chemicals are strong demand, high capacity utilization and improved efficiency. Chloralkali plants are said to be operating at around 90% of their nominal capacity. But the EC share of the world production of

chemicals (30%) is likely to decrease in the coming years due to the emergence of new industrialized countries in this sector.

The demand for chlorine (stronger in 1986 and 1987) will become less buoyant in 1988 and 1989. The largest segment for chlorine is VCM/PVC which represents 40%-45% of the chlorine output. Speculation that demand in 1988 will remain sluggish could be slowing chloralkali production. EC projections for annual growth in this market give a 1%-2% increase over three years.

A much better balance exists between chlorine and caustic soda. Downstream users of caustic soda, including the pulp, paper and aluminium industries are performing well. This trend should compensate for any decline in chlorine returns. As far as soda ash is concerned - the production capacity of which is more than adequate - output will remain flat in the near future. Many markets are mature and gradually shrinking, especially the glass market. EC projections regarding soda ash give a 1% increase over five years.

Environmental restrictions for many chlorine derivatives could tighten up their respective markets. Water-softening or de-icing activities will also develop in a different manner whether or not an anti-salt attitude prevails. But food-grade salt could experience a downturn. The demand for salt has been negatively affected by a recent tendency to reduce the use of salt in human consumption and less salt is used in food processing.

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# ZINC

(NACE 224)

*The EC zinc industry features a strong degree of vertical integration, with the same firms carrying out operations from the mining of the ore to the production of semi-finished products. The industry is recovering slowly after 10 years of persistently low prices brought about by overproduction. This situation has left some producers in a precarious financial situation. However, restructuring is now under way in the European and Japanese industries. If current favourable world trends continue, the zinc industry can be expected to maintain a shaky balance between supply and demand in the Western World.*

- rolled products
- wire
- sphere
- anodes
- pressure die-casting
- zinc oxide.

In addition to these, there are only minor products (various alloys, zinc powder, etc.), which only add up to small quantities.

Primary zinc is found in nature in the form of blende (zinc sulphide - ZnS), smithsonite (Zn carbonate - Zn<sub>2</sub>CO<sub>3</sub>) and calamina (mixture of smithsonite and Zn silicate - ZnSiO<sub>4</sub>). Blende is generally associated with galena (lead sulphide). As for secondary zinc, this mainly comes from the re-processing of residues from galvanization (Zn matte) and middlings from zinc ash and old zinc roofing, with very low recovery convenience. Its production is fairly low in comparison with primary zinc (8-10%).

Zinc is commercialized in various shapes: ingots, rods, wire and plates, with differing degrees of purity. The highest quality (SHG - special high grade) has a purity degree of 99.995%, the lowest having a purity degree of about 98%, with an intermediate range of four to five qualities.

As far as the production of zinc semis is concerned, the following list should be considered:

## Current Situation

Zinc production is very much vertically integrated in the sense that extraction, smelting and refining are generally carried out by one and the same concern either directly or via subsidiaries. Ireland and Greece are the only countries which carry out just the first production stage (mining production).

In the EC, 14 companies are involved in the production of zinc ingots, 5 for rolled products and 22 for oxides. Table I indicates the extent of integration at most smelters in Europe.

The extent of downstream integration by US zinc producers varies considerably from company to company. At the Jersey Minere Zinc Clarksville and the Zinc Corporation of America Bartlesville plants, the product range only includes various grades of slab zinc and galvanizing alloys. At Clarksville, just over half the output is normally Special High Grade, and the remainder is a mix of continuous galvanizing and controlled lead grades. The production split varies depending on market demand. At the 75 000 tonnes per year capacity Mon-

### Main Indicators Zinc Ingots

| (Thousand tonnes)          | 1980 | 1981 | 1982  | 1983  | 1984  | 1985  | 1986  | 1987  |
|----------------------------|------|------|-------|-------|-------|-------|-------|-------|
| Apparent consumption       | N/A  | N/A  | 1 393 | 1 447 | 1 411 | 1 494 | 1 545 | N/A   |
| Net export earnings        | 45   | 31   | 45    | 151   | 100   | 85    | N/A   | N/A   |
| Total Community production | N/A  | N/A  | 1 424 | 1 492 | 1 562 | 1 594 | 1 632 | 1 671 |

EC 12 for 1984-1987; EC 10 (excluding Spain and Portugal for 1981-1983) and EC 9 (excluding Greece, Spain and Portugal for 1980).

**Table I**  
**Zinc Production Capacities**

| Smelter               | Total capacity (1 000 tonnes) | Marketable Slab (1) |      | Products Produced (1 000 tonnes) |                |                 |           |  |
|-----------------------|-------------------------------|---------------------|------|----------------------------------|----------------|-----------------|-----------|--|
|                       |                               | Total (Galv.alloys) |      | Rolled zinc                      | Diecast alloys | Oxides / Powder | Semis (2) |  |
| Auby (F)              | 205                           | 90                  | (*)  | 40                               | 15             | X               | *         |  |
| Balen (B)             | 180                           | *                   | (*)  | X                                | *              | *               | *         |  |
| Noyelles Godault (F)  | 105                           | 75                  | (40) | X                                | 15             | *               | *         |  |
| Dattein (D)           | 135                           | 80                  | (*)  | 40                               | 15             | X               | *         |  |
| Berzelius (D)         | 90                            | 80                  | (20) | X                                | X              | X               | X         |  |
| Nordenham (D)         | 120                           | 100                 | (33) | X                                | 17             | X               | X         |  |
| Overpelt (B)          | 120                           | *                   | (X)  | X                                | *              | *               | *         |  |
| Budel (NL)            | 200                           | 170                 | (*)  | 15                               | *              | *               | *         |  |
| Porto Vesme (I)       | 150                           | 140                 | (X)  | X                                | X              | X               | X         |  |
| Crotone (I)           | 90                            | 65                  | (X)  | X                                | 12             | 9               | *         |  |
| San Juan de Nieva (E) | 200                           | 140                 | (15) | X                                | 18             | 13              | X         |  |
| Cartagena (E)         | 40                            | 21                  | (*)  | X                                | 12             | X               | X         |  |
| Avonmouth (UK)        | 100                           | 85                  | (X)  | X                                | X              | X               | X         |  |

(1) Total includes all grades - SHG, HG, GOB, debased, continuous galvanizing grade (GGA) and other galvanizing alloys.

(2) Semis include wrought products, battery callots and plating anodes.

(\*) indicates production at the smelter.

X indicates no production

Source: MNF.

aca smelter, the Zinc Corporation of America specializes in the production of a wide range of zinc oxides and dust. There is sufficient capacity to produce up to 60 000 tonnes per year of oxides, but normally only around 65% of this is actually used. At Sauguet, Amax has the capacity to produce 18 000 tonnes per year each of continuous galvanizing grade zinc and die-casting alloys, but actual output depends on market demand. Amax is planning to increase the range of products manufactured at Sauguet as part of its long-term strategy for the plant.

The Zinc Corporation of America also operates a products plant at Palmerton, Pennsylvania, producing zamak alloys, superplastic alloys, zinc oxide and powder, and a zinc dust plant at Depue, Illinois. The zinc metal requirements of these plants are met by the Monaca and Bartlesville smelters, giving some of the benefits of integration, although the economic advantages of product production on the same site as the smelter are not gained.

At each of the four Canadian smelters, the product ranges only include alloys for the steel industry for galvanizing. A wide range of speciality alloys are produced, tailored to customers' needs. None of the producers manufactures die-

casting alloys, powder or dust at the smelter site. One of them, however, Hudson Bay, does supply some 18 000 tonnes per year of zinc to a 100% owned subsidiary company, ZOChem, which manufactures zinc oxide, and 4 000 tonnes per year to HBDC, a former subsidiary which manufactures die-casting alloys.

The extent of integration in Japan is greater than in North America, but less than in Europe, as a narrower range of products are produced. All six electrolytic plants produce die-casting alloys, which account for between 20% and 50% of total zinc output. Except at Annaka, however, the remaining output is a mix of Special High Grade, Prime Western, Continuous Galvanizing Grade and Tailored Zinc. Not all plants produce the full range. Tailored zinc accounts for the majority of production at most of the plants. This is specially manufactured to customers' individual specifications, and each plant manufactures a number of different products.

In Australia, downstream products are manufactured at one of the two electrolytic plants, the EZ 220 000 tonnes per year Risdon facility. In addition to Special High Grade, High Grade, Prime Western and Battery Grade alloy, die-casting

**Table II**  
**EC Production of Ores and Unwrought Metal**

| (Thousand tonnes)              | 1982  | 1983  | 1984  | 1985  | 1986  | 1987  |
|--------------------------------|-------|-------|-------|-------|-------|-------|
| Mining production (Zn content) | 675   | 650   | 723   | 724   | 700   | 680   |
| Ingot production               | 1 424 | 1 492 | 1 562 | 1 594 | 1 632 | 1 671 |

Source: MNF.



**Table III**  
**EC Zinc Ingot Consumption Trends**

| (Thousand tonnes)              | 1982  | 1983  | 1984  | 1985  | 1986  | 1987  |
|--------------------------------|-------|-------|-------|-------|-------|-------|
| Ingot consumption              | 1 338 | 1 419 | 1 450 | 1 424 | 1 475 | 1 492 |
| % of Western World consumption | 31.5  | 31.1  | 30.7  | 29.9  | 30.0  | 29.5  |

Source: MNF.

alloys are also manufactured, accounting for approximately one-third of total zinc production.

The EC's share of the mining production of the Western World is about 13%, while its share of ingot production is about 32%.

### Consumption Trends

Metal consumption in the EC represents about 30% of the tonnage consumed in the Western World. The balance is spread roughly among the other industrialized countries (Japan and the USA, chiefly). It should not be forgotten, in fact, that with regard to the processing and consumption of zinc, by their very use, they are inseparably linked to the level of development of the regions, and thus geographically spread in the most industrialized countries.

From 1982 to 1987, EC consumption increased each year by 2.2%.

### Trade

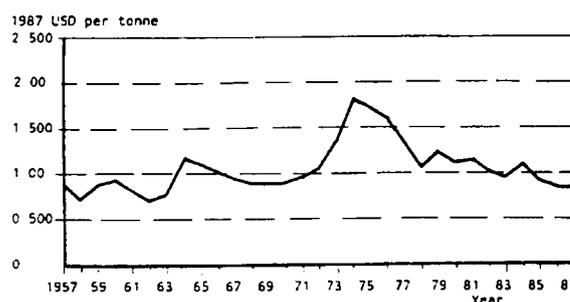
The EC is a net exporter, particularly to traditional markets such as the USA. The situation regarding third countries can be sketched out as follows. Japan, a major zinc consumer which was self-sufficient at the outset, now has to resort to imports following a drop in its production. The South-East Asian and Latin American countries are becoming increasingly important in international zinc trade. The industrialization of these regions has given rise to increased demand and production. For the time being, the African countries continue to play only an insignificant role, zinc demand being very low. Trade between the industrialized and directed-economy countries is based for the latter on qualitative import needs or currency requirements.

### Prices

There is a basic zinc price known as the Producer Price, which is the one on which all ore purchasing contracts are generally based. It is established in US dollars. Calculated in constant 1987 dollars, this price has been relatively stable in terms of quotations, apart from a short period of high prices between 1973 and 1977 (see Figure I).

Figure 1

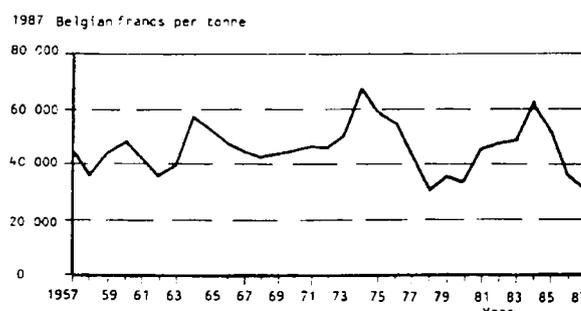
ZINC PRICES IN 1987 US DOLLARS



Calculated on the basis of the producer price, the actual selling price of the metal of the EC countries is influenced by the dollar exchange rate in relation to its various currencies, the state of the market and the quotations on the London non-ferrous metals exchange, the London Metal Exchange (LME). Converted into Belgian francs, for example, a representative EC currency, this price has, in fact, fluctuated quite considerably - a phenomenon felt particularly keenly by the European producers in comparison with their foreign competitors who are linked to the dollar zone (see Figure II).

Figure II

ZINC PRICES IN 1987 BELGIAN FRANCS



In addition to this there are the sometimes considerable discounts which the European producers are induced to offer as a result of the competition which the LME exerts on them, with its warehouses in Europe which receive supplies from countries such as North Korea or Algeria, seeking an immediate income of currency. These marginal sales have a very pronounced negative effect on the prices obtained by the European producers.

### *Technological Trends*

It is necessary to stress that the major industrial efforts tend towards the economical optimization of the integrated production line; in fact, most plants have a double link, the first being zinc production and the second, generally considered as by-products, related to the recovery of various metals. It should be pointed out that such metals are not negligible, either in quality or in quantity (and therefore in economic value).

It should also be noted that technological choices generally take various parameters into consideration, the major ones being:

- required product quality
- environmental aspects
- recycling
- energy specific consumption and its incidence on product costs
- availability of required sources of energy.

In regard to required product quality, only the electrolytical process allows the direct production of a 99.995% quality zinc. As far as energy consumption is concerned, it should be specified that zinc production is an energy intensive production. The energy costs account for about 30%-35% on the product cost.

### **Forecasts and Outlook**

The present situation is characterized world-wide by a delicate balance between production and consumption with, however, a considerable degree of surplus production in Europe.

### *Short Term*

In the short term, the situation will not change fundamentally. Production will increase further in 1988 to 5 200 million tonnes (+ 150 000 tonnes), with higher production in Canada and South Korea (the new smelter should reach full capacity of 100 000 tonnes). Consumption will increase by an estimated 1%-1.5%, representing 50 000-75 000 tonnes of zinc. In practice, 1988 could be a relatively reasonable year for the industry, aided by a favourable world economy. Higher purchases by Eastern bloc countries could also improve the situation. Temporarily higher prices are not excluded.

### *Medium Term*

For the next five years, the situation should remain basically unchanged provided that the world economy continues to flourish. It is hard to believe, however, that the present favourable economic climate will continue over such a long period. Any setback in the economy will immediately have a strong impact on the zinc industry because of the continuing delicate balance between production and consumption. New capacities will be installed elsewhere, e.g. Brazil, India, Russia, North Korea, China and Australia, in addition to small increases at various smelters of approximately 50 000 tonnes.

### *Long Term*

After more than 15 years of crisis, during which zinc production suffered from surplus capacities which resulted in a great deal of rationalization, and during which demand increased in an uneven way - although with a generally stronger tendency than for the other non-ferrous metals - demand has finally caught up with supply. The industry has therefore changed its structure, from a surplus capacity to a balanced situation at world level. The low price levels experienced in the recent past are no longer expected. In the galvanization sector, a developing one in which there is no substitute for zinc, there is every reason to think that the trend will remain favourable. It will therefore be important for the future of the Community industry for supply to adapt smoothly to demand.

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# ALUMINIUM

(NACE 224)

*The EC aluminium industry underwent spectacular structural changes between 1980 and 1986. It enjoys a strong technological lead in both the production of raw aluminium and the production of semi-finished products. However, the EC industry is facing stiff competition from countries where production costs are lower because of cheap energy. The price swings of semi-finished products on the world market, linked in part to the instability of the dollar, are also giving cause for concern.*

The Community aluminium industry covers mining production, the production of primary and secondary unwrought aluminium and alloys and the production of semi-finished products.

Primary aluminium is produced from bauxite in two stages after the bauxite is mined. First, alumina (Al<sub>2</sub>O<sub>3</sub>) is extracted from the ore in an alumina plant. Then, the alumina is fed into electrolysis cells where the aluminium is produced, utilizing the Hall-Héroult electrolysis process. The metal is further processed in rolling mills (up to the foil stage), extrusion plants and foundries.

The "ore" for a secondary aluminium smelter consists mainly of old scrap which was previously a product in the market and new scrap from fabricating plants. Secondary aluminium is mainly used to produce castings, but there are now efforts to upgrade the secondary metal to make wrought alloys as well.

## Current Situation

The structure of the EC aluminium industry has been considerably improved over the past 15 to 20 years. Smaller, inefficient smelters and mills were closed down, and larger, economically more efficient installations were expanded and modernized. Average energy consumption for electrolysis

dropped from 16 500 to 15 500 kWh/tonne. At the same time, productivity of rolling mills doubled.

At present, the large EC companies are not only metal producers but they also process a large part of the material at their own fabricating plants into semis and/or finished products. Nearly 100% of the rolling mills and about 60% of the extrusion plants are fully integrated into these large companies. This high degree of integration, particularly in the rolling sector, is a characteristic of the aluminium industry.

**Table I**  
**World Secondary Aluminium Production**

| (Thousand tonnes) | W. Europe | North America | Others, Incl. Japan |
|-------------------|-----------|---------------|---------------------|
| 1950              | 194       | 226           | 10                  |
| 1960              | 378       | 307           | 69                  |
| 1970              | 814       | 969           | 400                 |
| 1980              | 1 214     | 1 642         | 1 025               |
| 1986              | 1 365 (1) | 1 855         | 1 230               |

North American figures include direct use for scrap.

(1) Of the European figure, 1 197 are in the EC.

Source: MNF.

The increasing volume of secondary aluminium production should also be noted, as shown in Table I.

One of the reasons for this is that the remelting of aluminium consumes only a fraction of the energy required to produce primary aluminium.

Aluminium is produced and/or fabricated in nearly all the EC countries. The value of production, including the stage of semis, is estimated at about 25 billion ECU per year. The EC aluminium industry employs over 100 000 people at its various installations, such as alumina plants, aluminium smelters, secondary smelters and fabrication plants.

The EC aluminium industry maintains a very close working relationship with the key industries, thus contributing to the

## Main Indicators Aluminium - Semis

| (Thousand tonnes)          | 1980 | 1981 | 1982 | 1983 | 1984  | 1985  | 1986  | 1987  |
|----------------------------|------|------|------|------|-------|-------|-------|-------|
| Apparent consumption       | N/A  | N/A  | N/A  | N/A  | 2 885 | 2 940 | 3 190 | N/A   |
| Net exports                | 171  | 235  | 263  | 289  | 328   | 331   | 213   | N/A   |
| Total Community production | N/A  | N/A  | N/A  | N/A  | 3 213 | 3 271 | 3 403 | 3 579 |

success of the EC's high-tech, advanced and strategic industries. It supplies a wide variety of industrial sectors in the investment and consumer goods fields. The most important markets are transportation (particularly the car industry, aerospace, and advanced rail transport), the packaging industry and building and construction.

**Table II**  
**EC Domestic Aluminium Shipments**  
**by Major Markets**

|  | 1986 (%) |
|--|----------|
| Transportation                             | 29.2     |
| General engineering                        | 7.4      |
| Electrical engineering                     | 8.8      |
| Building & construction                    | 19.8     |
| Chemical, food and agricultural appliances | 1.3      |
| Packaging                                  | 11.2     |
| Domestic and office equipment              | 6.6      |
| Powder and paste                           | 0.5      |
| Iron, steel and other metal uses           | 4.8      |
| Miscellaneous                              | 10.4     |
| Total                                      | 100.0    |

Source: MNF.

### *Situation in Third Countries*

Japan's strong primary industry was predominantly oil-based. Hence, the competitive disadvantage of primary aluminium production became evident after the two oil shocks of the 1970s. Japan elected to follow a spectacular strategy of dismantling upstream activities and concentration on downstream activities, i.e. on the fabricating industries. Japanese companies received government support through the MITI planification process.

The Japanese strategy is thus twofold:

- reducing by any means the purchase price of aluminium, considered as a raw material
- maintaining a high level of protection for the fabricating industries.

The US and EC markets are comparable in size. Both the USA and the EC are net importers of primary aluminium (in 1986, 1.35 million tonnes for the USA and 1.28 million tonnes for the EC). Trade between these two trading partners only plays a minor role. The net amount of aluminium exports between the EC and the US is closely related to exchange rates between the US dollar and the European currencies. At the end of the last decade, the falling dollar had led to a minor imbalance in favour of the USA. The dramatic increase in the value of the dollar between 1981 and 1985 must be held responsible for the increased shipments of aluminium mill products to the USA. In 1987, in line with the devaluation of the U.S. dollar and after a lag of one year, a

reversed trend is now being experienced and the continuing weak dollar will lead to an EC shortfall for aluminium mill product shipments to the USA.

**Table III**  
**Production and Exports - 1986**

(Thousand tonnes)

|             | Primary Aluminium |         | (Semi)s    |             |
|-------------|-------------------|---------|------------|-------------|
|             | Production        | Exports | Production | Net exports |
| Canada      | 1 360             | 1 100   | 300        | 100         |
| Australia   | 875               | 585     | 260        | 50          |
| Brazil      | 757               | 323     | 453        | 35          |
| Venezuela   | 435               | 247     | 174        | 103         |
| Gulf States | 330               | 300     | 40         | 30          |

Source: MNF.

Several other western countries enjoying low-cost energy resources have developed very strong aluminium industries over the past 20 years or so.

### *Technology*

The EC aluminium industry has made considerable efforts to defend its position: after rationalizing and modernizing its existing installations, it has made it a point of honour to constantly improve both its production techniques and its product quality. The technological leadership gained by the EC aluminium industry has been expanded and manifested over the past 15 to 20 years.

The basis for this development was, and still is, productive collaboration with the aluminium users, particularly in the aerospace and automobile industries, the packaging sector and the machinery sector. Characteristic examples of the position of, and high technological standard reached by, the aluminium industry can be illustrated as follows. Firstly, EC aluminium smelting technology has gained a leading position throughout the world and is recognized as the most energy efficient. Secondly, semis and castings are being produced with increasingly thinner wall-thicknesses. The EC aluminium industry is now already in a position to produce aluminium foil which is over 2 metres wide but only 0.006 mm thick. These and similar high-tech achievements are not only of benefit to consumers, but they also help save resources. Thirdly, aluminium is now used in combination with many other materials. Composite materials offer considerable potential for solving problems in an intelligent way. Fourthly, the development of new alloys for special applications is another important target of the EC aluminium industry. In this connection, aluminium-lithium alloys are of particular importance for the aviation industry, for example. Fifthly, EC casthouses are equipped with proven, highly competitive technologies including electromagnetic casting of rolling

slabs and extrusion billets, horizontal casting of ingots and continuous strip casting.

Finally, there is still some growth potential in the packaging field which has not yet been exploited.

### *Energy*

Aluminium smelters are typical consumers of base load electricity. The EC smelters depend on a mix of primary energy sources. Certain cost disadvantages result from this in comparison, for example, with hydro-electric power as in Canada, the USA and Latin America. The price of electric energy is higher in the EC than for smelters supplied exclusively by hydroelectric-power stations. Over the years, those smelters concerned were able to compensate for this cost disadvantage. On the basis of realistic exchange rate ratios, it will not however necessarily constitute a threat to the existence of the aluminium industry in the EC in the future. Market changes on the politico-energy scene support the assumption that the existence of aluminium smelters in the EC will continue to be secure from the standpoint of energy supply in the future.

### *Exchange Rate*

Unwrought aluminium is, in fact, a dollar commodity. A devaluation of the US currency would therefore represent a serious threat to the existence of the aluminium industry in hard currency countries, without a change in their own competitive position.

### *International Trade*

The EC aluminium industry is also facing another considerable threat from structural changes to world aluminium trade. Because of high energy costs, Japan has practically discontinued primary aluminium production, while investing heavily in transformation. The annual demand for metal is either purchased on the world market or obtained through equity participation in overseas smelters. This Japanese requirement represents about one-third of total physical world trade in primary aluminium. In combination with the strong position of its trading houses and fabricators, Japan is likely to become a dominant player in world aluminium trade. This strong position is being used to influence price developments on the world market.

The State-trading countries of the Eastern bloc are net exporters of primary aluminium to the Western countries. The volume of such supplies is exclusively determined by their hard currency requirements. Because of their occasional participation in aluminium trade, the pricing structure on the world market is consequently influenced by producers who

are selling without taking their own actual production costs into account.

## **Forecast and Outlook**

Growth of aluminium consumption in the Western World has slowed down over the past few years. In spite of this general trend, however, the EC aluminium market is still a growth market. A mere comparison of per capita aluminium consumption in the various countries shows that Southern Europe in particular still has a considerable amount of potential growth ahead before it reaches the level of highly developed markets such as Germany. In addition, even when the EC is compared with the USA and Japan, it becomes obvious that the European countries have in no way reached the level of the most important aluminium consuming countries as yet. This growth potential will be mobilized in the years to come.

**Table IV**  
**Per Capita Consumption**

| (Kilogrammes)  | 1975 | 1985 |
|----------------|------|------|
| Belgium        | 7.5  | 9.9  |
| Denmark        | 8.2  | 13.4 |
| Germany        | 14.6 | 23.8 |
| Greece         | 5.3  | 5.4  |
| Spain          | 6.6  | 6.0  |
| France         | 9.7  | 12.3 |
| Ireland        | 1.9  | 4.5  |
| Italy          | 7.5  | 14.5 |
| Netherlands    | 8.4  | 11.4 |
| Portugal       | 1.3  | 4.5  |
| United Kingdom | 8.9  | 10.5 |
| EC             | 9.3  | 13.0 |
| Europe         | 9.9  | 13.0 |
| USA            | 20.4 | 26.6 |
| Japan          | 12.2 | 20.6 |

Source: MNF.

This growth potential, coupled with the considerable rationalization of production capacities which has developed at world level over the past few years, gives rise to hopes of a much better balance in supply and demand on the world aluminium market than there has been since the beginning of the decade. The strong rise in the aluminium quotations for 1987 and 1988, although complicated by economic factors, is a sign of this market improvement, but this situation is threatened by the hatching of a whole series of new projects, the simultaneous achievement of which would, in the medium term, plunge the aluminium sector back into the characteristic surplus capacity situation which it experienced at the beginning of the 1980s.

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# COPPER

(NACE 224)

*Faced with a low growth rate of consumption, chronic excess domestic capacities and competition from neighbouring countries with powerful processing industries which are not subject to the same economic constraints, the EC has still managed to build up a competitive copper fabricating industry which, thanks to considerable investments, is able to satisfy the requirements of the Community as well as international customers. These investment efforts have been coupled with considerable restructuring operations and mergers of companies which have only recently crossed the intra-Community frontiers and which should continue in future toward the goal of improving the competitiveness of the EC in this sector.*

The copper and copper alloy semis sector covers a wide variety of products:

- wire (single and stranded)
- rolled products (sheets, strip, circles)
- tubes (coils and in straight lengths)
- rods, bars and profiles.

The above semis are produced both in pure copper and in a wide range of copper alloys covering all types of brass (copper and zinc in variable proportions according to the specific type of brass), phosphor bronze, tinned bronze (copper + tin), cupronickel (copper + nickel), nickel-silver (copper + nickel + zinc) and other special alloys obtained by adding small parts of different metals to copper.

The manufacturing range of the various categories of semis, according to the combination of alloys, physical and mechanical characteristics, thickness, length, diameter, profile, coiling, surface treatment and finishing, tolerance, etc., is very

wide in order to satisfy the different qualities and performances needed by end-using industries.

Production operations in manufacturing copper and copper alloy semi-finished products may be broadly divided into three stages:

- melting and casting
- hot reduction by rolling or extruding
- cold reduction by rolling or drawing, including intermediate annealing and finishing.

## Production Trends

The production of copper and copper alloy semis in the Western World was over 9 million tonnes from 1984 to 1986. The subdivision among the main areas is shown in Table 1.

**Table 1**  
**World Production**

| (Thousand tonnes)   | 1984    | 1985    | 1986    | %     |
|---------------------|---------|---------|---------|-------|
| EC                  | 3 472.4 | 3 438.2 | 3 525.2 | 37.6  |
| USA                 | 2 612.2 | 2 428.5 | 2 444.4 | 26.0  |
| Japan               | 2 001.9 | 1 904.6 | 1 885.9 | 20.1  |
| Other countries     | 1 381.0 | 1 392.2 | 1 529.7 | 16.3  |
| Total Western World | 9 467.5 | 9 163.5 | 9 385.2 | 100.0 |

(1) 1986 total is provisional.

Source: MNF.

Production in the EC is shared among the various European countries in accordance with the characteristics of their manufacturing industries and end-using features. Contribution to the output of the major EC producers was spread as follows in 1986: Germany: 32.4%, Italy: 18.1%, France: 16.7%, UK: 13.8%, and Benelux: 11.8%. It should be noted that the EC, with an average annual output of 3 477 000 tonnes over the 1984-1986 period, represents the main

## Main Indicators

### Copper Fabricating (Copper and Copper Alloys)

| (Thousand tonnes)          | 1980    | 1981    | 1982    | 1983    | 1984    | 1985    | 1986    |
|----------------------------|---------|---------|---------|---------|---------|---------|---------|
| Apparent consumption       | 3 150.2 | 2 748.7 | 2 754.0 | 2 878.7 | 3 029.7 | 3 074.0 | 3 182.3 |
| Net exports (1)            | 259.9   | 420.2   | 375.0   | 381.8   | 392.7   | 364.2   | 342.9   |
| Total Community production | 3 410.1 | 3 168.9 | 3 129.0 | 3 260.5 | 3 472.4 | 3 438.2 | 3 525.2 |

(1) 1981-1983: EC 10. 1980: EC 9.

producing area in the Western World, ahead of the USA and Japan. The EC is, in fact, the world leader in the sector.

**Table II**  
**Production of Semis 1986**

|                         | Copper<br>% | Copper alloy<br>% | Total<br>% |
|-------------------------|-------------|-------------------|------------|
| Wire                    | 48.2        | 1.8               | 50.0       |
| Rods, bars and sections | 2.3         | 18.0              | 20.3       |
| Plate, sheet and strip  | 6.6         | 10.8              | 17.4       |
| Tubes                   | 8.9         | 3.4               | 12.3       |
| Total                   | 66.0        | 34.0              | 100.0      |

Source: MNF.

### Employment

In 1986, the EC copper semis industry had a work-force of approximately 70 000 units and a manufacturing structure of more than 80 companies of widely differing sizes and specialization, with work-forces varying from a few dozen to several thousand.

### Consumption Trends

The consumption of copper and copper alloy semis in the EC and in the other two main areas of utilization from 1984 to 1986 is shown in Table IV.

**Table IV**  
**World Consumption of Semis**

| (Thousand tonnes) | 1984    | 1985    | 1986    |
|-------------------|---------|---------|---------|
| EC                | 2 858.0 | 2 836.1 | 2 950.5 |
| USA               | 2 825.2 | 2 605.4 | 2 629.8 |
| Japan             | 1 785.7 | 1 722.0 | 1 697.5 |

Consumption includes stock variations and should therefore be distinguished from "Apparent Consumption" reported in the Main Indicators Table.

Source: MNF.

It should be noted that, as in the case of production, the EC, with an annual average consumption of 2 881 500 tonnes, represents the main consumer area of the Western World, well ahead of the USA and Japan. This is the best evidence of the importance of the copper semis industry for the whole manufacturing system of the EC, and the explanation for the strategic role which it plays.

**Table III**  
**Copper Semis National Production Trends**

| (Thousand tonnes) | Total   | BLEU  | D       | GR   | E     | F     | I     | NL    | P    | UK    |
|-------------------|---------|-------|---------|------|-------|-------|-------|-------|------|-------|
| 1980              | 3 310.2 | 340.5 | 1 119.6 | 46.8 | N/A   | 658.3 | 598.0 | 104.5 | N/A  | 542.4 |
| 1983              | 3 260.5 | 269.5 | 1 074.7 | 46.7 | 155.8 | 599.0 | 526.0 | 89.3  | 20.2 | 479.3 |
| 1986              | 3 525.2 | 311.0 | 1 144.6 | 59.3 | 169.2 | 591.2 | 636.0 | 105.4 | 21.0 | 498.6 |

Source: MNF.

**Table V**  
**Copper Semis Consumption By Country**

| (Thousand tonnes) | 1984    | 1985    | 1986    | %     |
|-------------------|---------|---------|---------|-------|
| Benelux           | 161.9   | 172.2   | 164.2   | 5.6   |
| Germany           | 921.3   | 896.6   | 916.2   | 31.0  |
| Greece            | 48.5    | 48.1    | 52.8    | 1.8   |
| Spain             | 166.9   | 167.6   | 212.4   | 7.2   |
| France            | 442.2   | 448.2   | 443.6   | 15.0  |
| Italy             | 604.9   | 606.6   | 661.9   | 22.5  |
| Portugal          | 26.8    | 27.0    | 29.2    | 1.0   |
| UK                | 485.5   | 469.7   | 470.2   | 15.9  |
| Total             | 2 858.0 | 2 836.1 | 2 950.5 | 100.0 |

Source: MNF.

### Factors Behind Production Trends

There are at present excess capacities in the EC. This reality is, however, forcing the producers to acquire an idea of the true proportion of their idle capacities. Major third country producers already exporting to the EC in varying degrees also have significant capacities which are not fully utilized, particularly in Sweden, Finland, Switzerland, Austria and Poland. In this extreme, "low-pressure" market climate, the EC copper producers are able to hold their own in many different ways. However, key elements, such as actual production costs, productivity levels and more detailed business results are kept confidential by companies.

### Technology

The technological level achieved by the EC copper and copper alloy semis industry is a very advanced one as a result of investments and rationalization. Rising labour and environmental protection costs, as well as the increasing quality demands and diversified product requirements of the advancing copper consumer industries have led to significant technological advances.

The chemical composition, physical properties and surface quality of products are continuously controlled throughout the process by increasingly sophisticated methods. The shape of semi-manufactured products is unlikely to change, but the improvement of their chemical and physical characteristics is constantly being researched and progress is constantly being made.

Among recent technological trends, the following major achievements should be mentioned. Firstly, the development

**Table VI**  
**Production and Foreign Trade**

| (Thousand tonnes) | 1980    | 1981    | 1982    | 1983    | 1984    | 1985    | 1986    |
|-------------------|---------|---------|---------|---------|---------|---------|---------|
| Production        | 3 410.1 | 3 168.9 | 3 129.0 | 3 260.5 | 3 472.4 | 3 438.2 | 3 525.2 |
| Index             | 100     | 93      | 92      | 96      | 102     | 101     | 103     |
| Imports extra-EC  | 161.6   | 107.8   | 113.7   | 115.2   | 150.2   | 143.6   | 151.7   |
| Index             | 100     | 67      | 70      | 71      | 93      | 89      | 94      |
| Exports extra-EC  | 259.9   | 420.2   | 375.0   | 381.8   | 399.7   | 364.2   | 342.9   |
| Index             | 100     | 161     | 144     | 147     | 151     | 140     | 132     |
| X/M               | 1.61    | 3.90    | 3.30    | 3.31    | 2.61    | 2.54    | 2.26    |

EC 10 (excluding Spain and Portugal.).

Source: MNF.

of continuous casting, not only for copper wire rod, but also for slabs, billets and, more recently, for strip. Secondly, improvement of the lubrication and cooling of rolling and drawing equipment. Thirdly, microprocessor-based control equipment, in order to increase speed and productivity, and to produce strip, rods or wire with narrower tolerances.

### Outlook

The market for copper and copper alloy semis in the EC has been characterized for several years now by a generally static consumption trend and by a practically "flat" growth forecast, or at least one with only a very modest rate of increase. This situation in the EC, which is also a feature of the USA and to a lesser extent Japan, is typical of a sector which, as is the case of other basic sectors with modern manufacturing systems (steel, oil, rubber, wood, other metals, etc.), has reached a certain degree of maturity. In particular, the search for economy and miniaturization within the various end-using manufacturing segments has led to substitution with other materials and, above all, to reduction in the total weight of

semis produced - i.e. the miniaturization of dimensions, thicknesses, diameters, etc. Also taking into account the mature stage of development reached by many end-using sectors such as the building industry, the overall picture explains the static consumption trend.

Copper and copper alloy semis in general, without specifically turning to copper wire rod and wire for electrical purposes, definitely do not have a growth market in the EC. The global market volume has decreased over the past few years, and Community demand is not expected to grow in the future.

These remarks can be regarded as being of more general significance if one takes into account the fact that the consumption of copper conductors (i.e. copper wire) has reached a mature stage due to competition from considerable infrastructural work in the electricity sector in the various EC countries, and from aluminium conductors and optical fibres.

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# PRECIOUS METALS

(NACE 224)

*The European Community is practically absent from the precious metals mining industry but it does hold a world leader position in the refining and processing of precious metals.*

*The consumption of gold and silver is largely dependent on fashions in jewellery and government policy concerning the minting of precious metal coins. Industrial demand is however relatively stable.*

*The consumption of platinum should grow sharply with the introduction of catalytic converters after the new European standards on automobile emission control come into effect.*

The precious metals are:

- gold;
- silver;
- the platinum-group metals: platinum, palladium, rhodium, tridium, ruthenium and osmium.

Precious metal activities can be grouped under four headings:

- refining - the treatment of both primary and secondary precious metal materials;
- trading - dealing in the unwrought metal on a commodity basis;
- fabricating - processing, alloying and converting precious metals into wrought semi-manufactured goods, industrial components, chemical compounds and other such products;
- manufacturing - producing items for sale at retail level, e.g. jewellery, silverware.

The larger EC precious metals firms are generally concerned with the first three activities, although there are a few exceptions where jewellery manufacture is also a major fully-integrated part of such companies' business. The precious metals industry in the EC on the other hand, unlike the industries of certain base metals, has relatively little integration with the actual precious metal mining companies, although there are some significant exceptions, mainly in the platinum sector. The most common ways of assuring supplies are by long-term contract or daily purchases on the commodity markets and from traders and banks.

**Table I**  
**Geographical Location of the Main EC Refiner/Fabricator Companies**

| Company Head Office                   | Johnson Matthey<br>England | CLAL<br>France | Degussa<br>Germany | Doduco<br>Germany | Heraeus<br>Germany | Metalor<br>Switzerland | Engelhard<br>USA |
|---------------------------------------|----------------------------|----------------|--------------------|-------------------|--------------------|------------------------|------------------|
| Belgium                               | F                          | -              | S                  | -                 | -                  | -                      | -                |
| Denmark                               | S                          | S              | S                  | -                 | -                  | S                      | S                |
| Germany                               | S                          | S              | F                  | F                 | F                  | S                      | S                |
| Greece                                | -                          | -              | -                  | -                 | -                  | -                      | -                |
| Spain                                 | S                          | F              | S                  | F                 | S                  | F                      | -                |
| France                                | S                          | F              | S                  | S                 | S                  | F                      | F                |
| Ireland                               | S                          | -              | -                  | -                 | -                  | -                      | -                |
| Italy                                 | F                          | S              | S                  | -                 | S                  | -                      | F                |
| Luxembourg                            | -                          | -              | -                  | -                 | -                  | -                      | -                |
| Netherlands                           | S                          | F              | F                  | -                 | S                  | -                      | -                |
| Portugal                              | -                          | -              | -                  | -                 | -                  | -                      | -                |
| UK                                    | F                          | F              | F                  | S                 | S                  | S                      | F                |
| EC countries directly represented (1) | 9                          | 7              | 8                  | 4                 | 6                  | 5                      | 5                |
| North America                         | Yes                        | No             | Yes                | No                | Yes                | No                     | Yes              |
| Far East                              | Yes                        | No             | Yes                | No                | Yes                | Yes                    | Yes              |

(1) This chart excludes basemetal refiners who also refine precious metals but do not fabricate them, e.g. MHO (Belgium), NDA (Germany), Inco (UK).

F = Fabrication company.

S = Sales company.

Source: E & OE, May 1988.

## Current Situation

### Refining

The total precious metal refining capacity of the EC countries approaches that of major primary producing countries such as South Africa and the USSR. Such refiners include both specialist precious metal firms and base metal refineries capable of both recovering precious metals as a by-product of their main activities in copper, lead and zinc, etc., and also of smelting and treating precious metal scrap and ores. All the major EC refiners are able to treat gold and silver as well as platinum and palladium, and most of them can also process other platinum group metals as well.

### Trading

While the number of companies actually refining or fabricating precious metals is comparatively limited, many more are involved in dealing in such metals, either as commodities in unwrought forms such as ingots, or as investment products, e.g. special bars and coins. Banks, commodity traders and brokers may all deal in precious metals, particularly gold and silver, but they do not have any production facilities themselves and rely on the refiner-fabricators to convert the precious metals into whatever other form they may require, e.g. gold of higher purity, bars of a different weight, etc. Such dealers trade largely in paper, with non-physical transactions on the commodity markets in London, New York or Zürich, and only rarely do they have cause to be actually involved with the physical metals themselves.

Refiners and fabricators are also active in such markets, both buying and selling metals to meet their customers' needs and carrying out hedging transactions in order to fix prices and protect themselves from losses due to fluctuating precious metal prices.

## Fabrication

The EC precious metal fabricators are among the leaders in producing precious metal materials for advanced-technology fields. Part of their business, too, is the manufacture to close tolerances of wire, sheet and tube in carat golds and silver alloys for goldsmiths, silversmiths and manufacturing jewellers. In practice, the larger of such jewellery firms in the EC are tending to integrate upstream, making their own alloys and semis.

More complicated products, such as complex chemical salts and catalysts, woven catalyst gauzes and electrical contact parts are also produced by the EC fabricators. Elsewhere, they often have to be imported from fabricators who have the production skills to produce what is required, and to a large extent it is EC firms which provide these services for Third World countries, where there is no local or regional manufacture.

Closely linked with the fabrication business is scrap recovery or recycling of precious metals. As already mentioned, such reworking business, using the customer's scrap metal, is an important sector of the precious metals fabrication industry, particularly in the case of the platinum-group metals.

### Mining Production

#### Gold

EC mine production of gold is currently only 7 500 kg out of annual world production of some 1.5 million kg, or 0.5%.

#### Silver

Some 60 countries produce primary silver, mostly as a by-product of base metal mining. EC mines yield under 5 million kg per annum, or about 3% of annual world production of 14-15 million kg.

Table II  
Trends In Community Gold Fabrication By Country

| (Tonnes) | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  | 1987  |
|----------|-------|-------|-------|-------|-------|-------|-------|-------|
| BLEU     | 3.5   | 2.6   | 2.6   | 2.3   | 2.2   | 2.3   | 2.0   | 16.4  |
| DK       | 0.4   | 0.4   | 0.8   | 0.7   | 0.8   | 0.8   | 0.9   | 0.9   |
| D        | 74.8  | 67.1  | 65.6  | 61.4  | 61.2  | 62.3  | 59.5  | 62.5  |
| GR       | 4.7   | 6.2   | 7.0   | 8.0   | 9.2   | 10.6  | 9.1   | 8.3   |
| E        | 19.3  | 18.3  | 17.1  | 14.6  | 13.8  | 16.7  | 16.7  | 18.1  |
| FR       | 23.7  | 22.6  | 25.7  | 24.0  | 22.6  | 23.4  | 26.0  | 26.7  |
| I        | 114.9 | 181.9 | 214.2 | 170.3 | 213.6 | 245.6 | 234.9 | 221.8 |
| NL       | 3.1   | 4.0   | 3.8   | 3.7   | 4.2   | 4.9   | 4.8   | 4.0   |
| P        | 2.2   | 2.6   | 3.1   | 3.3   | 2.5   | 2.4   | 2.6   | 4.8   |
| UK & IRL | 37.4  | 35.4  | 33.1  | 24.0  | 25.1  | 30.0  | 29.6  | 37.0  |
| Total EC | 284   | 341.1 | 373.0 | 312.3 | 355.2 | 399.0 | 386.1 | 400.5 |

Source: Gold 1988. Consolidated Gold Fields.

## Platinum-group metals

There are no mineral sources of any significance in Western Europe for the six platinum-group metals, which are found mainly in South Africa, the USSR and Canada. Platinum availability is usually about 90 000 kg per annum, including Russian sales to the West, and that of palladium is also about 90 000 kg, on a similar basis. The four other platinum-group metals are found in much smaller quantities.

## Consumption

Precious metals consumption within the EC countries varies from year to year, depending on industrial demand, jewellery fashions and government decisions regarding the minting of gold and silver coins. Such trends, particularly that of demand for precious metals for investment purposes, are both affected by, and have an impact on, precious metals prices.

Roughly just under a quarter of world precious metals consumption occurs in the EC countries. Only in the case of gold is jewellery the major use. About 75% of the EC's consumption of 400 tonnes per annum of fine gold is converted into jewellery, mainly in Italy, much of which is then exported.

**Table III**  
**Consumption of Precious Metals 1986**

| (Tonnes)                 | Gold  | Silver | Platinum | Palladium |
|--------------------------|-------|--------|----------|-----------|
| Total EC                 | 400   | 4 000  | 17       | 18        |
| Total Western World      | 1 500 | 15 000 | 90       | 90        |
| EC as % of Western World | 27%   | 27%    | 19%      | 20%       |

Source: Eurométaux

Examples of the sectors in which precious metals are used are as follows:

### Gold:

- jewellery;
- electrics and electronics;
- dental alloys;
- surface coatings - electroplating, spectacle frames, porcelain and glass decoration.

### Silver:

- photographic;
- electrics and electronics;
- jewellery and silverware.

### Platinum:

- catalysts for the chemicals, car and oil industries;
- electrics and electronics;
- jewellery.

### Palladium:

- dental alloys;
- electrics and electronics;
- jewellery alloys.

## Situation in Third Countries

In the Western World, the principal precious metal mines are situated in the USA, Brazil, Mexico, Republic of South Africa, the USSR and Canada.

In addition, the USSR and People's Republic of China are major suppliers or potential sources, whose mineral reserves are less well documented.

However, in the past both the primary refining processes for precious metal ores and the secondary ones for all different sorts of scrap materials have largely been developed by companies based in Europe. For instance, many of the processes used in the South African platinum-group metal refining industry originate from the UK, where the entire production used to be refined before the increased cost of transporting mineral concentrates made this uneconomic. However, final separation of Canadian primary platinum group metal production is still carried out in the UK. Gold from Papua New Guinea is refined in Germany in substantial quantities.

In the rest of the non-Communist world, there are major secondary refineries and fabricators in the USA and Japan, and smaller ones in Australia, Brazil, Canada, India, South Africa, Norway, Sweden and Switzerland. Many of these are subsidiaries or associates of the major EC refiners.

Precious metal fabrication activities employ over 10 000 people in the USA and several thousand more in Japan. Such figures exclude base metal refineries also treating precious metals.

## Forecast and outlook

The precious metals industry itself believes that it is impossible to make any realistic medium- or long-term forecasts in monetary terms because the prices of precious metals are so unpredictable. Historical sales figures in monetary terms since 1979 have little relevance because of major price fluctuations due to the highly speculative nature of precious metal trading, the influence of political and economic factors on supply and demand and fluctuations in exchange rates, particularly against the US dollar, the currency in which precious metals are most frequently priced.

However, some basic comments on the future of this business can be made. Although there have been fluctuations in supply and demand, there are no long-term risks of shortages. Ample reserves for the foreseeable future are well documented and at present new mines are being developed in a number of countries - the USA, Canada, South America, Australia and South Africa. Even if there are risks of disruption of supplies, whether from South Africa, the USSR or other countries due to political events, mine catastrophes or strikes, there are substantial pipeline stocks of precious metals available in the short term. In any case, as already explained, precious metals have many uses in industry and are continually being recycled. Much of this recycling activity takes place in the refineries of the EC precious metals

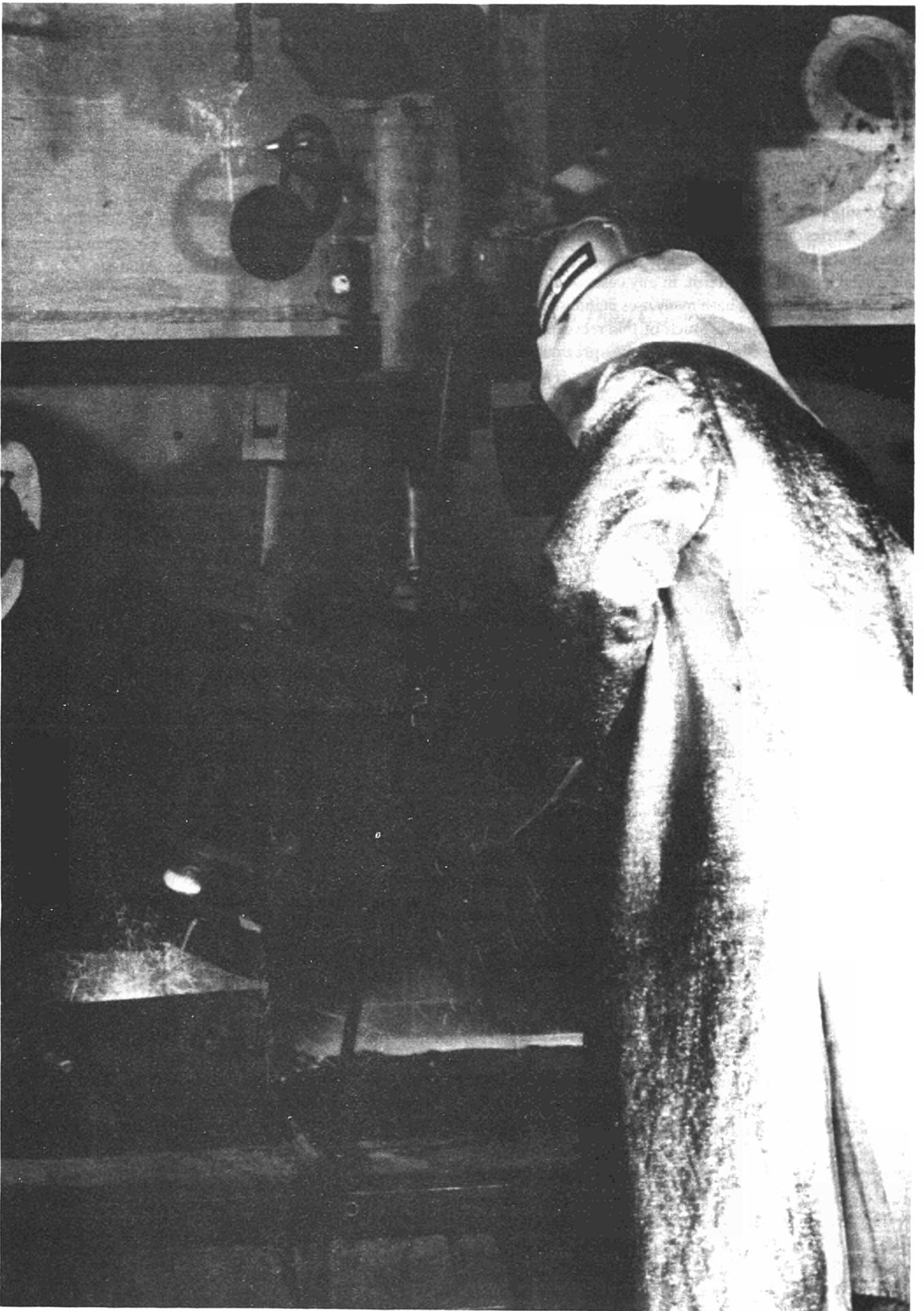
industry, so that free movement of precious metal materials both within and across the frontiers of the EC is of great importance to the industry.

Other issues which can be highlighted in the context of the single European market are: the evolution of a harmonization of EC hallmarking standards for alloys used in the jewellery trade and the growth of demand for platinum group metals in the EC as a result of the adoption of the 1987 European Community directive on car-exhaust emission controls and the resulting need for car catalysts.

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## IRON AND STEEL

(NACE 221)

*With a gross steel output of 126 million tonnes in 1987, the European steel industry accounted for 17% of world output (compared to 13% for Japan and 11% for the United States of America). But the steel industry has suffered serious set-backs in all the industrialized countries since 1974 owing to reduced production in steel-based industries, a decrease in the quantity of steel required to produce a given product and increased competition from newly-industrialized countries.*

*Institutions had to undertake restructuring operations to reduce production capacity by 18% between 1980 and 1986, while at the same time launching major productivity boosting programmes. This should enable a large number of companies to regain a sounder financial footing if further destabilization of the market can be prevented.*

*In these circumstances and taking an optimistic scenario, production of finished steel products in the Community could reach just over 100 million tonnes in the medium term (EC 10). This target is based on the assumption that restructuring efforts will be carried through and production geared to sectors where demand is likely to increase, such as coated sheet metals.*

The steel industry encompasses steel production from raw material processing to the production of finished and final laminated steel products. Contrary to accepted practice in most other parts of the world, tube manufacture, such as wire-drawn tube production, is not considered to be part of the steel industry, but is classified as a primary processing industry. This restriction is no doubt due to long tradition, reinforced by the limits the Treaty of Paris imposes on the

powers of the ECSC. Steel and coal were the subject of the first European integration agreement in 1952 and the special provisions governing those two products remained in force after the two administrative bodies were merged.

The steel industry as defined by the Community covers the following operations:

- coke manufacture (except when coke is purchased from coal-industry or independent coking plants);
- ore preparation, especially by manufacture of briquettes;
- cast-iron processing in blast furnaces;
- steel processing from cast iron in converters;
- steel processing from scrap in electric furnaces;
- hot rolling of long and flat products;
- cold rolling of flat products;
- metal and organic coatings.

The finished and final products of the steel industry, including ordinary, special and alloyed steels are as follows:

(i) Hot-rolled:

- flat products: coils; laminated strips or strips cut from coils; heavy or medium plate, laminated or cut from coils;
- long products: heavy sections; light sections, including reinforced concrete rounds; rod wire.

(ii) Cold-rolled:

- thin sheet metals and coated sheet metals (tinplate, galvanized, electro-galvanized, lead-covered, aluminium-coated, plastic-coated, pre-painted, etc. sheet metals).

### Main Indicators

#### Iron and Steel - Finished Products

| (Million tonnes)           | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 |
|----------------------------|------|------|------|------|------|------|------|------|
| Apparent consumption       | 86   | 83   | 78   | 75   | 80   | 80   | 90   | 91   |
| Net export earnings        | 13   | 16   | 9    | 11   | 14   | 16   | 13   | 14   |
| Total Community production | 99   | 99   | 87   | 86   | 94   | 96   | 103  | 105  |
| Employment(1 000)          | 635  | 573  | 533  | 494  | 460  | 438  | 475  | 440  |

1980: EC 9, 1981-1985: EC 10.

**Table I**  
**International Comparison of Production, Exports and Imports of Steel**

| (Million tonnes)     | 1973              |                 |                 | 1980              |                 |                 | 1987              |                 |                 |
|----------------------|-------------------|-----------------|-----------------|-------------------|-----------------|-----------------|-------------------|-----------------|-----------------|
|                      | Prod. crude steel | Exp. fin. prod. | Imp. fin. prod. | Prod. crude steel | Exp. fin. prod. | Imp. fin. prod. | Prod. crude steel | Exp. fin. prod. | Imp. fin. prod. |
| Total                | 694.0             | 105.0           | 105.0           | 720.0             | 138.0           | 138.0           | 735.0             | 135.0           | 135.0           |
| Community            | (1) 150.0         | 26.0            | 5.0             | 126.0             | 22.0            | 9.0             | 115.0             | 20.0            | 8.0             |
| USA                  | 134.0             | 3.0             | 6.5             | 102.0             | 3.0             | 10.0            | 81.0              | 0.7             | 15.0            |
| Japan                | 120.0             | 21.0            | 0.1             | 112.0             | 23.0            | 1.0             | 99.0              | 22.0            | 3.0             |
| Others               | 290.0             | 55.0            | 93.4            | 380.0             | 90.0            | 118.0           | 440.0             | 92.0            | 109.0           |
| Of which Brazil      | 5.0               | 0.3             | 1.2             | 15.0              | 0.6             | 1.0             | 22.0              | 4.0             | 0.5             |
| <b>Percentages .</b> |                   |                 |                 |                   |                 |                 |                   |                 |                 |
| Total                | 100               | 100             | 100             | 100               | 100             | 100             | 100               | 100             | 100             |
| Community (1)        | 22                | 25              | 5               | 18                | 16              | 7               | 16                | 15              | 6               |
| USA                  | 19                | 3               | 6               | 14                | 2               | 7               | 11                | 1               | 11              |
| Japan                | 17                | 20              | -               | 15                | 17              | 1               | 13                | 16              | 2               |
| Others               | 42                | 52              | 89              | 53                | 65              | 85              | 60                | 68              | 81              |

(1) Excluding Spain and Portugal.

Source: Eurostat.

## Current Situation

Production of finished products for the Community as a whole rose to 105 million tonnes in 1987. This figure cannot however be compared with the 1980 total of 99 million tonnes as Community statistics from 1981 onwards include production figures for Greece (900 000 tonnes). Spanish and Portuguese steel production (10 200 000 tonnes and 750 000 tonnes respectively) has been included since 1986. Thus it is only because of the expansion of the Community that production levels have equalled those recorded before 1980. Output for the 10 Member States of the Community as it was previously totalled 94.5 million tonnes in 1987. The same pattern can be seen in the Community's consumption and its exports.

As regards employment, the industry's 635 000 strong workforce in 1980 fell to 440 000 in 1987, despite the inclusion of Spain and Portugal. Without these two countries the manpower level would be 380 000.

There are a number of factors which account for the drop in the industrialized countries' share of world steel production. These include:

- A reduction in the tonnage consumed, which has affected all industrialized countries. This is no doubt due to recession-related production cuts carried out in a number of steel-based industries and to a decrease in the quantity of steel required to produce a given product. This drop can be attributed to major improvements in the quality, properties and performance of steel products themselves, which have meant less tonnage is required for constant consumption levels. Competition from substitutes such as aluminium and plastics is another important factor;
- A substantial increase in production levels in newly industrialized countries, resulting not only in their breaking into Community markets but also in a reduction in EC producers' share of the international market where vast quantities are often dumped at prices which bear no relation to production costs.

It was practices of this sort which led to the sudden jump in imports from third countries, which rose from 5% to 11% of apparent consumption between 1976 and 1977. The buoyant climate on the international market of 1974, when there was a steel shortage, and the absence of any Community import policy prepared the way for this invasion and the subsequent downturn in the economic situation confirmed it. Since 1978,

**Table II**  
**Trends in Community Production by Product**

| (Million tonnes)    | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 |
|---------------------|------|------|------|------|------|------|------|------|
| Cast iron           | 89   | 88   | 77   | 74   | 83   | 86   | 85   | 85   |
| Crude steel         | 127  | 126  | 111  | 110  | 120  | 121  | 126  | 126  |
| Hot-rolled products | 99   | 97   | 86   | 86   | 93   | 100  | 103  | 105  |
| Finished products   | 99   | 99   | 87   | 86   | 94   | 96   | 103  | 105  |

EC 9 (excluding Greece): 1980; EC 10: 1981-1985; EC 12 (including Spain and Portugal): 1986-1987

Source: Eurostat.

**Table III**  
**Production and Foreign Trade**

| (Million ECU)           | 1980   | 1981   | 1982   | 1983   | 1984   | 1985   | 1986   | 1987   |
|-------------------------|--------|--------|--------|--------|--------|--------|--------|--------|
| <b>Production</b>       |        |        |        |        |        |        |        |        |
| Current value           | 29 000 | 31 000 | 26 500 | 31 500 | 33 500 | 36 700 | 40 600 | 40 000 |
| Index                   | 100    | 107    | 91     | 109    | 115    | 127    | 140    | 138    |
| Constant value*         | 29 000 | 27 000 | 21 000 | 23 000 | 23 000 | 24 000 | 25 000 | 25 000 |
| Index                   | 100    | 93     | 72     | 79     | 79     | 83     | 86     | 86     |
| <b>Imports extra-EC</b> |        |        |        |        |        |        |        |        |
| Index                   | 3 000  | 2 200  | 3 300  | 3 300  | 3 400  | 3 800  | 3 900  | 3 400  |
| Index                   | 100    | 73     | 110    | 110    | 113    | 127    | 130    | 113    |
| <b>Exports extra-EC</b> |        |        |        |        |        |        |        |        |
| Index                   | 7 000  | 8 300  | 7 400  | 7 400  | 9 700  | 11 000 | 8 500  | 9 100  |
| Index                   | 100    | 119    | 106    | 106    | 140    | 157    | 151    | 130    |
| <b>X/M</b>              | 2.3    | 3.8    | 2.2    | 2.2    | 2.9    | 2.9    | 2.2    | 2.7    |

Million 1980 ECU.

1980: EC 9 (excluding Greece), 1981-1985: EC 10.

Source: Eurostat.

imports have stabilized at around 10% of apparent consumption, due among other factors to the import policy introduced by the European Commission.

In response to this situation Community institutions have undertaken a restructuring operation involving capacity cuts. This was implemented from 1980 to 1986 by means of the Aid Code approved by the Council. Although government subsidies are prohibited by the ECSC Treaty, the serious crisis which has affected the steel industry since 1974 has caused most governments to develop industrial support programmes for political and social reasons. However, the provisions and the form of these programmes, as well as the amounts allocated, have varied considerably from country to country.

The Council conferred authorizing and monitoring powers on the Commission while at the same time extending the right and even the obligation to make these contingent upon a reduction in the production capacity of hot-rolled products. This code expired at the end of 1986. Since then all forms of support have been prohibited except in specific circumstances, for example to meet the social cost of plant closures, to foster research and development and to safeguard the environment. Between 1980 and 1986 maximum production levels for the Community of 12 were reduced from 172 to 140 million tonnes, an 18% reduction of the total. It should be noted that a 1983 Community survey had estimated excess

capacity at 50 million tonnes, without taking into account the Spanish and Portuguese steel industries.

Although the crisis started at the end of 1974, the Community quotas on the production and delivery of certain categories of products on the internal market were not introduced until 1980. The coverage of the ECSC Article 58 quota system was gradually limited beginning in 1986 and expired entirely on 30 June 1988.

The decline in the production of crude steel has been even greater than for finished products. This is due to the proliferation of continuous casting plants where one step in the processing is eliminated. The volume of production crops is thus halved, bringing the rate down to 10%. The share of the continuous casting method in crude-steel production rose from 35% in 1980 to nearly 80% in 1987, resulting in lower requirements for crude steel as well as cast iron. The effect on scrap purchasing requirements is harder to gauge because as the steel requirement shrinks, the proportion of crops does too.

The factors behind workforce reductions are plant closures and lower production in those which remain open. There is also the overriding need to keep production costs down, a need which is underlined by the major productivity gains. These gains have been achieved by discarding inefficient production methods, investing in rationalization programmes and through constant technical research. Staff reduction is

#### Production of Crude Steel and Employment per Country

|   | B      | DK  | D      | GR  | E      | F      | IRL | I      | L     | NL    | P   | UK     |
|---|--------|-----|--------|-----|--------|--------|-----|--------|-------|-------|-----|--------|
| <b>Production of raw steel (000 tonnes)</b> |        |     |        |     |        |        |     |        |       |       |     |        |
| 1980  | 12 300 | 700 | 43 800 | -   | -      | 23 200 | 2   | 26 500 | 4 600 | 5 300 | -   | 11 300 |
| 1987  | 9 800  | 600 | 36 300 | 900 | 11 700 | 17 400 | 200 | 22 900 | 3 300 | 5 100 | 700 | 17 200 |
| <b>Employment (000s)</b>                    |        |     |        |     |        |        |     |        |       |       |     |        |
| 1980  | 47.4   | 2.5 | 201.0  | -   | -      | 113.6  | 0.7 | 100.6  | 16.0  | 21.0  | -   | 133.4  |
| 1987  | 28.9   | 1.6 | 137.3  | 4.0 | 47.6   | 62.8   | 0.6 | 64.9   | 11.6  | 18.8  | 5.7 | 55.1   |

Source: Eurostat

extremely expensive for companies in the short term so support schemes have been organized, based on a broad interpretation of the ECSC provisions with respect to redeployment. These have helped to alleviate the worst social effects by introducing early retirement, job-creation projects and professional training programmes for redundant workers. These measures, like those introduced for mine workers, have been financed from funds drawn directly or indirectly from the contributions paid by steel companies and, to a lesser extent, mining companies.

### *Financial Position*

It is important to emphasize that the steel companies' financial difficulties date back beyond 1980 to 1975. The 1974 oil crisis and the rise in all raw material prices which came in its wake led to a drastic change in the economic situation in the following year. There was a substantial drop in steel demand and the companies, with their excess capacity levels, were then drawn into a world price war which dangerously weakened their financial health.

The industry's crisis was first thought to be a direct result of the global economic situation, but a number of structural weaknesses gradually began to show up despite the fact that, in the years leading up to the crisis, large sums had been spent to adapt production methods to the industry's new geographical pattern and the latest technological developments. Two examples which come to mind are the rapid expansion of oxygen blowing which replaced the Thomas and Siemens Martin plants in the space of a few years and the parallel development of the continuous casting method. Brand new factories were also built on coasts to get closer to new raw material sources and the new markets for finished products.

Despite these new developments there still remained a number of old plants, with heavy production costs. It became imperative to close them in spite of the political and social cost, because of the catastrophic drop in their earnings. This drop was caused by products flooding the market at prices which bore practically no relation to those practised in normal competition. The difference in inflation rates from one country to another also exacerbated the situation as companies adjusted prices to compete with the cheapest offers.

From 1975 onwards but especially after 1980, the financial situation became critical for most steel producers. This led them to implement radical structural changes, involving mergers and drastic capacity cuts. Some companies disappeared altogether. There was an enormous demand for capital and many producers appealed for State support. As governments were anxious to avoid the social problems looming on the horizon and especially the painful prospect of large scale lay-offs, a wide range of different measures were introduced. Very often these included buying up shares in the company,

acquiring a majority holding or even the total share capital of the larger companies.

A gnawing price problem has persisted alongside the structural problems. Although prices have risen slightly since 1980, they have failed to keep pace with inflation. The unit value of production has fallen by 15% in constant figures, despite quality improvements, optimization of the most sophisticated categories and the existence of a strict quota system.

However, this has not prevented some companies from getting back into the black. By 1986, some of them were able to pay back part of the support they had received while others were privatized. One of the reasons for the recovery was the fall in certain cases, of production costs, especially lower raw material prices resulting from the dollar's fall. The dollar rate has a direct impact on the price of imported iron ore and imported or domestic coal as well as that of scrap of any origin. There has also been a drop in financial costs due to the fall in interest rates, and overheads and pay-roll costs have been reduced as a result of restructuring measures, thus enabling many companies to become going concerns again. However, these positive effects have been offset and often overridden by the drop in national currency earnings, due not only to sales on the American market, but also to sales invoiced in dollars, which represent the vast majority.

Major productivity gains have also been achieved, so that, although labour costs per hour have risen, their total share in the value of the manufactured product has been reduced. This process is still going on and calls for continued vigilance. Going by the progress over the past few years up to early 1988, there is every reason to believe that a return to financial equilibrium is a realistic target for many companies, as long as there are no new disruptions to the market.

### *Major Structural and Geographical Features*

Steel producers can be classified according to a number of different criteria:

#### **Manufacturing methods**

- The first category is made up of integrated companies which account for 70% of production. These companies produce cast iron in their blast furnaces and convert it in oxygen-based steel works, using a certain tonnage of scrap to maintain the temperature of the molten steel. The proportion varies from 5% to 35%, depending on the techniques used and the relationship between the price of cast iron and scrap. Companies using this method are usually geared to the production of flat products, including subsequent cold rolling into thin sheet metal which may be coated, and the production of heavy sections and rod wire.
- The second category is made up of companies with more specialized types of production. It includes small

companies which use electric furnaces to treat scrap from rolling mill crops or other recycling metal. The material prices largely determine the price of the finished products. These include laminated commercial products, reinforced concrete rounds and rod wire.

### Size

- Integrated factories often have large-scale production capacity ranging from 2 to 10 million tonnes of finished products. They reap the benefits of economies of scale, thereby reducing costs, but they also have to face all the difficulties of a capital and labour-intensive operation, and enjoy very little production flexibility.
- Plants organized around an electric furnace usually have much smaller capacity, which allows them more freedom to adapt their production. Their production costs depend to a large extent on the cost of electricity, but the most important factor is the price of scrap which is subject to wide fluctuations.

### Production quality

- Ordinary, mass-produced steel products.
- Special alloyed and non-alloyed steels whose importance is growing, even though they account for only a very low tonnage compared with ordinary steels. They represented a 16% share of 1980 crude-steel output. Their share is now 21%.

### Location

- There are steel plants throughout the European Community with varying levels of production capacity. A number of them were built inland, usually near the coal or iron ore fields they used to draw their supplies from, or near steel consumers.
- Those built more recently are on the coast, where they have easy access to imported raw materials, without the cost of land transport. They are also better placed to capture international markets. The companies falling into this category represent about 25% of total production.

### Financial structure

- Companies financed by private capital, which represented the vast majority before the 1974 crisis.
- Companies in which the State holds some or all of the capital. These have grown in number as deficits have increased and they now represent about 15% of total production. As companies begin to break even again and profitability increases there are signs that this trend will be reversed, for economic rather than ideological reasons.

## Forecast and Outlook

The Commission forecasts a GNP increase of over 3% in 1988 (compared with 2.7% in 1987 and 2.6% in 1986) with investment as the strongest component. The forecast for 1988 was repeatedly revised upwards from an initial 1.8% for GNP and 3% for investment. On the basis of the initial forecast, the Commission predicted at the OECD meeting in February 1988 a slight fall of apparent steel consumption. The present tendency is a sharp increase by 4% for steel consumption (compared to 1987) and by more than 6% for steel production.

It is extremely difficult to make valid predictions as to the future. In 1985 the Commission published a set of general objectives for the period up to 1990 concerning both domestic consumption and the net foreign trade balance. In both these areas it produced both an optimistic and a conservative estimate. In the optimistic estimate, apparent consumption in the Community of 10 could hover around 90 million tonnes of finished products and the foreign trade balance around 13 million tonnes. Whether or not the latter figure is achieved will depend on a number of factors which cannot be determined at this stage. This is particularly true of the dollar exchange rate. In spite of the monetary situation, Community companies have so far managed to develop productivity in such a way that they have been able to remain competitive on the international market as long as the competition has been fair. This last point is worth noting, for in a number of countries Community exports have come up against protectionist or restrictive measures.

For imports, the rate of exchange is a less significant factor than prices, which often bear no relation to actual production costs. The volume of imports will therefore largely depend on how effective trade moves by Community institutions are in preventing unfair imports from disrupting the European market and making the restructuring of the sector even more difficult.

This restructuring effort must be pursued and will involve further reductions in capacity, both for long and flat products. In the view of the industry, the consequences that this will entail for the workforce, with up to 100 000 job cuts in the industry, make political support vital as well as they imply the need to maintain all the accompanying social and regional development measures. Restructuring implies more than reducing capacity. Production must be geared to sectors where demand is likely to be highest, such as coated products. Great care must be taken to not let capacity outstrip the foreseeable development of demand.

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# INDEPENDENT STEEL MILLS

(NACE 221)

*The following text drawn up by the European Independent Steelworks Association (EISA) supplements the Eurofer monograph. It describes the situation and outlook for independent steel mills working with electric furnaces. The companies belonging to EISA have a production capacity of about 15 million tonnes and employ 25 000 persons. These figures are included in the Eurofer monograph. Deregulation of the steel product market is likely to reinforce the position of these companies.*

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The steel producers belonging to the European Independent Steelworks Association produce and convert steel into finished laminated products in their own steel works. No national government holds a share in the capital of any of these companies.

The EISA members have an annual production capacity of approximately 15 million tonnes of steel and they employ about 25 000 people. Their exports go first and foremost to European countries and their world market share is minimal.

The independent steel mills mainly use the electric furnace technique for the direct reduction of recycled steel obtained from other steel and scrap. This method uses electric energy, allowing rapid smelting. A number of new technical developments have also been incorporated, especially the continuous casting method. This method is ideal for producing thin steel sections. These companies therefore essentially produce reinforced concrete bars, rod wire and welded wire netting as well as commercial quality steels.

## Current Situation

Over the last 10 years the widespread introduction of the new continuous casting has allowed small production units equipped with electric furnaces to achieve the same productivity and quality levels as large integrated plants. Independent steel mills have proved to be highly competitive on the European market, even in a period of crisis. Their commercial vitality is a result of high productivity levels and a reasonable price/quality ratio.

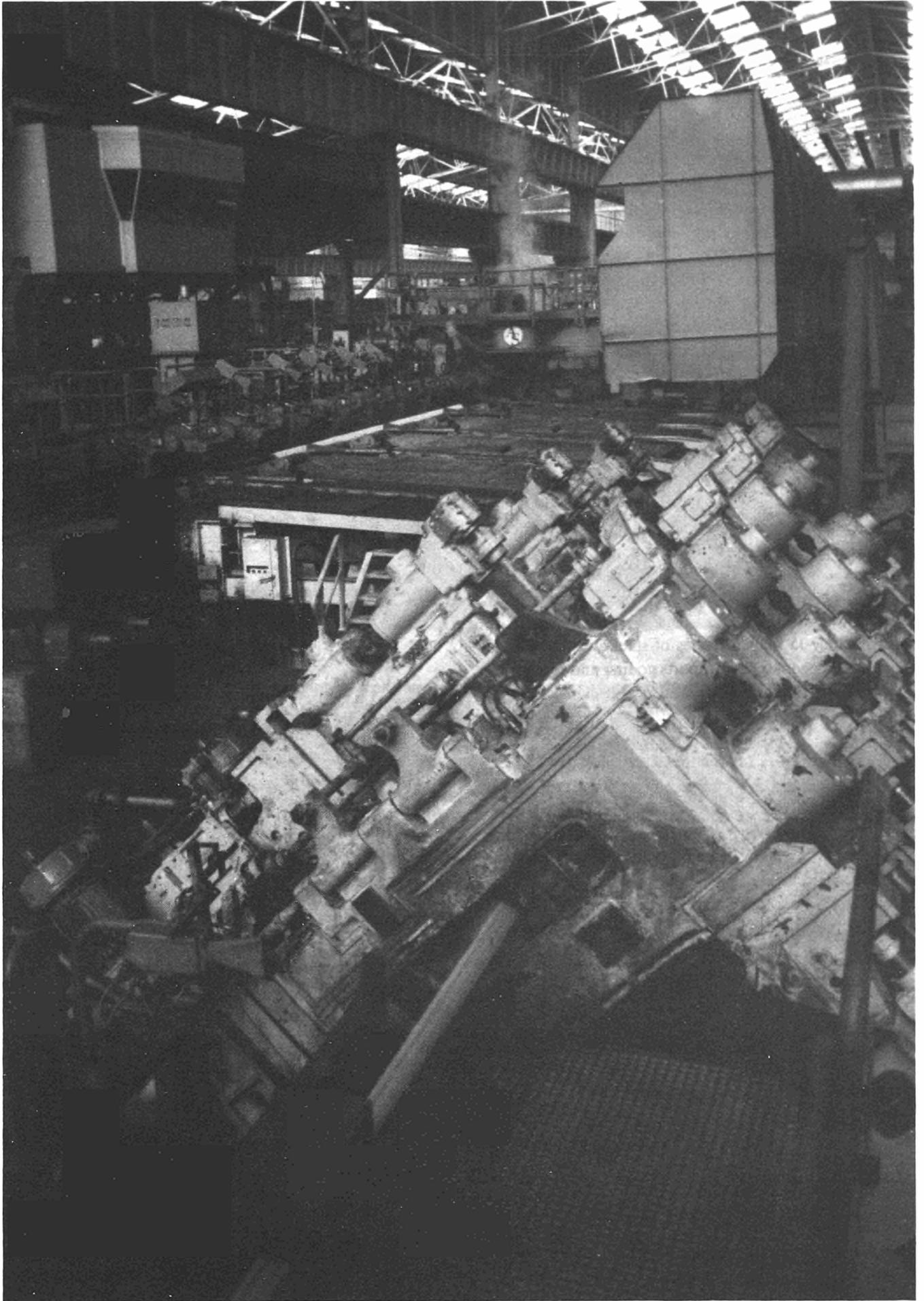
When the crisis deepened in the 1980s, forcing the European Commission to declare the Crisis manifest and enforce the ECSC Article 58 system of production quotas, the independent steel mills had already partly restructured and geared their efforts to new products. The small firms continued to restructure and to modernize, focusing their production on new, top-quality products. EISA has always advocated a return to free trade.

## Forecast and Outlook

Since the deregulation of the market for long products in January 1988, the independent steel mills are now free of any kind of constraint and should therefore be able to better compete on the domestic market and, more especially, with rivals from third countries.

Their low investment costs and new technology should also enable them to diversify their product range further and specialize in high-quality products. Some independent steel mills may well be able to go into the flat product business, which has been the exclusive preserve of integrated companies until now.

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# STEEL TUBES

(NACE 222)

*This activity covers a great number of user sectors. Its products are on the one hand linked to the consumer market and on the other hand to investment and equipment. Energy (oil and gas, nuclear and steam generation industries), motor vehicles, structural steel work and building are the main markets concerned. The steel tube industry has faced a severe downturn since 1981 due to overcapacity. It experienced a further set-back in 1986 and 1987, especially for seamless and large welded tubes deeply influenced by the oil and gas crisis and by the protectionist policies imposed by the USA on its largest competitors. The EC nevertheless maintains its leading position on the world market, ahead of the USA and Japan, with an annual output of 13 million tonnes, or 20% of total production. There is strong competition in this sector from newly industrialized and developing countries. Foreign trade has been steadily deteriorating and despite productivity gains achieved over the last few years through restructuring, the best that can be hoped for is some stabilization of the situation.*

The sector can be divided into three product areas as in the harmonized system of classification:

- seamless tubes (HS 73-04);
- round welded tubes over 406.4 mm in diameter (HS 73-05);
- round welded tubes up to and including (uti) 406.4 mm in diameter and welded tubes of non-circular section, whatever their perimeter (HS 73-06).

The market trends for each of these product areas vary widely.

## Current Situation

Production in the EC has followed world trends, except for a sharper drop in 1986 and 1987. Japanese production has matched EC trends, but with an even sharper drop in 1986 and 1987. The USSR's production has grown steadily, whereas production in the USA has been on the decline since 1982.

The newly industrialized countries (NICs) and the developing countries (DCs) have all expanded their production, in contrast to the drop in output in the EC, the USA and Japan. These countries include South Korea, Taiwan, Thailand, Brazil, Argentina, Turkey, Venezuela and Yugoslavia.

## Industry Structure

The various national industries of the Community have been forced to cut staff levels and to restructure their factories which led to a strong rise in productivity.

1986 and 1987 were crisis years. Factories were sometimes operating at only 50% of their capacity, restructuring costs were high and the Third World put heavy pressure on Community markets. In most cases there were end-of-year deficits. Overcapacity still remains on the world-wide level for all categories of tubes.

Geographically, steel tube factories are spread all over the Community. There are a large number of manufacturers in most Member countries. Because of the difference in scale of investment costs, producers of seamless and welded tubes over 406.4 mm in diameter are largely outnumbered by producers of welded tubes uti 406.4 mm in diameter and welded tubes of other sections. There is strong competition within the industry as a whole, as shown by the extent of trade between Community countries, which is thriving in the spirit of

## Main Indicators Steel Tubes

| (Million ECU)                          | 1981  | 1982  | 1983  | 1984  | 1985   | 1986  | 1987  | 1986  | 1987  |
|--|-------|-------|-------|-------|--------|-------|-------|-------|-------|
| Apparent consumption<br>(1 000 tonnes) | 8 395 | 7 623 | 6 851 | 7 510 | 7 791  | 7 468 | 7 857 | 8 221 | 8 328 |
| Net export earnings                    | 3 996 | 4 316 | 3 465 | 3 641 | 3 817  | 2 708 | 2 190 | 2 825 | 2 289 |
| Deliveries                             | 9 049 | 9 633 | 8 385 | 9 640 | 10 496 | 9 337 |       |       |       |
| Employment (1 000)                     | 123.5 | 119.9 | 114.8 | 105.4 | 98.4   | 78.1  | 67.5  | 84.3  | 73.6  |

1981-1987 (first columns): EC 10; 1986-1987 (second columns): EC 12.

**Table I**  
**World Production Structure**

| (Million tonnes and % of world production) | 1981        | 1982       | 1983        | 1984        | 1985        | 1986        | 1987        | 1986  | 1987  |
|--|-------------|------------|-------------|-------------|-------------|-------------|-------------|-------|-------|
| World Index                                | 75.9<br>100 | 67.3<br>89 | 63.2<br>83  | 68.3<br>90  | 70.3<br>93  | 66.0<br>87  | 66.3<br>88  | 66.0  | 66.3  |
| EC (1) Index                               | 14.4<br>100 | 12.8<br>89 | 12.1<br>84  | 13.3<br>92  | 13.4<br>93  | 12.1<br>84  | 11.9<br>83  | 13.1  | 12.9  |
| Share                                      | 18.9%       | 19%        | 19.1%       | 19.4%       | 19.1%       | 18.3%       | 17.9%       | 19.8% | 19.5% |
| USA Index                                  | 9.3<br>100  | 4.6<br>51  | 2.9<br>31   | 3.8<br>41   | 3.7<br>40   | 2.6<br>28   | 3.2<br>35   | 2.6   | 3.2   |
| Share                                      | 12.3%       | 6.8%       | 4.6%        | 5.7%        | 5.3%        | 3.9%        | 4.8%        | 3.9%  | 4.8%  |
| Japan Index                                | 13.1<br>100 | 12.2<br>93 | 9.7<br>74   | 11.5<br>91  | 12.2<br>93  | 10.5<br>80  | 9.7<br>74   | 10.5  | 9.7   |
| Share                                      | 17.3%       | 18.1%      | 15.4%       | 16.9%       | 17.4%       | 15.9%       | 14.6%       | 15.9% | 14.6% |
| USSR Index                                 | 18.3<br>100 | 17.9<br>98 | 18.7<br>102 | 18.9<br>103 | 19.4<br>106 | 19.8<br>108 | 20.3<br>111 | 19.8  | 20.3  |
| Share                                      | 24.1%       | 26.6%      | 29.5%       | 27.5%       | 27.6%       | 30.0%       | 30.6%       | 30.0% | 30.6% |
| Others Index                               | 20.8<br>100 | 19.8<br>95 | 19.8<br>95  | 20.8<br>100 | 21.6<br>104 | 21.0<br>101 | 21.2<br>102 | 20.0  | 20.2  |
| Share                                      | 27.4%       | 29.4%      | 31.3%       | 30.5%       | 30.7%       | 31.8%       | 32.0%       | 30.3% | 30.5% |

(1) 1981-1987 (first columns): EC 10; 1986-1987 (second columns): EC 12.

Source: CDL.

the single European market. The volumes traded in the sector are in the order of 2.5 million tonnes a year, which represented 30% of apparent consumption in 1987. The proportion for seamless tubes alone was as high as 43.3 % in the same year.

### *Factors behind Production*

#### **Seamless tubes**

There has been a general slump in output and exports causing sales prices to drop, particularly in 1986 and 1987, with many companies incurring losses. The seamless tube industry is deeply influenced by the oil and gas industry and the drop in the price of the barrel of oil had a disastrous effect. In addition, the United States has introduced protectionist policies and imposed import quotas on its largest competitors, namely Japan and the EC. And, last but not least, some countries, such as Brazil and Yugoslavia, have developed their means of production to a very great extent, thus limiting the EC's export opportunities in the Third World.

#### **Welded tubes over 406.4 mm in diameter**

There has been a drop in investments in oil and gas pipelines, the main outlets for this category of tube.

#### **Welded tubes uti 406.4 mm in diameter and welded tubes of other sections**

This branch has been hard hit by competition from NICs and DCs, which have developed their means of production and sell at very competitive prices, due to state aids in some cases.

It has also been affected by keen competition in the steel industry. This has led to drops in the prices of coils, the raw material for welded tubes. As a result, some years there have been wide variations within the Community, between Community prices and world export prices for this semi-finished product. These price variations have favoured third countries, which also have very low labour costs.

However, consumption on the Community market has risen following the steady recovery recorded in a number of

**Table II**  
**Employment Trends**

|                    | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  | 1987  | 1986  | 1987  |
|--------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Employment (1 000) | 123.5 | 119.9 | 114.8 | 105.4 | 98.4  | 78.1  | 67.5  | 84.3  | 73.6  |
| Tonnes/worker      | 116.8 | 107.1 | 105.6 | 125.8 | 135.7 | 155.3 | 171.9 | 155.8 | 174.9 |

1981-1987 (first columns): EC 10; 1986-1987 (second columns): EC 12.

Source: CDL.

**Table III**  
**Trends in Apparent Consumption**

| (Thousand tonnes)   | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  | 1987  | 1986  | 1987  |
|---|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| <b>Total: all steel tubes</b>   |       |       |       |       |       |       |       |       |       |
| Quantities  | 8 396 | 7 623 | 6 851 | 7 510 | 7 992 | 7 468 | 7 857 | 8 221 | 8 329 |
| Index   | 100   | 91    | 82    | 89    | 93    | 89    | 94    | 9.9%  | 10.2% |
| Imports   | 7.6%  | 9.0%  | 10.0% | 9.8%  | 8.9%  | 10.7% | 10.6% | 9.9%  | 10.2% |
| <b>Seamless tubes</b>   |       |       |       |       |       |       |       |       |       |
| Quantities  | 2 160 | 2 020 | 1 672 | 1 941 | 2 219 | 1 771 | 1 762 | 1 907 | 1 902 |
| Index   | 100   | 94    | 77    | 90    | 103   | 82    | 82    | 14.5% | 17.3% |
| Imports   | 12.1% | 11.8% | 13.8% | 12.6% | 12.3% | 15.1% | 18.2% | 14.5% | 17.3% |
| <b>Round welded tubes over D. 406.4 mm</b>                                |       |       |       |       |       |       |       |       |       |
| Quantities  | 877   | 875   | 273   | 598   | 665   | 719   | 465   | 735   | 479   |
| Index   | 100   | 100   | 31    | 68    | 76    | 82    | 53    | 17.8% | 4.6%  |
| Imports   | 2.8%  | 2.5%  | 12.7% | 12.1% | 3.2%  | 18.2% | 4.4%  | 17.8% | 4.6%  |
| <b>Round welded tubes uti 406.4 mm and welded tubes of other sections</b> |       |       |       |       |       |       |       |       |       |
| Quantities  | 5 358 | 4 729 | 4 905 | 4 970 | 4 908 | 4 978 | 5 630 | 5 578 | 6 248 |
| Index   | 100   | 88    | 92    | 93    | 92    | 93    | 105   | 7.2%  | 8.0%  |
| Imports   | 6.6%  | 9.0%  | 8.5%  | 8.5%  | 8.2%  | 8.0%  | 8.8%  | 7.2%  | 8.0%  |

1981-1987 (first columns): EC 10; 1986-1987 (second columns): EC 12.

Source: CDL.

industries, especially the automotive and the structural steelwork industries.

### *Employment Trends*

A comparison of overall employment levels to the tonnage output for each year shows that productivity has increased sharply in the industry since 1984. The companies have been obliged to face the heavy restructuring costs of employment reductions which concerned 50% of the manpower.

### *Consumption Trends*

Apparent consumption of seamless tubes has shown an appreciable reduction, since the market for this category of tubes is directly related to investments and the energy sector. With the reduction in consumption, imports have risen from

12.1% to 18.2%. Figures for welded tubes over 406.4 mm in diameter are irregular, owing to various market conditions.

In contrast, consumption of welded tubes uti 406.4 mm and welded tubes of other sections remained almost stable from 1983-1986 and increased strongly in 1987, since it is linked to the consumer market. Imports have taken an increasing share of Community markets, rising from 6.6% to 9.2%.

### *Foreign Trade*

Since 1985 there has been a progressive increase in imports of seamless tubes. The pattern for welded tubes over 406.4 mm in diameter has been very irregular. Imports of welded tubes uti 406.4 mm and welded tubes of other sections have increased steadily from year to year except for a drop in 1985 and 1986.

**Table IV**  
**Production and Foreign Trade**

| (Million ECU)           | 1981  | 1982  | 1983  | 1984  | 1985   | 1986  | 1987  | 1986  | 1987  |
|-------------------------|-------|-------|-------|-------|--------|-------|-------|-------|-------|
| <b>Deliveries</b>       |       |       |       |       |        |       |       |       |       |
| Current value           | 9 049 | 9 633 | 8 385 | 9 640 | 10 496 | 9 337 |       |       |       |
| Index                   | 100   | 106   | 93    | 107   | 116    | 103   |       |       |       |
| Constant value          | 9 049 | 9 016 | 7 496 | 8 119 | 8 470  | 7 528 |       |       |       |
| Index                   | 100   | 99    | 82    | 90    | 93     | 81    |       |       |       |
| <b>Imports extra-EC</b> |       |       |       |       |        |       |       |       |       |
| Index                   | 473   | 581   | 537   | 612   | 653    | 689   | 660   | 714   | 683   |
|                         | 100   | 123   | 113   | 129   | 138    | 146   | 139   |       |       |
| <b>Exports extra-EC</b> |       |       |       |       |        |       |       |       |       |
| Index                   | 4 469 | 4 897 | 4 002 | 4 252 | 4 470  | 3 397 | 2 849 | 3 539 | 2 971 |
|                         | 100   | 109   | 89    | 95    | 100    | 76    | 64    |       |       |
| X/M                     | 9.5   | 8.4   | 7.5   | 6.9   | 6.8    | 4.9   | 4.3   | 5.0   | 4.3   |

1981-1987 (first columns): EC 10; 1986-1987 (second columns): EC 12.

Source: CDL.

**Table V**  
**Foreign Trade by Tube Category**

| (Million ECU and thousand tonnes)   |                 | 1981  | 1982  | 1983 | 1984 | 1985  | 1986 | 1987 | 1986 | 1987 |
|-------------------------------------|-----------------|-------|-------|------|------|-------|------|------|------|------|
| Import penetration rate             |                 |       |       |      |      |       |      |      |      |      |
| % of total quantities               |                 |       |       |      |      |       |      |      |      |      |
| All tubes                           |                 | 7.6   | 9.0   | 10.0 | 9.8  | 8.9   | 10.7 | 10.6 | 9.9  | 10.2 |
| Seamless                            |                 | 12.1  | 11.8  | 13.8 | 12.6 | 12.3  | 15.1 | 18.2 | 14.5 | 17.3 |
| Welded tubes                        | over D 406.4 mm | 2.8   | 2.5   | 12.7 | 12.1 | 3.2   | 18.2 | 4.6  | 17.8 | 4.6  |
| Welded tubes                        | uti D 406.4 mm  | 6.6   | 9.0   | 8.5  | 8.5  | 8.2   | 8.0  | 8.8  | 7.2  | 8.0  |
| Export rate - % of total quantities |                 |       |       |      |      |       |      |      |      |      |
| All tubes                           |                 | 46.2  | 46.0  | 49.1 | 48.9 | 46.9  | 45.0 | 41.0 | 43.6 | 39.5 |
| Seamless                            |                 | 60.5  | 58.4  | 61.3 | 60.6 | 55.9  | 56.0 | 58.2 | 56.1 | 57.9 |
| Welded tubes                        | over D 406.4 mm | 74.1  | 73.2  | 92.1 | 83.3 | 81.3  | 82.3 | 82.5 | 81.9 | 82.1 |
| Welded tubes                        | uti D 406.4 mm  | 20.9  | 19.8  | 16.7 | 21.3 | 18.1  | 15.1 | 13.2 | 14.7 | 12.6 |
| Import/export ratio in value        |                 |       |       |      |      |       |      |      |      |      |
| All tubes                           |                 | 9.5   | 8.4   | 7.5  | 6.9  | 6.9   | 4.9  | 4.3  | 5.0  | 4.4  |
| Seamless                            |                 | 9.2   | 9.3   | 7.5  | 7.4  | 6.8   | 4.8  | 4.6  | 4.8  | 4.7  |
| Welded tubes                        | over D 406.4 mm | 119.8 | 85.8  | 72.3 | 28.7 | 109.9 | 24.0 | 94.9 | 23.7 | 88.0 |
| Welded tubes                        | uti D 406.4 mm  | 4.0   | 2.8   | 2.4  | 2.8  | 2.5   | 1.9  | 1.6  | 2.0  | 1.7  |
| Import/export ratio in quantities   |                 |       |       |      |      |       |      |      |      |      |
| All tubes                           |                 | 10.4  | 8.6   | 8.7  | 8.8  | 9.0   | 6.8  | 5.8  | 7.1  | 6.0  |
| Seamless                            |                 | 11.1  | 10.5  | 9.9  | 10.8 | 9.0   | 7.1  | 6.3  | 7.5  | 6.6  |
| Welded tubes                        | over D 406.4 mm | 100.7 | 104.6 | 80.0 | 36.5 | 131.4 | 21.0 | 97.8 | 20.9 | 94.7 |
| Welded tubes                        | uti D 406.4 mm  | 3.8   | 2.5   | 2.2  | 2.9  | 2.5   | 2.0  | 1.6  | 2.2  | 1.7  |

1981-1987 (first columns): EC 10; 1986-1987 (second columns): EC 12.  
Source: CDL.

These imports come largely from EFTA countries and from Eastern Europe. Yugoslavia has also become an important supplier over the last two years.

The increase in imports is also due to the fact that NICs and DCs have expanded their means of production for welded tubes uti 406.4 mm and welded tubes of other sections, which require far lower levels of investment than seamless and welded tubes over 406.4 mm.

An examination of imports and exports and of the import/export ratio shows that the Community trade balance has deteriorated considerably.

#### All tubes

The tonnage index for imports from outside the Community rose from 100 in the reference year of 1981 to 131 in 1987 and the value index rose from 100 to 139 for the Community of 10. The tonnage index for exports to third countries fell from 100 to 73 and the value index from 100 to 64. The import-export ratio therefore declined steadily from 1981 to 1987, with the quantity ratio falling from 10.4 in 1981 to 5.9 in 1987 and the value ratio from 9.5 in 1981 to 4.3 in 1987.

#### Seamless tubes

The tonnage index for imports from outside the Community rose from 100 to 122 and the value index from 100 to 117. The

tonnage index for exports to third countries fell from 100 to 69 and the value index from 100 to 59. The import-export ratio therefore declined steadily from 1981 to 1987, with the quantity ratio falling from 11.1 in 1981 to 6.3 in 1987 and the value ratio from 9.2 in 1981 to 4.5 in 1987.

#### Welded tubes over 406.4 mm in diameter

The tonnage index for imports from outside the Community fell from 100 to 88 and the value index from 100 to 86. The tonnage index for exports to third countries fell from 100 to 86 and the value index fell from 100 to 68. Indices and the import-export ratio showed an irregular pattern over the period in terms of both quantity and value. The quantity ratio fell from 100.7 in 1981 to 97.8 in 1987, while the value ratio fell from 119.9 to 94.9 over the same period.

#### Welded tubes uti 406.4 mm in diameter and welded tubes of other sections

The tonnage index for imports from outside the Community rose from 100 to 139 and the value index from 100 to 172. The tonnage index for exports to third countries fell from 100 to 59 and the value index from 100 to 70. The import-export ratio therefore declined from 1981 to 1987. The quantity ratio fell from 3.8 in 1981 to 1.6 in 1987 and the value ratio dropped from 4.0 to 1.7 over the same period.

## Forecast and Outlook

The efforts made by each company to remedy the situation should lead to improved results by the end of 1988. However, for the next three years forecasts indicate that the best that can be hoped for is stabilization of consumption within the Community and improved competitiveness on foreign markets.

The recovery of the steel market - and the ensuing price increases - have had a positive effect on the steel tube industry. But it is still vulnerable to unfair pricing by third countries on the Community market and more effective means of

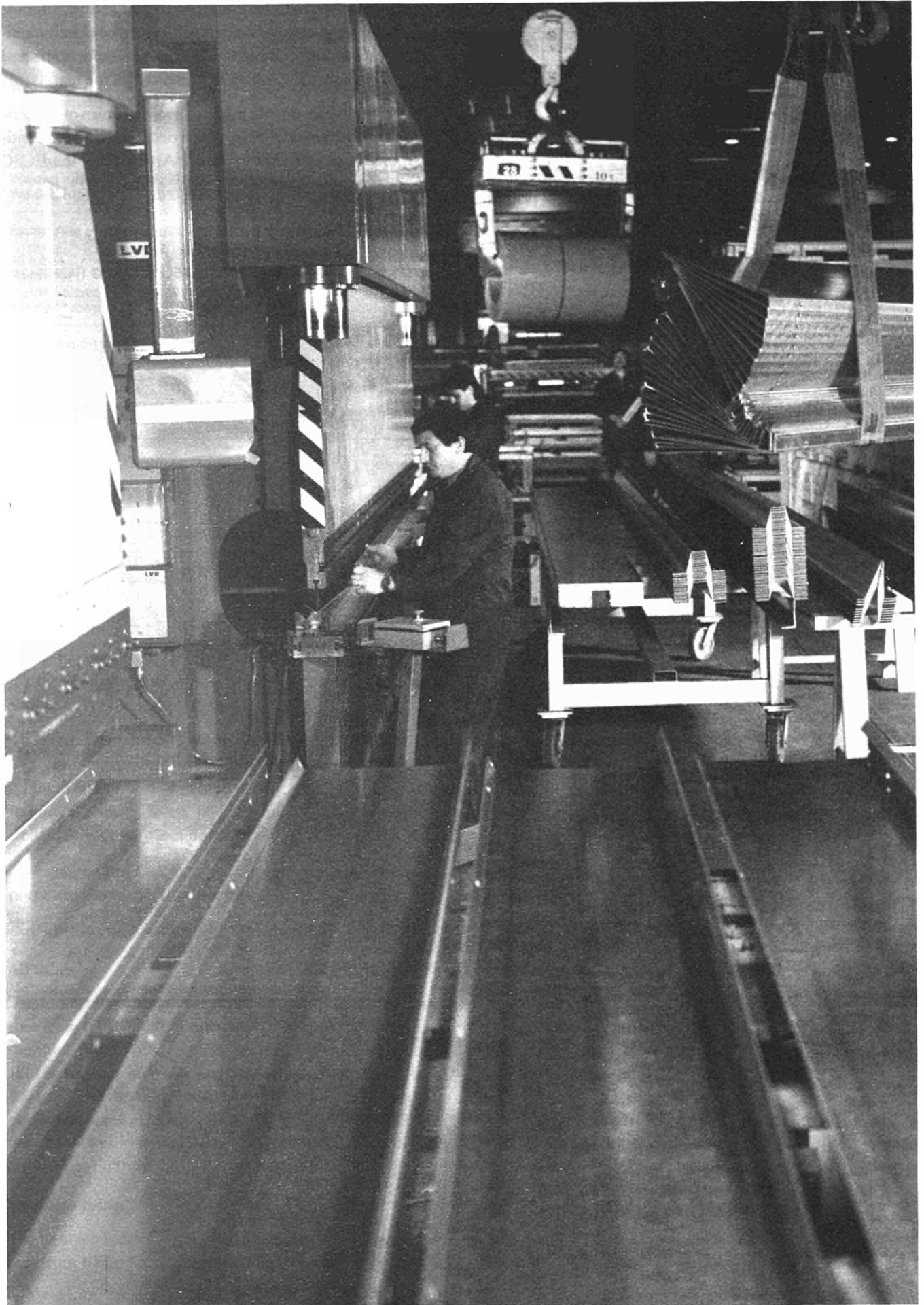
protection will have to be found. At the same time, support granted by member governments will have to be closely monitored to ensure fair competition between manufacturers and to avoid underpricing, which always disrupts the market.

Efforts will also have to be made to avoid a return of the serious price distortions in coils, which occurred when the anti-crisis measures provided for under Article 58 of the ECSC Treaty were implemented.

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# DRAWING, COLD ROLLING AND FOLDING OF STEEL

(NACE 223)

*The industry for the drawing, cold rolling and folding of steel forms part of the preliminary metal working sector. Production measured in current value ECU declined by 2.3% per year between 1980 and 1986. This unfavourable evolution was due to the erosion of foreign trade as well as to the poor orientation of internal demand, particularly in the construction industries, which are the leading clients in this sector representing approximately a third of the outlets.*

The following monograph concerns only part of the sector, the cold rolling of flat steel products. At this moment it is very difficult to give an idea of the European industry in figures.

On the one hand it is a young industry. Professional structures are not always present everywhere, and its constantly evolving products are not always included in national or international industrial statistics, or at least not in any specific or realistic form.

On the other hand cold rolling can exist in three types of industrial activity which rarely go together but which are often confused, particularly as it is not easy to identify the manufacturing process of certain products.

Steel sections are produced by rod drawing in a die or from flat products by press folding, or by gradual forming on a rolling machine. Only the latter technique will be considered here, as it represents the largest volume and greatest diversity of production.

It is difficult to define this industry precisely because of a couple of factors. Firstly, certain users sometimes carry out cold rolling themselves (manufacturers of door frames, casings, shutters, storage units and silos and steel fabricators)

but intervene on the market for part of their production. Secondly, certain rolling companies are moving more and more towards finished products which can be used directly.

## Current Situation

Cold rolling in Europe is carried out in factories which usually specialize in this activity, though they may also produce welded tubes, technically very similar and using the same type of raw materials.

The two main families of rolled steel products are generally separated:

- simple shape sections for various uses (L, C, U, omega, Z) or special, complex shape sections most often designed for a particular use or even for the needs of a single client. The width developed is generally slight compared to the length, which is only limited by conditioning and transport problems.
- corrugated sheets, profiled sheets, sandwich panels which are as wide as the sheet metal coil they come from; there is therefore a smaller width to length ratio. These products are always coated (galvanized or galvanized-lacquered).

## Consumption and Production Trends

Growth in the production of sections was rapid and sustained until the oil crises which marked the beginning of a severe general economic crisis. Since then the evolution of the two sectors previously mentioned has been different.

Sections for general and specialized use, which include thousands of references, are produced for a large number of user

**Main Indicators**  
**Drawing, Cold Rolling and Folding of Steel**

| (Million ECU)              | 1980  | 1981    | 1982    | 1983    | 1984    | 1985    | 1986    |
|----------------------------|-------|---------|---------|---------|---------|---------|---------|
| Apparent consumption       | 7 610 | 7 167   | 8 051   | 8 212   | 8 939   | 9 617   | 9 583   |
| Net export earnings        | + 970 | + 1 129 | - 1 005 | + 1 037 | + 1 339 | + 1 452 | + 1 118 |
| Total Community production | 8 580 | 8 296   | 9 056   | 9 249   | 10 278  | 11 069  | 10 701  |
| Employment (1 000)         | 134   | 123     | 118     | 109     | 102     | 98      | 93      |

EC 9 Excluding the Netherlands.

**Table I**  
**Foreign Trade in Sections**

| (Million tonnes) | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 |
|------------------|------|------|------|------|------|------|------|
| Extra-EC imports | 60   | 60   | 63   | 49   | 59   | 62   | 81   |
| Extra-EC exports | 69   | 64   | 54   | 46   | 49   | 46   | 46   |

EC 12 1986; EC 10 Excluding Spain and Portugal for 1981-1985; 1980 EC 9 Excluding Greece, Spain and Portugal.

Source: Eurostat (posts 73.11.31; 73.11.39; 73.11.43; 73.11.49).

sectors, many of which (construction industries, the transport equipment industry, the manufacture of durable goods) have been hit by the recession. These are products which are extensively traded within the Community. At the same time, imports from third countries have been increasing as this enabled third countries to compensate for anti-crisis measures taken to protect the steel market. Owing to this decline in demand and to the increase in competition, including that from certain aluminium and plastic products, production decreased and some companies ceased operation while others sought salvation through concentration or integration. Such movements have diminished and this adaptation phase may be considered to be largely carried out, if not entirely over.

The production of wide sections mainly for casing buildings (flooring, cladding, roofing) has hardly been affected by the crisis in the construction industry because the rapid evolution of these products, culminating in the sandwich panel, has given them a dominant position over more traditional materials. As these products are also often produced to specifications (particularly concerning dimensions, colour and fittings), they are less open to international trade and consequently their market is partially protected. Europe also has an undeniable technological lead in this field. Production of all these products has expanded and will continue to expand at a satisfactory rate, with the exception of corrugated sheets, where it has declined considerably.

### *The Position of the Firms*

The firms which are increasingly supplying products perfectly adapted to the needs of their users obviously have to integrate the requirements of these clients at the production level.

Such an evolution, which requires heavy investment, cannot take place without volume. It follows that the industry cannot

accept abandoning a part of the market to imports from countries where different economic conditions prevail. It has therefore successfully launched several suits against unfair pricing and is closely watching the market situation. The figures in Table I are given as an example; they cover only a part of the different categories of sections. They do show, however, that imports from third countries have increased by almost 20% between the years 1980-1981 and 1985-1986; this figure is even higher if the trade between East and West Germany is taken into consideration. At the same time imports within the Community have declined by almost 4% despite its enlargement.

Further difficulties for the industry have been caused by periodic disturbances in the market for iron and steel products and by fluctuations in the price of certain imported raw materials. There are from time to time considerable irregularities in conditions for the supply of raw materials, including downgrading certain qualities.

### **Forecast and Outlook**

Cold rolled sections are among the preliminary metal working products which are most affected by measures taken to organize and improve the steel market. It is thus particularly difficult to forecast evolutions in view of the uncertainty reigning over the whole of the iron and steel and steel working sectors.

However, there is hope that past efforts made by the industry to improve its competitiveness and to develop new products (as in the case of wide sections for the construction industry) will enable EC production to be maintained.

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## CLAY PRODUCTS

(NACE 241)

*The age-old industry of making bricks and tiles is found in all the EC countries, with numerous variations in size and techniques related to local circumstances. Production has been through a serious crises, with bricks being particularly affected by the decline in new construction. Tiles, which are frequently used in renovation operations, were less severely affected. The trends of the last two years, however, have been more positive.*

*The sector's future remains dependent upon new construction and especially on that of individual houses. The moves towards mergers and concentration in the industry will also continue, though at a more moderate pace than in the course of the last decade.*

Fired clay was already in use in the New Stone Age and was widely used as a building material in most ancient cultures. Bricks and tiles were introduced into Western Europe by the Romans. During the Dark Ages, these materials were used only sporadically, but were re-introduced during the twelfth century. Since that time, the brick and tile industry has become traditional.

Throughout their long history and with local developments, bricks and roofing tiles have formed part of the historic and cultural heritage of each country. This has consequences for national building standards and regulations, which are based upon such factors as local sizes and local methods of construction. In larger European countries such as France and Germany there are even considerable inter-regional differences. Thus, a facing brick from Northern France would

have completely different dimensions to one from the South of France. To quote another example, cavity walls and facing bricks are generally used in building in Northern Germany while in the South of the Germany facing bricks are practically unknown.

In general, two major product categories can be distinguished:

### Brick

Brick is a masonry building component made from a pre-formed clay mass fired in a kiln. The classification of different styles of bricks is effected on the basis of national standards, but the following classification is applicable for all European categories:

- solid brick is brick without perforations, or of which the number of perforations does not exceed a certain fixed percentage (15% to 25% according to the country);
- perforated brick has a large number of perforations, which are mostly vertical;
- hollow brick has large perforations (usually more than 50% of the gross volume), which are mostly horizontal.

The use of brick varies from country to country. Mainly solid brick is used in the Netherlands, the UK and Ireland; in Belgium and Denmark solid and perforated bricks are used whereas in France, Italy, Spain, Portugal and Greece mainly hollow and solid bricks are used.

In Northern Europe (the UK, Ireland, Denmark, the Netherlands, Belgium and Northern Germany), facing bricks are used in cavity walls, consisting of an outer leaf (facing bricks)

### Main Indicators Clay Products

| (Million ECU)      | 1980    | 1981    | 1982    | 1983    | 1984    | 1985    | 1986    |
|--------------------|---------|---------|---------|---------|---------|---------|---------|
| Production         | 4 074.4 | 4 012.2 | 3 890.3 | 4 101.6 | 4 389.1 | 4 547.3 | 4 275.3 |
| Index              | 100.0   | 98.5    | 95.5    | 100.7   | 107.7   | 111.6   | 104.9   |
| Employment (1 000) | 134.9   | 124.2   | 115.1   | 109.2   | 102.8   | 89.8    | 85.0    |

Production figures exclude Spain; the Netherlands and Greece are excluded in 1986; Ireland is not included in employment figures in 1981, 1983 and 1985; Greece is not included in employment figures in 1986.

and an inner leaf that can be of solid or perforated brick or of other materials. In Southern Europe, most buildings have plain walls in perforated or hollow brick. These walls are rendered. In some regions of Southern Europe, the tradition is to clad parts of the facade with facing brick instead (e.g. Toulouse, Barcelona, Venice).

### Clay roofing tiles

Clay roofing tiles have a special shape that makes them suitable as roofing material. The production process is essentially the same as for brick: clay is kneaded to the desired shape and the tile is then fired in the kiln. Roofing tiles vary from manufacturer to manufacturer and consequently are not interchangeable. They can be roughly divided into the Mediterranean type (for roofs with a slight slope) and the Northern European type (for roofs with a strong slope).

## Current Situation

The brick and roofing tile industry finds its main outlets in the construction of houses and buildings up to six storeys high. Less important, but still worthy of note, are small civil engineering works (engineering bricks) and paving. The roofing tile industry, especially, still finds part of its outlets from the maintenance, repair and transformation of existing buildings.

In most countries, there is a striking parallel between house construction and the sale of brick, although the correlation is not complete. When there is a sudden upswing in building activities, the building techniques applied are rather special and involve less brick. When a sudden slump hits building activities, sales of brick fall off less sharply because, by and large, these special building techniques are the first to suffer.

In most European countries, house construction after the Second World War experienced a prolonged period of intense activity, followed by a rather deep trough afterwards. This crisis did not affect all the countries at the same time, but took place between about 1980 and 1985. There has been a recovery over the last few years, especially in the single-family housing sector, but the brick sector is still a long way from returning to pre-crisis levels. Things were different in the roofing tiles sector. Sales of roofing tiles are dependent upon the popularity of the pitched roof and the popularity of the concrete roofing tile. After the Second World War, the clay roofing tile lost ground everywhere but over the last 15 years there has been a steady revival.

However, the available statistical material is difficult to interpret. With respect to brick, many national statistics convert production into one or another standard size brick, and production figures are given "per thousand". This unit is useful only insofar as one is familiar with the standard size on which the figures have been based because this is different in each country. Other countries use the cubic metre and others

again express production in tonnes. Considering that the weight of one cubic metre of brick can be anything between 600 kg and 2 200 kg, statistics given in tonnes are not comparable to statistics expressed in cubic metres.

Analogous statistics exist for roofing tiles, in "per thousand", "square metres" and "tonnes".

The value of one cubic metre of brick can vary from 50 ECU to 300 ECU, according to type.

## Production Trends

Table I shows the evolution of brick and tile production in the units mentioned above. In the early 1980s the production of tiles and bricks went through a crisis. This crisis struck all the countries after 1980, the lowest point being situated somewhere between 1982 and 1985. In no one country have 1980 levels been re-attained. The cause of the crisis may be found in the slack period of house-building activity, due, in turn, to the high interest rates on mortgage loans, the national budget deficit (cutbacks in the construction of public housing), rising unemployment in Europe and job insecurity. The upshot of the crisis was that the total capacity of brick production fell and investment for certain years was quite low.

In the same period, 1980-1985, there was a reasonable and even growing activity in the roofing tiles sector, but also - and chiefly - in the renovation of existing buildings. Whereas in the 1960s and 1970s the emphasis was on new construction, since 1980 more emphasis has been given to renovation of the existing heritage. In the case of traditionally-built houses, the masonry is still usable for the most part but the roofs have to be renewed.

## Export Trends

International brick trading between the Member States of the EC is not very highly developed because the material is rather heavy, making long distance haulage unprofitable and because national standards and regulations give rise to great difficulties where export is concerned. In view of the fact that these national regulations originate from local building traditions, the prospects of removing these barriers to trade by means of international harmonization are rather bleak.

Only certain small countries (especially the Netherlands and Belgium) have brick exports worth mentioning. In the Netherlands, exports represent up to 20% of the national production; in Belgium, up to 10%.

Exports outside the EC are virtually non-existent. The small contingency exports to remote countries that appear now and again in customs statistics almost invariably concern a single building; for example, the embassy of the exporting country, the church of a religious community or the premises of a foreign subsidiary of a big business concern.

**Table I**  
**Brick Production**

|                       | 1980 | 1981 | 1982   | 1983   | 1984   | 1985   | 1986   |
|-----------------------|------|------|--------|--------|--------|--------|--------|
| 1000 pieces (1)       | *    | *    | 3 517  | 3 806  | 4 012  | 4 100  | 3 971  |
| Index                 |      |      | 100    | 108.2  | 114.1  | 116.6  | 112.9  |
| 1000 cubic metres (2) | *    | *    | 24 922 | 23 829 | 24 043 | 21 753 | 21 950 |
| Index                 |      |      | 100    | 95.6   | 96.5   | 87.3   | 88.1   |
| 1000 tonnes (3)       | *    | *    | 20 306 | 18 732 | 17 654 | 16 031 | 16 525 |
| Index                 |      |      | 100    | 92.2   | 86.9   | 78.9   | 81.4   |

**Tile Production**

|                        | 1980    | 1981    | 1982    | 1983    | 1984    | 1985    | 1986    |
|------------------------|---------|---------|---------|---------|---------|---------|---------|
| 1000 pieces (4)        | 433 738 | 427 946 | 451 520 | 468 686 | 483 988 | 452 056 | 445 693 |
| Index                  | 100     | 98.7    | 104.1   | 108.1   | 111.6   | 104.2   | 102.8   |
| 1000 square metres (5) | 27 998  | 28 035  | 27 632  | 29 706  | 35 051  | 28 444  | 27 200  |
| Index                  | 100     | 100.1   | 98.7    | 106.1   | 125.2   | 101.6   | 97.1    |
| 1000 tonnes (3)        | 3 158   | 2 757   | 2 734   | 2 739   | 2 720   | 2 671   | 2 725   |
| Index                  | 100     | 87.3    | 86.6    | 86.7    | 86.1    | 84.6    | 86.3    |

It is not possible to include the brick production of different countries for 1980 and 1981 due to the fact that some of them changed their units of measurement after 1982.

EC 11 (excluding Greece for brick production). EC 8 for tiles; there is no production of tiles in Belgium, Greece, Luxemburg and Ireland.

(1) UK.

(2) Germany, Italy, Belgium, the Netherlands, Ireland and Denmark.

(3) France, Spain and Portugal.

(4) Germany, the Netherlands and Denmark.

(5) Italy and the UK.

Source: TBE.

For roofing tiles, the cost price/weight ratio is much more favourable and there is an important intra-Community trade in roofing tiles, and even some small-scale export of them to countries outside the EC. However, this export trade is very small in relation to the European market.

Imports from outside the EC are rare. The international trade in roofing tiles is hindered greatly by the difficulties surrounding the organization of product liability.

### *Employment Trends*

The number of jobs has continued to decline from year to year due to the closing of numerous old-fashioned factories which employed a greater number of manual labourers and the modernization of the remaining factories so that only a few workers are necessary for production.

In the wake of progressive mechanization, productivity in the brick and tile industry continues to expand. This can be shown by the evolution of the mean production per worker in the Belgian brick industry, expressed in cubic metres per man year:

1950: 150 cubic metres

1960: 196 cubic metres

1970: 390 cubic metres

1980: 685 cubic metres

1987: 814 cubic metres.

### *Factors behind Production Trends*

The situation varies greatly between the countries in the South and the North of Europe. In Southern Europe especially, factories tend to be rather old and, technologically, not very sophisticated. In Northern Europe, businesses are mostly modern and manning levels rather low. In the older factories the main cost factor is wages; in modern businesses it is energy and depreciation. The energy content of brick is relatively low (approximately 25% of the total cost price), yet since energy is the only raw material that the brick manufacturer has to buy (he digs the clay himself, and clay is cheap), the brick industry has always been very sensitive to any fluctuations in energy costs. Many brickyards regularly change their fuel (coal, fuel oil, natural gas, LPG) according to the price at a particular moment. On the other hand, the customer is very conservative, and it is quite difficult to get the customer to accept slight changes (for example, the tint of the brick) caused by modifications in the production process.

Most brickyards sell their products within a maximum radius of 70 km from where the factory is located. Since earliest times, a good site from the point of view of transport has always made for good sales. For historical and geological reasons brickyards tend to be situated along navigable rivers and canals. However, the transportation of brick by boat has now become rare.

**Table II**  
**Number of Enterprises**

|                | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  |
|----------------|-------|-------|-------|-------|-------|-------|-------|
| Belgium        | 99    | 82    | 72    | 64    | 58    | 57    | 56    |
| Denmark        | 68    | 58    | 51    | 45    | 45    | 46    | 42    |
| Germany        | 395   | 390   | 370   | 350   | 325   | 305   | 290   |
| Spain          | 1 000 | 800   | 750   | 700   | 650   | 600   | 650   |
| France         | 234   | 208   | 270   | 260   | 244   | 213   | 197   |
| Italy          | 680   | 650   | 615   | 590   | 513   | 440   | 397   |
| Netherlands    | 106   | 105   | 97    | 94    | 86    | 62    | 66    |
| Portugal       | 321   | 333   | 330   | 328   | 296   | 283   | 233   |
| United Kingdom | 220   | 215   | 210   | 200   | 200   | 200   | 180   |
| Total          | 3 126 | 2 844 | 2 768 | 2 634 | 2 420 | 2 209 | 2 114 |

Source: TBE.

### *The Position of the Firms*

The typical European brickyard is a family business with 10 to 50 employees, according to the level of technology. In most countries, there are concentrations made up of businesses owning a number of brickyards. In certain countries, the brick industry is in the hands of public companies but, at the European level, this situation is now, as formerly, the exception rather than the rule.

Modernization of the businesses has given rise to continuous concentration and, in all countries, the number of brickyards has taken a sharp downturn. (In Belgium, there were about 800 in 1950, against some 50 or so in 1988). Older factories were mostly seasonal businesses and during the winter the workers were unemployed. Even in countries where the brick industry is highly automated (mainly Northern Europe), one still comes across certain older, more traditional brickyards that have survived by specializing in hand-crafted products, sometimes with no small degree of financial success.

Table II shows the evolution in the number of enterprises by country; this number diminished by 33% between 1980 and 1986.

### **Forecast and Outlook**

The European brick and tile industry works on the assumptions that housing construction activity for the coming decade will remain fairly slack and that the building sector, over the next 10 years, will not reach the high levels of the 1960s and the 1970s. Expectations are thus for a lower volume. The possibility of exporting outside the EC is not seriously under consideration and it is equally unlikely that cheap imports will flood the EC.

The sector is thus attempting to keep its turnover up to present levels by offering high-quality products, such as hand-made facing bricks, insulating bricks and glazed bricks. Furthermore, everything possible is being done to increase productivity, with an eye to improving the chances of survival in a leaner market. The organization of the internal market in the EC could bring about far-reaching changes in the situation of businesses located close to national frontiers. It may be assumed that the tendency towards concentration and increased scale that began 30 years ago will continue.

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# PRECAST CONCRETE

(NACE 243.2)

*The Community precast concrete industry has reached a significant size although it is still difficult to provide precise figures; for 1987, turnover in this industry approached 10 billion ECU.*

*In relation to traditional building activities, the size of precast concrete activity in the Community varies from one country to another. This proportion is greater in the northern countries of the EC (especially Germany, Denmark, and the United Kingdom) than in the Mediterranean countries (Portugal, Spain and Italy).*

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The precast concrete industry is defined as follows: "The subgroup includes units exclusively or primarily engaged in the manufacture of concrete goods for construction purposes - including road building materials - such as pipes and similar products from light concrete...or from heavy concrete, even if reinforced or pre-stressed".

In practical terms, the precast concrete industry is the collective noun given to all enterprises that, independently of weather conditions, manufacture precast concrete products at specially-equipped plants which have a permanent location. The products are delivered to the construction sector ready to be put in place. Precast concrete embraces a wide range of products:

- precast concrete products for road construction such as paving flags, stones and blocks, kerbs, safety and sound barriers, sewage and drainage pipes and accessories;
- precast concrete products for building construction such as masonry stones and blocks, cladding in decorative concrete, floor elements, structural elements such as beams and columns for industrial, commercial and agricultural buildings;
- precast concrete products for civil engineering works such as bridge girders, tunnel elements;
- precast concrete products for various other purposes such as flood protection, landscaping, lighting poles, agricultural installations.

## Current Situation

Since the beginning of the twentieth century there has been some form of precasting. However, it remained essentially a

handicraft trade that merely engaged in the manufacture of non-reinforced concrete which gradually began replacing natural stone, timber and cast iron in many applications. It was only in the post-war period that a real breakthrough came for the industry. Indeed, high demand in the aftermath of the Second World War required an industrial approach to building activities. Consequently, the precast concrete industry grew into a highly mechanized industry.

The rapid technological development of reinforced and pre-stressed concrete led to the breakthrough of various plant-manufactured structural elements for building construction and civil engineering works.

Lightweight concrete was first applied in the precast concrete industry for the manufacture of masonry units, wall and floor elements. The specific and scientific approach of concrete technology helped guarantee a high and consistent quality of precast concrete products.

The construction boom in the 1960s and early 1970s as well as the increase in building costs over the same period led to a further industrialization of the precast concrete industry. Profits were re-invested in modern manufacturing methods and plant such as semi- and fully-automated batching and manufacturing equipment. Handling, packaging and transporting techniques were equally revolutionized.

Over the years the precast concrete industry has learned to adapt to the rapidly growing and changing demands of the construction sector and has thus acquired a place of its own as a supplier industry to the construction sector.

## Consumption Trends

Generally, precast concrete products are heavy and bulky in relation to value. The average value of one metric tonne of precast concrete products is approximately 90 ECU (but for some standardized un-reinforced products manufactured on a large scale this value could be as low as 35 ECU). Consequently, long distance transportation of precast concrete products is unusual. A typical exception is technologically more highly advanced precast concrete products such as the sophisticated cladding frame elements in architectural concrete that have been shipped from Western Europe to Middle-eastern countries. Hence, intra- and extra-Community trade is mostly limited to one border crossing, i.e. between Belgium and the Netherlands or Austria and Germany.

**Table I**  
**Precast Concrete - 1987**

|                | Turnover<br>(Million ECU)<br>Current<br>value | Turnover<br>(Million ECU)<br>Constant<br>value | Total<br>production<br>(1000 tonnes) | Employment | Total number<br>of precast<br>concrete<br>plants | Number of<br>precast<br>concrete<br>plants with<br>50+ employees |
|----------------|---|--|--------------------------------------|------------|--|--|
| Belgium        | 395   | 289  | 4 900                                | 5 900      | 370  | 44   |
| Denmark        | 392   | 245  | 3 600                                | 4 800      | 160  | 50   |
| Germany (1)    | 2 400   | 1 607  | 33 500                               | 34 000     | 1 600  | 1 100  |
| Greece         | N/A   | N/A  | N/A                                  | N/A        | 20   | N/A  |
| France (2)     | 1 370   | 962  | 29 000                               | 23 500     | 1 350  | N/A  |
| Netherlands    | 804   | 480  | N/A                                  | 9 000      | 190  | 65   |
| Portugal       | N/A   | N/A  | N/A                                  | N/A        | N/A  | N/A  |
| United Kingdom | 1 786   | 2 400  | N/A                                  | 17 000     | 300  | N/A  |

(1) Plants with 20+ employees.

(2) Turnover, production, employment estimated.

Source: BIBM.

Only the industrialized countries in Western Europe, Australia, some Asian countries (Japan, South Korea, Singapore, etc.) and North America have a highly industrialized precast concrete production. Here again, there are, of course, exceptions. These range from the manufacture of rudimentary masonry units on second and third-hand equipment in some developing countries to the large-scale industrialized production of modern products such as precast concrete pipes with rubber joint rings in India (a result of public health policy and rigid requirements of credit institutions such as the World Bank).

For the industrialized countries, the activity of the precast concrete industry largely depends on the overall economic climate and on activity in the construction sector in particular (99% of precast concrete production is taken up by the construction sector).

There can be trend differences, within construction sectors, for instance, high activity in residential building and a slump in non-residential building. In the road construction sector (roughly 30% of precast concrete production) activity always depends on the policy of the public authorities concerned.

The percentage of the precast concrete industry in the total national cement consumption is considered an important gauge of the level of advancement of the precast concrete industry in the various countries. The following table gives an overview of these percentages in the countries of the European Community.

In the precast concrete industry, this figure is called the "penetration coefficient" since it gives a clear (although mathematically disputable) indication of the part of the traditional building activity executed on the building site that was moved to the precast concrete plant.

**Table II**  
**Percentage of Cement Consumption by Country**

|                | 1986 (%) |
|----------------|----------|
| Belgium        | 24.0     |
| Denmark        | 45.0     |
| Germany        | 26.0     |
| Spain          | 11.0     |
| France         | 17.0     |
| Ireland        | 27.0     |
| Italy          | 13.3     |
| Luxembourg     | 12.0     |
| Netherlands    | 24.0     |
| Portugal       | 10.5     |
| United Kingdom | 27.3     |

Source: BIBM

### *Employment*

Even though there is no complete information on employment in the precast concrete industry at the moment, a reasonable estimate is nearly 150 000 persons in the European Community; 95 000 employees are accounted for in the partial figures available (for Belgium, Denmark, France, Germany, the Netherlands and the United Kingdom).

### *Major Structural and Geographical Features*

The description of the state of the precast concrete industry sums up the various objective factors that have played and/or still play an influential role in the development and evolution of the precast concrete industry in the countries of the European Community. Although described separately, to a large extent these factors have an interrelated impact on the situation in the industry.

One of the most clear-cut factors that influenced the rapid growth of the precast concrete industry in the last decades in Western Europe was the need for rebuilding of the

destruction that occurred during the Second World War and the resulting local demands for building activities. In order to be able to respond in an efficient way to demand, a rationalization of the building process was required, which led to industrialization. The most evident industrialization was the precasting of concrete. As a consequence, the precast concrete industry of the Federal Republic of Germany emerged over the years as a high profile industry. In recent years this trend has somewhat come to an end; nevertheless, the industry remains strong.

At the same time (with the mechanical know-how of the Germans) the Federal Republic of Germany also leads in manufacturing methods and plant for the precast concrete industry (they probably hold about half of the market in the Community). The relatively important and advanced precast concrete industry in the Netherlands and Belgium and, to some extent, in France, can be similarly explained. In some countries this factor accounted for a higher concentration of the precast concrete industry in certain regions (e.g. the southwest of the UK).

Industrial development as a whole stimulated demand for precast concrete products. Industrialization creates needs for construction materials. Moreover, the general level of industrial development has a carry-along effect: the precast concrete industry is more or less forced (under the influence of labour costs) to keep up with general industrial development.

Geographical factors have also played an influential role in the precast concrete industry. The more densely populated a region, the more important and developed the precast concrete industry tends to be. Indeed, these regions have a higher demand for building, water and road construction and since precast concrete products are heavy, entailing higher transportation costs, production takes place near the centre of demand. An example is the triangle made up of Belgium, the Netherlands and Germany (dense population = extensive and developed precast concrete industry) compared with regions such as central France and Spain (scarcer population = less developed precast concrete industry).

Another very important factor is the climatic conditions of a country. As a general rule, it can be said that the further north a country is situated, the more developed its precast concrete industry. Traditional building activity in more northern countries often has to be suspended during winter due to bad weather conditions (frost, etc.), while with precast concrete products, building activity can go on uninterrupted. In some cases, cold weather is even preferable (no mud on building sites).

This explains the relatively high share of the precast concrete industry in Nordic countries in the total national cement consumption (see Table II). This certainly holds true for Denmark but also for non-EC Nordic countries.

In terms of the technical possibilities in the precast concrete industry there has always been an interaction between demand and what could technically be achieved and vice versa. This factor is very much intermingled with other factors described. The following examples are illustrative. The technical realization of new types of beams or girders with, for instance, larger spans would automatically create a (higher) demand for these structural elements. Engineers become aware of the innovation and subsequently prescribe bridge girders that can span a six to eight-lane highway even if the bridge under construction was only planned for a four-lane highway. Thus in the case of possible future extension of the bridge, relatively easy and quick extension works would suffice and demolition (and hence, additional costs) would be avoided.

The same occurs in the building sector where architects can use the large-span beams to keep the number of columns in an industrial building to a minimum. The energy crisis has made people more conscious of the advantages of thermal insulation and in the precast concrete industry this has led to the development of products with a high thermal insulation value. However, in modern building the advantages of the thermal inertia of solid concrete, if properly used, have often been neglected. In terms of aesthetic requirements, the following developments have occurred. In the post-war period the main concern was to quickly rebuild the war destruction, while aesthetic considerations mattered less, if at all. However, with growing environmental consciousness came a greater concern for aesthetics. The precast concrete industry followed the lead and developed solutions that helped realize aesthetically extraordinary creations, while still meeting current technological requirements. In this context, the plastic properties and easy colouring of concrete were important, for example; this spurred the creation and use of specific precast concrete products for urban landscaping.

Tradition is another factor that has influenced the degree of development and strength of the concrete pavers industry in the various countries. Again this phenomenon can be best explained by some examples. In a country or region with a tradition of building with natural stone but where this raw material source has become scarce, expensive or too labour-intensive, it is easier for a precast concrete masonry unit to enter the market. On the other hand, it would be more difficult for precast concrete masonry units to gain ground on the clay brick industry in a region with a clay brick tradition and with no major price difference between the two competing products. In the same way, facing masonry units have a hard time breaking through in countries or regions with an exterior plastering tradition.

A further example of this is the interesting evolution in the Netherlands. There, a boom began for concrete pavers as a result of the traditional clay pavers becoming too expensive.

This secured the Dutch concrete paving industry a strong position which allowed large-scale production at a favourable cost, and the transportation beyond national borders became possible. In contrast, the British precast concrete flooring industry has great difficulty in breaking into the traditional timber floor market for low-rise housing, in spite of the obvious advantage of precast concrete floor elements over timber.

Productivity and labour have a strong interrelationship with general economic and industrial development: a rising level of industrial development entails higher wages, which in their turn force the precast concrete industry to rationalize and to undergo further technical developments so as to maximize productivity and keep the share of labour cost in the unit cost as low as possible. On the other hand, the energy crises that brought about a general economic crisis caused an approximately 30% to 40% drop in precast concrete production in the Community with an almost equal fall in employment figures in the sector.

With the economic revival in recent years, production increased again by about 10%-20%. Growth in employment did not follow, for the reason that the industry at first used means other than engaging additional labour to increase productivity in order to satisfy increased demand. However, this situation could not continue indefinitely; thus in certain economically strong countries, where there is a considerable demand for industrial buildings, employment is growing.

Over the short term, exchange rate fluctuations influence the competitive position between neighbouring countries. However, the impact of this factor diminishes relatively quickly since the industry works to counter this effect through extra productivity efforts (mechanization was one of the results of such efforts).

The concrete pavers industry is a typical small-business industry with considerable family ownership of firms. Nevertheless, large precast concrete businesses do exist. Either they were initially small businesses that were later bought up by a major industrial group, often a large building company (in spite of legal mergers, small production units as such mostly remained) or they were founded by a large industrial group such as a cement-making company.

With some exceptions the big businesses managed less well in surviving the economic crises of the late 1970s and early 1980s. The notion of a small business is, however, relative in this context and has to be considered in relation to the type of product manufactured by a given business. Two practical examples are illustrative.

In order to be able to rationally produce standardized products on a large scale (e.g. masonry units or precast concrete paving blocks), a business would need no more than 4 or 5 workers, but an initial capital investment of 2.5 to 3 million

ECU for, amongst other things, the automated production unit. For a business of larger, technologically more "sophisticated" components, and requiring a greater outlet (the market may be much larger) a starting capital of some 10 million ECU would suffice, but a work-force of 250 to 300 would be needed.

Nonetheless, the following characteristics of the precast concrete industry can be highlighted:

- relatively low value-added content of the products;
- marginal profitability in precast concrete products with a rather low intrinsic value and a small profit margin per unit;
- heavy internal competition under strong influence from the structure of the businesses and fluctuations in demand;
- strong dependence upon the efficiency of the business, that is, the degree of mechanization of the production unit on the one hand, and the managerial skills of the business managers on the other.

This latter point is confirmed by the finding that many of the businesses in the Community that did not survive the economic crisis lagged behind in equipment or management (or both).

## Forecast and Outlook

Detailed and complete forecasts for the countries in the Community are unavailable. However, the following can be concluded from the available information: after several difficult years most countries have seen some growth in the last two or three years and expect this upward trend to continue. However, much depends on the general economic climate. Apart from the differences between the various countries, there will also be differences between the various branches of the sector. In road construction, street products and accessories, activity almost exclusively depends on public authority policies. Most countries foresee a further fall or, at best, a stabilization. This takes into consideration the fact that highway construction has reached a level of saturation (for budgetary reasons, maintenance has also been neglected by public works authorities) and that, in spite of growing environmental consciousness, to date little has been done to improve water purification and sewage installations (this influences the situation and outlook for precast concrete pipes).

On the other hand, the sub-sector of landscaping products is in good shape and the boom is expected to continue. This is probably due to the previously cited growing environmental consciousness. Precast concrete solutions (concrete block paving, urban equipment) are widely used in urban landscaping projects.

Non-residential building is currently experiencing a relative boom after the years of the economic crisis when industry and businesses put off investments in equipment and buildings. How long this will continue will depend on the general economic climate and the way the industry reacts to possible future changes.

The outlook for residential building differs from country to country but, nevertheless, the following factors are important:

- a falling demand for residential buildings in some countries;
- the tradition in some regions of building one's own dwelling (a trend varying between 30% to 60%);

- both the influence of mortgage rates and real interest rates.

In water works and civil engineering works activity is largely dependent upon the means of the public authorities concerned, which differ from country to country. Budget restrictions have pushed down activity to an unsatisfactory level in most countries.

In the labour market, unit wage costs are likely to rise as a result of reduced working hours. Furthermore, precasters foresee a short-term shortage of skilled labour and, consequently, are planning investment in training programmes.

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# READY-MIXED CONCRETE

(NACE 243.6)

*The Community ready-mixed concrete industry picked up slightly after a difficult period in the early 1980s. The encouraging outlook for the industry's markets in construction and housing presages slight growth over the medium term.*

The ready-mixed concrete industry covers the off-site manufacture of concrete and its transport to the place where it is poured.

## Current Situation

The ready-mixed concrete industry is a relatively new industry which has contributed substantially to the modernization and efficiency of the building construction industry in each country. Although the use of concrete goes back to Roman times, the use of ready-mixed concrete from an exclusively designed plant probably started at the beginning of the century with Germany leading production in 1903 followed by the USA in 1913. More widespread use of the product developed when the UK and France established the industries in the early 1930s.

Today, there are few countries in the world which do not have a ready-mixed concrete industry. Over the life of ERMCO (21 years), its various members have concerned themselves with improving the quality of their product, ensuring that the concrete was designed for the purpose specified and have sought means of improving the marketing of the product against its main competitors of wood, bricks and steel. The target date of 1992 for completion of the European common

market standards and the removal of the technical barriers to trade has resulted in increased activity in the drafting of EC Directives, covering construction products, certification and testing and of Eurocodes and CEN standards for concrete. These documents place a great emphasis on quality and should enable the standards already achieved by the European ready-mixed concrete industry to be fully recognized.

In 1986, EC members of ERMCO produced some 180 million cubic metres of ready-mixed concrete, an increase of some 7% over the previous year. This is equivalent to over half a cubic metre per head of population.

Ready-mixed concrete cannot be transported more than a few dozen kilometres. Its manufacture is therefore by definition a local industry with no intra- or extra-EC trade.

## Environment

Environmental protection questions continue to play an outstanding role in the European Community, particularly in connection with air pollution control. In Germany, the law against emission has been extended to cover stationary concrete plants. Following a submission by the German Association, installations making concrete and having the same location for more than six months, and with a capacity of greater than 10 m<sup>3</sup>/hour, may be considered as ready-mixed concrete plants for the purposes of the anti-emission law regulations.

This should ensure more fair competition between ready-mixed and site-mixed concrete.

Table I  
Production Trends by Country

| (Million ECU)  | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986  | 1987  |
|----------------|------|------|------|------|------|------|-------|-------|
| Belgium        | N/A  | N/A  | N/A  | N/A  | N/A  | N/A  | 0.13  | 0.15  |
| Germany        | 1.64 | 1.60 | 1.57 | 1.71 | 1.62 | 1.46 | 1.60  | 1.62  |
| Greece         | 0.41 | 0.39 | 0.35 | 0.82 | N/A  | N/A  | 1.55  | 1.60  |
| Spain          | 0.13 | 0.16 | 0.18 | 0.18 | 0.16 | N/A  | 0.26  | 0.27  |
| France         | 0.82 | 0.78 | 0.86 | 0.88 | 0.87 | 0.94 | 1.12  | 1.29  |
| Ireland        | N/A  | N/A  | N/A  | 0.11 | 0.10 | 0.12 | 0.12  | 0.12  |
| Italy          | 1.91 | 3.06 | 3.17 | 3.17 | 4.20 | 4.97 | 4.97  | 5.21  |
| Netherlands    | 1.39 | 1.46 | 1.51 | 1.51 | N/A  | N/A  | N/A   | N/A   |
| United Kingdom | 0.75 | 0.67 | 0.74 | 0.86 | 0.91 | 0.96 | 0.88  | 0.96  |
| Total EC 9     | 7.05 | 8.12 | 8.38 | 9.24 | 7.86 | 8.45 | 10.63 | 11.22 |

Source: ERMCO.

**Table II**  
**Start Up, Production and Consumption Per Head**

|                | Start of Production | Number of Plants |       | Production (million m <sup>3</sup> ) |        | Consumption (m <sup>3</sup> per head) |      |
|----------------|---------------------|------------------|-------|--------------------------------------|--------|---------------------------------------|------|
|                |                     | 1984             | 1985  | 1984                                 | 1985   | 1984                                  | 1985 |
| Belgium (1)    | 1956                | 211              | 197   | 4.64                                 | 5.80   | 0.46                                  | 0.59 |
| Denmark (1)    | 1926                | 150              | 150   | 1.65                                 | 1.65   | 0.32                                  | 0.32 |
| Germany (1)    | 1903                | 2 001            | 2 025 | 39.90                                | 45.10  | 0.65                                  | 0.74 |
| Greece         | 1903                | 155              | 155   | 7.40                                 | 7.20   | 0.74                                  | 0.80 |
| Spain (1)      | 1942                | 422              | 422   | 8.39                                 | 8.39   | 0.22                                  | 0.22 |
| France         | 1933                | 1 244            | 1 250 | 21.83                                | 20.95  | 0.43                                  | 0.39 |
| Ireland(1)     | 1961                | 139              | 132   | 1.85                                 | 1.85   | 0.53                                  | 0.53 |
| Italy          | 1962                | 2 026            | 2 026 | 26.00                                | 22.00  | 0.47                                  | 0.40 |
| Netherlands    | 1948                | 188              | 188   | 6.18                                 | 6.35   | 0.4                                   | 0.4  |
| Portugal (1)   | 1966                | 57               | 57    | 2.10                                 | 2.10   | 0.21                                  | 0.21 |
| United Kingdom | 1930                | 1 150            | 1 200 | 21.61                                | 20.85  | 0.39                                  | 0.38 |
| Total EC 11    |                     | 7 743            | 7 802 | 141.55                               | 142.24 | -                                     | -    |

(1) 1984 figures for Ireland, Portugal and Spain are estimates, as are 1985 figures for Belgium, Denmark, Greece and Portugal.  
Source: ERMCO.

In Germany, the federal government is planning to revise the Water Resources Law with the effect that all discharge water must be treated in accordance with the latest technology. This would require the ready-mixed concrete industry to provide more thorough cleaning of its waste water. A working party is examining exactly what the latest technology is in respect to sewage discharge for the ready-mixed concrete industry.

In some regions, regulations already exist, or are being drafted, which require that waste discharge from certain installations, including ready-mixed concrete plants, require a licence if certain limiting values, such as chromium VI are exceeded.

### Forecast and Outlook

Growth of the ready-mixed concrete sector is necessarily linked to construction activity and the production and

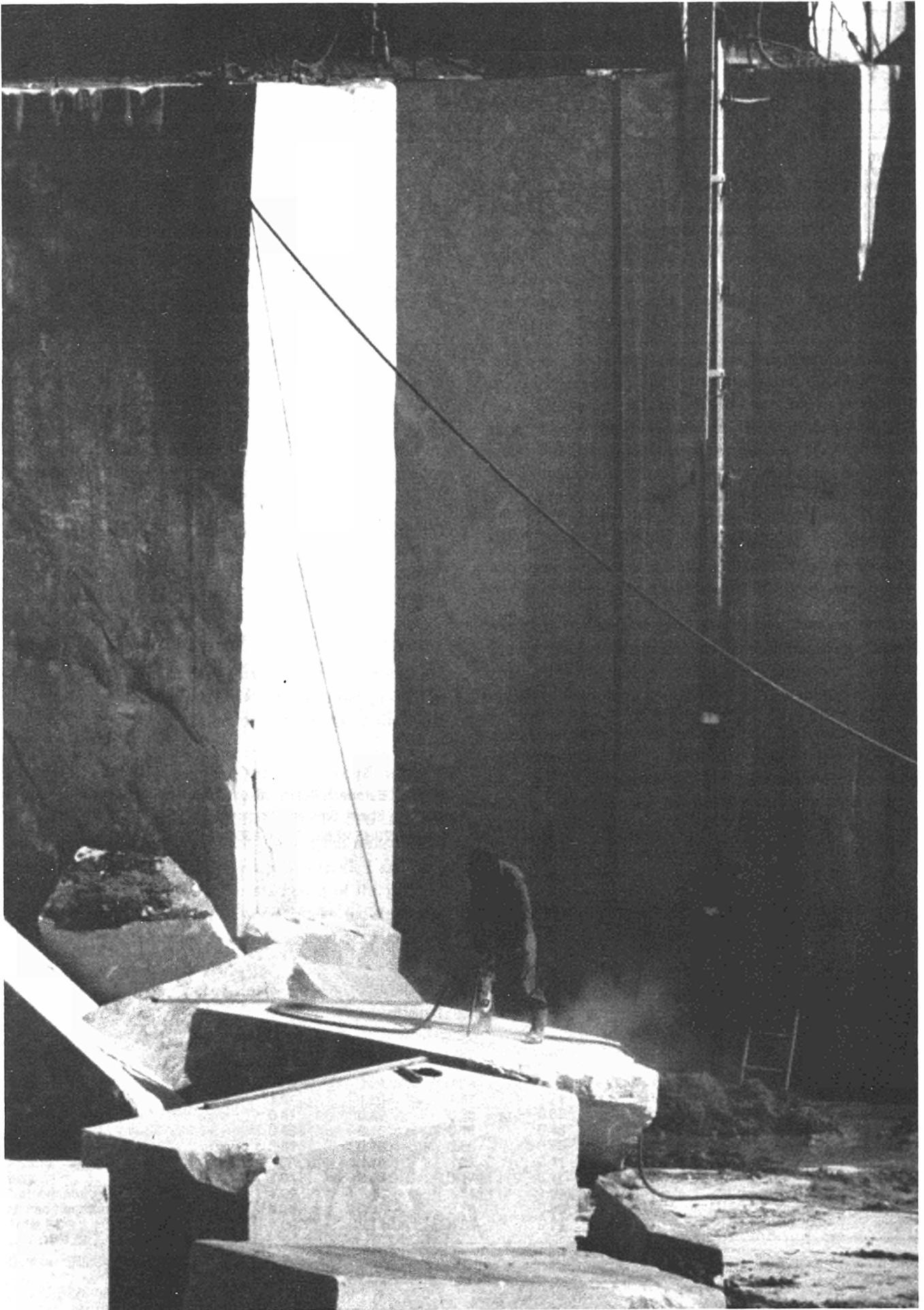
consumption of cement. Both these activities show signs of optimism for the future and this optimism is felt amongst ERMCO Members, although to varying degrees.

The following annual rates of growth are anticipated:

- 1% - Germany, Ireland and Netherlands
- 3% - Greece and Spain
- 5% - France, UK, Italy and Belgium.

These estimates have been made by ERMCO and are based on recent past economic activity in each country and current expectations for the years to 1990.

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# WORKING OF STONE

(NACE 245)

*The working of stone, marble and granite has remained a relatively important activity within the construction materials sector, despite particularly unfavourable conditions over the past two decades. The sector was strongly affected by the severe crisis in the building industry and the continued development of competitive new products. In recent years, activity has successfully diversified by way of funerary uses for granite and the development of export markets for stone and marble. Since 1985, however, exports to third countries, particularly the OPEC countries and Africa, have declined and there has been an increased focus on markets within the Community.*

This sector comprises the extraction and working of granite and marble, veined stone and decorative natural stone (as opposed to stone used in industry, such as crushed stone, or in industrial applications). Stone, marble and granite have long been among the most important basic construction materials. International trade in these materials, particularly Italian marble, has its origins in ancient times. However, for about 60 years now, the use of concrete and new materials has led to a steady decline in the working of natural stone.

At the same time, a sizeable European industry has developed in machines for stone cutting, polishing and sawing. The invention in the 1960s of saws with diamond-edged blades completely transformed the technique for working marble, stone and granite. These machines are exported throughout the world and ensure the survival of many firms that work unpolished local or imported material and export it to third countries.

## Current Situation

Since the beginning of the 1980s, production has been relatively stable for the sector as a whole. Product diversification has occurred, and in construction, demand has revived for very high quality products. Granite is primarily used for funeral monuments, but its use for building facing is increasing.

At Community level, the sector is represented by the Federation of the Marble and Granite Industries of the EC (FIMIGCEE). The association represents the industries of Belgium, the Federal Republic of Germany, Greece, France, Italy, the Netherlands, Portugal and the United Kingdom.

## Consumption Trends

Within the sector, a distinction can be made between the granite industry, for which the principal market is in the manufacture of funeral monuments, and the marble industry, for which demand derives from the construction industry and particularly the manufacture of building revetment, flooring tiles and ornaments.

In France, the manufacture of funeral monuments represents 75% of the granite industry's turnover. Here, as elsewhere, finely cut, high-quality granite is increasingly appreciated as a decoration for facades.

The other traditional market for granite is that of road-related products; its economic importance for the granite industry is now almost as important as the construction market. Market potential is high due to the development of urban amenities and recreation areas, which currently constitute a major market within the construction materials sector. Granite paving stones, slabs and urban monuments will occupy an important position in this new area, in addition to traditional road repair.

Despite higher manufacturing costs, granite's durability and its aesthetic qualities, as well as its ease of maintenance, represent important advantages in relation to more modern materials - with which, moreover, granite blends well.

The stone and marble industry has also undergone important changes and has significant potential. Oriented primarily towards the building market, which, in France for example, represents over 90% of product demand, this branch has undergone severe difficulties during the past 10 years. Since stone is used less and less frequently for walls, the profession is trying to diversify into secondary products, for example

## Main Indicators Working of Stone

| (Million ECU)            | 1980    | 1981    | 1982    | 1983    | 1984    | 1985    | 1986    |
|--------------------------|---------|---------|---------|---------|---------|---------|---------|
| Apparent consumption (1) | 3 981.6 | 4 151.2 | 4 647.7 | 5 477.9 | 6 031.1 | 6 429.3 | 6 090   |
| Total EC production (1)  | 3 579.8 | 3 649.1 | 4 039.1 | 4 746.3 | 5 144.7 | 5 422.5 | 5 095.5 |
| Net export earnings (2)  | 214.2   | 319.3   | 414.9   | 516.9   | 616.7   | 691.9   | 786.4   |

(1) EC 7: excluding Spain, Ireland, Luxembourg, Netherlands, Portugal.

(2) 1980: EC 9, excluding Greece, Spain and Portugal. 1981-85: EC 10, excluding Spain and Portugal. 1986: EC 12.

slabs and decorative fireplaces. As is the case for granite, the use of finely cut stone for facade ornamentation may pave the way for a return to external construction uses. Market opportunities exist primarily in buildings for the service sector such as offices, banks and insurance companies.

### Employment

According to the professional associations, the sector employs over 43 000 people in Italy, 9 500 in France, 6 000 in Germany and 3 500 in Belgium. These are the only countries for which association statistics are available.

The sector comprises numerous self-employed workers. These are marble masons or stone cutters who have their own workshops and do not appear in the employment figures.

### Export Trends

The great diversity of colour and quality of marble and its concentration in certain regions gives rise to a relatively high volume of international trade. Italy is clearly the largest exporter. Intra-Community trade is much greater than trade with third countries although the Community remains a net exporter. Main export primary markets are the United States and the oil exporting countries; however, most recently the importance of the latter has weakened.

### Major Structural and Geographic Features

There are only a few hundred firms in the large Member States of the Community which both quarry and work stone or marble, but thousands of workshops which work all types of stone, marble and granite quarried in Europe or abroad.

In Belgium and the Netherlands, which no longer have granite deposits, the industry's activities are limited to working imported granite. Due to the proximity of the port of Ant-

werp and the nearby outlets of the Rhineland, the Netherlands and northern France, Belgium is a major importer of unpolished granite and an exporter of worked and semi-worked blocks. Maritime transport of granite and marble blocks benefits from preferential freight rates because this heavy material constitutes compact ballast for the ships of major lines.

In countries with granite deposits, firms that quarry granite often also work blocks into finished or semi-finished products on site. Granite firms are concentrated in regions where granite deposits are found: Brittany and the Midi-Pyrénées region (Tarn) in France; Baden-Württemberg, Bavaria and North-Rhine-Westphalia in Germany. These are often regions with very little industry, where granite working assumes local importance. The same is true of marble working. In Italy, this activity has always been concentrated around Carrara in Tuscany.

## Forecast and Outlook

In several Community countries, industry representatives are concerned that regulations increasingly discourage the manufacture of funeral monuments by shortening the length of grave grants. Faced with a possible decline in the funerary market, diversification efforts are particularly timely, although the recovery in the construction industry has as yet only been comparatively slight.

At the European level, industry representatives are interested in the development of uniform standards for stone products so as to encourage the growth of intra-Community trade.

A further concern is professional training; in a number of countries the industry lacks qualified manpower for an activity that is increasingly mechanized and marketing products that are more and more sophisticated.

**Table I**  
**Production and Foreign Trade**

| (Million ECU)        | 1980    | 1981    | 1982    | 1983    | 1984    | 1985    | 1986    |
|----------------------|---------|---------|---------|---------|---------|---------|---------|
| Production (1)       |         |         |         |         |         |         |         |
| Current value        | 3 579.8 | 3 649.1 | 4 039.1 | 4 746.3 | 5 144.7 | 5 422.5 | 5 095.5 |
| Index                | 100.0   | 101.9   | 112.8   | 132.5   | 143.7   | 151.4   | 142.3   |
| Constant value       | 3 579.8 | 3 198.6 | 3 323.3 | 3 685.6 | 3 752.1 | 3 745.2 | 3 670.3 |
| Index                | 100.0   | 89.3    | 92.8    | 102.9   | 104.8   | 104.6   | 102.5   |
| Imports Extra-EC (2) | 187.6   | 182.8   | 193.7   | 214.7   | 269.7   | 314.9   | 208.1   |
| Index                | 100.0   | 97.4    | 103.2   | 114.4   | 143.7   | 167.8   | 110.9   |
| Exports Extra-EC (2) | 401.8   | 502.1   | 608.6   | 731.6   | 886.4   | 1 006.8 | 994.5   |
| Index                | 100.0   | 124.9   | 151.4   | 182.0   | 220.6   | 250.5   | 247.5   |
| X/M                  | 2.14    | 2.75    | 3.14    | 3.41    | 3.29    | 3.20    | 4.78    |

(1) EC 7: excluding Spain, Ireland, Luxembourg, Netherlands, Portugal.

(2) 1980: EC 9, excluding Greece, Spain and Portugal. 1981-85: EC 10, excluding Spain and Portugal. 1986: EC 12.

Source: Eurostat.

The pursuit of productivity gains by constant adaptation of the production plant is a necessity in a market where competition is likely to intensify in the future.

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# HEAT INSULATION PRODUCTS

(NACE 247.5)

*The turnover of this industry reached 1 100 million ECU in 1986. In that year some 1.1 million tonnes of glass, rock and slag wool were produced. Annual growth in the industry was about 6% in volume and 2% in tonnage between 1984 and 1986. Growth should continue at the same pace in the future.*

Man-made mineral fibres are manufactured from glass, rock, slag or other minerals which are melted and turned into products which can be divided into three broad types:

- mineral wool (glass, rock or slag)
- continuous glass filament
- ceramic fibres.

Rock and slag wool were first produced in the late 1800s, whereas production of glass fibres on an industrial scale began in the 1930s.

Mineral wool fibres are vitreous (amorphous) silicates made by centrifuging a stream of molten vitreous material into fibres. Rock fibres are traditionally made from various kinds of rocks, basalt or diabase or furnace slag. Glass wool fibres are made from silicate and borosilicate compositions of aluminium, boron calcium, sodium and other metal oxides.

## Current Situation

Mineral wool products are used for commercial, industrial and residential insulation, commonly in the form of rolls, batts, blankets and slabs. Mineral wool is also used to produce acoustic ceiling tiles and panels, air-conditioning ducts, specialized filtration media, and a variety of thermal and acoustic materials. In its granular form the product is also used for the insulation of cavity walls and as a soil conditioning agent.

## Main Indicators Heat Insulation Products

| (Million ECU)              | 1984  | 1985  | 1986  |
|----------------------------|-------|-------|-------|
| Apparent consumption       | 1 000 | 1 020 | 1 130 |
| Total Community production | 1 000 | 1 020 | 1 130 |
| Employment (1 000)         | N/A   | N/A   | 10.5  |

There is no significant extra-EC trade.

One of the major production problems is the volume of the final product. Thus the costs of stocks are considerable and the transportation cost of the product constitutes a major part of the sales price. Another consequence of the volume of the product is that each plant has a limited "service capacity" for its market.

## Production Trends

EC production reached about 1.1 million tonnes in 1986 which represents a 4.5% increase over the 1984 figure and a 5% increase over 1985. The industry is highly concentrated and most of the business is in the hands of the three EC groups which rank among the world leaders: Saint-Gobain (France), Pilkington (United Kingdom) and Rockwool (Denmark). There are also some small independent producers.

## Employment

The industry provides direct employment for more than 10 000 people. The geographical breakdown can be seen in Table I. The disproportionate roles of Denmark (nearly 15% Set...) and the Netherlands (nearly 12%) should be noted.

**Table I**  
**Employees by Country**

|                |      | %    |
|----------------|------|------|
| Belgium        | 0.6  | 5.7  |
| Denmark        | 1.5  | 14.7 |
| Germany        | 2.4  | 24.0 |
| Spain          | 0.5  | 4.9  |
| France         | 1.6  | 16.0 |
| Greece         | 0.1  | 1.0  |
| Ireland        | 0.1  | 0.9  |
| Italy          | 0.3  | 3.2  |
| Netherlands    | 1.1  | 11.6 |
| United Kingdom | 1.8  | 18.0 |
| Total EC       | 10.0 | 100  |

Source: EURIMA

## Research and Development

R&D is an important strategic element of the heat insulation products industry. EURIMA preliminary research concluded that its member companies spent around 64 million ECU on research and development in 1984 compared with

72 million ECU in 1986. These totals represented approximately 6.7% of turnover. For the record, it should be mentioned that the ways of appropriating research funds vary considerably, given the links between many companies as regards patents and know-how.

### *Importance of Insulation*

The EC has repeatedly underlined the need for better insulation in view of rational use of energy and the need to reduce energy consumption. Yet, although the level of insulation has progressed over the last 10-20 years (in fact since the oil crises of the 1970s), much still remains to be done, especially in existing houses.

In its document "New Community Energy Objectives" (May 1985), the Commission underlined the necessity to increase energy efficiency by 25%. Since thermal heating is about 60% of the national energy consumption, better insulation ought to be the first target. Yet, national authorities continue to fail to understand (or to act) in this respect.

**Table II**  
**Thermal Insulation Thickness**

| (Millimetres)  | Regulation | Economic thickness |
|----------------|------------|--------------------|
| Belgium        | 50         | 150                |
| Denmark        | 200        | 250                |
| Germany        | 120        | 180                |
| Spain          | 30         | 180                |
| France         | 120        | 150                |
| Italy          | 60         | 120                |
| Netherlands    | 80         | 130                |
| United Kingdom | 100        | 170                |

Source : EURIMA

Taking pitched roof insulation as an example, Table II gives an indication of the relationship between the mandatory regulations and the thermal insulation thickness calculated according to efficiency criteria. The basis for the calculations is the average degree days, the data on the interest (excluding inflation), the fuel and the prices of the insulation material valid for each country. The amortization period is estimated at 20 years. These comparisons show clearly that the present mandatory insulation thicknesses are far from giving optimum efficiency. Further, one has to expect that the present low energy prices will not continue and thus the economic justification for insulation measures would appear more favourable in the future. The investment necessary to save one energy unit should be made when this means a cost which is lower than the cost of purchasing the equivalent energy unit.

A rational energy policy is not the sole reason for the insulation industry. The comfort of housing is vastly improved by adequate insulation. However, in order to improve the

comfort of housing insulation requires a minimum of professionalism on the part of the operator. Good information and training - for both the professional and the DIY insulator - are thus important elements. Hygiene, too, improves with insulation. So does pollution control and the quality of the environment.

Stricter insulation requirements in Denmark between 1972 and 1986 have led to a reduction from 1 670 litres heating oil consumption in 1972 to 1 390 litres in 1986 (for a 120 m<sup>2</sup> house); this represents a reduction of 17%.

There is a direct and strong relationship between thermal insulation and less air pollution due to a reduced discharge of pollutants from heating power stations and individual heating systems. Consuming energy is associated with detrimental effects on the environment whilst saving energy is clean. EURIMA believes that the widespread and quite justified concern for a better environment will create more demand for insulation products.

Saving a unit of energy is cheaper than generating one, both in economic and ecological terms. The heat insulation products industry contributes to the better policy option.

### *Structural Problems*

#### **Lack of proper regulations**

Mandatory standards vary considerably in the EC and, as pointed out already, do not necessarily reflect differences in climate nor the need to conserve energy. In some countries, mandatory standards do not even exist, or apply only to the subsidized building sector. There is here a clear example of the "non-Europe". However, it should be understood that very often the standards of thermal insulation applied exceed the mandatory standards.

The situation in practice is not only very variable all over the EC but is even more different due to the diverse control systems. Beside varying building regulations, there are differences in tax systems and promotion campaigns. As regards tax deduction for insulation, the situation is complex and related to many other political and monetary issues; it is thus beyond the scope of this short monograph.

However, as far as promotion campaigns are concerned, these campaigns too often neglect the fact that existing buildings offer a very important potential for thermal insulation. The promotional programmes as yet have been of limited duration and have often been carried out to influence the building sector in general. EURIMA is of the firm opinion that these campaigns have to be intensified and prolonged.

#### **ack of proper information**

The large variations of the energy prices over the last 10-15 years have created uncertainty with the consumers and the

house-builders/buyers as regards insulation. Although - as indicated above - even with low energy prices the insulation investments pay off largely at micro-level (not to mention the major importance for the balance of payment and for air pollution control), many buyers/builders hesitate, with the result that they insulate insufficiently and the consequences will be felt for many years to come.

EURIMA and its member companies invest in proper, objective information to the consumers about the insulation. But EURIMA also believes that the Commission should do more to educate consumers on the basis of the above mentioned arguments. Moreover, it is quite possible that in the early 1990s there will again be a shortage of fuel and oil products. It is thus appropriate to convince consumers that insulation pays. The public concern for cleaner air, and thus for energy saving, grows too.

#### **Non-harmonization**

We have already stated that the regulatory requirements on insulation differ widely between the Member States. Other points on non-harmonization in the EC are:

- the tax situation for insulation
- the clarity of the energy requirements of houses for sale or for rent
- the mortgaging of insulation investments.

Two of these non-harmonization matters require very far-reaching EC integration policies and are certainly beyond the scope of this monograph.

#### *Characteristics of the Industry*

Mineral wool, although by far the market leader in insulation material, is not the only product available for the consumer. Foam plastics manufacturers are the major competitor on the insulation market. By way of example the market share of foam plastics in 1984 was 37% in Germany, 34% in France, 13% in the United Kingdom and 8% in Denmark.

The main difference between mineral wool and cellular plastic insulation material is the resistance to fire. Indeed fire resistance is much greater with mineral fibres, so much so that the French APAIRD (Assemblée plénière des sociétés d'assurances contre l'incendie et les risques divers) forbids plastic foams on light steel roofs in France.

In the UK, the Fire Protection Association keeps records on large scale fires. The records also point to a far better fire

safety with mineral wool. The universities of Ghent (Belgium) and of Borås (Sweden) have demonstrated conclusively that mineral wool has an excellent fire safety record.

In public opinion, and even amongst officials, there is a widespread lack of knowledge about the differences between asbestos and mineral wool for insulation purposes, comprising glass wool, rock wool, basalt wool and slag wool. EURIMA has supported an important research programme on health aspects of mineral wool through JEMRB (Joint European Medical Research Board).

The Commission has promoted the concept of "Third-Party Financing" as a means to accelerate energy efficiency investments. Third-Party Financing - or "performance contracting" - is a way to reduce capital investments in energy saving measures and to pay for these energy savings on the basis of the energy savings achieved. The concept is beyond the scope of this monograph.

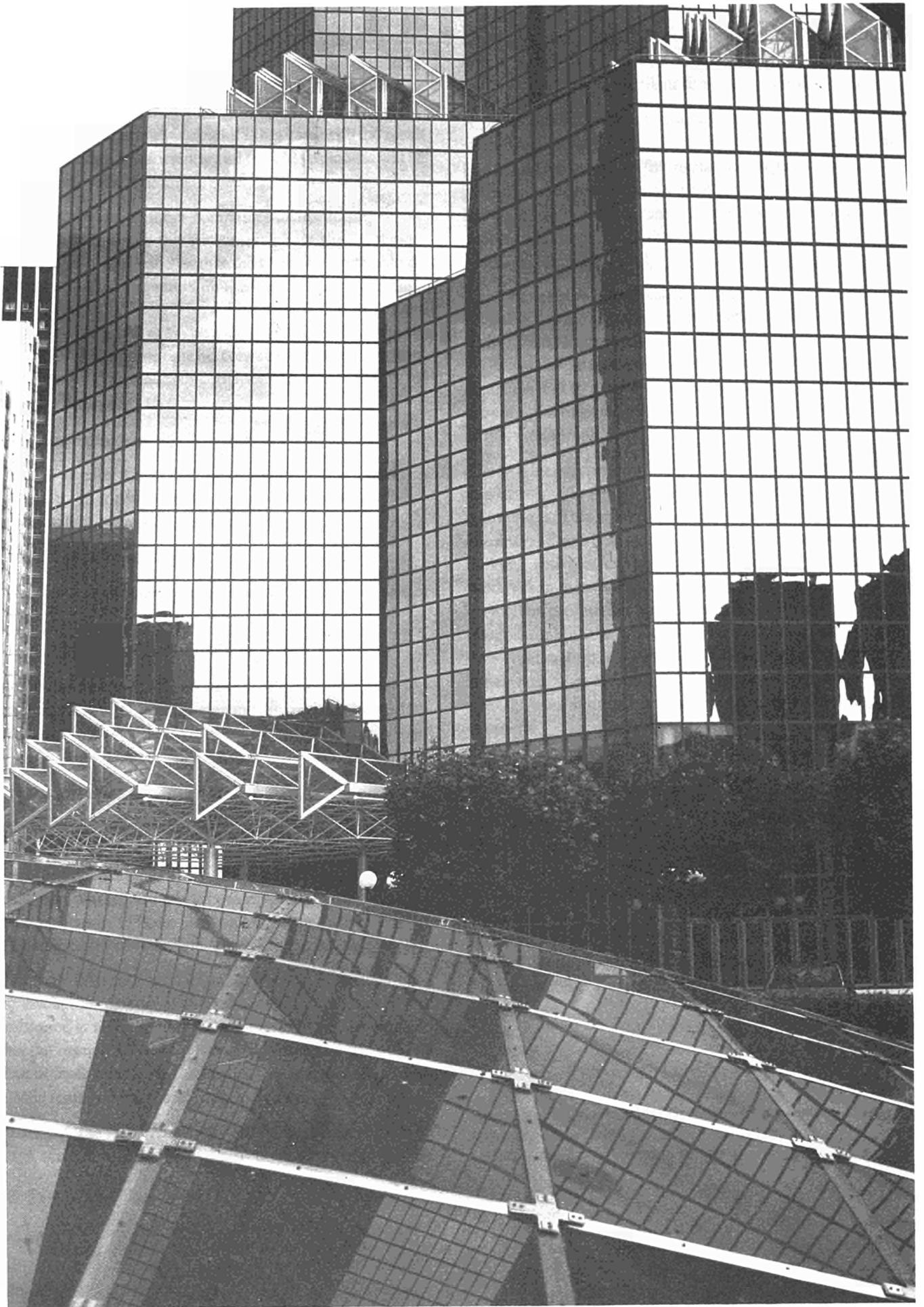
The production process is a rather rigid one, and the problem of stocks is almost insurmountable as these stocks are voluminous. This is even more important as the application of mineral fibres is seasonal: only when the weather permits building activities can the mineral fibres for insulation be used. When the weather does not permit building activities, very often production has to be halted with severe consequences for both the profits of the company and employment. This combination of a rigid production system with the seasonal and unpredictable delivery problems makes the mineral wool industry one where changes cannot happen overnight.

#### **Forecast and Outlook**

The future demand for heat and sound insulation materials should grow slightly faster than EC production of commercial, industrial and residential buildings. Nevertheless, the market share of mineral wools will depend on price trends compared with foam and the effect of fire regulations on competition between the two materials. Energy prices will be another factor. Under these conditions, 2% growth in the tonnage of mineral wools consumed in the EC would become possible.

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## GLASSWARE

(NACE 247)

*This age-old industry has reached a stagnant point due to the high price of energy and competition from plastics and other new materials. The EC turnover decreased by 18% in constant value between 1980 and 1986 while production remained constant (18 million tonnes and 15 million ECU in 1986). This stagnation hides the considerable efforts that have been made in the fields of technology, markets and human productivity. Glass is now much lighter and more resistant, so that new uses for glass have been found and marketed in a context of modernization of the commercial methods. Concurrently, employment has decreased by 3.5% per annum. The extra-EC trade shows a permanent surplus, but is limited in volume by the relatively high costs of transport. The future of the sector is still uncertain. It will depend on the capacity to maintain technology and marketing innovation.*

Glass-making is a traditional industry whose products are present in many aspects of our everyday lives: medicine and laboratories, electronics, motor vehicles, chemicals, pharmaceuticals, cosmetics, tableware, furniture and optical products, foodstuffs, textiles and the building industries.

Production of glass in the EC is concentrated heavily in the hands of several large multinational glass firms. The other companies are medium or small in size and are often traditional family firms.

The EC glass industry products can be divided into the following five main technical product areas:

- container glass (65% of production in 1986);

- flat glass (24%);
- glass tableware (4.5%);
- glass fibres (3.5%);
- other glass (3%).

The first three sectors are described in separate sections as well as special glass, which is a part of "other glass".

### Current Situation

With the exception of a sharp drop in 1981, which was followed by a slow recovery, production and apparent consumption remained practically unchanged between 1980 and 1986. This situation is a result of variable sectoral circumstances which are described later.

Total import penetration was also stable compared to consumption. However, the amount of imports originating from Eastern Europe has continued to increase from 405 000 tonnes in 1981 to 507 000 tonnes in 1986. Therefore, their share of the EC import quota has grown from 55% in 1981 to 69% in 1986. Despite this one-way growth in imports from Eastern European countries, the international competitiveness of the Community industry has shown a progressive trade surplus, with exports exceeding imports according to the following ratios: from 1.42 in 1980 to 1.82 in 1986. In value terms, this surplus increased from 0.7 million ECU in 1980 to 1.1 million ECU in 1986.

Intra-Community trade statistics bear witness to the increasing integration of national markets through growth in the share of national production which was sold in another member country. In 1986, 20% of the Community production

### Main Indicators Glassware

| (Million tonnes)           | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  |
|----------------------------|-------|-------|-------|-------|-------|-------|-------|
| Apparent consumption       | 18.36 | 16.89 | 17.08 | 17.27 | 17.87 | 17.66 | 18.07 |
| Net export volume          | 0.39  | 0.44  | 0.55  | 0.64  | 0.55  | 0.75  | 0.61  |
| Total Community production | 18.75 | 17.33 | 17.63 | 17.91 | 18.42 | 18.41 | 18.68 |
| Employment (1 000)         | 296   | 280   | 266   | 249   | 243   | 236   | 231   |

**Table I**  
**Production and Foreign Trade**

| (Million ECU)                | 1980   | 1981   | 1982   | 1983   | 1984   | 1985   | 1986   |
|------------------------------|--------|--------|--------|--------|--------|--------|--------|
| Turnover (1)                 |        |        |        |        |        |        |        |
| Current value                | 13 136 | 12 348 | 12 850 | 13 472 | 14 424 | 15 093 | 15 291 |
| Index                        | 100    | 94     | 98     | 103    | 110    | 115    | 116    |
| Constant value               | 13 136 | 11 250 | 10 838 | 10 801 | 10 972 | 10 963 | 10 761 |
| Index                        | 100    | 86     | 83     | 82     | 84     | 83     | 82     |
| Import penetration           | 5%     | 5%     | 5%     | 5%     | 5%     | 5%     | 4%     |
| X/M                          | 1.4    | 1.6    | 1.6    | 1.7    | 1.6    | 1.9    | 1.8    |
| Intra-EC imports/production  | 15%    | 16%    | 17%    | 18%    | 18%    | 18%    | 20%    |
| Tonnes produced per employee | 63     | 62     | 66     | 71     | 75     | 77     | 80     |
| Index                        | 100    | 90     | 104    | 113    | 119    | 123    | 127    |

(1) Excluding Spain.

Source: Eurostat.

was sold in a different member country from the one where it originated; the equivalent figure in 1980 was only 14%.

### *Productivity Trends*

Over the same period, the numbers employed constantly declined. The growth of production in tonnes per worker is very clear and bears witness to the enormous effort which the glass industry has made to keep down its costs.

In fact, while production remained nearly identical in 1980 and 1986, the value of this production in constant value indices dropped from 100 to 82. This shows that productivity efforts were not only translated into a decrease in employment but also into real savings.

## **CONTAINER GLASS**

### **Current Situation**

Production and apparent consumption have remained very stable for the period 1980-1986, with a noticeable drop in 1981 due to the impact of the economic crisis at the beginning of the decade; this drop was followed by a slow and progressive recovery (1983-1984).

In addition, surplus capacity and insufficient profitability characterized the sector in the 1980s and it faced sharp competition from competing products, especially plastic and cardboard, for high consumption products such as soft drinks and fruit juices.

Exports to non-EC countries only represent 3% of production, while about 75% of imports from non-EC countries originate from Comecon Member States.

### *Industry Structure*

As a reaction to the problems encountered, glass industrialists have started to restructure their companies and renew their profitability by aiming to better adapt their production capacities to the demand for container glass, increase productivity, and reduce costs (especially for employment and energy). Takeovers and mergers of companies took place, plants were closed down, production lines were stopped, manpower reduced and the production process improved through application of the latest technological developments.

These efforts were progressively successful and were helped by a stabler economic climate and a lower energy bill. By 1986, utilization of the capacity of the container glass industry was approximately 90%.

### **Main Indicators Container Glass**

| (Thousand tonnes)           | 1980   | 1981   | 1982   | 1983   | 1984   | 1985   | 1986   |
|-----------------------------|--------|--------|--------|--------|--------|--------|--------|
| Apparent consumption        | 12 190 | 11 291 | 11 452 | 11 619 | 12 004 | 11 781 | 12 030 |
| Index                       | 100    | 93     | 94     | 95     | 98     | 97     | 99     |
| Imports extra-EC            | 0.352  | 0.290  | 0.284  | 0.341  | 0.375  | 0.339  | 0.227  |
| Exports extra-EC            | 0.335  | 0.246  | 0.309  | 0.345  | 0.343  | 0.378  | 0.357  |
| Production                  | 12 173 | 11 247 | 11 478 | 11 623 | 11 972 | 11 820 | 12 160 |
| Import penetration          | 3%     | 3%     | 2%     | 3%     | 3%     | 3%     | 2%     |
| X/M                         | 1.0    | 0.9    | 1.1    | 1.0    | 0.9    | 1.1    | 1.6    |
| Intra-EC imports/production | 8%     | 8%     | 8%     | 9%     | 10%    | 9%     | 10%    |

Sources: FEVE and Eurostat

## *Factors behind the Situation*

The positive evolution of the sector during recent years is not only the result of the reorganization process, but also of the adaptation of the manufactured product to new economic circumstances. Five factors have contributed to the renewal of this sector:

### **The intrinsic qualities of glass**

It is an impermeable, inert, attractive, recyclable and quality product. Glass has also been able to remain a competitive packaging with a good quality-price ratio. Finally, glass is the only packaging material that offers the choice between returnable or non-returnable goods, thus allowing it to respond appropriately to the characteristics of the distribution networks for which the product is designed.

### **Glass recycling**

In terms of environmental impact, glass is the only packaging material which has proved economically viable to recycle. Between 1980 and 1987 some 19 million tonnes of glass waste (cullet) were recycled in the EC Member States. In 1987, 3 350 766 tonnes of glass were collected, about 30% of the total consumption. As well as diverting huge quantities of glass away from the domestic refuse channel, recycling creates large savings in raw materials (1 tonne of recycled glass replaces 1.2 tonnes of raw material) and energy (100 kg fuel-oil per tonne of recycled glass) thus 1 909 076 tonnes oil equivalent.

### **Technological developments**

Glass has a considerable potential for improving its technology and the efficiency of its production. The energy performance of the furnaces have been improved, enabling appreciable energy savings to be made. Also, furnaces currently use a vitrifiable mixture with more than 50% cullet. Some glass furnaces for green glass even produce a glass of very high quality with 100% cullet.

It has become possible to manufacture glass at a lower cost and with a more flexible production rate through the automation and computerization of the production lines. A glass-forming machine that produced 70 000 bottles per day in 1976 can now generate 270 000 bottles per day. Thanks to technological progress, productivity has improved, enabling glass containers to be sold at competitive prices.

The container industry has constantly increased its quality controls in order to deliver reliable products better able to cope with shocks and friction from the packing lines and during handling and transport. At present, a glass bottle undergoes several internal and external examinations. It receives some surface treatments as well.

The lightening of glass has been the constant preoccupation of glass makers. Technical regulation by micro-processors

and the technique of press-and-blow enables the creation of a lightweight glass container with an equal resistance at all points. For example, the weight of a beer bottle was reduced by 33% in a few years.

Concerning hygiene in the process of container production, the container industry norm has "clean pack" lines, the aseptic filling process and the complete handling, wrapping and palletizing of products.

### **New products**

Several glass companies from Europe, the United States and Japan and a large glass-forming machine manufacturer have put together a consortium whose aim is to develop a glass container 10 times stronger and half the weight of present glass containers.

As a result of its technological progress, the glass industry can now trade in new types of containers, for example, bottles with plastic sleeves, wide mouth bottles, pre-labelled bottles and jars sealed by a metallic sheet.

### **Media and advertising**

The glass industry has reacted to the policies of some competitive materials in several European countries by stating its message loud and clear that glass is a modern container, pure, sound, of quality and recyclable. Major media and advertising campaigns for container glass and recycling have been launched in recent years in Spain, France, the United Kingdom and Italy. In some cases, clients and retailers were involved.

## **Outlook**

Taking into account the afore-mentioned developments, the EC glass container industry can view the future with confidence.

## **FLAT GLASS**

### **Current Situation**

In the early 1980s, the flat glass industry in the EC was closely influenced by external economic factors such as the oil crisis and low demand. During this period, the flat glass industry in the Community went through a serious structural reorganization to adapt itself to the economic environment and also to the gradual technological conversion of sheet plants to float furnaces. In addition, considerable reduction took place in manning levels. The efforts of the flat glass industry are gradually being rewarded by the improvement of sales in the Community.

Referring to the float and sheet glass sales which represent the greater part of flat glass sales, it can be seen that since

## Main Indicators Flat Glass

| (Thousand tonnes)           | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  |
|-----------------------------|-------|-------|-------|-------|-------|-------|-------|
| Apparent consumption        | 3 946 | 4 007 | 3 948 | 3 951 | 3 956 | 4 046 | 4 184 |
| Index                       | 100   | 102   | 100   | 100   | 100   | 103   | 160   |
| Imports extra-EC            | 0.346 | 0.271 | 0.326 | 0.330 | 0.309 | 0.265 | 0.260 |
| Exports extra-EC            | 0.490 | 0.424 | 0.554 | 0.660 | 0.609 | 0.696 | 0.516 |
| Production                  | 4 090 | 4 160 | 4 176 | 4 281 | 4 256 | 4 477 | 4 441 |
| Import penetration          | 9%    | 7%    | 8%    | 8%    | 8%    | 7%    | 6%    |
| X/M                         | 1.4   | 1.6   | 1.7   | 2.0   | 2.0   | 2.6   | 2.0   |
| Intra-EC imports/production | 23%   | 25%   | 28%   | 30%   | 28%   | 28%   | 32%   |

Source: GEPVP and Eurostat.

1980, taken as a reference year, world-wide sales have on average been steadily increasing about 2%-3% a year although they fell to 91% in 1981. It is interesting to note that this growth rate is faster than the evolution of the gross national product trend.

In 1986, sales were high as a result of increased renovation and refurbishing work carried out on existing dwellings, of a slowly recovering building sector in some countries, and of good car sales. Flat glass sales are very sensitive to the development of the car industry. As a result of good intra-Community demand, the utilization rate of capacities installed in the EC reached a satisfactory level in 1987.

### Foreign Trade

Flat glass manufacturers are, however, concerned with increased and unfair competition from State-trading countries which undercut the EC market with very low-priced glass. Procedures to combat this have been initiated within the EC in reaction to this unfair policy but without success. Furthermore, it should not be ignored that the low rate of the US-dollar makes it difficult to export to the USA and other dollar markets. The fact that more and more plants are being built overseas also tends to reduce export opportunities outside the EC.

### Forecast and Outlook

The flat glass industry looks forward to an optimistic future as the completion of the Single Market in 1992 approaches. The industry is preparing harmonized standards for its products and new products are continuously being developed by company R&D departments, i.e. low-emissivity glasses, fire protection glasses, new automobile products, glasses for electronic applications and for solar collection applications.

The time and money spent on research and in developing new products is quite justified when considering, for example, that demand for toughened and low-emissivity glass increased by 30% in 1986 compared to 1985, and that demand for architectural laminated glass increased by 14% in 1986 over 1985.

The flat glass sector is therefore confident that prospects for the future are favourable and will depend on the industry's ability to develop new products to satisfy new applications for flat glass.

### GLASS TABLEWARE

This general term comprises a group of hollowware products which are encountered in daily life and which have high demands placed upon them, especially from the design point of view. This glass is often referred to as household glassware.

## Main Indicators Glass Tableware

| (Thousand tonnes)           | 1980  | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 |
|-----------------------------|-------|------|------|------|------|------|------|
| Apparent consumption        | 805   | 553  | 588  | 601  | 644  | 639  | 643  |
| Index                       | 100   | 69   | 73   | 75   | 80   | 79   | 80   |
| Imports extra-EC            | 67    | 56   | 68   | 70   | 71   | 73   | 66   |
| Exports extra-EC            | 286   | 304  | 302  | 330  | 320  | 329  | 282  |
| Production                  | 1 025 | 801  | 822  | 861  | 893  | 895  | 859  |
| Import penetration          | 8%    | 10%  | 11%  | 12%  | 11%  | 11%  | 10%  |
| X/M                         | 4.3   | 5.4  | 4.5  | 4.7  | 4.5  | 4.5  | 4.3  |
| Intra-EC imports/production | 20%   | 27%  | 26%  | 26%  | 29%  | 30%  | 38%  |

Sources: CPV and Eurostat

## Main Indicators Reinforcement Glass Fibre

| (Thousand tonnes)           | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  |
|-----------------------------|-------|-------|-------|-------|-------|-------|-------|
| Apparent consumption        | 215.0 | 181.9 | 203.3 | 222.5 | 251.6 | 279.4 | 285.2 |
| Index                       | 100   | 84.5  | 94.5  | 103.5 | 117   | 130   | 133   |
| Imports extra-EC            | 36.2  | 31.6  | 42.0  | 45.0  | 54.3  | 59.8  | 57.4  |
| Exports extra-EC            | 44.2  | 53.4  | 42.8  | 47.8  | 52.0  | 56.7  | 58.0  |
| Production                  | 223.0 | 203.7 | 204.2 | 225.3 | 249.3 | 276.3 | 285.8 |
| Import penetration          | 17%   | 17%   | 21%   | 20%   | 22%   | 21%   | 20%   |
| X/M                         | 1.2   | 1.7   | 1.0   | 1.1   | 1.0   | 1.0   | 1.0   |
| Intra-EC imports/production | 50%   | 54%   | 60%   | 60%   | 63%   | 62%   | 73%   |

1) Reinforcement and textile glass fibre.  
Sources: APFE and Eurostat

Drinking glasses, in terms of value, represent about 60% of the tableware produced. The remaining 40% is accounted for by other glass accessories for the table and by articles which are used in the kitchen, the home and the office.

### GLASS FIBRE

Fibre glass is produced from molten glass, heated in a modern furnace and pulled through tiny holes transforming the liquid mass into small glasswool fibres for insulation purposes or into textile yarns or reinforcement products.

A clear distinction should, however, be made between glasswool and continuous glass fibre. Although both are produced in glass furnaces, their industrial manufacture calls on different forms of technology and their products are aimed at separate end-users. Glasswool as a final product is part of the insulation industry and as such is dealt with in the monograph on heat insulation products.

The present comments, therefore, only refer to the continuous fibre glass industry. The continuous glass fibre industry, since its creation after the Second World War, has constantly evolved due to the many applications of its new products by industry.

#### Current Situation

The increase in production over the past five years in the 11 plants operating throughout the Community has been more apparent for reinforcement than for textile fibres. This can be explained by the rapid evolution in the automobile, sport and leisure, and construction sectors.

The amount of fibres destined for textile use declined in 1986 due to a slight hesitation in the market, but this has since been overcome by a recovery in demand. The Community producers' profit margin was very unsatisfactory in the early 1980s due to overcapacity and competition from unfair prices by East European and Japanese producers. Price commitments

by the latter and protective duties applied by the Commission to imports originating in Czechoslovakia and the Democratic Republic of Germany improved the competitive position of the Community industry from 1985. However, the strong price competition from non-Community producers remains a constant threat, which is exacerbated by the fluctuations in international exchange rates. Continuous adaptation to changing and new end-uses indeed require huge investment in both R&D and equipment.

#### Forecast and Outlook

The short-term forecast indicates a favourable evolution in demand as a result of new products used, for example, in the construction and the transport sectors and the booming electronics industry.

### OTHER GLASS

"Other glass" includes the category "special glass". Special glass is identified by its use and applications. The term is used to describe a wide range of special glasses with high chemical and thermal durability and with a variety of optical, electrochemical or special technological properties. These glasses are used in such fields as chemistry, pharmacy, electrotechnology, electronics apparatus and instrument construction, optics, illumination engineering, household appliances, certain sectors of the construction industry and in other technical applications.

#### Current Situation

In 1986, the gross production of special glass reached 1.4 billion ECU for which television glass represented 423 million ECU. The intra-EC market was 1.23 to 1.27 billion ECU lower than the production, which implies that exports were of the order of 0.18 billion ECU.

**Main Indicators  
Other Glass Products**

| <b>(Thousand tonnes)</b> | <b>1980</b> | <b>1981</b> | <b>1982</b> | <b>1986</b> | <b>1984</b> | <b>1985</b> | <b>1986</b> |
|--------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Apparent consumption     | 620.3       | 388.8       | 436.9       | 437.7       | 579.7       | 486.9       | 538.3       |
| Index                    | 100         | 63          | 70          | 71          | 93          | 78          | 87          |
| Imports extra-EC         | 91.2        | 89.5        | 107.5       | 118.8       | 107.4       | 114.7       | 121.2       |
| Exports extra-EC         | 151.0       | 148.9       | 158.9       | 155.2       | 138.5       | 141.2       | 126.7       |
| Production               | 680.1       | 448.2       | 488.2       | 474.0       | 610.8       | 513.5       | 543.8       |
| Import penetration       | 15%         | 23%         | 25%         | 27%         | 19%         | 24%         | 23%         |
| X/M                      | 1.7         | 1.7         | 1.5         | 1.3         | 1.3         | 1.2         | 1.1         |
| Intra imports/production | 58%         | 91%         | 90%         | 86%         | 71%         | 92%         | 93%         |

(Sources: CPIV and Eurostat)

About 95% of Community production comes from France, Italy, UK and Germany which represent 85% of the intra-EC market for special glass.

In the other EC countries there are practically no processing plants.

### Forecast and Outlook

The EC special glass market will continue to expand in the 1990s, although it will probably undergo some restructuring. Stagnant or declining sectorial markets are facing growing competition from new product areas, e.g. special glass for the environment, biotechnology and opto-electronics.

CPIV: Standing Committee of the EC Glass Industries  
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## CERAMIC GOODS

(NACE 248)

*The European ceramic industry, (without the bricks) has a turnover of more than 11 billion ECU and provides employment for some 220 000 people. It consists of a wide range of trades which are carried out by firms of all sizes. High-technology firms coexist with traditional labour-intensive firms. Production was stagnant in the early 1980s but there has been moderate growth since 1984.*

In its widest sense the ceramic industry embraces any industry which manufactures products based primarily on clay minerals which, after forming and drying, are subjected to high temperature firing. The raw materials used are largely found within the Community and the manufacturing process confers a high value-added content on them. However, highly technical ceramic products also use some special raw materials which are found outside the Community (e.g. zirconium, high-purity magnesium, etc.)

Classified according to use, the main products are:

- materials for construction: tiles, sanitaryware and bricks and roofing tiles
- tableware and household goods: tableware, household articles and ornamentalware
- products for electrical, electronic, mechanical and other uses: insulators and electrical insulating parts, products for chemical use and vessels for rural and transport, specialized and advanced technical ceramics
- refractories and heat-resisting products

- products for drainage and channelling: stoneware pipes.

Given the heterogeneous nature of the industries grouped under NACE 248 and the inadequacy of the aggregate data available, the sectoral study has concentrated on analysis of the principal sub-sectors as follows:

- tiles for floors and walls
- tableware and ornamentalware
- technical ceramics: insulators and insulating pieces and advanced ceramics
- refractory products
- ceramic sanitaryware.

### Current Situation

The structure of the ceramic industry continues to be characterized by the large number of small- and medium-sized companies, particularly in the tableware and ornamentalware sub-sector.

The degree of change which has come about in the ceramic sector due to technological change and the depressed economic situation during the last decade can be measured by the reduction in the number of undertakings and their employees since 1980 when the EC industry still comprised some 2 800 companies with about 320 000 employees. In the UK fine china industry alone the number of employees has been reduced by 25 000 in the last few years. In total, it is estimated that the Community at present includes approximately 2 300 companies employing about 220 000 people.

### Main Indicators Ceramic Goods

| (Million ECU)                  | 1980  | 1981   | 1982   | 1983   | 1984   | 1985   | 1986   | 1987   |
|--------------------------------|-------|--------|--------|--------|--------|--------|--------|--------|
| Apparent consumption           | 8 336 | 8 815  | 8 681  | 8 689  | 9 289  | 9 619  | 9 689  | 9 529  |
| Net export earnings            | 1 189 | 1 303  | 1 342  | 1 589  | 1 690  | 1 792  | 1 735  | 1 866  |
| Total Community production (1) | 9 525 | 10 118 | 10 023 | 10 278 | 10 979 | 11 411 | 11 424 | 11 390 |
| Employment (1 000)             | 320   | 300    | 281    | 265    | 253    | 230    | 224    | 219    |

(1) Figures for Portugal exclude refractory products as from 1983; figures for Spain are estimated from 1984 to 1987; figures for Greece and the Netherlands are estimated for 1986-1987.

Ceramic undertakings are scattered throughout the Community with several strong regional concentrations particularly in the tableware, ornamentalware and tiles sectors.

Thanks to intense research and development activity and considerable investment during the last two decades, the ceramic industry has achieved a high degree of modernization and uses advanced techniques. This period has seen the installation of automated lines as much in raw materials preparation as in shaping, firing, decoration and handling. New user requirements have led to new higher performance compositions being produced with new technologies.

At the same time, improvements in working conditions in the factories have made considerable progress, as has the control of environmental pollution.

### Production

Total turnover for the ceramic industry in 1986 reached about 11.4 billion ECU, i.e. about 50 000 ECU per person employed; 41% of this figure was achieved by tiles, 22% by tableware and ornamentalware, 16% by refractories, 8% by ceramic sanitaryware and 2% by insulators and insulating pieces. However, it must be remembered that the greater part of advanced ceramics is not included in these statistics.

After a reduction in sales in 1980, 1981-1983 were marked by stagnation which, above all, affected those sectors dependent on the construction industry where production capacity remained largely under-utilized. Sales picked up from the beginning of 1984 and continued to do so in the majority of the sub-sectors until 1987.

In current value, production follows almost the same pattern as turnover but at constant value production dropped by 17% in 1986 compared to 1980.

The relationship between volume, value of production and the numbers employed shows a nominal improvement in productivity, with considerable differences between branches.

### Foreign Trade

On the trade front, the opening of the Community markets brought about considerable growth in intra-Community imports (+ 44%) between 1980 and 1987 and strongly accentuated competition between Community producers.

At the same time, the Community industry has developed its export penetration of world markets which account for a growing proportion (19% in 1980 and 21% in 1986) of Community production with very different proportions according to product. The improvement in these exports progressed at a lower rate (+ 35% between 1980 and 1987) than the intra-Community trade. North American markets (particularly the USA) have taken a large portion of exports. For heavy products (e.g. refractories and sanitaryware) external trade has developed at a slower rate.

The existence of many tariff and non-tariff barriers on world markets seriously hampers the expansion of Community exports. This situation is even more imbalanced as a result of the policy of opening up the Common Market. Consequently, a number of third countries, in particular newly industrialized countries (South Korea, Taiwan, Brazil), countries with planned economies (China, Eastern Europe) and other countries, notably Japan, have been able to improve their positions in the Common Market often thanks to major distortions in competitive conditions.

In the majority of the third countries cited, the ceramic industries have developed strongly during recent years. They now have at their disposal, based generally on an old tradition of ceramic production, a large production potential equipped with modern plants originating for the most part

Table I  
Production and Foreign Trade

| (Million ECU)    | 1980  | 1981   | 1982   | 1983   | 1984   | 1985   | 1986   | 1987  |
|------------------|-------|--------|--------|--------|--------|--------|--------|-------|
| Production       |       |        |        |        |        |        |        |       |
| Current value    | 9 525 | 10 118 | 10 023 | 10 278 | 10 979 | 11 411 | 11 424 | N/A   |
| Index            | 100   | 106    | 105    | 108    | 115    | 120    | 120    | N/A   |
| Constant value   | 9 515 | 9 082  | 8 215  | 7 939  | 8 041  | 8 018  | 7 903  | N/A   |
| Index            | 100   | 95     | 86     | 83     | 85     | 84     | 83     | N/A   |
| Imports extra-EC | 643   | 725    | 667    | 696    | 839    | 865    | 699    | 642   |
| Index            | 100   | 113    | 104    | 108    | 131    | 135    | 109    | 104   |
| Exports extra-EC | 1 832 | 2 028  | 2 009  | 2 285  | 2 529  | 2 657  | 2 434  | 2 508 |
| Index            | 100   | 111    | 110    | 125    | 138    | 145    | 146    | 137   |
| X/M              | 2.9   | 2.8    | 3.0    | 3.3    | 3.0    | 3.1    | 3.5    | 3.9   |

Sources: Cerase-Unie and Eurostat.

**Table II**  
**1986 National Indicators**

| (Million ECU)      | BLEU | DK  | D     | GR  | E    | F     | IRL | I     | NL  | P   | UK    |
|--------------------|------|-----|-------|-----|------|-------|-----|-------|-----|-----|-------|
| Production         | 221  | 155 | 3 003 | 146 | N/A  | 1 369 | 54  | 3 613 | N/A | 180 | 1 496 |
| Imports extra-EC   | 45   | 49  | 216   | 7   | 11   | 98    | 4   | 96    | 53  | 5   | 115   |
| Exports extra-EC   | 43   | 45  | 773   | 21  | 111  | 245   | 5   | 713   | 32  | 37  | 409   |
| X/M                | 1.0  | 0.9 | 3.6   | 3.0 | 10.1 | 2.5   | 1.3 | 7.4   | 0.6 | 7.4 | 3.5   |
| Employment (1 000) | 4    | 4   | 60    | N/A | N/A  | 28    | 1   | 52    | N/A | 13  | 26    |

Sources: Cérame-Unie and Eurostat.

from the Community. In the absence of statistical data it is difficult to quantify this potential.

To get over their loss of competitiveness, Community enterprises have, during the last few years, directed themselves towards specialization in the high range and in highly technical products, which require an increased effort in research and development. On the whole, imports from third countries stabilized over the period 1980-1987 with an average penetration rate of 8%. However, in certain sub-sectors, such as tableware, there was a big increase in 1987. The rate of coverage of extra-Community imports was positive from 1980 to 1986.

### *Costs and Investment*

Overall, however, the ceramic industry continues to be characterized by a high level of manual work which can in some branches be as high as 35% to 60% of production costs. It follows that every change in the social field has a direct bearing on the competitive position of the ceramic industry in comparison with a number of third countries where labour costs are considerably lower.

Some idea of the change in labour costs within the Community ceramic industry can be gained by comparing the change in average hourly gross earnings paid in the EC countries since 1980, to which must be added the social charges, the size of which varies considerably from one country to another. (see Table III.)

Some harmonization has taken place in the hourly costs of the original six EC countries and of Denmark, while the hourly rates of other members (notably Greece, Spain and

Portugal) are appreciably lower. Under these conditions, a Community average means little.

Since it depends on firing processes at high and very high temperatures, the ceramic industry is among the high energy consuming industries and this accounts for 10% to 20% of production costs according to product. The energy crisis and continual increases in the price of natural gas, which is the main energy source for the ceramic industry, has accelerated research and the introduction of more effective firing processes. This innovative reconversion process which points, among other things, towards the techniques of rapid firing and single firing, requires very high investment.

The investment effort of the ceramic industry in the fields of rationalization and the development of new products reached an average of 515 million ECU between 1980 and 1985 (about 5% of turnover) as against about 350 million during the years 1975-1980. The continuing crisis in certain large user sectors such as construction and some sectors of heavy industry, such as the steel industry, has brought about a slowing down in investment.

### **Forecast and Outlook**

For the whole of the ceramic sector, the prospects for 1988 are moderately satisfactory, with developments differing between sub-sectors according to their dependence on the activity of basic industrial sectors and private demand (see sub-sector commentaries).

In the medium term, development will be affected by numerous changes which will be caused by the achievement of the internal market in the economic and social environment in which undertakings will operate. The increase in competition

**Table III**  
**Gross Hourly Earnings by Country**

| (ECU) | B    | DK   | D    | GR   | E   | F    | IRL | I    | NL   | P   | UK   |
|-------|------|------|------|------|-----|------|-----|------|------|-----|------|
| 1980  | 5.10 | 6.27 | 4.71 | N/A  | N/A | 3.60 | N/A | 3.24 | 4.43 | N/A | N/A  |
| 1986  | 6.72 | 9.56 | 6.81 | 3.06 | N/A | 5.65 | N/A | N/A  | N/A  | N/A | 5.32 |

Source: Cérame-Unie.

which will result will have an accelerating effect on structural changes in progress in the different sub-sectors of the ceramic industry. In those branches of activities centred on production of new materials and high technology products (advanced technical ceramics) which are confronted by very keen competition for Japan and the USA there will have to

be a closer cooperation between the EC industry in order to exploit the loopholes for potential development.

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# TILES

(NACE 248.3)

*The EC is a world leader in the ceramic tile industry by virtue of the quality of its products as well as by the quantity of its production, with more than 50% of total world production. The industry provides jobs for some 65 000 people in the EC. In the early 1980s, the crisis in the construction industry hit the tile industry hard. The outlook is now brighter, with new export markets opening up following a recovery in 1986 and 1987 coupled with major investment efforts.*

The ceramic tiles industry makes a wide range of products for covering floors and walls for private, public and industrial buildings. They are of various shapes and sizes and can be glazed or unglazed.

## Current Situation

### Consumption

Following the serious decrease in building activity, particularly in the housing sector in 1981-1985, the volume of ceramic tile consumption went through a period of stagnation and reduction from 1980-1983. An improvement began at the beginning of 1984, with a new squeeze in 1985, and further growth beginning in 1986 and more in 1987 when the construction industry increased by 2.5%. With a lower rate for housing (+ 1.3%) with 5% to 6% for non-residential building, and about 5% for renovation of housing. Total turnover for the tiles industry grew by 15% in 1987 with deliveries on the domestic market increasing by 19% and an increase of consumption of 17%. In the unglazed tiles sub-sector which constitutes about 10% of total turnover, demand has shown a fundamental downward trend for many years, but the im-

provement in 1987 was appreciably stronger for this type of tile. Analysis of quantities of tiles consumed shows appreciable differences from one country to another if one refers to the per capita consumption. It is strongest in Italy with 2 square metres per capita and weakest in the United Kingdom with about 1/2 square metre per capita.

### Production

With an annual production of about 650 million square metres, the Community tiles industry occupies the first place among world producers whose total production is estimated at 1 billion square metres. With the entry of Spain and Portugal into the EC in 1986, two very competitive industries increased the Community's production capacity by about 30%.

Thanks to large investment in research and development and to their intrinsic quality and design, Community products have achieved a world-wide reputation. Dimensional and qualitative standardization (CEN standards) and the development of rational methods for the placing of tiles has greatly facilitated their distribution.

The tiles industry, which comprises about 620 undertakings employing about 65 000 workers, is widely spread throughout the Community but has two strong regional concentrations: the Italian region of Sassuolo (province of Modena and Reggio Emilia) where about 55% of the EC's production is located, and the Spanish region of Onda (Castellon) which comprises 20%.

The introduction of new technologies in the last few years, notably single firing and the installation of automated lines, has led to a profound transformation in the process and organization of undertakings which have reached a very high degree of modernization and competitiveness. However, labour costs are still a large part of total costs (between 30%

## Main Indicators Ceramic Tiles

| (Million square metres)    | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 |
|----------------------------|------|------|------|------|------|------|------|------|
| Apparent consumption       | 493  | 455  | 445  | 462  | 448  | 448  | 472  | 534  |
| Net Export                 | 104  | 103  | 104  | 120  | 146  | 126  | 112  | 113  |
| Total Community production | 597  | 558  | 549  | 582  | 594  | 574  | 584  | 647  |
| Employment (1 000)         | 83   | 82   | 74   | 68   | 64   | 60   | 63   | 65   |

(1) EC 10 (excluding Denmark and Ireland).



**Table I**  
**Ceramic Tiles**  
**Production and Foreign Trade (1)**

|   | 1980 | 1981 | 1982 | 1983 | 1984  | 1985 | 1986 | 1987 |
|---|------|------|------|------|-------|------|------|------|
| Production<br>(Million m <sup>2</sup> ) | 597  | 558  | 549  | 582  | 594   | 574  | 584  | 647  |
| Index                                   | 100  | 94   | 92   | 97   | 99    | 96   | 98   | 108  |
| Imports extra EC                        | 64   | 78   | 64   | 75   | 71    | 62   | 62   | 61   |
| Index                                   | 100  | 122  | 100  | 117  | 111   | 96   | 97   | 96   |
| Exports extra EC                        | 638  | 721  | 712  | 843  | 1 039 | 954  | 855  | 904  |
| Index                                   | 100  | 113  | 112  | 132  | 163   | 149  | 134  | 142  |
| X/M                                     | 10.0 | 9.2  | 11.1 | 11.2 | 14.6  | 15.4 | 13.8 | 14.8 |

EC 10 (excluding Denmark and Ireland).

Sources: Cérame-Unie and Eurostat

and 45%). Being entirely dependent for its markets on activity in building, the tiles industry has been hard hit by the stagnation, even sharp recession, which has persisted in this sector since 1979.

The relationship between volume and numbers employed indicates an appreciable increase in productivity between 1980 and 1987, following rationalization and restructuring measures.

### Foreign Trade

Thanks to the efforts that the Community industry is making to penetrate world markets and to the intrinsic quality of its products and their design, about 20% of its production is exported at present outside the Community, of which a large proportion (20%) is sold on the American market where tiles imported from the Community represent about 60% of total imports 20% are exported to Asian markets.

The elimination of tariff and non-tariff barriers existing on many markets would allow considerable expansion of exports from the Community industry with, however, different degrees of penetration according to climatic conditions and the traditional use of ceramic products on the different markets.

In 1986, with the accession of Spain and Portugal, extra Community imports were considerably reduced (by about 20 million square metres) to the advantage of intra-Community imports. In total, imports coming from third countries represented in 1987 about 2.5% of the global consumption by volume, while by current value the percentage was appreciably lower (1.6%). For certain segments of the market (e.g. single coloured tiles) the rate was much higher.

The cover rate for extra-Community imports was largely positive and has grown strongly since 1980.

### Situation in Third Countries

The tiles industry has been greatly strengthened in a number of third countries during the last few years, particularly in South Korea which now has the best equipped industry in South-East Asia. Its exports into the Community market at very low prices, especially small size tiles (mosaics), have increased rapidly since the beginning of 1980.

The same development occurred in Brazil where the ceramic tiles industry is second in the world with an estimated production of 200 million square metres; its exports into the Common Market and the traditional export markets of the

**Table II**  
**1987 National Indicators**

|   | BLEU | D   | GR  | E     | F   | I     | NL  | P   | UK  |
|---|------|-----|-----|-------|-----|-------|-----|-----|-----|
| Production<br>(million m <sup>2</sup> ) | 2    | 64  | 6   | 151   | 32  | 350   | 14  | 13  | 15  |
| Imports extra-EC<br>(million ECU)       | 2    | 27  | 1   | 1     | 7   | 5     | 9   | 1   | 10  |
| Exports extra-EC<br>(million ECU)       | 3    | 98  | 1   | 137   | 33  | 602   | 6   | 14  | 10  |
| X/M                                     | 1.5  | 3.6 | 1.0 | 137.0 | 4.7 | 120.4 | 0.7 | 14  | 1.0 |
| Employment (1 000)                      | 0.5  | 9.0 | 0.7 | N/A   | 4.0 | 29.0  | 1.0 | 5.0 | n/a |

Sources: Cérame-Unie and Eurostat.

EC industry have increased strongly in recent years, particularly in 1987 (+ 141% by volume, + 96% by value).

Continental China, a country with a strong ceramic tradition, is devoting large resources to the modernization and development of its ceramic industry, with a special eye to exporting. Manufacture of ceramic products for the construction industry, like tiles and sanitaryware, includes about 360 factories and employs about 100 000 people; it is currently planned to increase considerably during the coming decade.

Important development in production capacity has also been going on in East European countries, particularly Yugoslavia. Imports from these countries now make up a third of all extra-Community imports by volume, but only 13% in value.

During the 1970s Japan, whose production capacity of tiles for floors and walls is about 65 million square metres, was the Community industry's main competitor in the small size tiles sub-sector (mosaics) where this country held the major part in certain Community markets.

### Forecast and Outlook

Since the figures for external trade for the first six months of 1988 are not yet available, it is difficult to estimate the changes in internal consumption or external demand. Nevertheless, it is likely that global demand for tiles will continue its upward trend since it is forecast that, for the third consecutive year, there will be an increase in activity throughout the whole of the construction industry. This will perhaps take place at a

lower rate due to the reduction in State-subsidized housing although private non-residential construction and renovation of older properties will continue to grow.

When the large internal market becomes operative there will also be a number of fundamental changes in the conditions under which companies will henceforth have to operate. Notably in the area of standards and technical regulations, industries involved with construction materials will be able to operate within a harmonized framework at Community level for the production and distribution of their products. As for harmonization of indirect fiscal measures, it is difficult to foresee their impact, decisions not yet having been taken at Community level.

In the long run it is expected that some markets, at present not sufficiently receptive to European tiles, will open up more as the result of structural changes like the method and quality of life, distribution systems and changes in internal demand and purchasing power. The creativeness of the Community industry and the development of new technologies are major trump cards in the penetration of markets where growing needs are appearing for improved wear, security, comfort and product design. It can be seen that owners and designers attach more and more importance not just to the decorative quality of tiles but to the idea of cost in the life of the materials, including their maintenance.

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# TABLEWARE AND ORNAMENTALWARE

(NACE 248.6 AND 248.7)

*The ceramic tableware and ornamentalware industry enjoyed relative stability in the period from 1980 to 1987. It provided 113 000 jobs and the value of production reached approximately 2.5 billion ECU in the latter year 1987. The European industry has been running into stiff competition from third countries on its own markets since 1985. Japan, China and South Korea have won a larger share of the European market. The future of the industry now depends on its ability to integrate new technology and its capacity to gain ground in export markets.*

This sector includes a wide range of consumer products equipment and decorative ware for households, the hotel industry and institutions. According to the mix of raw materials, the products can be in porcelain, earthenware, stoneware or terracotta.

## Consumption Trends

Consumption figures both in volume and value since 1980 indicate that consumption was almost static until 1987 when it improved and surpassed the level reached in 1980. However, according to the types of products and special characteristics in each country, changes were different.

Thus, in the ornamentalware sector a constant upward trend in volume of consumption since 1980 can be seen, if 1982 is ignored. In the same period the quantity of consumption in the ceramic tableware sub-sector was practically static until 1987 and showed an appreciable reduction in value in 1984 and 1985.

As the domestic ceramic sector does not depend on an industrial user sector which is stagnating or in recession, it has

resisted the economic depression better than most of the other sectors in the ceramic industry. However, during recent years it has suffered from an appreciable contraction in its markets which have experienced stagnation, or even reduction in the purchasing power of households and have been subject to very keen competition. This situation shows itself in the squeezing of prices and the restructuring of companies with a number of closures.

During recent years, the earthenware sector has suffered losses of important markets to the benefit of vitrified products (porcelain-stoneware). A number of earthenware producers have reverted to this type of product. Competition from substitute products like glass and plastic has become established in certain specific outlets. However, thanks to their intrinsic qualities, especially strength and hygiene as well as decorative and aesthetic appeal, ceramic products have been generally able to resist this competition.

In a sector where research into form and decoration answers an essential aspect of demand, dimensional standardization is only applied as an accessory in certain segments of the market (e.g. equipment for communities).

## Production

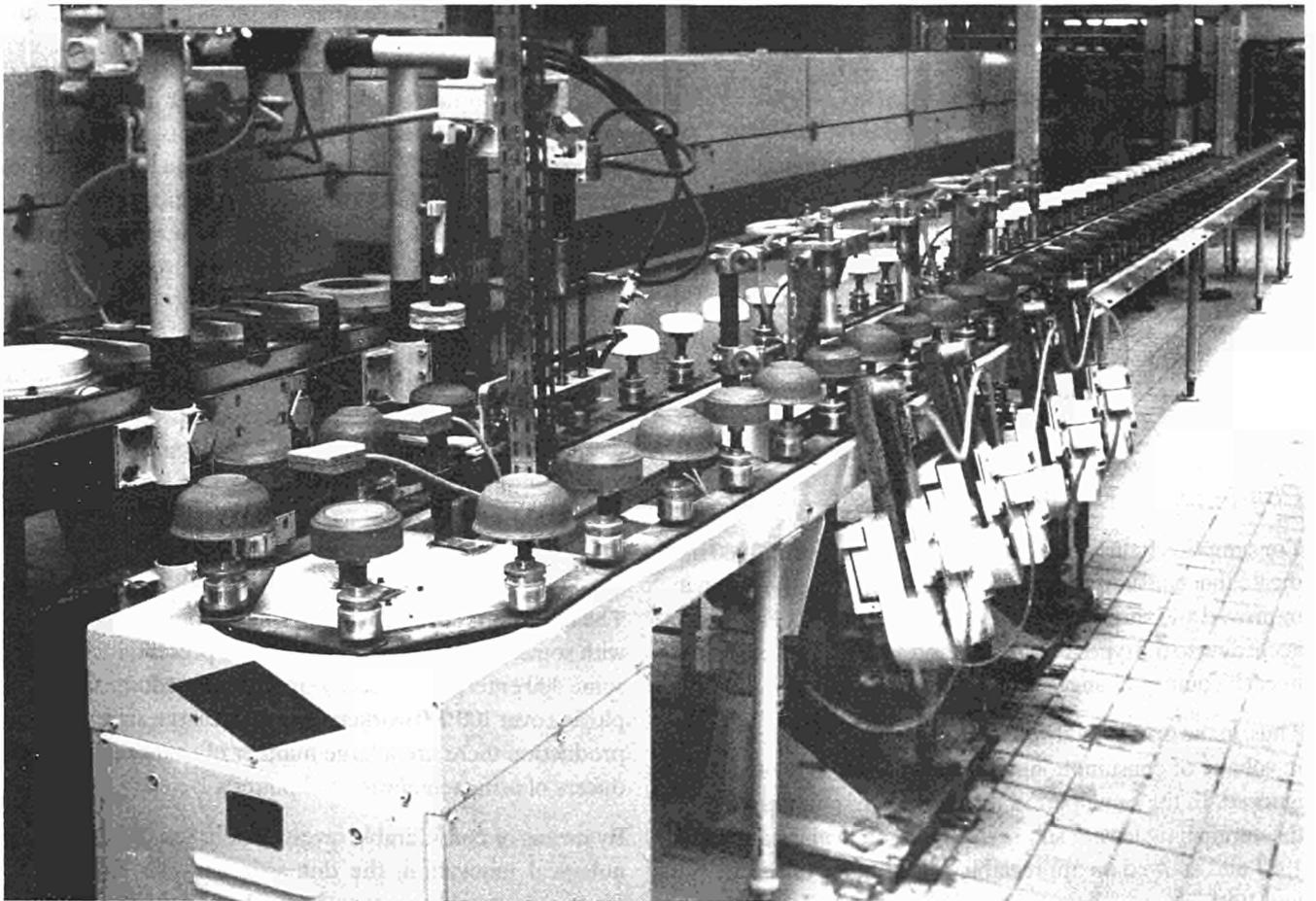
The industry is spread over the whole Community territory, with some regional concentrations. At present, it comprises some 400 enterprises, mostly small- and medium-sized, employing over 100 000 workers. Alongside largescale industrial production there are a large number of small regional producers of ornamentalware and pottery.

By means of considerable investment in research and technological innovation, the domestic ceramic industry has made considerable progress in mechanizing different stages of the manufacturing process and in the quality of its products. In particular, the introduction of rapid firing at high

**Main Indicators**  
**Tableware and Ornamentalware**

| (Million ECU)              | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  | 1987  |
|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Apparent consumption       | 2 086 | 2 164 | 1 999 | 2 059 | 1 993 | 1 947 | 2 029 | 2 188 |
| Net export earnings        | 173   | 157   | 222   | 278   | 299   | 443   | 375   | 292   |
| Total Community production | 2 259 | 2 321 | 2 221 | 2 337 | 2 292 | 2 390 | 2 404 | 2 480 |
| Employment (1 000)         | 183   | 179   | 175   | 134   | 127   | 127   | 115   | 113   |

EC 11 (excluding Ireland)..



temperature and the improvement in colouring substances has led to products with ever better resistance to wear. However, research of a very high quality can produce a limit to mechanization, and labour costs still account for 50% to 60% of production costs.

The ceramic tableware and ornamentalware industry is highly dispersed, particularly in the southern areas of the Community since the recent enlargement. Statistical information, therefore, remains very fragmentary in spite of efforts made at the professional level of the Community to improve the situation. As a result, the analyses are often based on estimates.

### Foreign Trade

Overall, third countries have been able to improve their position appreciably in the EC after a reduction between 1980 and 1985. The rate of penetration in the tableware sector of extra-Community imports grew in volume from 15.3% in 1980 to 18% in 1987 and in value from 11% to 13%.

In the porcelain tableware sub-sector, the change was particularly significant in 1987 with an increase of 30% by volume and 13.6% by value of imports from third countries, when internal Community imports only increased by 8.7% in volume and by 11.7% in value. The reduction of average prices of imported products is exerting considerable pressure on prices in a market which is globally static with only a slight expansion at the beginning of 1987. In the earthenware and stoneware sub-sector, third country progress was about 14% with a slight increase in average prices.

A large part of the Community industry's revenue was achieved in the world markets. In spite of very strong competition and tariff and non-tariff barriers which have continued there, it has been possible to improve exports of tableware and ornamentalware considerably between 1980 and 1987; +46% by value and +86% by volume. The rate of exports was 20% in 1980 and reached 27% in 1987. The progression of extra-Community exports between 1980 and 1987

in the tableware sector (+36% by value, +3% by volume) indicates that the demand in third countries centres mainly on the high end of the product range where quality and design are the determining factors.

The North American markets, above all the USA, traditionally constitute the main outlets for the Community industry. By volume, exports from the Community to the USA, the market where the Community industry is meeting growing competition from its main competing countries, has remained rather stagnant during the last four years, with a tendency to reduce in value. The drop in value of the US dollar has also strengthened the competitive position of a number of Third World countries which have adopted the US dollar for their commercial transactions.

### Situation in Third Countries

Among the main producer countries, Japan takes first place with a production of 600 000 tonnes in 1985 of which porcelain tableware represented about 70% and approximately 60% was exported. The USA imports about 60% of Japanese exports and the EC about 10%. The ceramic industry in Japan is based on very old traditions and an excellent and abundant supply of raw materials, notably kaolin, feldspar and silica. It is estimated that there are about 600 factories. Several large groups of companies have manufacturing units abroad.

During the last few years, the Chinese porcelain industry, based on an age-old tradition, has been strongly developed and modernized with the help of public support. The volume of production has grown constantly as well as the quality. It is difficult to estimate the production capacity of the Chinese industry. Among the five principal centres where modernization was to be carried out in the seventh plan is the region of Jingdezhen, where about 350 million pieces of porcelain apart from other ceramic products were produced in 1985. China, which was among the principal world exporters of porcelain, is at present seventh, after Japan and Taiwan; exports of stoneware products have increased noticeably.

Table I  
Production and Foreign Trade

| (Million ECU)    | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  | 1987  |
|------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Production       |       |       |       |       |       |       |       |       |
| Current value    | 2 259 | 2 321 | 2 221 | 2 337 | 2 292 | 2 390 | 2 404 | 2 480 |
| Index            | 100   | 102   | 99    | 103   | 101   | 106   | 106   | 110   |
| Imports extra-EC | 290   | 332   | 286   | 302   | 324   | 285   | 314   | 383   |
| Index            | 100   | 114   | 99    | 104   | 112   | 98    | 108   | 132   |
| Exports extra-EC | 463   | 489   | 508   | 580   | 623   | 728   | 689   | 675   |
| Index            | 100   | 106   | 110   | 125   | 135   | 157   | 149   | 146   |
| X/M              | 1.6   | 1.5   | 1.8   | 2.0   | 1.9   | 2.4   | 2.2   | 1.8   |

EC 11 (excluding Ireland).

Source: Cérame-Unie and Eurostat.

**Table II**  
**1987 National Indicators by Product**

| (Million ECU)        | BLEU | DK  | D   | GR  | E    | F   | I   | NL  | P   | UK  |
|----------------------|------|-----|-----|-----|------|-----|-----|-----|-----|-----|
| Production           |      |     |     |     |      |     |     |     |     |     |
| Production tableware | N/A  | N/A | 658 | 27  | N/A  | 180 | N/A | 9   | 51  | 458 |
| Ornamentalware       | N/A  | N/A | 165 | N/A | N/A  | 19  | N/A | 7   | 45  | 146 |
| Total                | N/A  | N/A | 823 | N/A | N/A  | 199 | N/A | 16  | 96  | 604 |
| Imports extra-EC     |      |     |     |     |      |     |     |     |     |     |
| Tableware            | 11   | 17  | 56  | 3   | 3    | 29  | 21  | 18  | 2   | 39  |
| Ornamentalware       | 7    | 6   | 53  | 1   | 4    | 27  | 20  | 20  | 2   | 45  |
| Total                | 18   | 23  | 109 | 4   | 7    | 56  | 41  | 38  | 4   | 84  |
| Exports extra-EC     |      |     |     |     |      |     |     |     |     |     |
| Tableware            | 17   | 16  | 118 | 1   | 8    | 35  | 35  | 4   | 16  | 163 |
| Ornamentalware       | 2    | 15  | 55  | 1   | 51   | 13  | 71  | 10  | 14  | 29  |
| Total                | 19   | 31  | 173 | 2   | 59   | 48  | 106 | 14  | 30  | 192 |
| X/M                  |      |     |     |     |      |     |     |     |     |     |
| Tableware            | 1.6  | 0.9 | 2.1 | 0.3 | 2.7  | 1.2 | 1.7 | 0.2 | 8.0 | 4.2 |
| Ornamentalware       | 0.3  | 2.5 | 1.0 | 1.0 | 12.8 | 0.5 | 3.6 | 0.5 | 7.0 | 0.6 |
| Total                | 1.1  | 1.4 | 1.6 | 0.5 | 8.5  | 0.9 | 2.6 | 0.4 | 7.5 | 2.3 |
| Employment (1 000)   |      |     |     |     |      |     |     |     |     |     |
| Tableware            | N/A  | N/A | 21  | 1   | N/A  | 6   | N/A | 0.6 | N/A | 12  |
| Ornamentalware       | 0.2  | N/A | 6   | N/A | N/A  | 0.6 | N/A | N/A | N/A | N/A |
| Total                | N/A  | N/A | 27  | N/A | N/A  | 6.6 | N/A | N/A | N/A | N/A |

Sources: Cérame-Unie and Eurostat.

China doubled its exports of tableware and ornamentalware into the Community in 1987, mainly in the porcelain sector. This country has thus become the biggest foreign supplier of porcelain tableware to the Community by volume; by value, however, it is exceeded by Japan and East Germany. In the field of ornamentalware Taiwan has become the largest supplier with a one-third increase in 1987.

South Korea very rapidly became the chief supplier in the market segment of articles in stoneware in 1981-1983. Market saturation and activities released by the very active sales policy of South Korean exporters, also backed up by copying Community models and decoration, have had the effect of stopping the development which resumed in 1987 with a growth of more than 30%.

### Forecast and Outlook

Statistics relating to external trade are not available for the first half of 1988. Therefore it is difficult to have any precise idea on the subject of changes in trade. It is, however, expected that there will be a further increase in imports from Third World countries. On the whole, revenue is likely to be static in 1988 with perhaps slight expansion in some sub-se-

tors. The increase in exports will reach a rate higher than sales on the internal markets.

In the long run, the EC industry's strength in technological advances and creativity should enable it to maintain and strengthen its market positions. The fundamental demand for direct consumer products like ceramic tableware is determined by demographic factors, particularly changes in the number of households. Thus the dropping of this rate observed in Western countries for the younger age groups will have an impact on the markets of the Western countries. On the other hand, potential new markets are being created due to important demographic changes forecast for a number of newly industrialized countries. Changes in the tourist and restaurant trades will influence the hotelware markets favourably.

On a more general level, changes in purchasing power available to households and influenced by the incomes policies followed by governments will remain a determining factor in the future as the trends in the past few years have demonstrated.

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# TECHNICAL CERAMICS

(NACE 248.8)

*After a period of growth that followed the oil crises, the European technical ceramics industry has declined and undergone sweeping restructuring since the early 1980s. In the sector of the advanced ceramics, covering a large and constantly growing number of applications, the operational basis of the EC industry is undergoing considerable changes.*

The vast range of products embraced under the title of technical ceramics includes, besides a number of electroceramic products like insulators and insulating pieces, a large number of materials and ceramic products for electronic, mechanical and various other applications. The latter group includes the more traditional products for laboratories, chemical industries, the rural economy and the whole field of materials and new ceramic products, called collectively "advanced ceramics" or "new ceramics".

## Current Situation

### Insulators

The sector for high tension ceramics has seen considerable enlargement in its production capacity in order to meet the large increase in demand after the first oil crisis, a period when important extensions to electrical distribution networks throughout the world were carried out or planned. Later, with the depression in industrial activity, these programmes suffered big cutbacks, as has been the case in the nuclear energy field, and this led to a savage return to the situation of 1977 and has necessitated a considerable reduction in the EC insulator industry's activity.

This situation has deteriorated still further due to the effects of widespread investment in a number of countries with planned economies which have ceased to be importers of electrotechnical ceramics and have become exporters. At the same time the main competitor for the EC industry, Japan, has consolidated its leading position on world markets. Japanese insulators production capacity (about 140 000 tonnes) considerably exceeds the Community's capacity and is very concentrated. One company alone accounts for 80% of Japanese very high voltage insulator production. Japanese exports of 7kV insulators rose to 52 000 tonnes in 1986 at a value of 28 billion YEN.

In East European countries, it is in Yugoslavia that development of the electrotechnical porcelain industry has been most rapid and now surpasses the capacity of the EC industry. Benefiting from customs freedom, this country has been able to develop its exports into the Community rapidly at very low prices. Increases in production capacity for electrotechnical ceramics are also expected in South-East Asia, in India, China and Brazil.

The appearance of substitute materials (toughened glass, synthetic materials) has also reduced the market for ceramic insulators. All these factors have combined to place the Community industry in a very difficult position and have led to the closure of a number of companies and reduction in capacity and employment. Thus, of 16 companies existing in 1977 there remained no more than 10 in 1982 of which the Belgian company has passed into Japanese control. During the same period the labour force, which had been about 6 000 people, was reduced by half.

Data available on changes in EC production of ceramic insulators confirm this change. Production, which reached about 48 000 tonnes (98 million ECU) in 1977, dropped in 1980 to 39 000 tonnes (107 million ECU), in 1981 to 35 000 tonnes, and in 1983 to 30 000 tonnes (figures are not available for subsequent years). Community consumption in 1977 appeared to be about 30 000 tonnes. In 1983 it was about 25 000 tonnes.

**Table I**  
**Production Trends in Some Countries**

| (Million ECU)                          | 1980 | 1981 | 1982 | 1983 | 1984 |
|--|------|------|------|------|------|
| Germany                                |      |      |      |      |      |
| Insulators                             | 36   | 38   | 44   | 45   | 42   |
| Insulating pieces                      | 69   | 61   | 66   | 70   | 89   |
| Total                                  | 105  | 99   | 110  | 115  | 131  |
| France                                 |      |      |      |      |      |
| Insulators                             | 25   | 22   | 24   | N/A  | N/A  |
| Insulating pieces                      | 13   | 12   | 13   | N/A  | N/A  |
| Total                                  | 38   | 34   | 37   | N/A  | N/A  |
| Portugal (1)                           |      |      |      |      |      |
| Total insulators and insulating pieces | 2    | 2    | 2    | 1    | 1    |
| United Kingdom                         |      |      |      |      |      |
| Insulators                             | 27   | 27   | 27   | 26   | 26   |
| Insulating pieces                      | 18   | 21   | 18   | 24   | 24   |
| Total                                  | 45   | 48   | 45   | 50   | 50   |

(1) Figures are in tonnes.  
Source: Cerame-Unie.

### Advanced technical ceramics

The market for advanced ceramics is mixed and covers a high number of applications which are constantly growing. Roughly speaking it is possible to differentiate between advanced ceramics used in electronic applications which form the largest part of the market and those used in mechanical/engineering construction. Other fields of application are optical, chemical, biological and nuclear.

Some examples from an impressive list of applications for advanced ceramics are as follows: capacitors, resistors, sensors, ferrites, substrates, cases for integrated circuits, materials for high temperature cladding, fibre optics, optical memories, diodes for lasers, semi-conductor supports, electrical elements for condensers, piezo-electric materials, accumulators, magnetic memories, prostheses and dental implants, cleaning catalysts, cutting tools, abrasives, elements for turbines, motors and various machines. For many applications the markets have not been developed. This is the case in the area of ceramics motors and motor parts where great efforts in research and technological developments are still needed.

Statistical data relating to the structure, activity and markets of the main sub-sectors in this rapidly changing industry are not available. Not having its own chapter available in NACE, advanced technical ceramics are scattered over a large number of different nomenclature headings; they are moreover difficult to identify as they are made up for the most part of components for complex products. The setting up of terminology and uniform classification of technical ceramics within the framework of the standardization work proposed at the EC level should serve as a good basis for the establishment of an adequate statistical system in this sector.

In the absence of viable statistics, it is difficult to hazard a guess, however imprecise, of the world market, but it is thought it could be around USD 5 billion at present.

The tendency to horizontal and vertical concentration continues at Community level, particularly by the inclusion in the same large industrial group of both producers and users of ceramic materials and products. This is very noticeable in the chemical sector where production techniques are established for powders for advanced ceramics.

In most EC countries, as in third countries, a growing number of new undertakings are springing up in the field of new ceramics; at the same time existing companies are enlarging their production programmes. As is generally the case with new products where markets will only develop with time, the investment required is very high.

### Foreign Trade and Third Countries

Thanks to the very high quality of the EC's insulators, a large proportion of production was exported outside the

Community (40% in 1983). To direct exports should be added the indirect exports incorporated in equipment built by EC manufacturers. The main outlets for the EC industry are in Asia which absorbed 34% of total exports whilst EFTA took 23%. In many developing third countries there is considerable potential demand for EC products with a high technical content which, however, suffer from a number of tariff and non-tariff obstacles.

Overall, direct extra-Community imports increased by 13% in volume and 60% in value between 1980 and 1986; it is again necessary to add indirect imports of products incorporated in varied materials and apparatus imported from outside.

For some types of product, penetration is appreciably higher. As far as advanced ceramics are concerned, the EC industry is faced with very keen competition from the American and Japanese industries which, at present, dominate this market of which they probably hold a share of some 80%.

Table II  
Foreign Trade Trends

| (Million ECU)                            | 1983 | 1984 | 1985 | 1986 |
|--|------|------|------|------|
| Exports extra-EC                         |      |      |      |      |
| Insulators                               | 36   | 34   | 45   | 48   |
| Insulating pieces                        | 13   | 14   | 18   | 17   |
| Products for technical and chemical uses | 46   | 56   | 63   | 63   |
| Total                                    | 95   | 104  | 126  | 128  |
| Imports extra-EC                         |      |      |      |      |
| Insulators                               | 18   | 13   | 21   | 17   |
| Insulating pieces                        | 18   | 19   | 22   | 18   |
| Products for technical and chemical uses | 17   | 14   | 35   | 31   |
| Total                                    | 53   | 46   | 78   | 68   |
| Export/import                            |      |      |      |      |
| Insulators                               | 2.0  | 2.62 | 2.14 | 2.82 |
| Insulating pieces                        | 0.72 | 0.74 | 0.82 | 0.94 |
| Products for technical and chemical uses | 2.71 | 4.0  | 1.40 | 2.03 |
| Total                                    | 1.79 | 2.26 | 1.62 | 1.94 |

Sources: Eurostat and Cerame-Unie.

In the sector of ceramics for electronic components it is the Japanese who largely predominate, as they do for the supply of powders for advanced ceramics, whilst the USA hold a very strong position in ceramics for mechanics/engineering construction. However, Japan is exerting much effort in applications for motors.

Japan owes its strong position less to its superiority in fundamental research than to the close cooperation which exists between industries, universities and government agencies; the latter allows close coordination and favours the transfer

**Table III**  
**Import/Export Values by Geographical Zones**

| (% Value of extra-EC Total) | 1983       | 1984       | 1985       | 1986       |
|-----------------------------|------------|------------|------------|------------|
| <b>Exports</b>              |            |            |            |            |
| Non-EC Europe               | 36         | 38         | 34         | 33         |
| North America               | 10         | 14         | 13         | 11         |
| Central and South America   | 6          | 3          | 4          | 3          |
| Asia                        | 27         | 14         | 27         | 16         |
| Africa                      | 10         | 8          | 7          | 3          |
| Others                      | 11         | 23         | 15         | 34         |
| <b>Total</b>                | <b>100</b> | <b>100</b> | <b>100</b> | <b>100</b> |
| <b>Imports</b>              |            |            |            |            |
| Non-EC Europe               | 22         | 23         | 20         | 19         |
| Eastern bloc countries      | 10         | 6          | 5          | 5          |
| America                     | 43         | 41         | 50         | 44         |
| Japan                       | 24         | 27         | 22         | 22         |
| Others                      | 1          | 3          | 3          | 10         |
| <b>Total</b>                | <b>100</b> | <b>100</b> | <b>100</b> | <b>100</b> |

Insulators, insulating pieces and products for technical and chemical uses.

Source: Cerame-Unie.

of basic research at development level and proper commercialization. The American industry has been able to develop techniques in special ceramics through benefiting from great support within the military and space programmes. It is thought that the federal government spend at least USD 50 million a year for research and development in this sector.

Equally, in some newly industrialized countries like South Korea, large investments are going into the development of new ceramics. An increase in the national market is expected from USD 200 million in 1980 to several billion in 1990.

Thanks to the research and development efforts of European industry specializing in advanced technical ceramics, it has been possible to reduce the gap. Also, the development of advanced ceramic techniques has had repercussions on the traditional ceramic industry as shown by a renewal of technology (e.g. isostatic pressing). In spite of considerable technological progress in the production of advanced ceramics, the latter always requires a large amount of handwork - a situation which bears heavily on costs.

## Forecast and Outlook

Faced with the uncertainty concerning development and modernization of electricity distribution systems, it is difficult

to evaluate future needs for high tension insulators. Overall, the high tension ceramics industry is confronted by a stagnant situation due to the almost stationary consumption of electrical energy. On the other hand, user industries are forced to devote a large part of their investment to protecting the environment, notably in the field of nuclear energy production. Technical evolution also lowers the specific consumption of insulators. Development of underground cables and, in the long term, of cryogenics and modifications of a technical nature to apparatus, will have a bearing on future demand. H.T. and V.H.T. insulators of the EC industry will continue to play an essential part in the viability and security of equipment for generation and distribution of electrical energy. Thanks to its potential for research and development, the insulator industry is in a good position to answer the new requirements these changes will bring.

Changes in the user sectors create a constant challenge to the new industry of advanced ceramics. It is difficult in the context of the general uncertain situation to evaluate the growth potential of different segments of the market, but it is practical to count on an accelerated rhythm of development on world markets, the size of which could be USD 50 billion by the year 2000. Some sub-sectors, such as electronic products, may perhaps expect lower rates of growth than in the past whilst a higher rate may be expected for micro-electronic products such as substrates and cases for integrated circuits; strong growth is expected for other applications such as piezo-electric ceramics, supports for anti-pollution catalysts and optical fibres.

At present, the position of the European industry in the world market is still modest compared to the USA and Japan; however, thanks to its considerable potential in research and development, it should move towards substantial growth in the last decade of the century. The realization of a large EC internal market and a larger cooperation at EC level should greatly help to achieve the necessary environment for the development of this young industry on which the technological progress of a number of key sectors in the EC is largely dependent.

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# REFRACTORY PRODUCTS

(NACE 248.1)

*Consumption is declining sharply in Europe as well as in the United States and Japan. This trend is likely to continue until the mid-1990s and to give rise to structural reorganization of this industry in Europe.*

## Current Situation

Refractory products are materials resistant to high temperatures and to hot or cold chemical or physical action. They come in the form of shaped materials (bricks and various pieces) or unshaped materials (concrete and various masses). Demand for refractory products has been declining steadily since the 1960s. From 1980 to 1986, total sales of shaped refractory products from the EC decreased by 26% in tonnage.

The main client sector for these products is the iron and steel industry, which takes up two-thirds of production. Sectors using 2%-10% of production include the following industries: ceramics, lime and cement, glass, chemicals/petrochemicals, non-ferrous metals, energy and heating.

In 1983, 290 firms in the Community employed 29 300 people.

### Foreign Trade

During the period 1980 to 1986 both exports and imports fell in real terms but the export/import ratio improved from 2.3 to 2.9.

Currency fluctuations create serious difficulties for exporting, since delays in production and delivery are often extended in this sector, which primarily works to order.

## Technology

Rapid technological progress by user industries has led to parallel development in the production capacity and

processes of the refractory products industry, making it possible to enhance considerably the performance of modern furnaces and other plant. Originally based solely on the use of fireclay available in the EC countries, this development has led to the introduction of other raw materials such as quartzite, magnesia, chromite, silicon carbide, extra-aluminous materials, zircon, etc., many of which come from outside Europe.

The development of products of increasing technicality has necessitated ever-greater investment in research and installations. These changes have hastened the disappearance of small firms and have accelerated concentration in the industry.

## Situation in Third Countries

Among third countries, the USA has a highly developed refractory products industry, characterized by large plants which tend to be specialized. Competition from Japan's highly developed industry is most evident in the area of high performance products and makes itself felt in markets outside the Community. The Eastern European planned economies represent competition at very low price ranges. China is making strong efforts to modernize and to develop a refractory products industry within the framework of an ongoing industrial development programme in which that industry constitutes an important element of industrial infrastructure.

As regards demand, it appears that the United States and Japan are confronted, as is Europe, with a considerable decline in their markets. In the United States, decline in demand resulting from structural changes in large user groups, which had already become clear in the EC between 1960 and 1970, did not have repercussions for the refractory products industry until much later. In 1982, an already weak demand fell even further owing to a sharp drop in steel production together with a change in consumption rates (crude steel

**Main Indicators**  
**Shaped Refractory Products**

| (Thousand tonnes)          | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  |
|----------------------------|-------|-------|-------|-------|-------|-------|-------|
| Apparent consumption       | 2 995 | 2 710 | 2 330 | 2 250 | 2 315 | 2 390 | 2 135 |
| Net exports                | 395   | 360   | 360   | 350   | 395   | 405   | 375   |
| Total Community production | 3 390 | 3 070 | 2 690 | 2 600 | 2 710 | 2 795 | 2 510 |

EC 9 (excluding Greece, Spain and Portugal).

**Table I**  
**Shaped Refractory Products**  
**Production and Foreign Trade**

| (Thousand tonnes) | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  |
|-------------------|-------|-------|-------|-------|-------|-------|-------|
| Production        | 3 390 | 3 070 | 2 690 | 2 600 | 2 710 | 2 795 | 2 510 |
| Index             | 100   | 91    | 79    | 77    | 80    | 82    | 74    |
| Imports extra-EC  | 305   | 280   | 190   | 160   | 175   | 215   | 200   |
| Index             | 100   | 92    | 62    | 52    | 57    | 70    | 66    |
| Exports extra-EC  | 700   | 640   | 550   | 510   | 570   | 620   | 575   |
| Index             | 100   | 91    | 79    | 73    | 81    | 89    | 82    |
| X/M               | 2.3   | 2.3   | 2.9   | 3.2   | 3.3   | 2.9   | 2.9   |

EC 9 (excluding Greece, Portugal and Spain.).

Sources: PRE - Fédération Européenne des Fabricants de Produits Réfractaires and national export statistics.

production in the United States in 1980 was 103 million tonnes, in 1981 it was 111 million tonnes, and in 1982 it fell to 69 million tonnes). In Japan, this decline was less marked than in the United States. Applied to 1986-1987, a comparison of indices based on 1980 = 100 shows similar trends for the EC, the United States and Japan.

### Forecast and Outlook

In the medium term, a further decline in the use of refractory products by the steel industry must be anticipated due to the growth of continuous casting, which uses a smaller quantity of refractory bricks. Moreover, smelting and casting furnaces are being made with high-quality, long-lasting refractory products whose performance under wear and tear can be monitored by advanced methods.

At the beginning of the 1990s, the EC steel industry's use rate for shaped refractory products should be below 8 kg per tonne of production of crude steel. In the coming years, it is highly unlikely that EC production of crude steel will be

appreciably higher than the 1987 level. This signals a new decline in demand for refractory products which, using 1986 as an index, is approximately 20%. However, the value-added content of these products will increase sharply and although the overall quantities used by the steel industry may decline, the fall in the real value of production will be much slower.

Demand does not appear to be growing in other sectors. To the contrary, a growth in specific demand comparable to that seen in the steel industry must be anticipated for most of the industries using refractory products. If there is no fundamental alteration in the thermal manufacturing process found in the steel, glass, non-ferrous metal and cement industries, which are the main users of refractory products, it must be anticipated that the structural reorganization which has been taking place throughout the refractory products industry for so many years will continue until the mid-1990s.

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# SANITARYWARE

(NACE 248.5)

*The ceramic sanitaryware sector has been hard hit by the stagnant and declining situation in the construction industry since the end of 1970. However, there are hopes that more spacious housing will increase demand in the future. The production of this branch of the ceramic industry includes the whole range of porcelain and fireclay sanitary equipment for bathrooms, lavatories and kitchens.*

## Current Situation

### Consumption

The ceramic sanitaryware industry depends, like the tiles industry, on changes in the construction industry, both private and public sector. It has been hard hit by the stagnant and declining situation which has been going on since the end of 1970 in this sector, particularly in house building. However, activity in the renovation of buildings has partially made up for the considerable shrinking in demand.

Overall consumption of ceramic sanitaryware in the EC was about 500 000 tonnes in 1985 of which about 5% was imported from outside.

### Production

Manufacture of sanitary equipment, which represents relatively heavy products, has seen far reaching changes during recent years, mainly due to the increasing mechanization. As a result, there has been an appreciable improvement in productivity. Production, which was about 515 000 tonnes in 1983 (nine countries) with a value of about 900 million ECU, was achieved in about 100 factories employing about 35 000 people. With the increase in the Community (Greece, Spain, Portugal), total EC production grew by about 100 000 tonnes. By reference to 1980, production of the nine countries suffered a reduction of 15% in 1983. Efforts at rationalization

have also centred around the definition of European dimensional standards in collaboration with users, installers and producers of taps.

### Foreign Trade

The industry's foreign trade has slipped since 1980, with the export/import ratio falling from 4.6 to 3.2.

Table I  
Foreign Trade

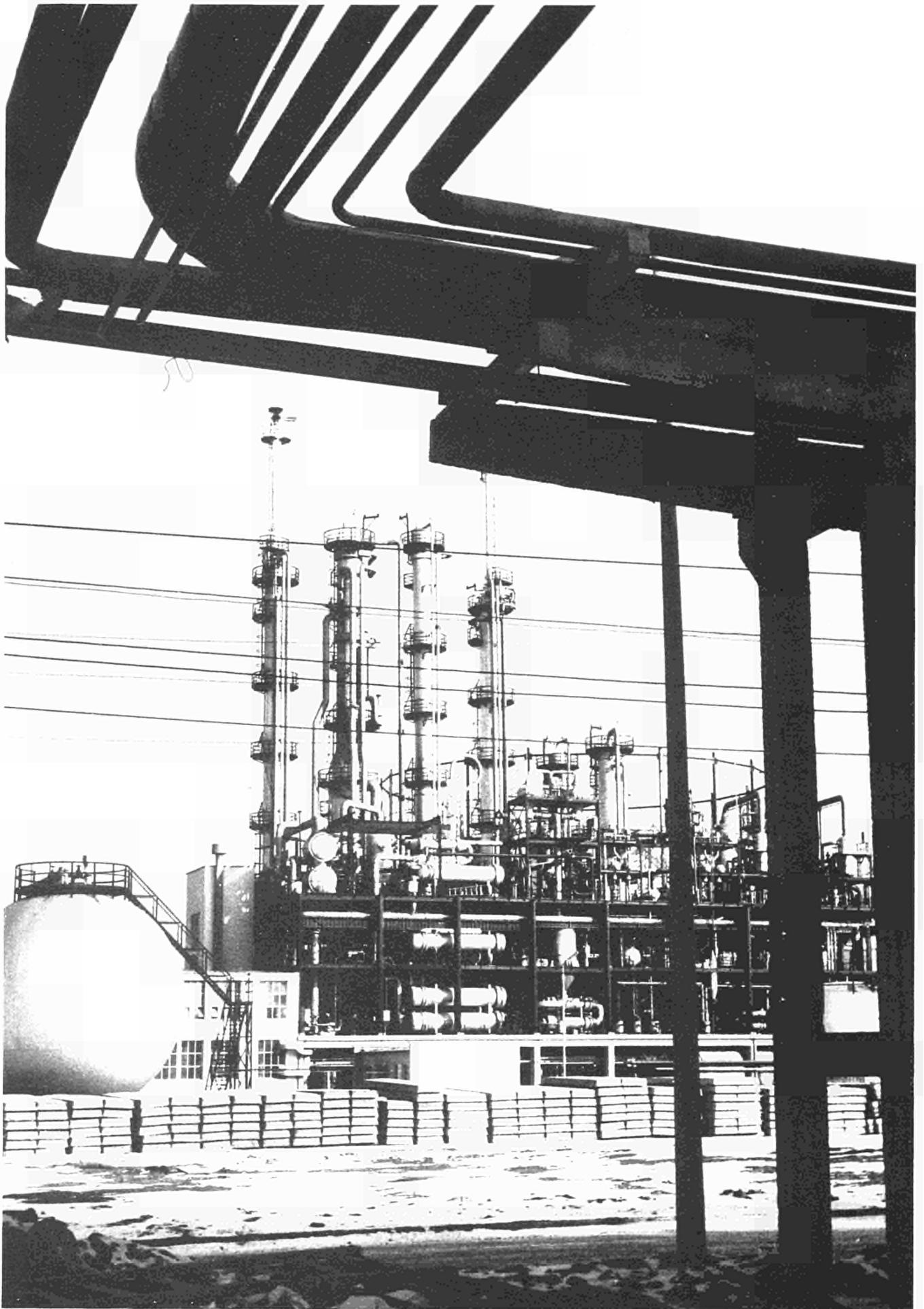
|                         | 1980  | 1983  | 1986  |
|-------------------------|-------|-------|-------|
| Imports                 |       |       |       |
| Extra-EC (million ECU)  | 26.8  | 32.4  | 43.3  |
| Quantity (1 000 tonnes) | 16.8  | 21.3  | 35.5  |
| Exports                 |       |       |       |
| Extra-EC (million ECU)  | 122.6 | 171.3 | 138.4 |
| Quantity (1 000 tonnes) | 75.3  | 76.9  | 60.4  |
| X/M                     | 4.6   | 5.3   | 3.2   |

1986: EC 12.  
1983: EC 10 (excluding Spain and Portugal).  
1980: EC 9 (excluding Greece, Spain and Portugal).  
Source: Eurostat.

## Forecast and Outlook

Whilst awaiting the improvement in the housebuilding situation to become steady, the considerable requirements for the renovation of buildings will influence consumption favourably. It should also be stimulated by various factors such as the tendency to build more spacious houses requiring more sanitary equipment to be installed.

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## THE CHEMICAL INDUSTRY

(NACE 25)

*The EC has one of the two largest chemical industries in the world supplying an estimated 27% of the world chemical output. This compares with the US share of the world market at around 24%. Steady growth has been experienced in the industry since the difficulties of the early 1980s and this trend is expected to be sustained over the medium term. Capacity utilization levels are high and capital investment is continuing at a strong pace.*

The chemical industry begins where the oil refining and extractive industry ends. It provides materials and products to many sectors of the industrial economy as well as a wide range of goods to consumer markets.

The major activity sectors of the chemical industry cover manufacture of the following groups of products:

- basic industrial chemicals
- fertilizers and nitrogen compounds
- plastics in primary forms and synthetic rubber
- pesticides and other agrochemical products
- paints, varnishes and similar coatings, inks and fillers
- pharmaceuticals, medical chemicals and botanical products
- soap and detergents, cleaning and polishing preparations, perfumes and toilet preparations
- chemical products n.e.s.
- man-made fibres (NACE 26).

### Current Situation

Chemicals are the third largest manufacturing industry in the EC, representing around 10% of total manufacturing output in terms of value added. At least 9 000 chemical companies operate in the EC. Despite being hit by two oil shocks over the past 14 years, the chemical industry has maintained its rapid pace of growth, compared with other industries. In the period 1970-87, the EC industry increased its production by 76%, compared with a rise of 41% for manufacturing industry as a whole. Although oil prices since 1974 have increased by around 250% in nominal terms, chemical prices rose less than consumer prices in general, with the industry having to contain increases in raw materials cost.

Capital investment by the chemical industry totalled 12.8 billion ECU in 1987 or 12% of investment by manufacturing industry as a whole. The EC chemical industry spends, on average, more than 4% of its turnover on research and development, or an estimated 10 billion ECU in 1987. In sectors such as agrochemicals and pharmaceuticals, this can rise to as much as 10-12% of turnover.

In 1987, after a weak start the recovery of chemicals output led to overall growth of almost 4%, reflecting the high level of domestic European demand. Most sectors experienced high capacity utilization. Production was particularly strong in basic petrochemicals, plastics and several consumer related sectors, whereas performances in fertilizers and in fibres remained weak. The upward trend in investment continued and overall employment in the industry was stable. In the EC as a whole, some downward pressure on producer prices was evident, especially in export markets.

### Main Indicators Chemical Industry

| (Million ECU)  | 1980     | 1981     | 1982     | 1983     | 1984     | 1985     | 1986     | 1987     |
|--|----------|----------|----------|----------|----------|----------|----------|----------|
| Apparent consumption (1)                                 | 137 110  | 151 924  | 162 089  | 173 561  | 197 483  | 212 333  | 205 768  | 212 400  |
| Net export earnings (1)                                  | + 14 664 | + 18 894 | + 18 429 | + 21 414 | + 25 606 | + 26 325 | + 22 214 | + 22 292 |
| Total Community production (2)<br>(not including fibres) | 155 600  | 174 404  | 183 703  | 199 780  | 209 641  | 223 219  | 199 162  | N/A      |
| Employment (1) (1 000)                                   | 2 097    | 2 040    | 1 961    | 1 912    | 1 905    | 1 905    | 1 910    | 1 908    |

(1) EC 11: Greece excluded. Spain and Portugal only included from 1985. Fibres included: UK, Germany, Netherlands, Denmark, Italy, Portugal. Rubber and plastic manufacturing included: Belgium, Spain.

(2) Eurostat data. EC 11: excluding Portugal. 1984, 1985: excluding Spain. 1986: excluding Spain, Netherlands, Greece.

**Table I**  
**Turnover and Investment Trends (1)**

| (Million ECU)            | 1980    | 1981    | 1982    | 1983    | 1984    | 1985    | 1986    | 1987    |
|--------------------------|---------|---------|---------|---------|---------|---------|---------|---------|
| Turnover (2)             | 152 285 | 170 196 | 180 645 | 195 562 | 223 850 | 240 473 | 229 331 | 236 143 |
| Gross investment (2) (3) | 7 426   | 7 512   | 7 457   | 7 886   | 8 218   | 10 553  | 12 024  | 12 782  |

(1) EC 11: excluding Greece.

(2) Fibres included for UK, Germany, Netherlands, Denmark, Italy, Portugal. Rubber and plastics manufacturing included for Belgium, Spain.

(3) 1986: excluding Portugal; 1987: excluding Portugal and Ireland.

Source: CEFIC.

### Employment Trends

The EC chemical industry provides direct employment for around 1.9 million people in western Europe, representing 7% of the workforce employed in manufacturing. Many employees in the industry are highly qualified and well trained.

Along with the rest of manufacturing industry, the chemicals sector has experienced a contraction in its workforce since 1974. However, the decrease was smaller than the overall average for industry - 13% for chemicals, compared with 18%.

### Export Trends

The value of the EC chemical industry's exports to the rest of the world totalled 45.9 billion ECU in 1987, an amount two times larger than US chemical exports and 4.5 times larger than those of Japan. The EC's trade surplus in chemicals stood at 22.3 billion ECU in 1987, compared with a corresponding surplus of 8.8 billion ECU for the US and a small deficit for Japan.

### Forecast and Outlook

1988 is expected to be another good year for the European chemical industry with continued firm demand and high levels of production and capacity utilization. Output is forecast to grow by some 2.5%, underpinned primarily by European domestic demand.

Export growth is expected to weaken this year to 4% in volume terms, partly due to currency movements against the US dollar resulting in reduced competitiveness of European products in world markets. By comparison, the volume of chemical imports is forecast to grow by 5.5%.

Once again, capital spending is expected to be a strong feature and is anticipated to grow by 6% in real terms. Employment should remain unchanged.

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**Table II**  
**Production and Foreign Trade**

| (Million ECU)        | 1980    | 1981    | 1982    | 1983    | 1984    | 1985    | 1985   | 1986    | 1987   |
|----------------------|---------|---------|---------|---------|---------|---------|--------|---------|--------|
| Production (1)       |         |         |         |         |         |         |        |         |        |
| Current value        | 155 600 | 174 404 | 183 703 | 199 780 | 209 640 | 223 219 | —      | 199 161 | N/A    |
| Index                | 100.0   | 112.1   | 118.1   | 128.4   | 134.7   | 143.5   | —      | 128.0   |        |
| Constant value (1)   | 155 600 | 158 056 | 153 822 | 158 851 | 157 698 | 160 836 | —      | 140 586 | N/A    |
| Index                | 100.0   | 101.6   | 98.9    | 102.1   | 101.3   | 103.4   | —      | 91.4    |        |
| Imports Extra-EC (2) | 12 665  | 14 029  | 15 844  | 18 167  | 22 099  | 24 642  | 25 331 | 23 665  | 23 591 |
| Index                | 100.0   | 110.8   | 125.1   | 143.4   | 174.5   | 194.6   | 100.0  | 93.3    | 93.2   |
| Exports Extra-EC (2) | 27 329  | 32 923  | 34 273  | 39 581  | 47 705  | 49 136  | 51 656 | 45 879  | 45 883 |
| Index                | 100.0   | 120.5   | 125.4   | 144.8   | 174.6   | 179.8   | 100.0  | 88.8    | 88.8   |
| X/M                  | 2.2     | 2.3     | 2.2     | 2.2     | 2.2     | 2.0     | 2.0    | 1.9     | 1.9    |

(1) Eurostat data. EC 11: excluding Portugal. 1984, 1985: excluding Spain. 1986: excluding Spain, Netherlands, Greece.

(2) EC 11: excluding Greece. Spain and Portugal only included 1985, 1986. Fibres included: UK, Germany, Netherlands, Denmark, Italy, Portugal. Rubber and Plastic manufacturing included: Belgium, Spain.

Sources: CEFIC, Eurostat.

RELATIVE SHARE OF WORLD CHEMICAL  
INDUSTRY PRODUCTION (%) - 1986

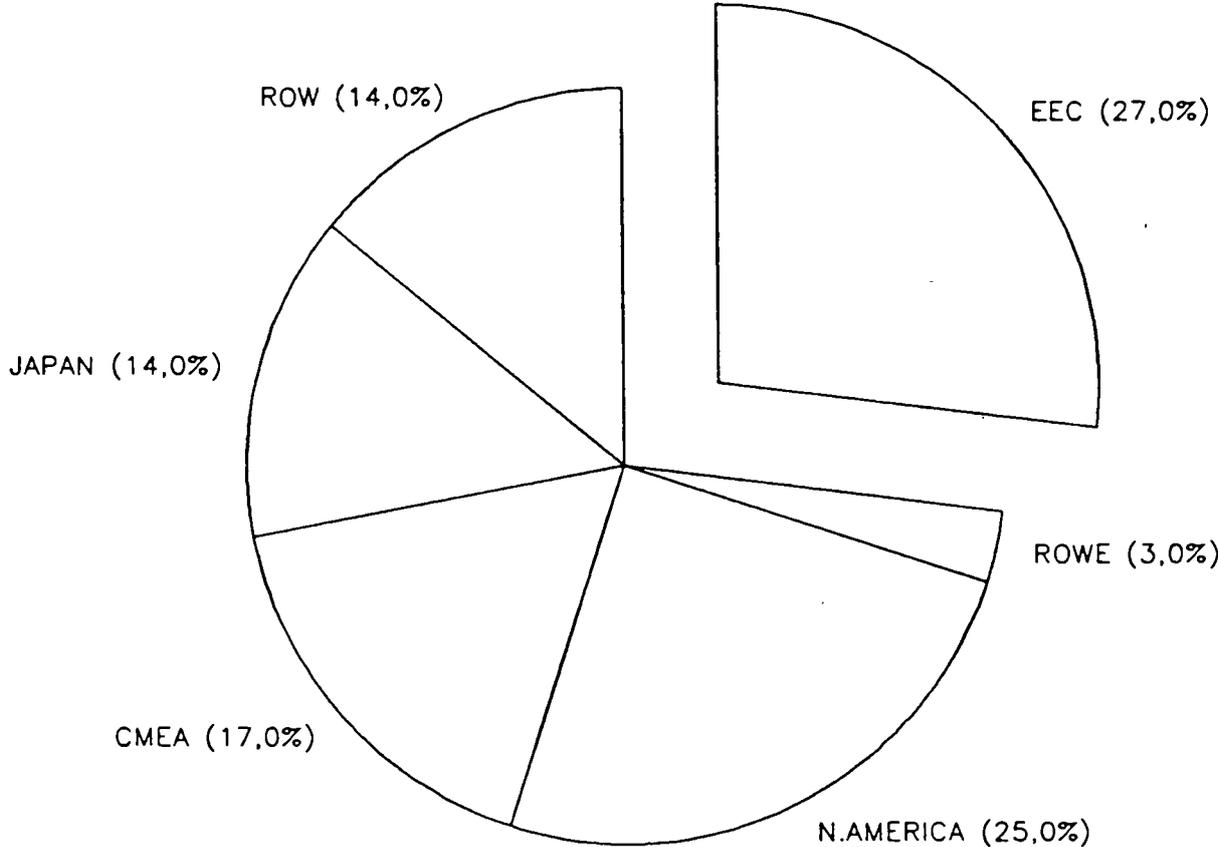


Figure 1

# PLASTICS

(NACE 252)

*The plastics manufacturing industry has experienced a dramatic turnaround over the last few years, and is currently enjoying its sixth year of sustained expansion in output. Growth in demand has originated mainly from within the Community; fulfilling domestic demand has taken precedence over export markets producing lower export levels in the industry. Investment in extra production capacity is viewed with caution due to longer term uncertainties in both the EC and world economy.*

The plastics industry consists of the production of polymers and synthetic resins, compounded with additives into materials named plastics, and of the processing of these materials into semi-finished and finished structural articles. Apart from plastics manufacturers and plastics processors, other operators essential to the plastics industry include manufacturers of processing equipment and of ancillary products used in the various stages of plastics production and processing. The plastics processing industry in the EC - mainly composed of small and medium-sized firms - achieved total sales of around 60 billion ECU in 1987, providing employment for around 700 000 people. The information and statistics provided below primarily relate to plastics manufacture in the EC; plastics processing is covered in greater detail in Chapter 24.

## Current Situation

The current yearly output of plastics manufacturers in the European Community is of the order of 18 million tonnes of plastics with a value of some 30 billion ECU.

In the economy generally, the role of plastics and synthetic resins is important; most industrial and consumer sectors are users of plastics either as raw materials or as ancillary products. Plastics manufacturers are not only suppliers of raw materials, but also strengthen the entire sector, by contributing largely to the technical and commercial development of plastics applications; the prosperity and innovative potential

of the plastics manufacturers affects the whole of the plastics manufacturing and processing industry.

In general, engineering and specialty plastics continue to be a growing business. The so-called major or bulk plastics, representing over two-thirds of total plastics production, have played an essential role in the strong development of the plastics industry since the Second World War. They have been vulnerable to the oil cost explosions and the economic slowdown over the period 1975 to 1983, which led to production overcapacities. The bulk plastics industry has been actively rationalizing and restructuring itself in more recent years, thus adjusting capacities and securing more economic operations. The past five year period has brought a recovery of demand and of financial returns for the industry.

Statistical data in this section covers production of the five major thermoplastics:

- low density polyethylene (LDPE)
- high density polyethylene (HDPE)
- polypropylene (PP)
- polystyrene (PS)
- polyvinyl chloride (PVC).

These represent an estimated 70% of total plastics production in the EC; in volume terms around 13.5 million tonnes, with a market value of approximately 17 billion ECU.

Based on 1987 data, EC production of these plastics, in volume terms, is slightly larger than equivalent US output and over twice as large as Japanese production.

## Consumption Trends

The broad range of product properties available and the tailoring of property profiles for application in defined uses has led to a wide and diversified demand for plastics. There are large and consolidated volume applications on the one hand

### Main Indicators Plastics (volume) (1)

| (1 000 tonnes)           | 1983   | 1984   | 1985   | 1986   | 1987   |
|--------------------------|--------|--------|--------|--------|--------|
| Production               | 11 392 | 11 733 | 11 849 | 12 542 | 13 348 |
| Apparent consumption (2) | 10 243 | 10 625 | 11 348 | 12 011 | 13 057 |
| Net exports (2)          | +1 355 | +1 434 | +975   | +765   | +661   |
| Employment (1 000)       | N/A    | N/A    | N/A    | N/A    | 170    |

(1) EC 12: estimates based on West European figures - APME; 1987: provisional estimates; the statistics cover production of LDPE, HDPE, PP, PS and PVC, and 95% of total production of these items in the EC; PS does not include expandable grades or acrylate or acrylonitrile modified grades.

(2) Imports include LLDPE.

and technical applications characterized by continuous development on the other. A very large number of industries use polymers along with other raw materials. The main outlets are found in the following industries:

- packaging (food, beverages, industrial)
- building and civil engineering
- transportation (motor vehicles, railways, aerospace, etc.)
- domestic appliances
- electrical and electronics
- communications technology (optical fibre, satellites, etc.)
- textiles
- agriculture and horticulture
- toys and leisure (sports, recreation)
- health and medical
- paper and wood
- photography (cameras, films, projectors)
- armaments (plastics are often strategic requirements).

After the difficulties of the early 1980s, the plastics industry has enjoyed relatively sustained growth in demand since 1984, partly reflecting generally improved economic conditions both within the EC and elsewhere. Steady growth in a number of the key industries which rely on inputs from the plastics industry has been a major factor in the recent upturn.

Most recently, double digit growth for some grades of plastics has meant sustained high growth rates in 1987 for EC plastics manufacturers in terms of production and sales. The continued growth in demand has meant that capacity utilization has often reached the highest practicable levels which has produced a progressive recovery of market prices. The sustained growth in plastics demand is attributed to the improved economic environment but more particularly, to good conditions in end-user sectors such as the automotive and construction industries.

All five major thermoplastics recorded significant improvements in 1987 with increases ranging from 4% to 13%; production and sales of high density polyethylene were particularly strong.

### *Export Trends*

The EC plastics manufacturing industry exports around 11% of its production, in volume terms. This percentage has fallen over the period 1983 to 1987; in 1983, 17% of the volume of production was exported outside the Community. By comparison, in 1987 US exports represented a similar percentage of domestic production (10.6%), while Japan exported a slightly higher percentage of production volume (11.9%).

Most recently, higher growth in the demand for plastics has come from within the Community rather than from export markets; given high capacity utilization levels in the industry, it is apparent that a proportion of production has been diverted away from exports in order to fulfil domestic demand requirements in the Community. In volume terms, EC exports have declined continuously since 1983 with the 1987 level 27% lower than in 1983. By contrast, the volume of imports into the Community have grown steadily over the period, standing 32% higher than the 1983 level and currently representing 6% of EC market demand. Import growth has been particularly marked for LLDPE (Linear Low Density Polyethylene), the consumption of which has been growing particularly rapidly in the EC; official industry statistics for this PE grade are not yet available but industry estimates indicate that consumption of LLDPE in the EC has grown from 85 000 tonnes in 1982 to 485 000 in 1987, with imports - mainly from the Middle East - totalling around 162 000 tonnes and representing 33% of EC consumption of LLDPE.

Growth in plastics manufacturing has occurred over a period when exchange rates have been particularly volatile. Over the last couple of years, exchange rate parities have affected the competitiveness of EC manufacturers and made the EC market more attractive for Middle East and Far East exporters. However, indications are that domestic supply shortages

**Table I**  
**Production and Foreign Trade (Volume)**

| (1 000 tonnes)       | 1983   | 1984   | 1985   | 1986   | 1987   |
|----------------------|--------|--------|--------|--------|--------|
| Production (1)       | 11 392 | 11 733 | 11 849 | 12 542 | 13 348 |
| Index                | 100.0  | 103.0  | 104.0  | 110.1  | 117.2  |
| Imports Extra-EC (2) | 565    | 524    | 800    | 888    | 748    |
| Index                | 100.0  | 92.7   | 141.6  | 157.2  | 132.4  |
| Exports Extra-EC     | 1 920  | 1 958  | 1 779  | 1 653  | 1 409  |
| Index                | 100.0  | 102.1  | 92.7   | 116.2  | 73.4   |
| X/M                  | 3.40   | 3.74   | 2.22   | 1.86   | 1.88   |

(1) EC 12: estimates based on West European figures - APME. 1987: provisional estimates. The statistics cover production of LDPE, HDPE, PP, PS and PVC, and 95% of total production of these items in the EC. PS does not include expandable grades or acrylate or acrylonitrile modified grades.

(2) Imports include LLDPE.

Source: APME.

within the EC have also led to increased import opportunities for some products, and particularly polypropylene.

### *Employment Trends*

Industry over-capacities which existed in the late 1970s and early 1980s entailed a substantial restructuring of the industry, particularly over the period 1982 to 1984. This rationalization, which in some areas is still continuing, has meant a reduction in numbers employed by the industry to the present estimated figure of around 170 000. However, more recently, the continuing expansion of demand and production in the plastics market has meant some job creation in the industry, albeit at a conservative pace.

### *Factors Behind Production Trends*

The restructuring and rationalization of plastics manufacturing across the Community has not been uniform; although reductions of thermoplastic capacities occurred in most Member States, the UK and Germany have borne a substantial share of these reductions, across the range of products. The revival in demand since 1984 has meant that the industry has been brought back to high levels of capacity utilization. Further expansion of capacity is likely to be cautious, given the experiences of the last decade; investment patterns are primarily geared towards the development of new processes and products and a continued drive towards productivity improvements in order to maintain the competitiveness of the industry. In future, the unified internal market is expected to provide greater impetus and opportunities for rationalized industrial structure.

The EC plastics manufacturing industry has a strong technology base; its research and development record compares favourably with that of the plastics industries in the USA and Japan. This is a strategically important asset for the modern manufacturing industry in Europe, which is dependent on the availability of state-of-the-art materials and application technology.

Plastics are energy-efficient in their conversion into articles, and during the effective lifetime of plastics articles in use. They are readily processable into a variety of forms as well as combinations with other materials, thus both increasing labour productivity and creating employment in modern technology. They have led to many new applications in consumer products as well as in high technology parts, the manufacture of which would not be feasible without them.

### *Regulatory Environment*

Regulatory controls concerned with public and environmental safety and well-being, are important factors influen-

cing industry operations. Particular areas of safety concern include:

- food contact and medical applications
- fire safety of plastics
- ecological aspects of plastics use.

These factors have a strong bearing on developments in the industry. In traditional applications, plastics comply with the same criteria as those applied to any alternative materials. In new development applications, plastics and plastics in combination with other materials often set improved or unique standards of performance and safety.

### *The Position of Firms in the Industry*

The financial position of firms in the plastics manufacturing industry has dramatically improved over the last four years. Re-structuring in the industry over the first part of the 1980s and the subsequent upturn in demand has led to a return to profitability for many manufacturers. Plastics manufacturers, by and large, have funds and credit available for investment in new business ventures; the guiding factors appear to be increasingly environmental including waste management requirements and public acceptance of chemicals and chemical industry activity, of which plastics forms a part.

## **Forecast and Outlook**

Uncertainty regarding both developments in major overseas markets and exchange rate movements remains, but the general outlook for the industry continues to be optimistic. The first quarter of 1988, showed steady growth in major plastics consumption. Domestic supply shortages have attracted increased imports for some products. No change of trend is expected in the results for the first half of 1988, although slower growth later in the year may mean that total growth is slightly lower than in 1987.

Over the medium and longer term, other factors will come into play. Plastics manufacturing will continue to be highly competitive on a global basis; US investment in sizeable production capacities, as well as the increased pace of plant construction in South-East Asia, are likely to represent additional competitive factors. In the face of future limited market growth and expected increases in plastics imports, the EC industry will need to sustain its advanced technological standards and selective research and development efforts. In addition, an anticipated recovery in oil prices by the mid-1990s will have consequent effects on cost structures.

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# FERTILIZERS

(NACE 256.8)

*Although the output of fertilizers has remained relatively stable over the 1980s, the industry has undergone massive restructuring and rationalization in an effort to improve efficiency and revitalize its competitiveness. The industry is particularly subject to the vagaries of world supply and demand and to global competition; between 1980 and 1987 the volume of imports into the Community has almost doubled while the value of exports has declined sharply.*

The fertilizer industry produces and markets simple nitrogenous and phosphate fertilizers and the compound fertilizers NP, NK, NPK, PK as well as intermediates in their manufacture. The production of simple potash fertilizers is a mining activity. The statistical data and comments in this chapter concern fertilizer activity alone, the intermediates being covered by the section on chemicals.

## Current Situation

In 1987, the EC fertilizer sector produced 50 million tonnes of fertilizer valued at 6.5 billion ECU, of which around 8% was exported to the rest of the world. The Community industry, accounting for 15% of world fertilizer production, ranks third place in the world behind the USSR and the USA. Production in volume terms has been relatively stable since the beginning of the 1980s.

The industry is highly dependent on its supplies of raw materials, hydrocarbons (particularly natural gas) and natural phosphates and manufactures heavy, low value-added products. Fixed costs are an important element of the cost structure since the industry is highly capital-intensive; the construction of an ammonia plant costs approximately 250 million ECU.

Fertilizer plants are often large integrated operations that process raw materials into inputs for other industrial sectors: these inputs include ammonia, nitric acid, urea, ammonium

nitrate, sulphuric acid, phosphoric acid. Apart from sales of intermediates, which represent only 10% to 20% of the total, the industry has just one customer, i.e agriculture.

## Consumption Trends

Fertilizer consumption is seasonal and widespread: out of 50 million tonnes, 30 million tonnes are utilized in three months on all the agricultural land of the Community. Because fertilizers are manufactured in continuous process plants, distribution is maintained throughout the year using a large transport and storage infrastructure. The cost of storage is recovered by the use of a progressive price structure, with products bought in the closed season being cheaper than those bought nearer the time of use.

Apparent consumption, in volume terms, has grown at an average annual rate of around 2.4% over the 1980s but an increasing proportion of Community consumption has been met by imports.

## Export Trends

In 1987, the industry exported around 12% of total output representing around 8% of the total value of production. The external trade balance, which showed a surplus at the start of the 1980s, has become adverse.

The European industry is faced with competition from both developing countries which enjoy large resources of natural gas and natural phosphates, and State-trading countries seeking to earn foreign exchange. Such competition is particularly fierce when supply exceeds demand on the world market as was the case in 1986, the year in which most European producers were unable to balance their accounts. In that year, the EC trade deficit in fertilizers reached some 500 million ECU.

Given the obvious injury caused by low-priced imports and dumping practised by some exporters, the Community auth-

## Main Indicators Fertilizers

| (Million ECU)                  | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  | 1987  |
|--------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Apparent consumption (1)       | 5 700 | 6 100 | 6 000 | 6 500 | 7 200 | 8 100 | 7 900 | 7 000 |
| Net export earnings (1)        | + 133 | + 247 | -67   | -141  | +98   | +42   | -344  | -510  |
| Total Community production (1) | 5 800 | 6 300 | 6 500 | 6 400 | 7 300 | 8 100 | 7 600 | 6 500 |
| Employment (1 000)             | N/A   | N/A   | N/A   | N/A   | 60    | N/A   | N/A   | 50    |

(1) EC 10; 1986, 1987: EC 12. Manufactures made from imported semi-finished products not counted in Community production.

**Table I**  
**Production and Foreign Trade**

| (Million ECU)        | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  | 1987  |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Production           |       |       |       |       |       |       |       |       |
| Current value (1)    | 5 800 | 6 300 | 6 500 | 6 400 | 7 300 | 8 100 | 7 600 | 6 500 |
| Index                | 100   | 109   | 112   | 110   | 126   | 140   | 131   | 112   |
| Constant value       | 5 800 | 5 792 | 5 482 | 5 131 | 4 956 | 5 883 | 5 348 | 4 472 |
| Index                | 100   | 100   | 95    | 89    | 86    | 101   | 92    | 77    |
| Imports Extra-EC (2) | 606   | 613   | 670   | 826   | 893   | 1 024 | 1 034 | 1 030 |
| Index                | 100   | 101   | 111   | 136   | 147   | 169   | 171   | 170   |
| Exports Extra-EC (2) | 739   | 860   | 603   | 685   | 991   | 1 066 | 690   | 520   |
| Index                | 100   | 116   | 82    | 93    | 134   | 145   | 93    | 70    |
| X/M                  | 1.22  | 1.40  | 0.90  | 0.83  | 1.11  | 1.04  | 0.67  | 0.51  |

(1) EC 10: excluding Spain and Portugal; 1986, 1987: EC 12; manufactures made from semi-finished products not counted in Community production.

(2) EC 10: excluding Spain and Portugal; 1986, 1987: EC 12.

Source: CMC-Engrais, Eurostat.

urities, like many other OECD countries, have initiated anti-dumping procedures.

### *Major Structural and Geographic Factors*

The Community industry has embarked upon a vast restructuring and rationalization process, first inside national frontiers, then at the European level. Five companies occupy a leading position in northwest Europe - Norsk Hydro, Kemira Oy, BASF, ICI, and Grande Paroisse. Restructuring is also underway in Italy and Spain. Sales networks have been developed in all countries; plants have been shut down and production concentrated in the most favourably located plants, in terms of possibilities for raw material supplies and outlets. The necessary investment has been made in an effort to boost efficiency and productivity - particularly in the use of energy - and to produce better quality fertilizers.

### *Research*

In the area of research, the industry is continuing its studies in the efficient and environmentally responsible use of fertilizers. These studies are intended to define spreading periods, modes of use and the best agricultural practices, the aim

being to optimize fertilizer use while respecting the environment. Research is often carried out in cooperation with agriculture and public or private institutes. The results are circulated to farmers as part of the training traditionally carried out by the industry.

### **Outlook**

The increasing population of the world will mean that more and better food is needed with a consequent increase in fertilizer consumption. However, the growth in fertilizer production and consumption is likely to be erratic because of various political, economic and climatic factors. As a result, there will continue to be cyclical imbalances between supply and demand, with market prices fluctuating accordingly.

Current efforts to cut production costs and to boost productivity will continue but it is thought unlikely that any fundamental discoveries will result in radical changes in either fertilizer manufacturing processes or in methods of fertilizer usage in the next 10 years. As a better understanding of both plant development and plant needs is acquired, it will become possible to specify fertilizer requirements more accurately and this will bring both economic and environmental benefits.

**Table II**  
**Production Volume**

| (Million tonnes)     | 1980  | 1981 | 1982 | 1983  | 1984  | 1985  | 1986  | 1987  |
|----------------------|-------|------|------|-------|-------|-------|-------|-------|
| Production (1)       | 46    | 44   | 42   | 42    | 45    | 45    | 49    | 50    |
| Index                | 100.0 | 95.7 | 91.3 | 91.3  | 97.8  | 97.8  | 106.5 | 108.7 |
| Imports Extra-EC (1) | 4.4   | 3.8  | 4.1  | 5.0   | 4.9   | 5.4   | 7.1   | 8.6   |
| Index                | 100.0 | 86.4 | 93.2 | 113.6 | 111.4 | 122.7 | 161.4 | 1.95  |
| Exports Extra-EC (1) | 6.2   | 5.6  | 4.1  | 5.0   | 5.8   | 5.9   | 5.1   | 6.0   |
| Index                | 100.0 | 90.3 | 66.1 | 80.6  | 93.6  | 95.2  | 82.3  | 96.8  |

(1) 1980-85: EC 10 excluding Spain and Portugal.

From the production angle, rationalization, energy saving, plant reliability, safety and product quality are all areas in which continuing improvements will be sought.

The Community fertilizer industry has undergone a considerable transformation in the past few years. It now has efficient industrial installations and structures adapted to the needs of the vast European market. In future, its degree of competitiveness will be strongly affected by the cost of raw material supplies and any constraints imposed on it regarding the operation of plants.

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# PAINT, VARNISH AND PRINTING INK

(NACE 255)

*The aggregate output of the paint, varnish and printing ink sectors (excluding painters' fillings) in the EC was worth around 11 billion ECU in 1987. The paints and printing inks sectors together employ around 105 000 persons. Extra-EC exports represent a comparatively small proportion of production at around 7.5%. The industry is relatively stable and, over the medium term, moderate growth is expected for both the paint and printing ink sub-sectors.*

The NACE definition of this sector includes "paint, painters' fillings, varnish, and printing ink". The information and data below cover paint and varnishes and, separately, printing ink.

## PAINT AND VARNISH

Paint and varnish comprises a range of product categories with a wide variety of applications:

- architectural coatings including exterior and interior house paint, undercoaters, primers and sealers, varnishes and stains
- product coatings used for a wide variety of industrial and consumer products, for example, wood and metal furniture and fixtures, automotive, non-automotive transportation and aircraft, machinery and equipment, appliances, electrical insulation, film, paper and foil, toys and sporting goods
- special-purpose coatings formulated for special applications or extreme environments and including automotive and machinery refinishing, high-performance maintenance, road markings, bridge maintenance, crafts, metallic and multicoloured coatings.

These products exist in liquid form, as high solids, or in powder form.

## Current Situation

The output of the EC paint industry reached around 3.5 million tonnes in 1986 corresponding to more than three quarters of total European production. This figure represents around two thirds of US production and more than twice the Japanese total.

The production of paints and varnishes in the EC peaked in 1981, and subsequently fell over the period 1982 to 1984. Output picked up in 1985 with growth continuing over 1986 and 1987; paint and varnish output grew by 1.2% over 1986 and by 2% over 1987. The value of paints and varnishes reached around 9 billion ECU in 1987, although only marginal real growth was recorded over 1987.

## Consumption Trends

During the last decade, the pattern of production was different from country to country, and the product mix was unstable everywhere. The main influences on production came from economic cycles as paint consumption, in general, followed economic developments in the respective countries. Exports to relatively close countries can sometimes provide a further growth stimulus although, generally, paint is a product which - due to transport costs - does not "travel well". As a result of this, the paint industry has many outlets (production, joint ventures, licences) in locations all over the world. One important reason for this expansion is the wish to serve the same customer (e.g. car, marine, other original equipment manufacturers) with the same specified product.

During the last decade consumption has slightly decreased. However, the overall figures obscure the increase (albeit rather slow) in the use of powder coatings and the general trend to so-called high solids (products with higher concentrations of "colour"). While powder coatings may often reach double-digit growth rates, their share in overall consumption

Table I  
Production of Paint and Varnishes

|                              | 1980    | 1981    | 1982    | 1983    | 1984    | 1985    | 1986    | 1987    |
|------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|
| Production (1)               |         |         |         |         |         |         |         |         |
| Volume (1 000 tonnes)        | 4 182.2 | 4 238.8 | 4 178.4 | 4 025.4 | 4 047.7 | 3 927.9 | 3 888.5 | 4 074.9 |
| Index                        | 100.0   | 101.4   | 99.9    | 96.3    | 96.8    | 93.9    | 92.9    | 97.4    |
| Current value (million ECU)  | 6 587.6 | 7 055.8 | 7 247.1 | 7 197.1 | 7 822.2 | 7 978.6 | 8 636.8 | 9 074.8 |
| Index                        | 100.0   | 107.1   | 110.0   | 109.3   | 118.7   | 121.1   | 131.1   | 137.8   |
| Constant value (million ECU) | 6 587.6 | 6 428.5 | 6 112.2 | 5 770.4 | 5 310.3 | 5 795.2 | 6 078.0 | 6 242.6 |
| Index                        | 100.0   | 97.6    | 92.8    | 87.5    | 80.6    | 88.1    | 92.3    | 94.8    |

(1) EC 9: excluding Ireland, Greece, Luxembourg.  
Source: CEPE.

is still comparatively low and probably under one-twentieth of the total market. Higher market shares are also registered for high solids which indicate a reduction in the use of non-aqueous solvents. Here quality criteria, but in particular customers' reluctance to make use of new technologies, may be considered to be one of the reasons why growth remains disappointing.

However, within this context it should be recognized that stable production, combined with new techniques (e.g. high solids, powder, reduction in overspray, recycling), cannot be characterized as stagnation. The surface coated/painted unit is steadily growing, although the sector seems unable to turn this progress to their own advantage.

In general, overall technical standards equal, if not exceed, those of any non-European competitor. This may have some bearing on the fact that not only is the world's largest paint manufacturer based in the EC, but four of the largest six paint producers originate from the EC; the other two are US companies, and the largest Japanese competitor ranks seventh.

### *Employment Trends*

Employment in the industry has declined relatively sharply over the 1980s. In 1987, around 90 000 persons were employed across the EC (EC 9), compared with 104 000 in 1980 and representing a fall of 14%.

### *Major Structural and Geographic Features*

The last decade has seen many mergers and takeovers downstream and across national borders. This new orientation did not happen simultaneously but rather country by country. A new stimulant for similar movements across EC countries is the envisaged completion of the internal market in 1992.

Some sectors, e.g. can lacquers or marine paints, may be considered oligopolistic, but as this applies to both producers and buyers, competition is still fierce.

R&D plays an important role for most fields of application and these costs have obliged all companies to specialize. Many countries show a tendency towards large (publicly-owned) or small companies, although there are sufficient examples of highly competitive medium-sized and family-owned companies. A number of important

production entities are located in the larger and in particular highly industrialized countries, but since more and more inter-company flow of paints takes place, inter-EC exchange figures lose transparency and no real geographic centre can be determined.

Industrial concentration will continue to increase and in particular many smaller companies, who have not yet discovered the market potential of a larger common market, will disappear as their local outlet can no longer safeguard their future. On the other hand, the wide variety of products and their multiple application provides opportunities for the flexible and innovative entrepreneur.

### *Trends in Member States*

Germany accounts for a large proportion (34%) of the output of the industry, followed by Italy, France and the UK which have a roughly similar share of EC production (around 15%) and employment. There is some production in all Member States.

During 1987, output in volume terms grew most rapidly in Italy (6.3%); by value, growth was most rapid in Portugal. However, in the latter country a large part of this growth is accounted for by price increases.

Per capita consumption of paint also varies markedly from country to country. The highest level of per capita consumption is reported for Denmark at 26.3 kg; the lowest figure is for the UK at 7.8 kg.

Member States with larger manufacturing capacities (Germany, France, Italy and the UK) produce primarily for their domestic markets with exports, even to other EC countries, representing a comparatively small share of output. Conversely, the industry in Belgium, Denmark and the Netherlands exports a much larger share of production. However, it should be noted that many of the larger companies manufacture in a number of different countries and supply to the local market due to the transport cost factor for paints.

### **Forecast and Outlook**

Constraints on the industry include the growing importance of product liability and decreasing possibilities of insurance coverage. A negative impact is also felt from the wide field of

**Table II**  
**Employment Trends**

|                              | 1980  | 1981  | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 |
|------------------------------|-------|-------|------|------|------|------|------|------|
| Persons employed (1 000) (1) | 106.4 | 103.7 | 98.1 | 93.6 | 90.9 | 88.8 | 88.1 | 89.1 |

(1) EC 9: excluding Ireland, Greece, Luxembourg; 1983: Belgium - estimate based on CEPE data; 1984: UK - estimate based on CEPE data. 1986: Belgium, Spain, Portugal - estimate based on CEPE data.

Source: CEPE.

**Table III**  
**Per Capita Consumption of Paints, 1987**

|                | (kg) |
|----------------|------|
| Belgium        | 14.4 |
| Denmark        | 26.3 |
| Germany        | 19.5 |
| Spain          | 8.2  |
| France         | 13.0 |
| Italy          | 12.0 |
| Netherlands    | 15.1 |
| Portugal       | 10.3 |
| United Kingdom | 7.8  |

Source: CEPE.

environmental and similar legislation. In addition, since many raw materials are dependent on, or directly linked with, the price of crude oil, and the sector attributes about half of its costs to this factor, the exchange rate against the US dollar can be vital, although this problem has recently lost some of its impact.

Assuming steady, general economic growth in the EC, a 1-2% growth rate per annum for the industry seems likely over the medium term.

## PRINTING INK

The term "printing inks" refers to one of the essential raw materials of the graphic (but not textile printing) industry. These inks are provided for the following main printing processes:

- letter press
- offset/litho
- gravure
- flexography
- screen
- other

and are used to produce e.g.:

- newspapers
- periodicals
- books
- catalogues
- packagings
- wall coverings
- posters
- business forms
- security papers.

## Current Situation

The output of the EC printing ink industry of nearly 450 000 tonnes in 1986 (1980 about 368 000 tonnes) corresponds to nearly nine tenth of the total production in Europe and is valued at around 1.5 billion ECU. It is estimated to be half of US production and is two fifths higher than Japanese production. In volume terms, output grew by 5% over 1986 but real value grew only marginally. Between 1980 and 1985, volume grew by about 17%; over the same period, the value of output grew by 9% in real terms.

### *Employment Trends*

Over the 1980s, employment in the printing ink industry has fallen, although to a lesser extent than in the paint and varnish industry. The number of employees in the EC is about 15 000 persons in more than 140 companies.

### *Consumption Trends*

As in the allied paint industry, there are no comprehensive figures with breakdown of usage. For inks, with the exception of some screen inks for hobby purposes, the customer and applicator is always known. However, the printing process used does not necessarily indicate end use and, in addition, border lines between ink types (per process) may be blurred. An additionally uncertain factor within this context is, for example, the circulation of the newspaper, the requested quality of the printed products (the standard of European printing and *nota bene* printing inks rank highest in the world) and/or the time allotted for production. Similarly to the allied paint industry, problems may arise from the use of non-aqueous solvents, although the rather restricted number of professional users allows better control of emissions.

Product prices do not always reflect the intensive service nature of this highly specialized industry, the clients of which are sometimes still of an artisan character.

### *Export Trends*

As in the paint industry, much of production is geared towards domestic consumption and once again this is particularly true of the larger producers (Germany, France, UK). For the smaller producers, inter-EC and other European trade is relatively extensive.

A similar trend can be observed in other major producers of printing inks; Japanese production is around 70% of the EC total, but exports represent only a tiny proportion (3-4%) of this output. Again, the USA exports only around 1.4% of its production.

**Table IV**  
**Printing Ink Sales**

|                                     | 1980  | 1981    | 1982    | 1983    | 1984    | 1985    | 1986    |
|-------------------------------------|-------|---------|---------|---------|---------|---------|---------|
| Sales quantities (1 000 tonnes) (1) | 367.9 | 366.8   | 368.9   | 381.2   | 405.1   | 413.4   | 430.8   |
| Value (million ECU) (2)             | 962.9 | 1 022.2 | 1 100.6 | 1 173.8 | 1 306.2 | 1 430.8 | 1 499.3 |

(1) EC 10: excluding Greece, Luxembourg, Ireland - production figures. 1985, 1986: excluding Ireland.

(2) EC 9: excluding Greece, Luxembourg, Ireland. 1986: excluding Portugal.

Source: CEPE

### *Major Structural and Geographic Features*

Although the largest printing ink company is Japanese (Dai Nippon Ink), the second largest producer of printing inks is EC-based. Most of the large manufacturers in the EC are quoted companies whereas the medium and smaller-sized companies are often family businesses. A noticeable feature in many countries is the often slowly but steadily growing importance of State or otherwise publicly-owned print shops.

The last decade has seen a number of mergers showing a pattern similar to the paint industry and occurring in waves which reached different countries at different times. The importance and further growth of large printing facilities will continue to have an influence on concentration in the printing ink industry. In general, production units in most southern countries of the EC are considerably smaller than elsewhere in the Community.

Further similarities to the paint industry are the importance of transport costs and the dependence on the oil price of many raw materials costs. However, unlike the paint sector there are few multinational companies in the printing ink business.

Financial reserves of many companies may be considered to be below normal.

### *Trends in Member States*

Germany is the largest producer of printing inks, accounting for over 40% of EC production and employing one third of

total EC employment in the industry. Other large producers are France and the UK.

Germany is also the highest per capita consumer of printing inks in the Community, followed by Denmark and Belgium.

**Table V**  
**Per Capita Consumption of Printing Inks, 1986**

|                | (kg) |
|----------------|------|
| Belgium        | 1.60 |
| Denmark        | 1.90 |
| Germany        | 2.40 |
| Spain          | 0.53 |
| France         | 1.20 |
| Ireland (1)    | 0.67 |
| Italy          | 0.82 |
| Netherlands    | 1.57 |
| United Kingdom | 1.37 |

(1) Ireland: 1985.

Source: CEPE.

### **Forecast and Outlook**

The average growth rate for the next half decade is estimated at between 1.5 and 2.5% per annum.

CEPE: European Committee of Paint, Printing Ink and Artists' Colours Manufacturers Association

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# SOAPS AND DETERGENTS

(NACE 258.1)

*The soap and detergent industry is a relatively stable sector with a strong international orientation and significant potential in both industrialized and developing countries. It is also a dynamic industry, operating in a highly competitive environment as indicated by its involvement in advertising as well as by the wide range of products on offer to the consumer. Overall, the consumption of soaps and detergents has increased at a moderate pace in line with rises in the standard of living; market development is enhanced by the introduction of new products and the satisfaction of new demand. Many companies active in the industry also have significant involvement in other areas of household demand including cosmetics, perfumery and other items.*

Whereas many industrial products were developed only in the twentieth century, soap has been known and used for over 2 000 years. The soap and detergent industry can therefore be considered as a combination of a "classic" material and a modern "high technology" product. Products covered by the information and statistics below include:

- toilet products
- household and industrial soaps
- washing products, surface cleaners and scourers.

Household products which are not covered include polishes for leather and shoes; polishes for wood and floor coverings; polishes for various metals and stoves; polishes for motor cars; cleaning products for windows and mirrors; stain removers; household disinfectants and deodorizers; household insecticides, etc. Together, these items represent about 10% of the soap and detergent sector.

## Current Situation

The industry is stable and demand for its products is increasing steadily largely irrespective of changes in the economic climate in Member States. An important feature of the sector is the frequency of new product launches reflecting improved technology and changing patterns in consumer tastes. The sector therefore still has major development potential, against a background of very strong competition.

In 1986, the EC market represented nearly 8 million tonnes and a value of 9 billion ECU. Between 1975 and 1980, annual volume increases of about 4% were recorded; between 1981 and 1986, this annual increase had slowed to only about 1%.

**Table I**  
**Detergent market, 1985**

|                      | (%) |
|----------------------|-----|
| Laundry detergents   | 63  |
| Dishwashing products | 16  |
| Household cleansers  | 11  |
| Fabric softeners     | 10  |

Source: AIS.

## Consumption and Distribution Trends

It is estimated that soaps and detergents, in their different forms (see Table I), are used 750 million times per day in Europe, providing individual and collective hygiene. The industry also satisfies the needs of both institutions and other industries, for which specific formulations are developed, sold in bigger containers and better adapted to the specific needs of hospitals, restaurants, etc. The distributive network for these items is different to that for household products.

Since the 1960s, there has been a concentration of distributive channels, and the self-service market has developed considerably. It is estimated that almost 75% of soaps and detergents are currently sold in supermarkets and hypermarkets compared with less than 40% 20 years ago. This development has modified the relationship between the manufacturer and the distributive trade, which now has larger and more powerful purchasing groups. The distributive trade is becoming a competitor in that it often commercializes its own brands.

A certain amount of standardization of product containers has taken place to provide easier organization of shelf-space for the retailer and for greater product comparability.

## Employment Trends

The total number of employees is stable and has remained so over many years; increased production has been met by greater automation.

A precise estimate of the total number of employees is difficult because many of the companies are also involved in the manufacture of related products such as cosmetics, toiletries, household products, etc. A reasonable estimate for the whole EC would be 80 000 to 85 000, indicating relatively high turnover per employee.

The increase in automation referred to above has meant that the workforce has needed to adapt itself to new technology. Historically, this need has been met by the implementation

of training programmes in which the upgrading of existing personnel has had priority. Recruitment policies have also been aimed at attracting new personnel who are capable of benefiting from sophisticated training programmes.

### *Factors behind Production Trends*

The period between 1981 and 1986 saw an important change in washing habits and textile materials, mainly due to increased energy costs but also a variety of other factors; boiling of laundry became less frequent; the average number of weekly washes increased significantly; and the quantity of detergent used for each wash decreased.

Some product categories developed rapidly; consumption of softeners, in volume terms doubled within a few years and it is now also sold in concentrated form. Moreover, liquid laundry products have gained a significant market share in some countries.

The development of the EC market is the sum of the changes in the various national markets; however, each Member State has retained some individual features, as illustrated in Tables II and III.

The following socio-demographic trends will play a role in the future development of the detergent market:

- Europe's population has almost stopped growing
- the proportion of elderly persons is increasing
- the percentage increase in the number of households is much higher than the percentage increase in population.

These trends mean that the average age of the consumer will be increasingly higher and that the average household will be increasingly smaller. However, there is really no "typical European" consumer, nor will there be one in the near future. This is due to historical and socio-cultural influences on both attitudes and behavioural patterns. Differences in both climatic conditions and types of washing machines also play a part in the regionally different developments in washing habits. These factors have to be taken into account by the detergent industry in supply and product-mix policies.

**Table II**  
**Average Number of Machine Loads/Month**

|             |                      |
|-------------|----------------------|
| Germany     | 14.2                 |
| Italy       | 14.2 (large machine) |
| France      | 17.8                 |
| EC          | 18.0                 |
| Belgium     | 18.2                 |
| Spain       | 19.3                 |
| Netherlands | 20.4                 |
| UK          | 25.4 (small machine) |

Source: AIS.

Detergent companies are continually involved in R&D activities with a view to product improvement and increasing their market share. In international companies, research is generally carried out by specialized scientists who have access to and participate in worldwide programmes. This has led to major innovations by adapting formulations to changing consumer needs and through the introduction of technological advances.

The soap and detergent industry carries out a thorough programme of fundamental and applied research. Overall expenditure is significant; in major companies, the percentage devoted to research varies between 2.5% and 3% of turnover.

Apart from the development of totally new products, existing products are constantly being modified in the laboratories to improve performance. Only significant improvements are implemented in the market - often without a special marketing effort - as part of the ongoing process of product improvement.

Research also includes development of new manufacturing processes; it was a manufacturing development which first allowed the industry to use enzymes in washing powders. The improvement in performance (on fruit stains, for instance) is widely known.

A recent development is the appearance of liquid formulations in the marketplace; these formulations are especially efficient for low temperature washing. Another recent trend is the introduction of more concentrated products; this will further reduce distribution costs.

Recently, there has been discussion, throughout the Community, on the reduction of the presence of phosphates in detergents. It is thought that the presence of phosphates may be responsible for the phenomenon of eutrophication (the promotion of the growth of certain organisms in water) in certain areas and under certain circumstances. As a result two Member States have introduced a legal restriction on phosphate levels (Germany and Italy); proposals are in the pipeline in Spain and a further restriction is foreseen in Italy; in the Netherlands, the industry has agreed to a voluntary restriction. In the Benelux countries, the industry has agreed to make available and/or promote zero-phosphate products.

**Table III**  
**Average Number of Hand Washes/Month**

|             |      |
|-------------|------|
| Belgium     | 3.8  |
| Germany     | 4.3  |
| Netherlands | 4.9  |
| UK          | 7.2  |
| France      | 9.3  |
| EC          | 9.6  |
| Spain       | 11.6 |
| Italy       | 19.4 |

Source: AIS.

**Table IV**  
**Production Figures - Soap and Toiletries Combined (1)**

| (Million ECU)             | 1980   | 1981   | 1982   | 1983   | 1984      | 1985   | 1986      | 1987   |
|---------------------------|--------|--------|--------|--------|-----------|--------|-----------|--------|
| Production                |        |        |        |        |           |        |           |        |
| Current value             | 13 004 | 14 262 | 15 684 | 17 013 | 18 748    | 19 834 | 19 349    |        |
| Index                     | 100.0  | 109.7  | 120.6  | 130.8  | 144.2     | 152.5  | 148.8     |        |
| of which:                 |        |        |        |        |           |        |           |        |
| - soap and detergents (2) | N/A    | N/A    | N/A    | 7 530  | 8 096     | 8 435  | 9 199     |        |
| - toiletries              | N/A    | 6 850  | 7 582  | 7 705  | 8 430     | 10 963 | 11 334    | 11 928 |
| Production                |        |        |        |        |           |        |           |        |
| Constant value            | 13 004 | 12 944 | 13 128 | 13 372 | 14 014    | 14 142 | 13 847    |        |
| Index                     | 100.0  | 99.5   | 101.0  | 102.8  | 107.8     | 108.8  | 106.5     |        |
| Imports Extra-EC          | 147    | 199    | 214    | 244    | 285       | 327    | (3) 297   |        |
| Index                     | 100.0  | 135.4  | 145.6  | 166.0  | 193.9     | 222.5  | 202.0     |        |
| Exports Extra-EC          | 1 153  | 1 366  | 1 445  | 1 604  | 1 960     | 2 073  | (3) 2 139 |        |
| Index                     | 100.0  | 118.5  | 125.3  | 139.1  | 170.0     | 179.8  | 185.5     |        |
| X/M                       | 7.84   | 6.86   | 6.75   | 6.57   | 6.88      | 6.34   | 7.20      |        |
| Number of companies (3)   | 1 555  | 1 450  | 1 430  | 1 465  | (4) 1 400 |        |           |        |

(1) EC 10: excluding Spain and Portugal.

(2) Source: AIS.

(3) EC 12.

(4) Estimate.

Source: Eurostat.

### *Major Structural and Geographical Features*

The number of EC companies active in the manufacture and distribution of soaps and detergents approaches 1 000. This includes both national companies - basically supplying only their local market - and major international companies which are active worldwide. The names of these companies are not as well-known to the public as their brand names, which are widely advertised.

### **Outlook**

It is difficult to make long-term forecasts, since consumer behaviour and therefore demand may change. In addition, the textile industry and the domestic appliance sector are also

subject to new developments. Packaging is another area where changes may occur, through new materials or new dosage devices.

An important part of research and development activities relates to the socio-economic environment. Factories and manufacturing plants are now designed more carefully than in the past to minimize environmental impact and to ensure better working conditions for the workforce. Health and safety, and the protection of the environment are an important element of research programmes.

AIS: Association Internationale de la Savonnerie et de la Détergence  
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# COSMETICS, PERFUMERY AND TOILET GOODS

(NACE 258.2)

*The cosmetics, perfumery and toilet goods industry is a stable sector which has recorded average annual growth of around 4% in real terms over the 1980s. The growth of the large multinational groups has meant increased industry concentration; however, smaller enterprises still fill particular market niches. The single market is likely to further increase concentration in the industry, although it also expected to provide opportunities for the more dynamic smaller companies.*

## Current Situation

The cosmetics, perfumery and toilet goods industry is in general a healthy industry, both in the EC and worldwide: the current value of the EC industry's ex-factory sales increased by more than 60% over the six year period 1981-87, from 7 billion ECU to 12 billion ECU.

Worldwide sales for the industry are not known, but in 1987 the two most important markets outside Europe, the USA and Japan, were worth 11.8 and 6.1 billion ECU respectively.

The markets in this sector are characterized by their diversity and it is therefore helpful to divide them into product sub-sectors:

- toiletries (products for face and body)
- make-up products
- perfumery products
- products for men
- hair products
- sun-tan products
- toilet soaps.

The first four sub-sectors are dynamic product groups which have shown a particularly strong growth trend. Conversely, the latter sub-sectors have been characterized by stagnant growth in recent years.

## Consumption Trends

Market saturation is an important factor in the last three sub-sectors listed. The situation is quite different in the group of active cosmetics, notably beauty products, where the markets appear to be far from saturated.

On the other hand, the expansion of the fragrance market is apparently related to an increase in general living standards, which has led to an ever-increasing number of female and male consumers. The ageing of the population also contributes to the expansion of certain market segments, both for males and females.

In general, the toothpaste market follows demographic developments in terms of changes in the total population.

## Major Structural and Geographic Features

One can distinguish between two categories of countries:

- those enjoying a relatively high living standard, where production is in the hands of relatively few companies
- those with a relatively low living standard, which usually have a high number of small and medium-sized enterprises. Thus Germany has 150 companies while Spain and Italy have 336 and 395 companies respectively).

Industrial concentration, a trend which began some 20 years ago, is continuing. Recent take-over activity has included Richardson-Vicks acquired by Procter & Gamble, Chesebrough-Pond's by Unilever, Laboratoires Goupil by L'Oréal. At the same time, there is also a tendency for smaller enterprises to disappear due to the inadequate capitalization.

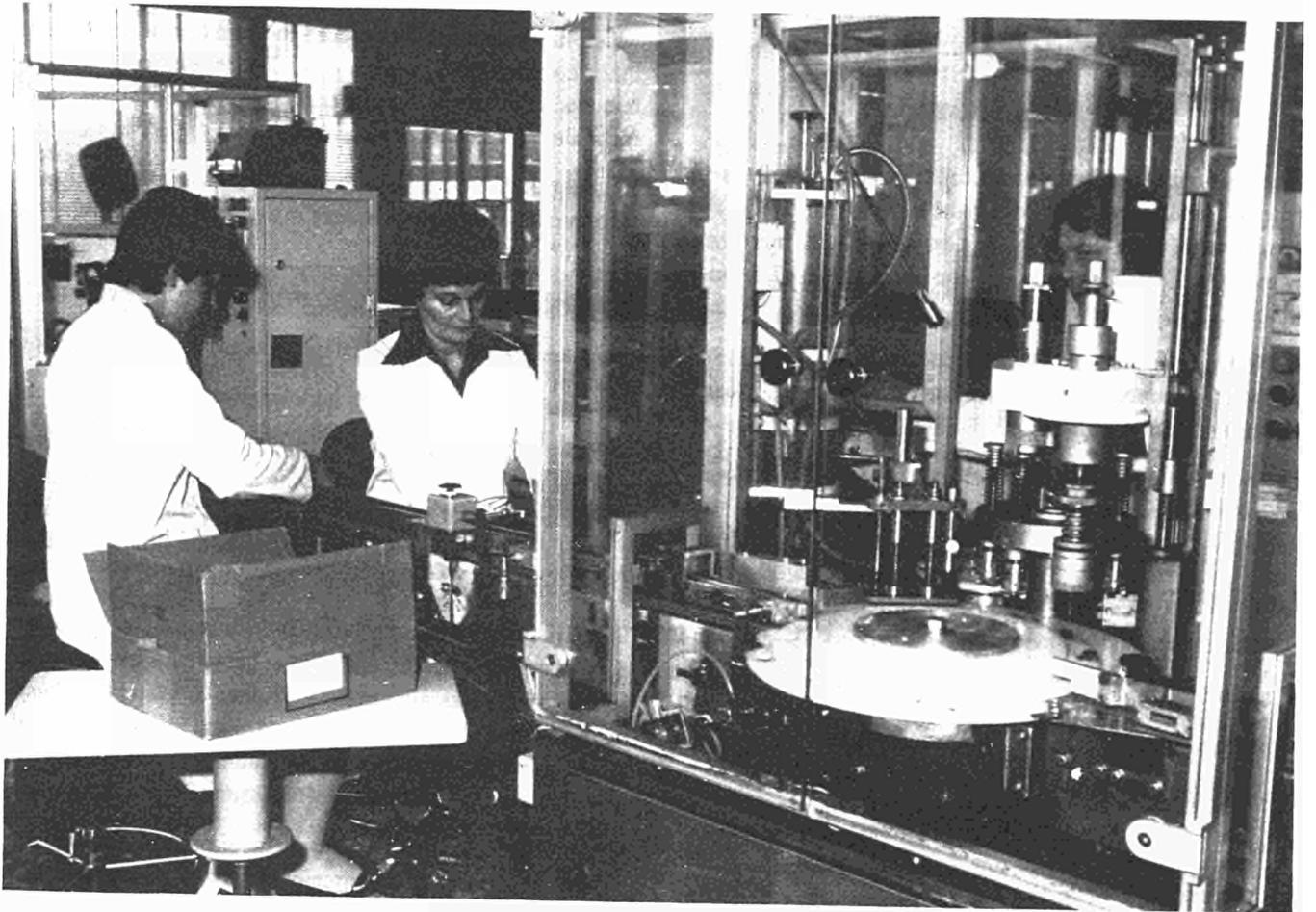
US and Japanese capital is present in this industry, but market penetration of foreign companies is not a dominant factor.

For certain sub-sectors it is not currently possible to make comparisons between Member States, largely due to the differing tastes and customs of local consumers. Toilet water for men, for instance, is sold in France and Spain in bottles of at

## Main Indicators Perfumery, Cosmetics and Toiletries

| (Million ECU)   | 1981      | 1982      | 1983      | 1984      | 1985   | 1986   | 1987   |
|---|-----------|-----------|-----------|-----------|--------|--------|--------|
| Ex-factory sales (excluding exports and toilet soaps) | (1) 6 850 | (1) 7 582 | (1) 7 705 | (1) 8 430 | 10 963 | 11 334 | 11 928 |

(1) Excluding Spain and Portugal.



**Table I**  
**Production Figures - Soap and Toiletries Combined (1)**

| (Million ECU)             | 1980   | 1981   | 1982   | 1983   | 1984      | 1985   | 1986      | 1987   |
|---------------------------|--------|--------|--------|--------|-----------|--------|-----------|--------|
| Production                |        |        |        |        |           |        |           |        |
| Current value             | 13 004 | 14 262 | 15 684 | 17 013 | 18 748    | 19 834 | 19 349    |        |
| Index                     | 100.0  | 109.7  | 120.6  | 130.8  | 144.2     | 152.5  | 148.8     |        |
| of which:                 |        |        |        |        |           |        |           |        |
| - soap and detergents (2) | N/A    | N/A    | N/A    | 7 530  | 8 096     | 8 435  | 9 199     |        |
| - toiletries              | N/A    | 6 850  | 7 582  | 7 705  | 8 430     | 10 963 | 11 334    | 11 928 |
| Production                |        |        |        |        |           |        |           |        |
| Constant value            | 13 004 | 12 944 | 13 128 | 13 372 | 14 014    | 14 142 | 13 847    |        |
| Index                     | 100.0  | 99.5   | 101.0  | 102.8  | 107.8     | 108.8  | 106.5     |        |
| Imports Extra-EC          | 147    | 199    | 214    | 244    | 285       | 327    | (3) 297   |        |
| Index                     | 100.0  | 135.4  | 145.6  | 166.0  | 193.9     | 222.5  | 202.0     |        |
| Exports Extra-EC          | 1 153  | 1 366  | 1 445  | 1 604  | 1 960     | 2 073  | (3) 2 139 |        |
| Index                     | 100.0  | 118.5  | 125.3  | 139.1  | 170.0     | 179.8  | 185.5     |        |
| X/M                       | 7.84   | 6.86   | 6.75   | 6.57   | 6.88      | 6.34   | 7.20      |        |
| Number of companies (3)   | 1 555  | 1 450  | 1 430  | 1 465  | (4) 1 400 |        |           |        |

(1) EC 10: excluding Spain and Portugal.

(2) Source: AIS.

(3) EC 12.

(4) Estimate.

Source: Eurostat.

least 200 ml and often in quantities of 500 ml and more, allowing for generous consumption; in Germany, the same products have to be sold in quantities ranging from 120 to 200 ml, and generally in a more concentrated form.

It is obviously not possible to sell the same colour range of hair dyes in Denmark and in Andalusia.

### Outlook

The general outlook for the industry is good, both in terms of product consumption - which is expected to increase at a sustained pace - and the market share held by European-based companies. Dynamism and creativity are important factors in this competitive market.

Although it may be difficult to market the same product everywhere in the EC, harmonized legislation would nevertheless improve the situation for many products. A number of administrative barriers to the free circulation of products within the EC still exist; these tend to discourage medium-sized companies from selling abroad and thus limit their potential development.

Even though the single unified EC market is likely to accelerate the trend towards concentration of the industry, at the same time, it is expected to stimulate the growth and development of the more dynamic enterprises.

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## PHARMACEUTICALS

(NACE 257)

*Although the pharmaceutical industry in the EC has reported a positive trade balance with the rest of the world over the 1980s, it is currently faced with a number of problems jeopardizing the future health of the sector. These include the high cost, currently estimated at 100 million ECU, of developing and bringing to the market a product or a new chemical entity (NCE); the short period of exclusivity granted under existing patent protection legislation; the varying degree of State involvement in Member States' social security systems; the favourable treatment granted to certain generics manufacturers; and increasing competition from the US and Japanese industry, which are generally able to operate in a freer domestic environment.*

**Table I**  
**Definitions and Scope**

### Article 1

1. Proprietary medicinal product:  
Any ready-prepared medicinal product placed on the market under special name and in a special pack.
2. Medicinal product  
Any substance or combination of substances presented for treating or preventing disease in human beings or animals. Any substance or combination of substances which may be administered to human beings or animals with a view to making a medical diagnosis or to restoring correcting or modifying physiological functions in human beings or in animals is likewise considered a medicinal product.
3. Any matter irrespective of origin which may be:
  - human, e.g. human blood and human blood products
  - animal, e.g. micro-organisms, whole animals, parts of organs, animals secretions, toxins, extracts, blood products, etc.
  - vegetable, e.g. micro-organisms, parts of plants, vegetable secretions, extracts, etc.
  - chemical, e.g. elements, naturally occurring chemical materials and chemical products obtained by chemical change or synthesis.

Source: EC Directive 65/65 (OJ C 22 of 9.2.1965).

### Current Situation

The pharmaceutical industry is present in every Member State of the Community, in which the various stages of production are incorporated in different ways. Luxembourg is the exception in that it only imports pharmaceutical products.

Europe is currently the world's leading location for production and export, with an external trade surplus of over 3.1 billion ECU in both 1986 and 1987.

A survey of the pharmaceutical sector requires first of all a definition of what is meant by medicinal products, and how this translates into economic data.

Within the EC, the first Article of Directive 65/65 defines medicinal products as shown in Table I.

It is not so easy to translate the concept of medicinal products into economic terms. Until recently, each State had its own classification. To avoid any confusion, the sector has adopted, as reasonably representative, the SITC 54 heading of the OECD - that is to say the entire "medicines" section, as well as the sections covering specific active substances.

This definition is used for supplying the key figures; missing data have been completed, wherever possible, with Eurostat data drawn from a NACE 257 base, but the statistics are slightly different and less complete (see Table II).

The data covered here are approximate and should be considered as trend indicators, providing an acceptable level of information and comparison.

### Main Indicators Pharmaceuticals

| (Million ECU)            | 1980       | 1981    | 1982    | 1983    | 1984    | 1985    | 1986       | 1987        |
|--------------------------|------------|---------|---------|---------|---------|---------|------------|-------------|
| Apparent consumption (1) | (2) 15 352 | 17 316  | 19 382  | 21 438  | 23 350  | 26 495  | (2) 28 378 | N/A         |
| Net export earnings      | + 1 797    | + 2 044 | + 2 250 | + 2 470 | + 2 842 | + 3 129 | + 3 174    | (2) + 3 245 |
| Total EC production      | 18 601     | 21 199  | 24 234  | 26 585  | 28 952  | 32 397  | 34 007     | 36 230      |
| Employment (1 000)       | 389        | 397     | 397     | 395     | 398     | 402     | 408        | 409         |

(1) Excluding Spain.

(2) Estimated.

**Table II**

**Composition of SITC 54**

| Combined Nomenclature Codes (CN) |                         |
|----------------------------------|-------------------------|
| CN 29.36                         | Provitamins, vitamins   |
| 29.37                            | Hormones                |
| 29.38                            | Alkaloids               |
| 29.41                            | Antibiotics             |
| 30.01-30.06                      | Pharmaceutical products |

**Composition of NACE 257**

|                  |   |
|------------------|---|
| Eurostat         |   |
| 130311 to 130396 | Opium, vegetable extracts, mucilages          |
| 150419           | Fish liver oils                               |
| 294410 to 99     | Antibiotics                                   |
| 300110 to 309700 | Pharmaceutical products                       |
| 340790           | Dental cements                                |
| 381974           | Pharmaco-surgical products including plasters |

Sources: SITC and Eurostat.

The European pharmaceutical industry continues to invest close to 4 billion ECU each year in research. However, its position is precarious. Domestically it does not always operate in a positive environment, neither nationally nor at the Community level; internationally it is faced with strong American and Japanese competition.

Apparent consumption increased by 85% from 1980 to 1986; net export earnings increased by 81% up to 1987 and total EC production almost doubled in the same period (+ 95%).

Employment remained stable at around 400 000.

*Factors Behind Production Trends*

Production is very diversified as it meets specific yet very diverse demands. It varies as much in its degree of integration - from the synthesis of basic chemical entities to the preparation of finished products - as it does in the nature of the form produced, i.e. from the most widely used solid form (tablets, pills, etc.) to the specific forms meeting the needs of particular therapeutic activities (injectable ampoules, capsules, etc.).

It must meet the demand for both widely prescribed medicines intended for the treatment of major illnesses, and for medicinal products used to treat certain rare conditions of which only a few hundred cases have been diagnosed in Europe.

However, in all cases the legislative framework is the same, production standards are very strict and high quality essential.

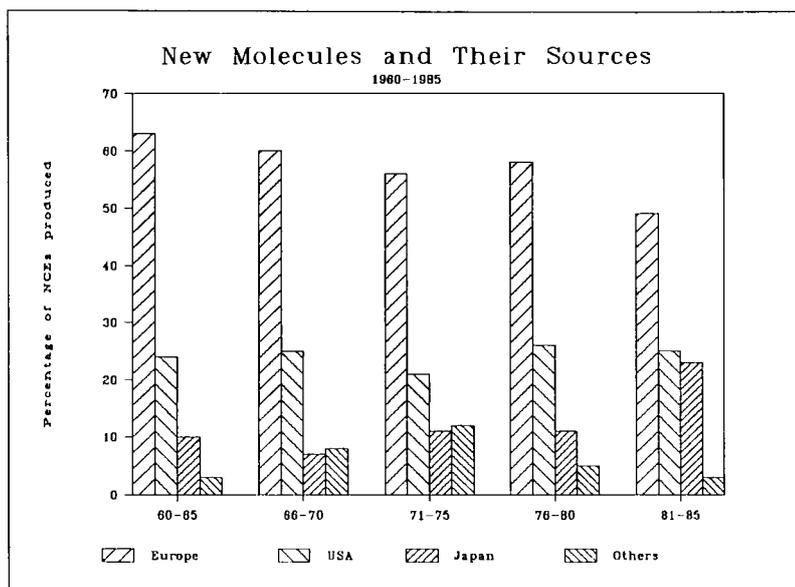
Production has increased steadily to meet the demands of the world market, with the European industry active in scientific and technical research.

*Research*

As an innovative sector, medicinal products depend heavily on research for progress.

In 1986, the Community industry invested close to 4 billion ECU in research, representing 12.5% of its turnover and one of the highest research ratios in industry. Depending on the size of the national industries, the figure varies between 7.7% and 18%. Research is carried out principally in Germany, France, Italy and the United Kingdom, and to a lesser extent in Belgium, Denmark, Spain and the Netherlands.

**Table III**

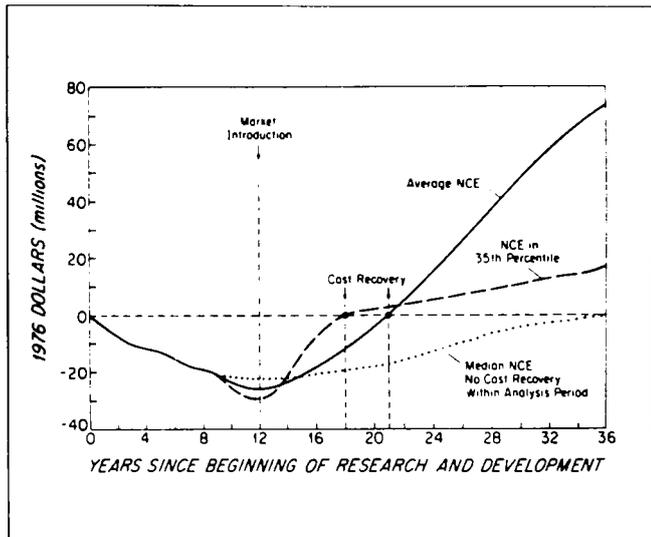


In the increasingly competitive international pharmaceutical market, Europe's pre-eminence in new product introduction is subject to a mounting challenge.

The proportion of NCEs discovered by European companies is still high, but the growing challenge mounted by the US and Japanese pharmaceutical industries is evident.

Source: Reis-Arndt, E. *Drugs in Germany* 30 No 3. 1987.

**Table IV**



Cumulative world-wide after-tax earnings of new chemical entities (NCEs) in the average, median, and 35th percentile of sales ranked by declining average annual sales. Up to year 8, research and development cash outflow for all NCEs is identical, i.e. average. In years 9 to 11, cash outflow varies because additional plant and working-capital costs in these years are assumed greater for the higher selling NCEs. The median NCE does not recover its costs. The average NCE, earning much more than the median because of atypical "big winners", recovers its non-capitalized costs in year 21 after the start of research and development and by year 36 accumulates cash of USD 76 million (in 1976 dollars).

Source: "Economic Evaluations of Antibiotic Use and Resistance - A Perspective: Report of Task Force 6", *Reviews of Infectious Diseases*, Vol 9, Supplement 3, May-June 1987.

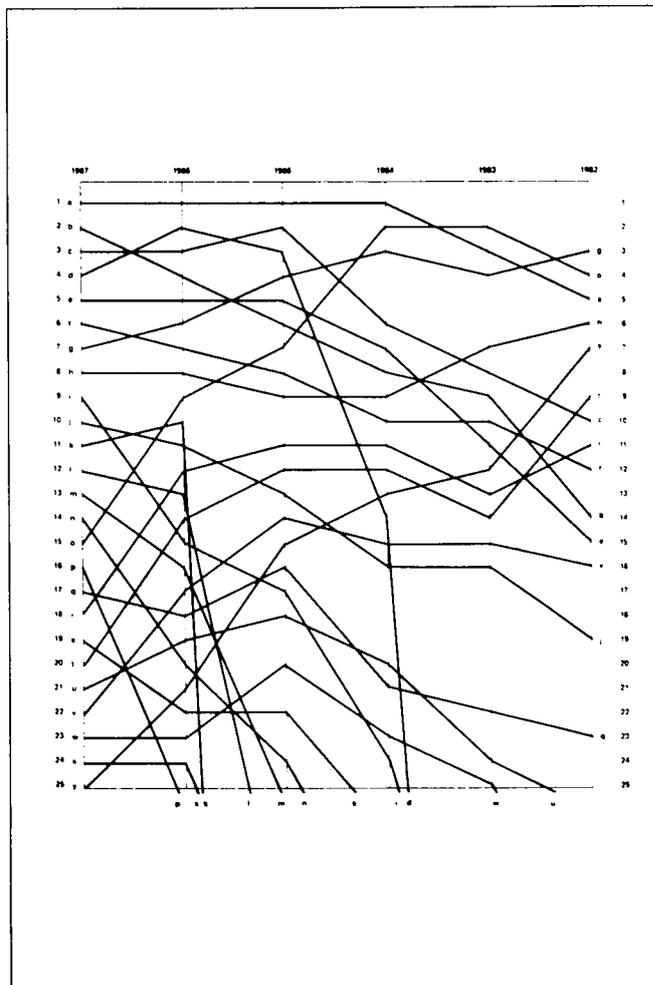
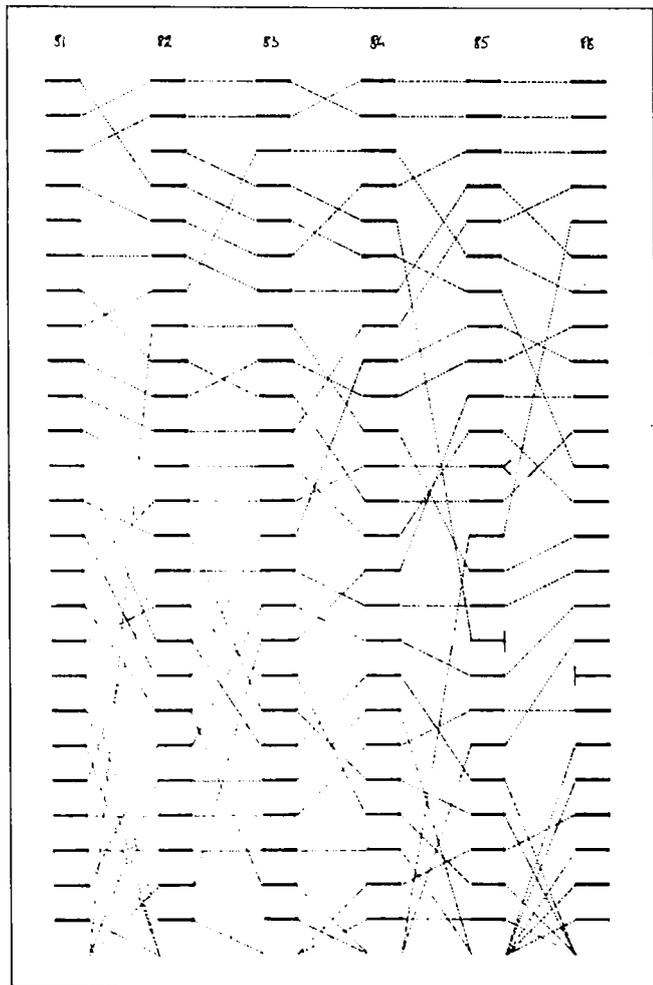
**Table V**  
**Ranking of Top 25 Products**

**Belgium between 1981 and 1986**

(Source: AGIM).

**Denmark between 1982 and 1987**

(Source: MEFA).



As a result of this important investment, five European companies (three of which are of Community origin) number among the 10 largest pharmaceutical companies in the world. However, continued research depends upon a sufficient profit margin and protection of intellectual property rights, both of which are a source of concern for the industry.

More than 10 years' work and 100 million ECU are required before a product can be put on the market, and there are no long-term guarantees as to profitability or market exclusivity. Yet the industry today is preparing the medicinal products which will reach the market after the year 2000. In the face of strong international competition from the USA and Japan, where the industrial climate is often more favourable than in the EC, the industry needs a positive environment.

European research is still the most productive, but the results achieved, particularly in Japan (19 NCEs out of 56 introduced in 1987) demonstrate that a redoubling of effort is required and that more investment is essential.

Strong competition exists at both the European and world-wide level, and no single company has a dominant position; the 10 largest companies in the world represent only 25% of the world market. However, the diversity of research fields has required companies to specialize in certain research areas, and consequently in certain production fields. In addition to research costs (essentially personnel expenses), other necessary investments (see Table VII: 2 billion ECU in 1987) are sufficiently important to confirm the need for specialization. However, this is a changing situation and no one company or product is protected from the arrival on the market of a competitor with a newer therapeutic profile.

Another problem area is the long development time of a product; this takes over 10 years from the time of patent application until a marketing authorization is obtained. This has, in effect, cancelled out more than half the patent protection

**Table VI**  
**Insurance and State Spending as a Percentage of Total Spending on Medicines**

|                | (%)  |
|----------------|------|
| Belgium        | 52.0 |
| Denmark        | 53.4 |
| Germany        | 56.4 |
| Greece         | N/A  |
| Spain          | 66.9 |
| France         | 65.2 |
| Ireland        | 48.0 |
| Italy          | 64.0 |
| Netherlands    | 33.5 |
| Portugal       | 67.2 |
| United Kingdom | 75.6 |

Source: EFPIA

period granted to the innovator, leaving companies without sufficient exclusivity to ensure profitability of their investment in R&D before the appearance on the market of a second, and obviously much cheaper, type of competition, the imitator (see Table IV). By comparison, American and Japanese companies have been granted, by their own authorities, an extension of the patent protection period to compensate for the time required to fulfil administrative formalities.

### *Consumption Trends*

In 1987, the EC market was worth around 33 billion ECU.

A patient can obtain medicine either through a medical prescription - and in this case he will probably, but not necessarily, be reimbursed by his social security system - (see Table VI) or by making a spontaneous purchase if he wishes to obtain a product for minor indications. The latter refers to pro-

**Table VII**  
**Production, Foreign Trade and Gross Investment**

| (Million ECU)        | 1980   | 1981    | 1982    | 1983    | 1984    | 1985    | 1986    | (1) 1987 |
|----------------------|--------|---------|---------|---------|---------|---------|---------|----------|
| Production           |        |         |         |         |         |         |         |          |
| Current value        | 18 601 | 21 199  | 24 234  | 26 585  | 28 952  | 32 397  | 34 007  | 36 230   |
| Index                | 100.0  | 114.0   | 130.3   | 142.9   | 155.6   | 174.1   | 182.8   | 194.8    |
| Constant value       | 18 601 | 20 018  | 20 192  | 21 657  | 22 507  | 24 115  | 23 654  | 24 777   |
| Index                | 100.0  | 107.6   | 108.6   | 116.4   | 121.0   | 129.6   | 127.2   | 133.2    |
| Imports Extra-EC     | 1 216  | 1 483   | 1 703   | 2 027   | 2 332   | 2 643   | 2 929   | 3 055    |
| Index                | 100.0  | 121.9   | 140.0   | 166.6   | 191.8   | 217.3   | 240.8   | 251.2    |
| Exports Extra-EC     | 3 013  | 3 527   | 3 953   | 4 497   | 5 174   | 5 772   | 6 103   | 6 300    |
| Index                | 100.0  | 117.1   | 131.2   | 149.3   | 171.7   | 191.6   | 202.6   | 209.1    |
| X/M                  | 2.48   | 2.38    | 2.32    | 2.22    | 2.22    | 2.18    | 2.08    | 2.06     |
| Gross investment (2) | 927.4  | 1 071.8 | 1 313.2 | 1 383.7 | 1 504.3 | 1 764.4 | 1 998.1 | 2 172.0  |

(1) Estimates.

(2) Excluding Spain and Portugal; 1983, 1985, 1986 and 1987: estimates.

Sources: EFPIA and Eurostat.

ducts available over the counter (OTC), which have been advertised directly to the public.

The American concept of an "ethical" or an "OTC" product does not entirely cover the above possibilities; a clearer definition should therefore be given to the terms "OTC" and "non-prescription medicine" (see following section).

For products dispensed following a prescription, reimbursement mechanisms are different in the 12 Member States. A 1986 survey examined the levels of intervention as a percentage of total patient spending on medicines (see Table VI).

Apart from varying reimbursement systems, the EC also has 12 different price structure systems, which are summarized below:

For a public price of 100:

- the manufacturer receives between 49 and 70
- the distributing wholesaler between 6 and 13
- the dispensing pharmacist between 22 and 38
- the State, through VAT, between 4 and 19

(NB: the very particular case of the UK system was not included in this survey).

### Employment Trends

The pharmaceutical industry has a workforce of approximately 400 000 and, in general terms, employment is stable. However, indirect employment generated upstream and downstream should be taken into account. It has been calculated that the pharmaceutical industry generates employment for a total of 1.2 million people throughout the EC.

In addition to employment stability, the workforce covers a wide range of professional positions, 20% of which are university graduates. Women represent, on average, 30% of

**Table IX**  
**Evolution of World Market: 1987-92**

| (USD million, 1987 exchange rates)          | 1987           | 1992           |
|---|----------------|----------------|
| Europe                                      | 38 000         | 53 700         |
| USA   | 33 223         | 54 130         |
| Japan                                       | 25 359         | 32 779         |
| <b>World total (excluding Eastern bloc)</b> | <b>117 300</b> | <b>170 900</b> |

Source: US Estimates.

the total workforce, and up to 50% in certain manufacturing countries.

### Export Trends

The trade balance has been positive since the beginning of the decade, and has practically doubled in the last eight years. However, export growth is showing signs of slowing, and imports are continuing to increase. This is reflected in the export/import ratio which has slid from 2.48 to 2.06, although it remains in a 2 to 1 ratio in favour of exports.

The world market for pharmaceutical products has evolved as shown in Table VIII.

While Europe as a whole represents the largest potential market, unlike in the USA and Japan the existing structures do not allow it to benefit from a market free of internal barriers. The EC market effectively consists of 12 separate markets as opposed to two large markets.

### Outlook for 1992

The pharmaceutical industry is faced with a series of specific uncertainties which make attempts at forecasting difficult. In short, the trend appears to be one of slower growth. The challenges facing the industry are formidable:

**Table VIII**  
**Evolution of World Market, 1983-87**

| (USD million) | 1983   | 1984   | 1985   | 1986    | 1987    |
|---------------|--------|--------|--------|---------|---------|
| World market  | 85 700 | 87 100 | 94 100 | 110 370 | 134 400 |
| Europe        | 21 300 | 20 200 | 22 001 | 29 800  | 38 000  |
| USA           | 21 266 | 24 226 | 26 451 | 29 238  | 33 223  |
| Japan         | 13 389 | 13 072 | 14 038 | 19 805  | 25 359  |
| (%)           | 1983   | 1984   | 1985   | 1986    | 1987    |
| World market  | 100    | 100    | 100    | 100     | 100     |
| Europe        | 25     | 23     | 23     | 27      | 28      |
| USA           | 25     | 28     | 28     | 26      | 24      |
| Japan         | 16     | 15     | 15     | 18      | 19      |

Source: US estimates.

- rising research costs and the need to invest simultaneously in new fields such as biotechnology
- erosion of the profitability necessary for research
- pressures on the industry from cost containment by national authorities who are - for their part - anxious to control healthcare budgets
- erosion of protection afforded by existing patent legislation due to lengthy administrative procedures and the sophistication of control techniques in the industry
- parallel to the erosion of effective patent life, the threat from lower-priced imitator products to the detriment of the innovative medicine
- strong competition from the principal US and Japanese competitors which already benefit from a large internal market. However, at the international level, the outlook is good since demand is likely to increase. The rise in population and especially an increasing proportion of elderly people, will make more consistent therapeutic means necessary.

According to US projections, the European market will evolve in a more limited manner than the other principal markets, but still holds non-negligible potential. However, compared with Japan's increasing share of the world market, the prospects for growth in Europe are less favourable.

Operating in a complex domestic and internationally competitive environment, the European pharmaceutical industry faces an uncertain future. Its capabilities and innovative and technical value are undoubted, but the investment necessary for healthy growth is essential. In short, a balanced yet global solution must be sought within the EC for this spearhead of Community industry to compete successfully, in line with the Commission's views as expressed in the Explanatory Memorandum to Document COM(86)765 final:

"The aims of Community policy must be to ensure that such measures [i.e. those taken by national authorities to control the cost of medicines and social security] do not adversely affect the operation of the internal market and take due account of the need to maintain a high level of innovation within the Community."

"The maintenance of a high level of public health within the Community will to a large extent depend on the activities of the Community's own pharmaceutical industry. It will not be in the interests of the European patient to become dependent on research conducted in third countries."

EFPIA: European Federation of Pharmaceutical Industries' Associations/Fédération Européenne des Associations de l'Industrie Pharmaceutique

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# NON-PRESCRIPTION PHARMACEUTICALS

(NACE 257)

*Sales of non-prescription products are estimated to represent about one sixth of overall pharmaceutical sales. Moderate to strong growth is expected in the industry over the medium term, as the trend continues towards both encouragement of self-medication for minor ailments and public awareness of general health. Harmonization of EC legislation on OTC products generally as well as that relating to product advertising should provide a boost to the industry.*

The non-prescription pharmaceutical industry, whose products are included in the figures on the overall pharmaceutical industry, represents the manufacturers of pharmaceuticals which can be obtained by the general public without a doctor's prescription. Statistical material on the sector only began to be gathered in 1987, so that as yet no sales or consumption trends can be established.

The non-prescription pharmaceutical industry produces medicinal products which can be bought directly by the consumer without a doctor's prescription. These products are mainly used for minor illnesses or ailments. Purchase without medical prescription (over-the-counter or OTC) is accepted for several reasons:

- to reduce expenditure by the public health care system
- to reduce the medical profession's workload by reducing visits to doctors for ailments which do not require medical treatment
- to increase the public's own responsibility as far as health problems are concerned.

OTC products are not defined in the same way in all Member States. The information provided below is only concerned with products defined as medicinal products in the pharmaceutical legislation of the different Member States.

## Current Situation

The registration of OTC products is in most cases identical or similar to the registration of prescription medicines. Currently, this procedure has to be repeated in every Member State for the same product; unification of the EC market and certification on a Community-wide basis will ease the situation considerably.

As for other consumer products, the public needs continuous information concerning the availability, properties and improvements of OTC pharmaceuticals. The best product will remain ineffective if the patient with a minor ailment does not

know about its existence. Advertising also provides information on health education and helps to improve cost awareness.

Most Member States allow OTC products to be advertised to the public in the media. Although advertising controls for non-prescription medicines vary considerably from one Member State to the other, all Member States exercise some kind of control. Some recognize the industry's self-regulatory bodies, others have controls applied by official bodies such as the Ministry of Health. In some countries an obligation exists to include a special short message in advertisements exhorting the consumer to read the label or leaflet carefully or instructing him to stop self-medication after a certain period and see a doctor if no improvement occurs. Many Member States also require the inclusion of product leaflets in the package.

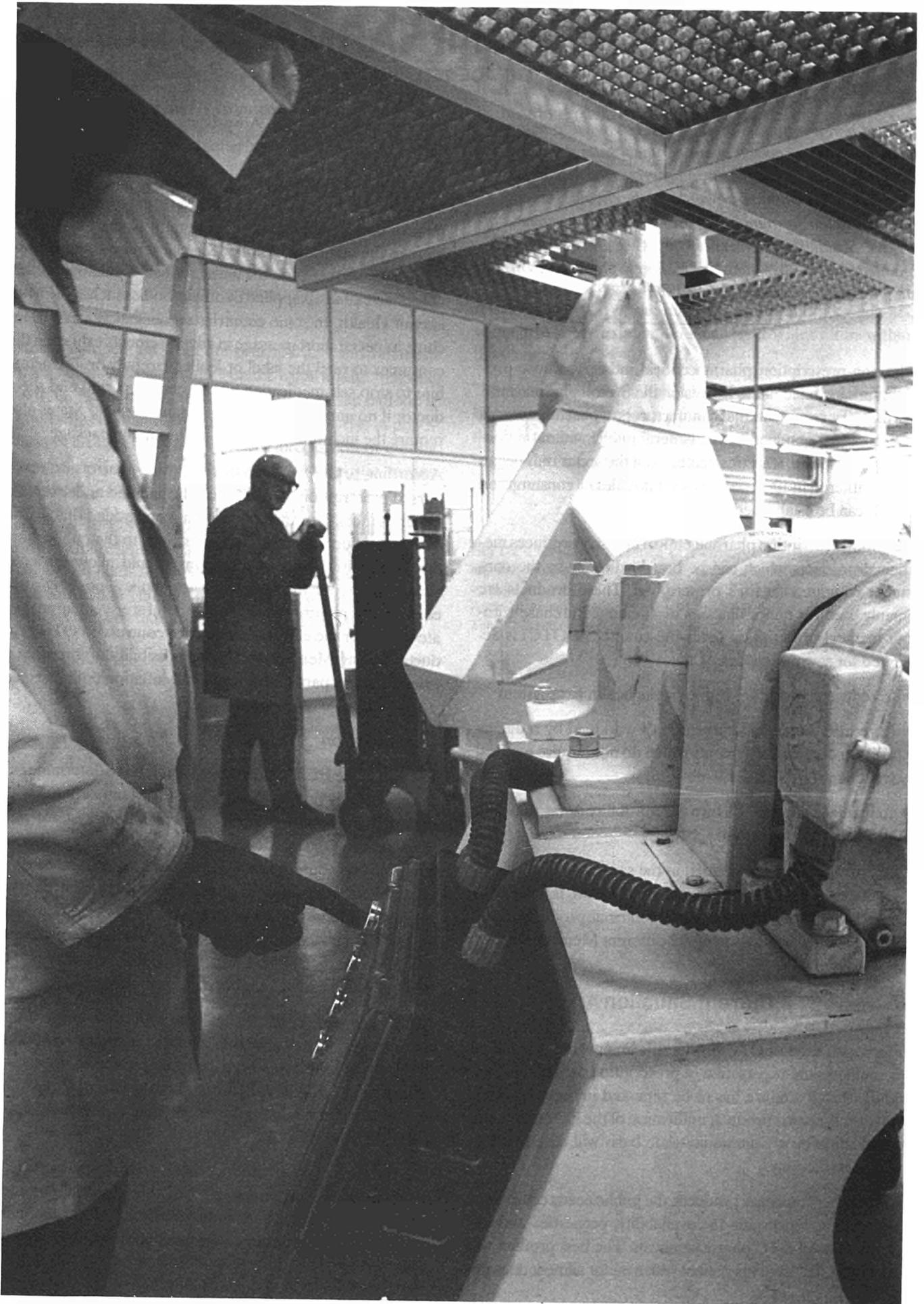
According to the EC Commission, price controls on reimbursed prescription medicines can be justified under certain circumstances. However, the Commission added that, in the case of products which are on direct sale to the public, normal competitive price mechanisms should allow the consumer to choose the best value for money, possibly after consulting a pharmacist. It would therefore seem appropriate to aim for the elimination of price controls on OTC products, leaving Member States the possibility of imposing a price freeze as part of an overall anti-inflation policy.

## Consumption

The size of the EC's OTC market is difficult to determine because of widely varying legislation in the Member States with regard to prescription rules, reimbursement systems and sales outlets. One particular product may be prescription-bound in one country and OTC in another. In some cases it may be sold exclusively in pharmacies; in others it may be available in food outlets or drug-stores. These differences make it difficult to compile aggregate statistics. Finally, there are many pharmaceuticals which are basically prescription-free but which can be reimbursed if prescribed by a doctor.

After many years of discussion, data collection and continuous improvement of available data, the market size of non-prescription medicines on a consumer price basis is now estimated at 12.1 billion ECU, or about one third of the total pharmaceutical market (Source: Institute of Medical Statistics (IMS) and AESGP).

The turnover of these products is also defined as the OTC-potential. However, almost 50% of this potential is under doctor's prescription, and about 6.5 billion ECU are actually spent by the EC consumer on medicines without medical prescription.



**Table I**  
**Turnover of Non-prescription Medicines, 1987**

|             | (Million ECU) | Share of total pharmaceutical market (%) |
|-------------|---------------|--|
| Belgium     | 300           | 24                                       |
| Germany     | 4 600         | 37                                       |
| Spain       | 400           | 9  |
| France      | 3 800         | 35                                       |
| Italy       | 1 000         | 13                                       |
| Netherlands | 700           | 47                                       |
| UK          | 1 000         | 22                                       |

Source: IMS, 1988.

**Table II**  
**Major Non-prescription Product Groups, 1987**

| Product group                     | Turnover (1) (million ECU) |
|-----------------------------------|----------------------------|
| Cough-and-cold preparations       | 1 650                      |
| Digestive and intestinal remedies | 1 650                      |
| Pain relievers                    | 1 300                      |
| Skin treatments                   | 950                        |
| Vitamins/mineral supplements      | 870                        |

(1) EC 7: excluding Denmark, Greece, Ireland, Luxembourg and Portugal

Source: IMS, 1988.

### Current Trends

Whereas - at least officially - there are almost no sales of non-prescription medicines in Greece, and very low sales in other southern Member States such as Spain and Portugal, their use is well established in France, Germany and the United Kingdom.

Since 1987 is the first year for which statistical data for the non-prescription market have been calculated, it is difficult to indicate development trends for both the overall non-prescription market and the share of actual self-medication. Until recently, IMS registered overall pharmaceutical sales only, without indicating whether they were non-prescription or self-medication products. Meaningful comparisons with previous estimates can therefore not be made. However, certain trends are well-known:

- the way in which the health care systems are financed leads to completely different measures of cost containment and thus to different reimbursement policies, thereby influencing the economic incentives for practising self-medication
- in the last three years, OTC turnover increased in the UK, marginally changed in Germany and decreased in France
- in virtually all Member States, cough-and-cold products and pain relievers are among the main OTC categories.

Moreover, it has been observed that self-medication can contribute to alleviating national health expenditure. For example, it is estimated that self-medication in Germany reduces the national health bill by at least 1 billion ECU per year.

### Outlook

Since a high number of non-prescription medicines are - at least to some degree- reimbursed by national social security systems, there is little incentive for an increase in self-medication. However, various studies, e.g. "Self-medication in Europe" published by the WHO Regional Office for Europe in 1988, demonstrate an increasing awareness of self-medication and a high degree of willingness amongst the public to take care of their health and illnesses without professional treatment.

As a consequence, the outlook for this industrial sector can be regarded as good. An increase in turnover of about 5% p.a. is expected for the next few years, but with significant differences in the individual Member States. An overall trend has emerged towards the application of prophylactic self-medication and utilization of non-prescribed diagnostics. In some countries, products containing garlic or ginseng may gain a considerable market share. This development is coupled with an increase in the sale of vitamins and mineral supplements in many markets. Both trends are expected to continue.

On the other hand, turnover levels for products which have had a relatively market share for many years such as pain relievers and cough-and-cold preparations, are stagnating and will show only slight changes in a number of countries. This primarily relates to countries with an already high level of self-medication; in some Member States self-medication is still growing and the market for non-prescription product groups such as pain relievers and cough-and-cold products is still likely to expand.

The future development of the non-prescription pharmaceutical industry will depend on the regulatory environment of the EC in 1992. If the proposed system of mutual recognition of marketing authorizations is implemented, and the principles of responsible but liberal advertising and market-oriented pricing are upheld, self-medication using over-the-counter (OTC) products will continue to expand. However, the non-prescription pharmaceutical industry - like the pharmaceutical industry as a whole - depends to a relatively high degree on the overall regulatory environment.

AESGP: Association Européenne des Spécialités Pharmaceutiques Grand Public/The Proprietary Association of Europe  
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## MAN-MADE FIBRES

(NACE 26)

*The manufacture of man-made fibres in the Community has undergone a lengthy period of restructuring which began in the late 1970s. The industry is struggling to maintain its market share against a background of intense competition particularly from the developing and newly industrialized countries. The rationalization process in the industry is ongoing with investment geared towards this process; this has meant a sharp fall in employment over the 1980s for this sector. Only marginal growth is expected over the medium term.*

1978-1981 period, the industry engaged itself in a second programme of capacity cuts, since in 1981 the losses incurred by the companies had largely continued. The objective was a further reduction in capacities of more than 500 000 tonnes.

While the first operation provided for a more or less linear cutback in capacity, the second one was aimed at allowing companies to restructure towards a specialized fibre.

Despite these cutbacks in capacity the number of producers in the EC today is still much higher in relation to production than in Japan or the USA.

Man-made fibre consumption represents over 60% of total fibre consumption in the EC. These fibres are especially used in the clothing industry (45%) while home-furnishing and industrial applications account for 35% and 20% respectively. For this reason, the development of this industry is largely dominated by the performance of the textile and clothing industries.

Production of the EC man-made fibre industry covers three categories of commodities: synthetic staple fibres (55%), synthetic filament yarns (30%), and cellulose fibres and yarns (15%).

### Current Situation

The EC man-made fibre industry has undergone a process of widespread restructuring since the end of the 1970s. After an agreed upon capacity reduction of 220 000 tonnes over the

**Table I**  
**Main European Man-Made Fibres Producers**  
**in the Community**

| Name                             | Country        | Production capacities or participation in other EC countries |
|----------------------------------|----------------|--|
| AKZO (NV)                        | Netherlands    | Germany<br>Spain   |
| BAYER AG                         | Germany        | Belgium  |
| COURTAULDS. PLC                  | United Kingdom | France<br>Italy<br>Spain                                     |
| HOECHST. AG                      | Germany        | Belgium<br>United Kingdom                                    |
| IMPERIAL CHEMICAL INDUSTRIES LTD | United Kingdom | Germany<br>Portugal<br>Spain                                 |
| MONTEFIBRE SpA                   | Italy          | Spain  |
| RHONE POULENC SA                 | France         | Germany<br>Spain   |
| SNIA FIBRE                       | Italy          | France   |

Source: TEXTILE ORGANON.

### Main Indicators Man-Made Fibres

| (Thousand tonnes)              | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  | 1987  |
|--------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Apparent consumption (1)       | N/A   | 2 280 | 2 145 | 2 110 | 2 405 | 2 492 | 2 934 | 2 909 |
| Net exports (1)                | N/A   | + 144 | + 49  | + 204 | + 91  | + 60  | -56   | -9    |
| Total Community production (1) | N/A   | 2 424 | 2 194 | 2 314 | 2 496 | 2 552 | 2 878 | 2 900 |
| Employment (1 000) (2)         | 113.6 | 100.1 | 93.6  | 88.4  | 86.2  | 81.6  | 77.2  | N/A   |

(1) 1981-1985: EC 10 (excluding Spain and Portugal).

(2) EC 11 (excluding the Netherlands).

The main man-made fibre producers in the Community are shown in Table I.

Foreign producers such as Du Pont De Nemours (Germany, Luxembourg, the Netherlands, the United Kingdom) and Asahi (Ireland) are also present in Europe. The German company Hoechst took over Celanese Corporation (USA).

Poor growth in textile consumption in Europe in the 1970s and 1980s following the oil shock of 1973 as well as the growing deficit of the EC textiles and clothing trade balance, and the development of man-made fibre capacities in the rest of the world, are the main factors which led to cutbacks in the production capacity of the industry.

Many investments by EC companies were made in other parts of the world, in particular in the developing countries, with the result that the share of EC man-made products in world production diminished substantially; synthetic yarns fell by 5% and cellulosic fibres by 6.7% between 1977 and 1986.

**Table II**  
**Key Trends in Man-Made Fibres**

| (Million ECU) | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  |
|---------------|-------|-------|-------|-------|-------|-------|
| Turnover      | 6 200 | 6 250 | 6 750 | 7 730 | 8 150 | 7 840 |
| Added value   | 1 520 | 1 640 | 1 860 | 2 025 | 2 150 | 2 100 |
| Investments   | 145   | 180   | 190   | 200   | 220   | N/A   |

EC 9

COMITEXTIL estimates, as some of the figures are covered by statistical confidentiality at national level.

**Table III**  
**Share in World Production**

|                                       | 1977  | 1986  |
|---------------------------------------|-------|-------|
| Synthetic filament yarns              | 20.3% | 15.3% |
| Synthetic staple fibres               | 23.1% | 20.1% |
| Cellulosic filament and staple fibres | 18.8% | 12.1% |

EC 12

Source: CIRFS

### *Factors behind Production Trends*

The European man-made fibre industry is turning to products with a higher value-added content and is steadily pursuing a dynamic investment policy chiefly oriented towards

rationalization and capacity reduction. The consequence has been a large and steady reduction in the number of people employed. Even though in value terms the EC remains a net exporter of man-made fibres, the import/export ratio has steadily decreased. However, given the effect of exchange rate fluctuations, comparative yearly changes are not always significant.

In 1987, compared with 1986, production increased marginally in Europe, but still recorded a lower volume than in 1985.

1977/86 growth by types of fibres for Western Europe is shown in Table IV.

**Table IV**  
**Output Growth 1977/86 (%)**

|                   | Filament yarns | Staple fibres |
|-------------------|----------------|---------------|
| Synthetic         | 0.2            | 1.3           |
| Polyamide         | 0.6            | 1.5           |
| Polyester         | -2.5           | 0             |
| Others (1)        | 9.5            | 13.3          |
| Acrylic           | N/A            | -1.2          |
| Cellulosic        | -3.6           | 0             |
| Viscose           | -3.5           | 0             |
| Acetate and Cupro | -4.0           | 0             |

(1) Mainly aramids and polyolefin fibres.

Source: COMITEXTIL.

This growth contrasts with the US situation, where there was a small decrease in the production of cellulosic fibres (-2%), but with a substantial increase in the synthetic sector (+6%), to the extent that capacity utilization reached nearly 90%.

Japanese production of synthetic fibres decreased by 1.1%, while rayon and acetate fibres showed a decrease of 4.9%, partly affected by the reduction of production capacities.

In the meantime, South Korea registered double-digit growth, while China and Taiwan also achieved a substantial expansion in production.

Although demand for man-made fibre increased by 2% in the EC, much of this was met by increased imports which in 1987 induced the industry to lodge complaints against unfair pricing.

**Table V**  
**1986 National Production by Product**

| (Thousand tonnes)            | EC 11   | BLEU | DK   | D     | GR   | E     | F     | IRL  | I     | P    | UK    |
|------------------------------|---------|------|------|-------|------|-------|-------|------|-------|------|-------|
| Synthetic yarns              | 905.3   | 97.9 | 1.5  | 350.0 | 10.0 | 85.0  | 62.9  | 11.0 | 193.6 | 2.3  | 91.1  |
| Synthetic staples            | 1 561.7 | 74.2 | 15.2 | 429.0 | 10.0 | 191.3 | 115.4 | 62.8 | 456.5 | 59.7 | 147.6 |
| Cellulosic yarns and staples | 398.9   | 49.2 | -    | 161.0 | 7.1  | 36.2  | 20.5  | -    | 30.0  | 0.9  | 94.0  |

EC 11 (excluding the Netherlands).

Source: CIRFS.

**Table VI**  
**Production and Foreign Trade**

| (Million ECU)          | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  |
|------------------------|-------|-------|-------|-------|-------|-------|
| Turnover Current value | 6 200 | 6 250 | 6 750 | 7 730 | 8 150 | 7 840 |
| Index                  | 100   | 100.8 | 108.9 | 124.7 | 131.5 | 126.5 |
| Imports extra-EC       | 675   | 766   | 812   | 990   | 1 155 | 1 084 |
| Index                  | 100   | 113.5 | 120.3 | 146.7 | 171.1 | 160.6 |
| Exports extra-EC       | 1 503 | 1 414 | 1 603 | 1 908 | 2 012 | 1 562 |
| Index                  | 100   | 94.1  | 106.3 | 126.9 | 133.9 | 103.9 |
| X/M                    | 2.2   | 1.8   | 2.0   | 1.9   | 1.7   | 1.4   |

EC 10 (excluding Spain and Portugal).  
Sources: COMITEXTIL/CITH.

### Polyester and acrylic

In relation to the growth in imports, the main areas of concern were polyester staple fibres and polyester filament yarns for which earlier complaints were lodged in 1985.

**Table VII**  
**Production of Man-Made Fibres**

| (Thousand tonnes)        | 1985  | 1986  | 1987  | 87/86 |
|--------------------------|-------|-------|-------|-------|
| Synthetic staple fibres  | 1 582 | 1 553 | 1 579 | +1.7% |
| Synthetic filament yarns | 939   | 923   | 923   | N/A   |
| Cellulosic staple fibres |       |       |       |       |
| Cellulosic filament yarn | 414   | 402   | 398   | -1.0% |
| Total                    | 2 935 | 2 878 | 2 900 | +0.8% |

EC 12  
Source: COMITEXTIL

Although polyester fibre production remained relatively stable from 1984 to 1987, the market share of Community producers fell from 81.8% in 1984 to 75.7% in 1987. The average price of first quality fibres, which account for the bulk of Community production, fell by some 13% to 15%. With the exception of two producers, the Community industry saw its profits fall, its profits turn to losses or its losses grow. The investigation conducted by the EC Commission led to the introduction in June 1988 of provisional protective duties on deliveries from Turkey, Taiwan, the US, Mexico, and Romania, which for the latter two countries were above 40%.

The situation is not much different for polyester yarns. Production also remained relatively stable, but the market share of Community producers fell from 91% in 1984 to 79% in 1987. Increased Community consumption was largely met by imports. The fall in prices ranged from 6% to 16% for POY and from 9% to 24% for PTY, and profitability deteriorated accordingly. Provisional protective duties were imposed on shipments from Mexico, Taiwan, Turkey and South Korea.

Since the end of 1987, the situation in the acrylic sector has also changed dramatically. Because of a downturn in the consumption of acrylics in certain end-uses, and a large increase in imports of finished products made from acrylic, especially from Turkey, the market situation has become very depressed.

### Polyolefin textiles

In the mid-1960s the process of extruding polypropylene and polyethylene (polyolefins) into a film or sheet - slitting it into narrow strips and creating, by stretching, a tape with textile yarn characteristics - reached the stage of commercialization.

The tapes thus produced were found to be ideal for weaving and knitting into fabrics that very quickly found a use, initially in some of the traditional markets. The industrial textile produced in this manner proved to be very cost effective. For the first time a synthetic replacement for jute products manufactured 100% within Europe became available.

**Table VIII**  
**Community Production by Product**

| (Thousand tonnes)                     | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  | 1987  |
|---------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Synthetic filament yarns              | 816   | 856   | 783   | 802   | 879   | 939   | 923   | 923   |
| Synthetic staple yarns                | 1 238 | 1 376 | 1 259 | 1 384 | 1 511 | 1 582 | 1 553 | 1 579 |
| Cellulosic filament and staple fibres | 567   | 523   | 463   | 450   | 466   | 414   | 402   | 398   |
| Total                                 | 2 621 | 2 755 | 2 505 | 2 636 | 2 856 | 2 935 | 2 878 | 2 900 |

EC 12  
Source: COMITEXTIL

The challenge presented by this new product was taken up by the technicians within the traditional industry on the one hand and the polymer and machinery manufacturers on the other.

The resultant unprecedented rapid growth in demand in traditional markets, in particular tufted carpet backing, knitting fabrics, ropes, twines and nets, was soon followed by development and innovation resulting in demand from other major market sectors.

In the early 1970s special tapes for carpet weaving, fibres for spinning into yarns for carpet and other end-uses and mono-filament and multi-filament yarns became established as important new markets.

**Table IX**  
**Production of Polyolefins Granules**  
**and Woven Clothes**

| (Metric tonnes)    | 1986    | 1987    | % Change |
|--------------------|---------|---------|----------|
| Western Europe     |         |         |          |
| Granules including | 577 700 | 602 500 | 4.3      |
| Monofilaments      | 13 600  | 13 800  | 1.5      |
| Multifilaments     | 91 400  | 93 800  | 2.6      |
| Staple fibres      | 250 200 | 277 500 | 11.0     |
| Tapes (1)          | 165 500 | 160 800 | -2.9     |
| Woven clothes (1)  | 134 800 | 141 500 | 5.0      |
| 3m wide and over   | 70 400  | 69 600  | -1.1     |
| Below 3m wide      | 64 400  | 71 900  | 11.6     |
| EC 12              |         |         |          |
| Granules           | 521 000 | 545 000 | 4.6      |

(1) Excluding Turkey.  
Sources: EATP/CITH.

The conversion of the polyolefin tapes into textile products was initially carried out on the traditional looms and equipment, but it became quickly apparent that investment in new specialized equipment would be necessary if full advantage was to be taken of the product. This investment in specialized machinery has continued over the last 15 to 20 years.

New end-uses for the polyolefin textiles requiring high standards of quality control and assurance are still being introduced into the field, such as fabrics for intermediate bulk containers, geotextiles for civil engineering use and fine denier fibres for use in the disposable coverstock market. In many cases the products from polyolefin are not only cost effective but offer technical advantages over their alternatives.

The rapid growth in polyolefin textiles, registered throughout the 1960s and 1970s, slowed at the beginning of the 1980s except for staple fibres.

Last year the tonnage of polyolefin granules extruded for textiles showed 4.6% growth in the EC 12 and 4.3% in Western Europe.

The main reason for concern is the growth in imports of manufactured products, especially in polyolefin fabrics for bags and in polyolefin twines and ropes.

These products are mainly shipped from developing countries and State-trading countries, such as China, at prices that are below production costs, especially in the field of polyolefin light woven bags.

### *Employment Trends*

The industry has experienced a large and steady reduction in the number of people employed, partly due to the reduction in production capacities and technological labour saving developments. In the EC 11 employment in the industry fell by 37 000 (-32%).

### **Forecast and Outlook**

Short-term prospects for manufactures of man-made fibres are not very bright. After an anticipated stagnation in the production volume in 1988, only a very slight recovery can be expected to take place in 1989.

Performance in 1988 will be influenced to a large extent by the decisions adopted by the EC with regard to the complaints about unfair pricing practices introduced by the producers. Due to provisional duties charged on imports from a series of suppliers from Third World countries, pressure should diminish in terms of price and volume; this should allow for an upward adjustment of prices, thus restoring some profitability.

However, these adjustments will have to take into account the situation downstream. The large increase in imports of textile and clothing products in 1987 hampers the activity of the textile processing industry since this reduces demand for EC textile products.

A further reduction of capacities may have to be considered. Present surplus capacities are estimated at 150 000 tonnes and could be reduced through a series of rationalization agreements, like the ones that were concluded in 1987 between ICI and ENKA.

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## METAL ARTICLES

(NACE 31)

Since 1985, this major sector of the metal manufacturing industry has experienced some stabilization after the decline in production over the first half of the 1980s. Productivity gains have been steady over the period, against a background of a sharp fall in employment. Demand both in domestic and foreign markets is expected to grow at a moderate pace; however, an acceleration in import growth is anticipated. A continuing decline in employment is forecast, although at a marginal rate.

### Current Situation

The production of metal products in the EC is one of the major sectors in the metal manufacturing industries. Around 40 000 firms are active in the sector employing almost two million people. For 1987, sales of metal products are estimated at 132 billion ECU.

The size of the various sub-sectors in the metal products industries is indicated in the table below.

NACE 31 includes:

- 311 foundries
- 312 forging (drop forging, closed die-forging, pressing and stamping)
- 313 secondary transformation, treatment and coating of metals
- 314 manufacture of structural metal products (including integrated assembly and installation)
- 315 boilermaking, manufacture of reservoirs, tanks and other sheet-metal containers
- 316 manufacture of tools and finished metal goods, except electrical equipment
- 316.5 manufacture of domestic heating appliances and kitchen appliances of all kinds
- 316.6 manufacture of metal furniture (including safes)
- 319 other metal workshops not elsewhere specified.

These sub-sectors cover a wide range of products from nuts and bolts to metal packaging, and from metal furniture to castings.

**Table I**  
**Sectoral Share of Production and Employment, 1986**

| NACE Code       | Production (%) | Employment (%) |
|-----------------|----------------|----------------|
| 311             | 12             | 14             |
| 312             | 7              | 7              |
| 313             | 11             | 13             |
| 314             | 16             | 14             |
| 315             | 14             | 12             |
| 316             | 39             | 38             |
| 319 (1)         | 1              | 1              |
| <b>31 Total</b> | <b>100</b>     | <b>100</b>     |

(1) The figure for NACE 319 is probably too low due to statistical problems.

Source: Eurostat.

Production of metal products takes place in all Member States of the Community. The largest producer is Germany, followed by France, the UK and Italy. Overall production in the EC increased over the period 1980-87; it is estimated that the value of production rose 33%. However, in volume terms the picture is rather different; for the EC as a whole, the volume of production declined by 7% over the period 1980-87.

### Main Indicators Metal Articles

| (Million ECU)            | 1980    | 1981    | 1982    | 1983    | 1984    | 1985    | 1986    | 1987    | 1988    |
|--------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Apparent consumption (1) | 92 492  | 94 034  | 98 486  | 100 438 | 108 861 | 115 739 | 120 059 | 124 979 | 129 779 |
| Net export earnings (1)  | +6 262  | +8 005  | +8 941  | +8 714  | +8 659  | +8 886  | +7 678  | +6 828  | +6 656  |
| Total EC production (2)  | 98 754  | 102 039 | 107 427 | 109 152 | 117 520 | 124 625 | 127 737 | 131 807 | 136 435 |
| Employment (1 000) (2)   | 2 407.1 | 2 263.1 | 2 163.8 | 2 047.1 | 1 972.5 | 1 939.8 | 2 078.1 | 1 878.1 | 1 863.9 |

(1) 1980-85: EC 10, excluding Spain and Portugal; 1986-88: EC 12; 1987: estimate Orgalime; 1988: forecast Orgalime.

(2) EC 12; 1987: estimate Orgalime; 1988: forecast Orgalime.

**Table II**  
**Production and Foreign Trade**

|                      | 1980   | 1981    | 1982    | 1983    | 1984    | 1985    | 1986    | 1987    | 1988    |
|----------------------|--------|---------|---------|---------|---------|---------|---------|---------|---------|
| Production (1)       |        |         |         |         |         |         |         |         |         |
| Current value        | 98 754 | 102 039 | 107 427 | 109 152 | 117 520 | 124 625 | 127 737 | 131 807 | 136 435 |
| Index                | 100    | 103     | 109     | 111     | 119     | 126     | 129     | 134     | 138     |
| Constant value (1)   | 98 754 | 92 916  | 88 804  | 87 668  | 89 067  | 89 884  | 90 867  | 91 517  | 93 687  |
| Index                | 100    | 94      | 90      | 89      | 90      | 91      | 92      | 93      | 95      |
| Imports Extra-EC (2) | 3 205  | 3 701   | 3 931   | 4 123   | 4 497   | 4 700   | 4 777   | 5 384   | 5 922   |
| Index                | 100    | 116     | 123     | 129     | 140     | 147     | 149     | 168     | 185     |
| Exports Extra-EC (2) | 9 467  | 11 706  | 12 872  | 12 837  | 13 156  | 13 586  | 12 455  | 12 212  | 12 578  |
| Index                | 100    | 124     | 136     | 136     | 142     | 144     | 132     | 129     | 133     |
| X/M                  | 2.95   | 3.16    | 3.27    | 3.11    | 2.93    | 2.89    | 2.61    | 2.27    | 2.12    |

(1) EC 12; 1987: estimate Orgalime; 1988: forecast Orgalime.

(2) EC 10, excluding Spain and Portugal; 1986-88: EC 12; 1987: estimate Orgalime; 1988: forecast Orgalime.

Sources: Eurostat, Orgalime.

### *Consumption Trends*

Consumption, in terms of current value, has grown steadily over the period, by around 5% per year. However, taking 1980 as the base year total consumption has declined by about 8% between 1980 and 1987. Most recently, a slightly increased proportion of EC consumption has been met by imports.

The EC metal products industries are primarily focused on domestic markets; on average, only 20% of total EC production is exported. Substantial intra-Community trade exists in the sector; this has been a growing trend over the 1980s with intra-EC trade increasing from around eight billion ECU in 1980 to an estimated 14 billion ECU in 1987. This represents an annual average growth rate of 7.5%.

### *Export Trends*

The EC metal products industries are net export earners: total extra-EC exports amounted to 12.5 billion ECU in 1986 while imports of metal products from outside the EC reached 4.8 billion ECU in 1986. However, over the 1980s, the rate of growth in the value of imports into the Community has been higher than export growth; exports have increased, on average, by 4% per year whereas the average yearly increase in imports into the Community has been over 7%.

### *Employment Trends*

As production declined in the metal goods industry, so total employment in the industry also declined. During the years 1980-87, employment fell by 22%, from 2.4 million in 1980 to an estimated 1.9 million in 1987. These figures do not include Spain, for which reliable figures on employment in this industrial sector are not available.

Over the 1980s, the number of employees increased only in Denmark and Greece; in all other European countries em-

ployment declined, ranging from a 40% reduction in Portugal to a more modest fall of 10% in Germany.

Despite the decline in production, productivity in the industry improved considerably during the period 1980 to 1987. On average, productivity - measured as output per person - grew by 2.5% per year. During 1981 and 1982 productivity remained at the level of 1980 but started to improve during 1983. In France and the UK the rate of growth in output per head was higher than the EC average, but in Greece and Portugal productivity appears to have grown much more slowly and may even have declined.

**Table III**  
**Productivity Trends**

|      |     |
|------|-----|
| 1980 | 100 |
| 1981 | 100 |
| 1982 | 100 |
| 1983 | 104 |
| 1984 | 110 |
| 1985 | 113 |
| 1986 | 116 |
| 1987 | 119 |

Source: Eurostat.

Productivity in the metal product industry is slightly lower than in other metal working industries. Output per person in the mechanical engineering industry and the electrical engineering industry was higher in 1986, although since 1980, productivity trends in general have been very similar across all these industries.

### *Factors Behind Production Trends*

The level of investment in the EC metal products industry in 1986 was estimated at 5.4 billion ECU (EC 11, excluding

Spain). The total value of investment in the EC industry fell during 1981 and 1982, but recovered gradually during the following years. Investment reached a level of 5.7 billion ECU in 1987, an increase of 46% since 1980.

Capital expenditure in Germany, Netherlands, Belgium and Denmark progressed at an above average rate during this period; investment is concentrated in four countries, Germany, UK, Italy and France, which account for 88 % of total EC investment in the industry.

**Table IV**  
**Investment Trends (1)**

|      | (Million ECU) |
|------|---------------|
| 1980 | 3 937         |
| 1981 | 3 612         |
| 1982 | 3 547         |
| 1983 | 4 035         |
| 1984 | 4 444         |
| 1985 | 5 056         |
| 1986 | 5 342         |
| 1987 | 5 744         |
| 1988 | 6 038         |

(1) EC 11: excluding Spain; 1988: forecast Orgalime.  
Sources: Eurostat, Orgalime.

### *Major Structural and Geographical Features*

The industry is characterized by a large number of small firms; the average number of employees per firm is estimated at 50 persons in 1986.

The most recent detailed information available on the structure of the EC metal products sector, indicates the preponderance of small and medium-sized companies. In 1981, 78% of EC enterprises employed less than 100 persons and these firms accounted for around 30% of total turnover of the sector. Conversely, only 3% of the firms in the industry were classified as large enterprises - with over 500 employees - and these accounted for 37% of total turnover. Companies employing between 100 and 499 persons accounted for 34% of total EC turnover and 19% of the enterprises in the Community.

More recent, but less detailed information from various countries indicates that there has been some increase in industry concentration with the market share of large firms slowly expanding. However, the inclusion of Portugal and Spain in the data may lower average company size in the EC statistics.

The EC industry is concentrated in a few countries. 83% of the total value of production is attributable to four countries: Germany, France, Italy and the UK. Including Spain, 90% of production is concentrated in five EC countries. Regional distribution is illustrated in Table V.

**Table V**  
**Production by Member State**

|                 | Share of total production (%) |
|-----------------|-------------------------------|
| Belgium         | 3.0                           |
| Denmark         | 1.0                           |
| Germany         | 36.0                          |
| Greece          | 1.0                           |
| Spain           | 7.0                           |
| France          | 20.0                          |
| Ireland         | 0.4                           |
| Italy           | 11.0                          |
| Netherlands     | 4.0                           |
| Portugal        | 0.5                           |
| United Kingdom  | 17.0                          |
| <b>EC total</b> | <b>100.0</b>                  |

Source: Orgalime.

### *Trends in Member States*

The location of production facilities has not changed significantly over recent years; the distribution of production in 1988 was almost a copy of that in 1980. The distribution of employment almost matches the distribution of production. However, production trends show considerable differences between the various Member States of the Community. Over the period 1980-87, changes in the value of production ranged from an increase of 89% for Denmark to a decrease of 2% for Portugal. In volume terms, only the production of the Danish industry increased, all other EC countries saw their production volumes decline.

**Table VI**  
**Production Trends, 1980-87**

| (1980=100)        | Value index | Volume index |
|-------------------|-------------|--------------|
| Belgium           | 125         | 88           |
| Denmark           | 183         | 117          |
| Germany           | 145         | 97           |
| Greece            | 132         | 78           |
| Spain             | 110         | 89           |
| France            | 133         | 95           |
| Ireland           | 137         | 83           |
| Italy             | 143         | 83           |
| Netherlands       | 143         | 99           |
| Portugal          | 42          | 47           |
| United Kingdom    | 116         | 91           |
| <b>EC Average</b> | <b>133</b>  | <b>93</b>    |

Sources: Eurostat, Orgalime.

## Forecast and Outlook

The outlook for the metal products industry is favourable for 1988. The volume of production increased by only 1% in 1987, but it is expected to rise by 2 to 2.5 % over 1988.

Strong growth is anticipated in some Member States including Belgium, the Netherlands and the newer Member States, Spain and Portugal. Conversely, little growth is expected in Germany, France and Greece.

Employment is expected to decline by 0.5 to 1% in 1988. However, investment is expected to continue at a moderate pace; a rise of 5% in investment is forecast for 1988. This shows the continuing trend towards improvements in production facilities in order to maintain competitiveness and improve productivity.

Trade within the Community is expected to continue to increase at a rate of 3.5% in value terms over 1988. Exports outside the EC are also anticipated to improve during 1988, growing by 3% over the year. Imports are forecast to grow more rapidly, with a strong increase of 10% forecast over 1988.

It must be emphasized that the trade figures are affected by the entry of Spain, Portugal, and Greece to the EC in that growth rates are obviously enhanced by the growth of the number of countries in the Community.

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# STEEL FORGING

(NACE 312.12)

*The European forging industry ranks second in the world behind those of Japan and the United States. The main client of this basic industry, with a production of almost 3 billion ECU in 1987, is the motor vehicle industry, which consumes more than 50% of total production. The forging industry usually operates at a deficit because of strong competition from other techniques. However, with increasing specialization within companies and technical innovation helping to cut costs, there is every hope that the decline which set in at the beginning of the 1980s may be halted. In fact production already showed signs of stabilizing in 1987.*

The Netherlands, Ireland, Denmark, Greece and Portugal, although members of the EC, are not mentioned in this report for they have no forging industry to speak of.

Forging consists of taking a piece of steel known as a slug and heating it until it becomes malleable. It is then shaped by dies or swages which are brought together more or less rapidly by devices using impact or pressure. The semi-finished steel products used for forging are generally round or square bars, known as billets, which are formed either by rolling ingots or by continuous casting, with or without rolling. These semi-finished products are cut up into slugs by sawing or shearing depending on the thickness. Their weight and length are calculated to make them suitable for forging a specific item.

The types of steel processed are carbon steels or ordinary steels, low-grade alloyed steel or strong alloy steels. There are strict rules for deciding which grades of steel are appropriate for a given piece. The criteria include stress analysis, data on the environment in which the piece will be used, the size and shape of the piece, ease of machining, the

mechanical characteristics sought and the heat treatment to be applied.

A wide range of steel grades are used to produce forged pieces. Intensive research and development have resulted in more resistant steels. The forging and treatment processes themselves also enhance the quality of the steel so that it can meet various customer requirements. Micro-alloys have also been developed over the last 15 years, particularly in Germany. These alloys render heat treatment unnecessary or simplify the process, thereby reducing costs.

It takes a great deal of pressure to ensure that the slug fills the cavities in the moulds, known as swages. These cavities carry the form that the slug is to take in reverse. This shaping is achieved by impact or pressure. When the impact method is used, instruments known as drop hammers or drop forges are used. A falling mass which can weigh up to several tonnes provides the impact. Presses exert a much slower and more progressive force on the slug than drop forges. Shortages of skilled workers have led to a growing tendency in factories to replace drop forges with presses. Billet mills are sometimes used to outline the shape of long slugs before forging with presses or drop forges.

A work station is generally made up of several machines. First a shearing machine provides slugs for one or more pieces of forging equipment. Shearing can take place when the metal is hot or cold. A drop forge or a press is then used to shape the pieces and a flash trimmer removes the excess metal from the seam lines. These flashes inevitably occur because of the need to fill all the cavities in the swages. The work station can also include a billet mill or mechanization and automation equipment. Once the flashes have been trimmed, the part may be heat-treated, finished and inspected.

The parts manufactured by forging vary in weight from one gram to a few tonnes. The force required to forge the latter

## Main Indicators Steel Forging

| (Million ECU)              | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  | 1987  |
|----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Apparent consumption       | N/A   | N/A   | N/A   | N/A   | N/A   | N/A   | 2 674 | 2 664 |
| Export earnings (1)        | N/A   | N/A   | N/A   | N/A   | N/A   | N/A   | 298   | 311   |
| Total Community production | 2 940 | 2 895 | 2 872 | 2 690 | 2 750 | 2 951 | 2 972 | 2 975 |
| Employment (1 000)         | 65.1  | 63.4  | 61.6  | 59.0  | 57.8  | 56.5  | 55.9  | 56.5  |

Independent professions in the following countries: Germany, the UK, Belgium, Spain, Italy and France.

(1) There are no available figures for imports.

and the cost of equipment means that heavy parts are hammer-forged in small quantities.

## Current Situation

The forging industry declined overall from 1980 to 1986 but in 1987 the decline stabilized in the case of Germany and was even reversed in Britain. In every country but Belgium, the fluctuations are the direct result of similar trends in the motor vehicle industry. The Belgian forging industry does not have the motor vehicle industry as a client and therefore has not been affected by the fluctuations in that sector. During the last 20 years the Belgian industry has seen production volumes drop as a result of the decline in some of its client sectors (coal, steel, railways) and the competition from other materials or techniques.

In Sweden there has been overall stability in production except for a low point in 1982, but, unlike its counterparts elsewhere in Europe, the Swedish industry does not produce enough to meet all of the national requirements. These total some 100 000 to 110 000 tonnes, owing to the size of the country's car industry.

Japanese production of forged pieces has grown considerably over the years because of the expansion rate of the car industry and other user sectors. In 1987, the total production of the Japanese industry was put at over two million tonnes. Production is now likely to level off or rise only slightly.

In the United States, production was estimated at 785 000 tonnes in 1987 with more than 50% (about 400 000 tonnes) going to the car industry.

As far as world production is concerned, Japan leads in terms of tonnage, followed by the EC and then the USA. American production has fallen sharply from its former total of around 1 200 000 tonnes.

## Consumption Trends

Forged parts are used in all industries: car-making, aeronautics, shipbuilding, machine-building, agricultural machinery, construction machinery, mechanical engineering, electricity (traditional and nuclear power stations). However, the car industry is by far the biggest consumer, accounting for 73.5% of the total in Germany, 48% in the United Kingdom, 61% in Spain, 37% in France and 44% in Italy. Belgium is the only country where the forging industry does not supply the car industry. The same phenomenon of the dominance of the car industry can be noted in Japan and, to a lesser extent, in the United States. The forging industry is therefore very susceptible to the technical options adopted by the car industry, the effects of which even spill over into other industrial sectors. So far, the car industry's choices have been unfavourable for

the forging industry, as they have tended to favour competing techniques.

## Export Trends

The forging industry is a sub-contracting operation, based on close links between the commissioning party and the sub-contractor. Furthermore, forged parts are not particularly suitable for international trade because of their low added value. The industry's export levels are therefore low compared with those of the finished products industry.

By and large export rates are around 20%. However, the 1987 figures show differing national trends: a downward trend in Germany, the United Kingdom and Spain owing to the fall in the dollar, a stable situation in Belgium and Italy, and a peak of 27% in France.

## Employment Trends

The industry's workforce has shrunk as a result of the slack market and the mechanization of production. This process is still going on and is likely to continue over the next few years. Forging, which used to be essentially a labour-based industry, is becoming mechanized and its industrial relations are the same as in any other industry.

## Factors behind Production Trends

Forging industries in all EC countries have made constant efforts to improve productivity by purchasing more productive machinery, extending the induction heating process, and by mechanizing and robotizing work stations. Such moves had become inevitable because of advances made in this direction by competing production techniques and customer pressure for lower prices.

In the most efficient and productive companies, investment levels have reached 10% of turnover or more. But for most companies, the average is just over 5%, as in Germany for example. However, a few companies invest practically nothing, thereby condemning themselves to extinction. In France and Spain investments were at a low ebb until 1985 owing to the shrinking market, but they have picked up since and have mainly gone into renovation and computerization. In contrast, Italy had high investment levels until 1981, after which they tailed off sharply except for equipment replacement and the purchase of induction heating systems. Very little has been spent on robotization. Investments and productivity gains combined with customer pressure have driven production costs down. However the metal used accounts for a large part of costs - at least 35% - and this is virtually impossible to reduce. The rest of the cost price is made up of labour costs (45%), energy (8%) and various other costs (12%). Of course

**Table I**  
**1987 Production by Country**

| (Thousand tonnes)                           | B     | D     | E     | F     | I     | UK    | TOTAL |
|---|-------|-------|-------|-------|-------|-------|-------|
| Total production                            | 15    | 782   | 144   | 155   | 328   | 223   | 1 647 |
| for car industry (home market plus exports) | 4     | 532   | 96    | 58    | 143   | 107   | 940   |
| for exports (for all sectors)               | 9     | 143   | 21    | 33    | 45    | 35    | 286   |
| Average price per tonne (ECU)               | 1 637 | 1 954 | 1 588 | 2 142 | 1 362 | 1 956 | 1 773 |
| Employment (1 000)                          | 0.5   | 24.0  | 4.3   | 5.2   | 12.5  | 10.0  | 56.5  |

Source: Euroforge.

these percentages vary widely according to the weight and grade of the metal used as well as the treatment and the shape of the piece to be produced. Production costs have also been reduced as a result of technical advances such as improved yields, the use of new, high-output equipment, and the manufacture of lighter, higher-precision parts.

### *The Position of the Firms*

Generally speaking, forging does not generate high profit margins. Companies often run at a loss or just manage to break even. The financial situation of the larger firms in the sector varies from firm to firm. Some have incurred heavy losses as a result of the depreciation of the dollar, especially those which had established a strong position on the American market. Others, with smaller commitments in America and a more European orientation, have developed normally.

The main pressure has been from competition with other methods for producing stampings, which include in order of importance: casting (especially nodular graphite iron casting), metal stamping (for parts which are sometimes mechanically welded), cold forging and lathing.

An illustration of the forging industry's defeat at the hands of competing techniques is provided by the shrinking weight of forged parts used in making cars. Twenty years ago the average car contained 60 to 80 kilos of forged parts. Today the figure has dropped to 20 or 30 kilos.

Forgers have made great strides in the preparation, manufacture and cost of their products. They have managed to withstand the competition, which mainly played on lower prices, because forged parts are unquestionably of superior quality. Today the technical struggle goes on unabated.

### *Major Structural and Geographical Features*

Most companies are specializing more and more in specific areas to be able to produce at the lowest possible prices. Specialization gives companies an edge over the competition and gives them long-lasting control of the market niche they have chosen. Some companies have developed semi-hot forging,

at temperatures below the normal 1250. More and more companies are using computer-aided design and manufacturing techniques. These methods allow them to optimize their product and to achieve the maximum strength/weight ratio.

The majority of forging companies are family-owned and operated businesses. Those which have survived have built their success on the quality of their products. Others are subsidiaries of the steel industry, which uses them as a means of testing and selling its products. However the number of these subsidiaries has decreased as a result of denationalization, particularly in the United Kingdom and France. The sector also includes independent and captive forges. It is important to note that the former may be steel-company subsidiaries, whereas the latter are amalgamated with larger groups, especially in the car industry. Generally speaking, the number of forging companies has declined over the last 20 years.

In Germany, 150 companies produce what amounts to one of the highest national production levels in the world. There are a great many large German companies. They include: Gerlach, Dew, Peddinghaus, Brockhaus, Siepmann, Schoeneweiss and Schneider.

In the United Kingdom, the largest company is Engineering & Forging, (formerly GKN), which accounts for 50% of UK production. The other important groups are: Firth Rixson, INCO Group, and Cameron Iron Works.

In Belgium 10 companies, four of which have forging as their main business, operate in the sector. They are spread over the country, but more clustered in places like Charleroi and Liege which used to be the centres of heavy industries such as mining and steel. The decline in certain customer sectors (such as coal, steel and railways) and competition from other manufacturing methods, has led to a substantial reduction in the number of forging companies.

In Spain, out of the 40 companies that make up the sector only eight have more than 150 employees, five have between 100 and 150, nine 50 to 100, and 18 less than 50. The geographical spread is as follows: Basque Country 30, Catalonia 4, Aragon 2, Madrid 1, Galicia 1 and other regions 2. The largest companies are: Patricio Echeveria SA, La Farga

Casanova SA, Forgas de Villalba SA (Gekanor Group) and Forgas de Galicia SA.

In France, the industry is made up of 72 companies. Three groups, one of which was constituted recently, dominate the sector: Ascometal, Forges Stephanoises and Forges de Courcelles. Forging companies are spread over the following regions: Ardennes 25, Loire 6, East 14, other regions 27.

In Italy, most companies are located in the North, in Piedmont, around Turin, in Lombardy, in the Como area, in Varese and Brescia, and in Venetia and Emilia (Bologna). The largest companies are Teksid, a Fiat subsidiary - 90% of whose production goes to the car industry - the Erber Group, Riganti and Casartelli. In Lombardy, 10% of the companies account for 50% of production and, except for Teksid, they are all family businesses.

## Forecasts and Outlook

### *Short-term Forecasts*

In Germany, it looks as if 1988 will see a 3% to 4% drop in production compared with 1987. It is difficult to forecast what the future will be.

In the United Kingdom, business picked up in the second half of 1987, making the total for the year 23% higher than the figure recorded in 1986. If the order books and comments of customers are anything to go by, it looks as though this recovery is not transitory and that production levels will remain high throughout 1988 and 1989. The main reason is the improved situation in the car industry, where production is expected to rise from one million units in 1986 to 1 400 000 in 1989.

In Belgium, there is no foreseeable rise in tonnage. Production levels are expected to remain stable between 13 000 and 16 000 tonnes.

In Spain, high production levels in the car industry in 1986 and 1987 kept up the general level in the forging industry. Vehicle production will fall slightly in 1988 and other markets will remain stationary, apart from the agriculture and machine tools markets which will improve. Exports will remain at present levels. Production in 1988 should therefore match or be slightly under the 1987 level. Future production is likely to stabilize at around 140 000 tonnes a year.

In France, the higher production levels recorded in 1986 and 1987 were mainly caused by an increase in orders from the car industry. The factors behind this increase in car sales stem

largely from the overall economic situation and not from structural changes. The upward trend should persist through 1988 and into 1989, resulting in higher tonnage than in 1987. From 1989 on, production should stabilize or fall slightly.

In Italy, production figures in 1988 and 1989 should not vary more than 5% from those recorded in 1987.

The European forging industry's activity as a whole is likely to slow down as a result of a levelling-off of demand from its main customer, the motor vehicle industry.

### *Medium-term Forecasts*

Most forging companies are caught up in a trend towards specialization which started several years ago for technical and economic reasons. This specialization is based on different factors such as the shape and volume of the piece, the size of the order, the customer and the manufacturing methods. In certain applications alloy steels are replacing lower-quality grades. Also, parts are being given more and more complex shapes and they tend to be lighter.

The long-term trend of technical and economic competition from other manufacturing techniques has spurred forging firms to ever greater advances. In some countries like Germany and Belgium they are having to maintain a tonnage production which has stabilized over the years, while elsewhere firms are fighting to keep production from falling. The forging market is much coveted by rival techniques and the struggle that has been going on is far from over. In this subcontracting business, where relations with customers are paramount, a certain geographical proximity has always existed. Imports from far afield - from Brazil for example - are now beginning to appear on the scene as a result of the increase in foreign trade, and other countries may well have designs on the European market. The forging industry has however taken a number of measures in respect of quality, productivity, service and costs to meet these challenges.

The medium-term prospects will depend directly on the technological options adopted by the car industry. Technological changes may well result in some new customers opting for forged products, even though other techniques have been used in their place elsewhere. If these technological changes fail to occur, the struggle between the different manufacturing techniques will go on. If they do occur, nobody at this stage can predict what the outcome will be.

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# METAL WINDOW FRAMES

(NACE 314.1 AND 314.2)

*The EC market for metal window frames was valued at 5 billion ECU in 1987. In terms of materials, this sector competes with the use of wood and PVC. Each material has its own market sector. Manufacturers in the sector exhibit a number of strengths which should benefit them over the medium term. These include: flexible production (some leading firms for standard manufacturing and especially a large number of dynamic SMEs for "non-standard" products); the capacity to change with technology (anodization, thermal insulation and thermo-lacquering); creativity (large product ranges such as profiles and systems); and finally a method for distributing and installing high-performance products.*

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The EC metal window frames and curtain wall industry comprises a number of manufacturers who use and sometimes design mostly aluminium profiles and systems for outdoor construction such as windows, doors, curtain walls, framework for structural glazing, balustrades and verandas.

The metal window frames industry has a share of about 8% to 10% in the total cost value of the building. However, being a part of the building shell, the products described below play an important role in performance in relation to environmental conditions.

The main products manufactured by the industry for outdoor applications are as follows:

- doors and windows
- light metal curtain walls
- large skylights and verandas
- metal wall sheets
- balustrades and hand rails.

The main products manufactured by the industry for indoor applications are as follows:

- metal partitions
- architectural ceilings
- any other metal joinery incorporated in the building.

## Current Situation

Manufacturing is mainly based on finished or semi-finished profiles and sheets made of aluminium or mild and stainless steel. Statistics on the European window market also include other materials. Steel is becoming less and less important as frame material and has thus not been taken into account. A large number of other materials are included in window, door and curtain construction such as glass and insulation panels for infillings, sealants and rubber gaskets for weatherproofing and hardware for opening and fixing.

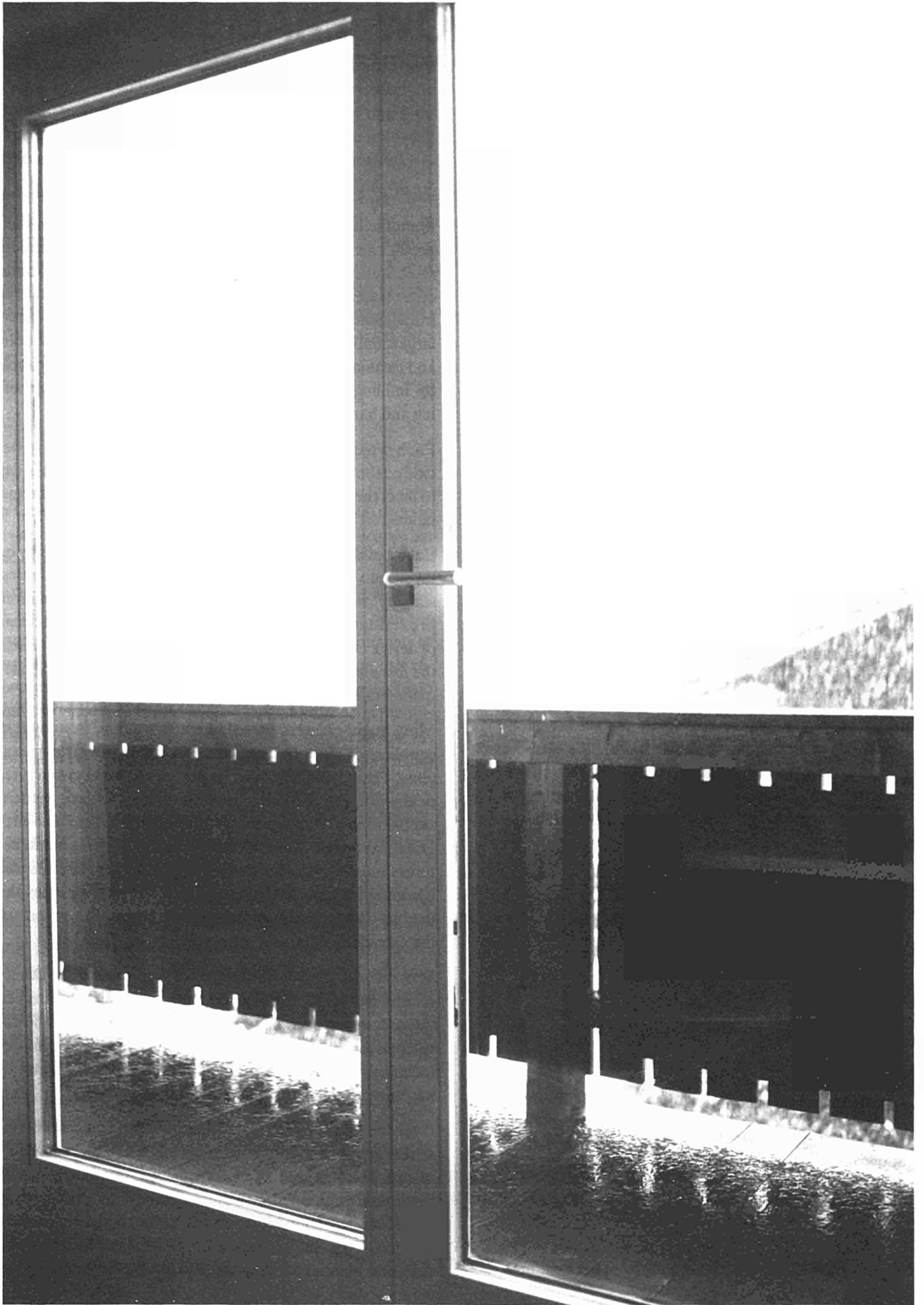
Each project makes it necessary for the manufacturer to decide on the materials and the structural systems used in order to meet the requirements of the architect and standard regulations.

Each building has its own characteristics which have to be taken into account from various points of view: aesthetics, stability, weatherproofing, thermal and acoustic insulation, fire resistance, ageing, etc. These points are defined in terms of design criteria which must be met by the profile design and the installation criteria. Care must be taken in selecting adequate infillings.

Most manufacturers buy aluminium profiles from system suppliers or directly from extruders offering their own systems. These companies can be part of the same group (vertically integrated companies) or they can be independent suppliers in the highly competitive open market (non-integrated companies). On the other hand, large-scale manufacturers usually employ systems developed by themselves and designed for their specific requirements. In such cases the dies used for extrusion of the profiles remain the property of the extruders.

The systems used for building projects must meet design criteria and requirements. Sometimes standard systems can be used, in other cases specific or new systems have to be developed for which the manufacturer must have the necessary technical know-how. Introduction of CAD/CAM methods has made design work much easier in this respect.

Over the past 20 years, design of outdoor equipment construction has been improved. This has led to higher performance levels as well as better quality. Aluminium profile sections are equipped with thermal breaks for reducing the risk of condensation inside and achieving better thermal insulation. New surface treatment procedures for clear and coloured aluminium sections provide the architect with a



wider range of possibilities to choose from with regard to the aesthetic aspect of the building. New glazing techniques such as structural glazing have been developed in which silicone replaces glazing beads for fixing the pane to the window or curtain wall frames.

Developers and public or private owners ask architects and consultants to execute the design drawings and provide specifications for the work to be performed. They are also responsible for supervising the work on site.

The manufacturers, for their part, receive the orders either directly from the owners or act as subcontractors of the main contractor or are nominated subcontractors. These manufacturers supply the products and may also be in charge of on-site installation, even with glazing included. Procedures differ from one country to another depending on local customs and dimensions of the project.

### Consumption Trends

The overall market comprises windows, doors and curtain walls and can be divided into two main sectors: residential and non-residential building construction. This can be subdivided again into new housing construction and renovation projects.

In residential construction, wood and uPVC compete with metal. New housing construction for small- and medium-sized houses favours wood, whereas renovation relies more on uPVC.

For non-residential building, aluminium is highly competitive due to the fact that most industrial and office buildings require windows with relatively large surfaces or curtain wall constructions.

Even though demand for windows and curtain walls depends to a large extent on growth in the building industry, there are differences in demand. The reason for this is the high proportion of building renovation which shows a high rate of growth in practically all countries in the European market. The situation benefits the window market much more than the building trade market. The volume of demand is shown below.

### New building construction

Until the mid-1970s, new building construction played a major role in the window market. However, this picture has changed in recent years, showing a marked downward trend. Window production is not expected to grow with regard to new building construction. In the two building construction sectors, it is clear that contrary to non-residential construction where a strong increase in demand for windows has been registered, residential construction has declined. This has caused shifts in the demand for the material groups used for

**Table I**  
**Survey of the Market by Type of Material**

| (Thousand units) | 1984   | 1985   | 1986   | 1987   |
|------------------|--------|--------|--------|--------|
| Total market (1) | 39 277 | 38 803 | 40 827 | 42 250 |
| Index            | 100    | 99     | 104    | 108    |
| Wood             | 25 366 | 24 527 | 24 766 | 25 062 |
| Index            | 100    | 97     | 98     | 99     |
| uPVC             | 6 615  | 7 356  | 8 415  | 9 693  |
| Index            | 100    | 111    | 127    | 147    |
| Aluminium        | 7 296  | 6 920  | 7 646  | 7 495  |
| Index            | 100    | 95     | 105    | 103    |

(1) EC 8.

Source: FAECF.

window frames. Wood windows are tending to lose market shares whereas prospects for aluminium windows are much better.

### Renovation

With a total volume of 24.5 million units for all materials, the market share of this sector exceeded 50% in the EC in 1987. It is believed that it will continue to grow in 1988 to 25 million units and in 1989 to 25.7 million units.

This growth has been clearly stimulated by the upturn in the renovation sector and it has had an initial favourable side-effect on uPVC windows, the competitiveness of which has increased in this market sector. Since renovation of non-residential buildings shows a high rate of increment as well, an upward trend can also be expected in metal construction.

In total, the European metal window and curtain wall market can be valued at 5 billion ECU in 1987 (7.5 million units). The new construction market accounts for 48% of the end-uses of these metal products compared with 54% in 1984.

**Table II**  
**Survey of the Market in the New Building Construction Sector**

| (Thousand units)              | 1984  | 1985  | 1986  | 1987  |
|-------------------------------|-------|-------|-------|-------|
| Total market (1)              | 3 927 | 3 540 | 3 728 | 3 581 |
| Index                         | 100   | 90    | 95    | 91    |
| Residential buildings         | 2 248 | 1 964 | 2 008 | 1 892 |
| Index                         | 100   | 87    | 89    | 84    |
| Non-residential buildings (2) | 1 679 | 1 576 | 1 720 | 1 689 |
| Index                         | 100   | 94    | 102   | 101   |

(1) Aluminium.

(2) Farm, industrial and office buildings.

Source: FAECF.

The renovation market represented 52.2% of the total in 1987 compared with 46% in 1984.

Demand from the new building construction sector has dropped 3.1% due, for the most part, to a slump in

construction of blocks of flats and individual houses (-5.6% per year). In contrast, demand from the renovation sector is growing by 5.1% a year which can be broken down to 6.9% for non-residential buildings (offices, factories) and 4.8% for residential buildings.

**Table III**  
**Survey of the market in the Renovation Sector**

| (Thousand units)              | 1984  | 1985  | 1986  | 1987  |
|-------------------------------|-------|-------|-------|-------|
| Total market (1)              | 3 369 | 3 380 | 3 918 | 3 914 |
| Index                         | 100   | 100   | 116   | 116   |
| Residential buildings         | 2 687 | 2 694 | 3 117 | 3 079 |
| Index                         | 100   | 100   | 116   | 115   |
| Non-residential buildings (2) | 682   | 686   | 801   | 835   |
| Index                         | 100   | 101   | 117   | 122   |

(1) Aluminium.

(2) Farm, industrial and office buildings.

Source: FAECF.

Between 1984 and 1987 the European metal products market grew by 1% a year.

In these markets substitutes play an important role since aluminium, wood and PVC all compete with one another. Generally, competition amongst these alternatives is mostly in the field of private dwellings. For new construction, wood seems to be favoured and in renovation PVC tends to take the lead. For non-residential buildings, competition is rather limited as industrial and office buildings require windows with relatively large surfaces or curtain wall construction. In general, these applications are only feasible in metal.

The shifts in demand influence the shares of the frame materials, as shown in Table IV. Metal joinery clearly benefits from an increasing market volume in non-residential construction, and renovation. This is further promoted by architectural trends, such as verandas, roofings or winter gardens which stimulate the market qualitatively as well as quantitatively.

**Table IV**  
**Proportion of Frame Materials**

| (%)       | 1984 | 1985 | 1986 | 1987 |
|-----------|------|------|------|------|
| Wood      | 64   | 63   | 61   | 59   |
| uPVC      | 16   | 18   | 20   | 22   |
| Aluminium | 18   | 17   | 18   | 17   |

### *Major Structural and Geographical Features*

The EC metal window frames production industry comprises about 19 000 enterprises employing nearly 110 000 persons in 1987 in 8 countries. In addition to some active groups with expertise in the upper range and especially in making curtain

walls, it also encompasses numerous small- and medium-sized companies (SMEs) with 4 to 15 persons mainly specialized in manufacturing and fitting windows, doors and other metal "made to measure" products (small frames for verandas and windows, for example). The activities of some SMEs can sometimes extend into several neighbouring countries.

Competition remains intense between European firms. Spanish firms have become a more important force in the course of the last few years but Italian, French and German enterprises are keeping their dominant position in the European metal window and curtain wall market.

The manufacturers use and sometimes design mostly aluminium profiles and systems for windows, doors, curtain walls, frameworks for structural glazing, balustrades and verandas. These manufacturers keep inventories of finished and semi-finished profiles. It is these profiles which are being assembled into windows, doors and curtain walls.

For each project the manufacturer has to decide which profiles will have to be used in order to meet the requirements of the architect. Each building has its own peculiarities which have to be studied from various points of view: stability, physics, security, behaviour over time. On the basis of all these elements the profiles and their method of assembly are decided upon.

Due to the ever-increasing number of standards and higher requirements levels, the time spent working out solutions is also increasing and requires more qualified personnel.

Most manufacturers buy their profiles from extrusion companies, either from companies belonging to the same group (vertically integrated firms) or on the open market where there is strong competition among suppliers (non-integrated companies).

## **Forecast and Outlook**

An important factor in this market will be the achievement of the single market in 1992.

Elements which may have an influence are as follows:

- transportation costs may continue to remain significant
- tariff barriers will have been eliminated within the EC
- non-tariff barriers such as national standards for insulation, finishing, etc. do exist but have not been explicitly defined. (These standards apply only to official tenders and not to the private sector. For large projects, insurance companies have their own traditional standards.) It is not expected that this situation will change in the near future. It is also believed that elimination of non-tariff barriers in 1992 will not have much influence on the market

- adaptation costs are necessary to deal with typical differences between countries. (These tend to be relatively low but will not disappear in 1992 because of different national characteristics)
- regional customs will remain the same as they are determined by climate, existing habits and the structure of the industry.

The large number of manufacturers in this sector is due to the special structure of the building industry. It is clear that this situation will not change in 1992; there will probably still be a large number of manufacturers.

For suppliers (extruders), recent takeovers in the extrusion industry indicate that it is undergoing a period of structural change. However, at the EC level, the number of extruders is still quite high and only a drastic concentration of the industry would significantly affect the position of the remaining participants.

The demand for outdoor metal constructions is directly linked with the situation in the building sector. After going through a period of recession for many years, this sector has picked up again to some degree.

Metal window manufacturers (including curtain walls and structural glazing) already have a high penetration rate into the non-residential sector and are likely to maintain this position. In the residential sector and for medium-sized flats, industry faces strong competition from wood and PVC, particularly in renovation.

Over the short- to medium-term, moderate growth in demand (and hence activity) is forecast.

FAECF: Federation of European Window Manufacturers' Associations

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# BOILERMAKING

(NACE 315)

*In 1986, boilermaking represented a production of 16 billion ECU, a steady trading surplus (over 10% of production) and 200 000 jobs. Activity is declining slightly (- 0.3% per year in volume between 1980 and 1986). The industry is also undergoing far-reaching changes as heavy industries (oil, gas, energy, iron and steel) go through an investment crisis and export markets have become more competitive and less solvent. There have been heavy job losses (-3.2% annually between 1980 and 1986). Boilermaking needs to seek new outlets in fast expanding industries and acquire new expertise in line with the demands of new clients and the need to modernize production methods.*

- nuclear boiler construction
- fittings for steam generators and boilers
- plate and tube heat exchangers and condensers for nuclear reactors
- water tanks, reservoirs and vessels
- distillation, refining and similar equipment
- pipework
- various activities including installation and maintenance.

The boilermaking industry equips many branches of industry. Its main outlets, in decreasing order of importance, are:

- the production of thermal and nuclear power
- the oil and gas industry
- the chemical, petrochemical and pharmaceutical industries
- the food and drink industry
- the construction industry
- the iron and steel and metalworking industries
- the paper industry
- various other industries including automobiles, textiles, mechanical engineering, cement, rubber and electronics.

As classifications differ between EC countries, it is difficult to estimate the importance of the industry in each country.

Boilermaking products are divided into the following categories:

- steam generators and boilers

## Current Situation

Boilermaking production has declined slightly since 1980 (-2% in six years). The considerable increase in German boilermaking and slight growth in Italy did not compensate for a decrease in activity in France and the UK.

Production in France, Germany, the UK and Italy represents over 80% of the Community total. These four countries relied on the volume of internal demand to develop strong positions and specific expertise which they were then able to transfer to major export markets.

## Consumption Trends

The strong points of French boilermaking are nuclear power (which means looking towards new markets, given French over-capacity in electricity and the weakness of solvent world demand), oil, the automobile industry and the food and drink industry. There has been a drop in production of 1.5% per year by volume between 1980 and 1986.

The powerful chemical, automobile, mechanical engineering and energy industries form the basis of German boilermaking. There is also a growing market specifically in Germany for anti-pollution installations aimed at protecting water and

## Main Indicators Boilermaking

| (Million ECU)                  | 1980   | 1981   | 1982   | 1983   | 1984   | 1985   | 1986   |
|--------------------------------|--------|--------|--------|--------|--------|--------|--------|
| Apparent consumption (1)       | 10 360 | 11 230 | 11 720 | 11 850 | 13 070 | 13 860 | 14 330 |
| Net export earnings (1)        | +1 330 | +1 890 | +2 200 | +2 040 | +1 870 | +2 100 | +1 710 |
| Total Community production (1) | 11 700 | 13 120 | 13 920 | 13 890 | 14 950 | 15 970 | 16 040 |
| Employment (1 000) (1)         | 250.9  | 244.9  | 240.2  | 220.3  | 212.9  | 209.6  | 206.7  |

(1) EC 10 excluding Spain and Portugal

the atmosphere from dangerous pollutants, particularly nitric and sulphurous waste. The extent of this new demand coupled with excellent export results has made Germany the only country to experience any significant growth over the period 1980-1986 (+ 1.3% per year by volume).

The UK's particular economic and geographical characteristics have determined its specializations: the oil industry (particularly high-technology off-shore extraction), energy production, harbour and shipping industries, iron and steel. Activity in the UK fell back slightly by 0.7% per year by volume between 1980 and 1986.

Italy has major markets in thermal, nuclear and solar energy production, the automobile industry, harbour and shipping industries and ventilation. The gap between small businesses with a flexible work-force and large firms supplying high value added services is wider in Italy than in the rest of the EC. Italian production seems to have grown by 0.6% per year by volume between 1980 and 1986. The respective importance of the different countries is shown in Table I.

The clientele of the boilermaking sector has changed profoundly in the recent past. For many years the major clients were nuclear or thermal energy producers and the oil and gas industry. But falling investment in these industries and strong growth in plastics and electronics, together with new outlets in the construction and food and drink industries, have led to a more balanced range of clients.

**Table I**  
**Breakdown by Member State**

| (%)         | Production | Employment | Apparent consumption |
|-------------|------------|------------|----------------------|
| BLEU        | 2          | 2          | 2                    |
| Denmark     | 1          | 1          | 1                    |
| Germany     | 36         | 32         | 29                   |
| France      | 34         | 34         | 38                   |
| Italy       | 5          | 5          | 2                    |
| Netherlands | 1          | 1          | 2                    |
| UK          | 21         | 24         | 26                   |

There are no official production statistics available for Spain and Portugal. The existing Community statistics underestimate the boilermaking activities in Italy and even in Germany.

Source: Estimate from Eurostat data.

### Export Trends

The EC is an overall exporter. The Community boilermaking industry has been able to sell its products in major equipment contracts for industrializing countries. France has sold specific skills in nuclear power stations and Germany has had notable successes in major export markets, particularly in Africa and the Middle East, by implementing dynamic commercial policies and matching supply to demand.

Four countries contribute to the positive foreign trade balance (10% to 15% of production, depending on the year). Germany alone accounts for more than half, with Italy

accounting for about 20% and France and the United Kingdom between 10% and 15%. There is little trade within the Community and imports are negligible.

### Major Structural Features

There are three types of firms in the boilermaking industry.

- The system integrators are the fewest in number but the most powerful. They are medium-sized firms or divisions of large diversified industrial groups and have three activities: design and engineering, manufacturing and on-site installation. Turnover depends on export successes and variations in major industrial investment on internal markets. In export markets, they are in competition with the small local system integrators that are emerging and South Korea, which is taking an increasingly large share of the market due to highly competitive prices.

The principal feature of system integrators' activity is high value added content. Purchases of raw materials represent only about 20% of turnover whilst personnel costs run at about 45% due to large design and engineering departments with highly qualified technical staff. As work-force services become less competitive, system integrators are tending to turn into "general undertakings", developing know-how in many different areas, particularly in mechanical engineering, electricity and civil engineering. This enables them to preserve a high level of value-added content and to remain competitive with a relatively small basic staff. System integrators are now offering more maintenance services. Whereas maintenance work used to be lengthy and infrequent, this situation has altered. This is due firstly to increased concern for the profitability and optimization of installations and secondly to ageing equipment which needs more maintenance.

In order to meet these new needs, maintenance firms are creating small units close to sites, with the necessary structure and skills for rapid intervention when this is required. Methods of long-distance maintenance are also being developed, similar to the principle of supervision networks: different sites are connected up to the same agency. System integrators have thus been able to develop such a high level of technical skills that they are increasingly called in to replace internal maintenance departments. In areas demanding high-level qualifications such as nuclear power, the extent of their services is tending to increase.

- Product specialists are equipment suppliers for heavy industry, manufacturing vessels, exchangers, boilers, etc. which are then integrated into a process. Certain products such as vessels are manufactured in batches; others such as exchangers are custom-designed and manufactured. Product specialists are generally medium-sized firms operating nationally and, in collaboration with system

integrators, world-wide. At the world level, there is not much competition in this area of expertise; if companies are genuinely efficient and have a dynamic commercial activity they can export successfully. The value-added content in these firms is less than for system integrators; purchases of raw materials represent over a third of total turnover.

- Activity specialists are the most common type of firm and are sub-contractors for the system integrators. They are small firms, able to manufacture particularly difficult items (in titanium or zirconium, for example) from blueprints supplied by the client. They do not tend to be diversified, have no contact with the ultimate client and 80% of their personnel are blue-collar workers.

### *Employment Trends*

In parallel with a very slight fall in production (-0.2% per year in constant ECU between 1980 and 1986) there has been a significant fall in employment of 3.2% per year over the period 1980-1986. This fall has been regular and fairly evenly spread over each country in the Community except Germany where, in six years, production has grown almost 10% by volume but with a constant employment level. The decline in employment is partly caused by stagnation in major investment on internal markets and the arrival of more export-efficient competition particularly from South Korea. Lastly, as in all established industries, employment levels in boilermaking have been affected by the appearance of new techniques (mechanical, robots, data processing) and higher-qualification requirements.

Within the industry itself, system integrators are concentrating their activities on design, contracting and on-site installation. Most intermediate shop assembly work is sub-contracted to small local firms, which may be foreign or extra-Community, thus transferring management of temporary labour to an earlier stage in the production process. This has meant less shop assembly jobs at systems integrators' and more jobs at sub-contractors', although there is less job security overall.

Personnel training is a major concern of boilermaking firms in the EC, whether they be small-scale or part of a large group. Training also extends to tangential activities, particularly through the recruitment of engineers and executives from outside the industry.

These training needs correspond to the need for improved productivity caused by competition and the evolution of demand towards high-technology equipment (special materials, complex equipment, new processes). Many firms

have established links with technical institutes or research centres.

### **Forecast and Outlook**

Boilermaking in the future is unlikely to show change from the situation at present as key factors show long-term stability. Activity depends on several factors including investment, technology and competition.

The rate of investment by heavy industry in the various EC countries mirrors generally sluggish economic growth. If growth were to pick up, the first to benefit would likely be tertiary industries rather than industrial equipment industries.

Lower investment by developing countries, extra-Community competition and the solvency of international markets also affect activity. It is increasingly difficult to win profitable export contracts due to the emergence of South-East Asian boilermaking, oil-producing countries' loss of purchasing power, debt levels of the developing countries and a global reduction in investment in industrial equipment (particularly for energy production). This will only change if there is an upturn in world growth or a modification in trading conditions, making them more favourable to industrializing countries.

Another important area is the productivity and technology levels of European boilermakers. Stagnant demand makes it necessary to restructure the industry if Community firms are to preserve their competitiveness inside and outside the EC. Trying to win new markets with particular technical requirements necessarily involves renewing expertise and hence sustained training initiatives.

Choosing appropriate complementary training depends on the ability of industry leaders to choose the right strategic orientations and to integrate new activities corresponding to the requirements of emerging markets without risking overly dangerous diversification. The markets of the future seem to be electronics, environmental protection, chemical engineering, bio-technologies and food engineering. The activities of the future are likely to be design and engineering, on-site installation and above all maintenance, all in a context of increased structural flexibility.

In general, there should be a slight increase in boilermaking activity, with an increase in turnover from new activities and stability in other sectors more than compensating for a slight fall in electricity-related markets.

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# DOMESTIC HEATING APPLIANCES

(NACE 316.5)

*Demand for gas water heaters and boilers is closely related to trends in different areas where it has no real influence (the building industry, energy prices, the size of the gas network, etc.). It is therefore a rather fragile industry with a great deal of uncertainty as to its future development.*

*About 110 companies are active in this field in the EC; roughly speaking about one-sixth of these are responsible for about 90% of total production. The market for these products can be described as corresponding to private dwelling construction in areas where a gas network is available. In this market three substitutes play a role, all using a different energy source: electricity (substitute for water heaters and boilers), fuel oil (substitute for boilers), and coal (substitute for boilers).*

*In the near future, energy prices and environmental consciousness are likely to play a very important and rather positive role in the demand for these products.*

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The information and data below cover instantaneous water heaters and wall-hung boilers. These products are in general characterized by a low water content. Two main uses can be distinguished: room heating and instantaneous production of hot water for sanitary uses.

The industry can be defined in terms of products, technologies and markets.

## Products:

- instantaneous gas water heaters;
- wall-hung (combination) gas boilers.

## Technologies:

- the products are assembled using relatively large amounts of components in different materials; as the products are complex and have to satisfy very stringent safety requirements, rigorous control is essential during the whole production cycle.

## Markets:

- products are sold to building contractors and the public at large;

- as the installation of these products requires special skills, it is usually firms who have specially-trained personnel who sell and install these products.

## Current Situation

### *Production and Consumption Trends*

Gas water heaters compete with electrical and indirect water heaters. The boilers compete with those using other fuels (electricity, coal, fuel oil) as well as space heaters and room heaters.

Demand for these appliances is directly related to trends in the building industry, to government intervention and to energy prices. The building sector has gone through a depression in the last few years. However, it seems that this trend is coming to an end. The general upswing in the construction activity in the EC began in 1986, continued over 1987 and is still on the increase. The number of building permits is an indicator of potential demand, although gas networks are not yet available everywhere.

The availability of a gas network is largely dependent upon the policies of the public authorities and the gas companies. The price of energy is influenced by market forces. At present the price of gas is higher than that of fuel oil, but lower than the price of electricity. It is difficult to predict future trends. The decreasing price of fuel oil does not mean that there is a weakened interest in gas boilers; many national governments are actually promoting the use of gas as a means of combating pollution caused by the combination of solid or liquid fuels. In Germany standards for CO and NOx percentages are already being issued.

Because the clean combustion of gas has environmental advantages, positive demand for gas appliances can be expected to continue.

The price of the materials used for components is also an important factor in the competitiveness of these products on the market. The composition of components by materials is as follows:

- copper: 25%;
- steel/cast iron: 30%;
- brass: 15%;

- aluminium: 10%;
- plastics: 10%;
- others: 10%.

Major changes in the price of the first three materials will strongly affect the production cost of gas water and wall-hung boilers.

The price of electronic components has fallen. However, aluminium prices have started to rise since mid-1987 although the 1985 level has not yet been reached on the London Metal Exchange.

### *Major Structural and Geographical Features*

The industry comprises a small number of vertically integrated firms, designing and producing almost all parts of the boiler and water heater appliances. It is estimated that these firms handle around 50% of total production. The other 50% of the industry makes use of specialized suppliers and manufacturers and operate as assemblers of boilers and gas water heaters.

In the EC around 25 manufacturers account for 90% of production, the remaining 10% being manufactured by some 130 companies.

The types of products described above are not manufactured in the USA; in Japan there are an estimated 20 manufacturers. It is rumoured that the Japanese may enter the EC market, although this is not expected to happen in the near future.

The number of firms in each Member State is as follows:

- Belgium: 0;
- Germany: 2;
- United Kingdom: 6;
- Italy: 85;
- France: 6;
- Ireland: 0;
- Denmark: 1;
- Greece: 0;
- Spain: 3;

- Portugal: 2;
- Netherlands: 5;
- Luxembourg: 0.

Figures for Germany, the UK, Italy, France and the Netherlands include subcontractors.

Source: Frankfurt Fair catalogue.

### *Technological Trends*

Current R&D focuses on methods for obtaining improved performance in the field of energy consumption. A second but different field of research is that of safety and control devices. Research is being done on the combustion of gas to decrease CO and NOx (responsible for acid rain). According to industry sources no major technological developments are expected, except the more widespread use of electronic components to control appliance operation and act as safety devices.

### **Forecast and Outlook**

The long-term profit potential of the industry should be good. Demand is likely to be stimulated by the following factors:

- increased importance of ecological consciousness (products using gas as an energy source are very efficient and produce the least environmental pollution);
- energy prices that may be favourable to gas;
- development in the construction industry;
- the diffusion of gas, thanks to national reserves (about 100 years) and the East-West détente, which will probably increase (new gas-fields have recently been developed in the North Sea);
- demographic developments leading to a growing number of smaller families (demand for smaller appliances is likely to be enhanced by this trend; units produced will probably increase).

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# LIGHT METAL PACKAGING

(NACE 316.42)

*The light metal packaging industry is a stable sector and has experienced steady growth in recent years. Average annual growth of 2-3% is anticipated over the medium term. Substantial cost saving and productivity improvements have been achieved, mainly as a result of technological developments. The industry operates in a strongly competitive environment with regard to alternative packaging products and the continuing development of new types of packaging materials. Environmental and recycling regulations are a particularly important factor affecting the sector.*

The term "light metal packaging" includes all metal packaging less than 0.49 mm in thickness, the contents of which do not exceed approximately 40 litres. By contrast, "heavy metal packaging" refers to packaging made from cold-rolled sheet steel, with a surface thickness equal to or greater than 0.5 mm, and which primarily takes the form of cans, casks and drums with capacity ranging from 30 to 220 litres. This is not an arbitrary distinction; it corresponds to quite distinct usage of raw materials and manufacturing technologies.

Within the sector, a distinction is generally made between the following groups of products:

- food packaging, which includes food tins (for vegetables, soups, meats, fish, milk, prepared dishes, domestic animal feed); beverage cans (for beer, soft drinks, mineral water)
- various light packaging (known as "general line"), including tins with removable lids for paints, varnish; cans for oil, cleaning materials; unsealed tins for food products such as coffee, powdered milk, biscuits; decorative boxes for cigars and candies, money boxes; aluminium table dishes; metal containers for specific industrial uses, such as battery casings, capacitor housings
- aerosol cans intended to contain a gas-liquid mixture and used primarily for cosmetic, pharmaceutical and cleaning products

- closures and caps, including crown caps; other types of metal closures, such as caps, threaded caps and crimped-on closures (especially for glass bottles).

The breakdown of light metal packaging production by product is as follows: food packaging - 60% (50% for food tins and 10% for beverage cans), general line packaging - 30%, metal stoppers and accessories - 10%.

Initially intended solely for food products, metal packaging grew to occupy an increasingly important position in common usage as the result of the new qualities it offered in contrast to all other forms of packaging. These factors include the possibility of preserving foods over long periods without loss of nutritional value, the absence of corrosion and toxicity, durability allowing for easy transport and storage, and almost unlimited possibilities for decoration.

## Current Situation

The light metal packaging industry has a current turnover of around 6 billion ECU, employs 60 000 people in 400 firms, and has an annual consumption of more than 3.3 million tonnes of tinplate and 250 000 tonnes of aluminium.

Light metal packaging is estimated to represent 16% of all packaging used in Europe and ranks third in terms of materials used for packaging purposes. By comparison, paper/cardboard accounts for 30%, plastics 30%, glass 7%, heavy metal packaging 4%, and wood 4%.

## Factors Behind Production Trends

Tinplate, tinfree steel and aluminium are the three principal raw materials used in the manufacture of light metal packaging.

Tinplate is cold-rolled sheet steel that is less than 0.5 mm thick and is covered with a thin coating of tin of the order of

**Main Indicators  
Light Metal Packaging and Closures**

| (Million ECU)            | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  | 1987  | 1988  | 1989  | 1990  |
|--------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Apparent consumption (1) | 3 851 | 4 224 | 4 589 | 4 878 | 5 730 | 5 999 | 5 758 | 5 853 | 6 040 | 6 245 | 6 537 |
| Net export earnings (2)  | 93    | 109   | 144   | 165   | 154   | 175   | 154   | 61    | 60    | 65    | 70    |
| Total EC production (1)  | 3 966 | 4 371 | 4 707 | 5 053 | 5 872 | 6 133 | 5 875 | 5 908 | 6 100 | 6 300 | 6 600 |
| Employment (1 000) (1)   | 71.7  | 70.0  | 65.6  | 63.5  | 66.8  | 66.9  | 62.8  | 60.1  | 58.6  | 57.2  | 55.8  |

(1) EC 11: no figures available for Ireland: 1980-83 excluding Spain; 1980-84 excluding Greece.

(2) EC 8: 1985 figure includes Greece. 1986 figure includes Greece and Portugal. 1987 figure includes Spain; 1988-90 EC 11.

**Table I**  
**Production and Foreign Trade**

| (Million ECU)        | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  | 1987  | 1988  | 1989  | 1990  |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Production (1)       |       |       |       |       |       |       |       |       |       |       |       |
| Current value        | 3 966 | 4 371 | 4 707 | 5 053 | 5 872 | 6 144 | 5 875 | 5 908 | 6 100 | 6 300 | 6 600 |
| Index                | 100   | 110   | 120   | 127   | 148   | 155   | 148   | 149   | 154   | 159   | 166   |
| Constant value       | 3 966 | 4 027 | 4 145 | 4 155 | 4 669 | 4 321 | 4 226 | 4 260 | 4 350 |       |       |
| Index                | 100   | 102   | 105   | 105   | 118   | 118   | 109   | 107   | 107   | 108   | 110   |
| Imports Extra-EC (2) | 36    | 35    | 53    | 49    | 62    | 66    | 58    | 129   | 140   | 150   | 160   |
| Index                | 100   | 97    | 147   | 136   | 172   | 183   | 161   | 358   | 389   | 416   | 444   |
| Exports Extra-EC (2) | 129   | 144   | 197   | 214   | 216   | 241   | 212   | 190   | 200   | 215   | 230   |
| Index                | 100   | 112   | 153   | 166   | 167   | 187   | 164   | 147   | 155   | 166   | 178   |
| X/M (2)              | 3.6   | 4.1   | 3.7   | 4.4   | 3.5   | 3.7   | 3.7   | 1.5   | 1.4   | 1.4   | 1.4   |

(1) EC 11: no figures available for Ireland; 1980-83 excluding Spain; 1980-84 excluding Greece.

(2) EC 8: 1985 figure includes Greece, 1986 figure includes Greece and Portugal, 1987 figure includes Spain; 1988-90 EC 11.

Sources: SEFEL, Eurostat.

3 g/m<sup>2</sup> on each side. Its primary application is in the light metal packaging industry: up to 95% of the annual global production of around 11 million tonnes of tinplate is used by this sector. The characteristics that justify its use in packaging are: a high degree of mechanical strength, ease of decoration (it lends itself to printing as easily as does paper), and anti-corrosion qualities that allow it to be used for a wide range of products including food and chemical or pharmaceutical products.

Tinfree steel (TFS) is made of a steel base coated with a chrome-oxide mixture. Although its technical characteristics are less interesting than those of tinplate, it has been widely used in recent years to manufacture less demanding products such as tin bottoms and lids, caps, etc. because it is less expensive than tinplate - the current difference in cost is about 10%.

Aluminium is the next most frequently used material after tinplate. Approximately 10% of world aluminium production is used for packaging. It is particularly widely used for products such as dishes, receptacles, stoppers, and beverage cans and in markets in the Anglo-Saxon countries. Thus, aluminium represents 99% of the beverage can market in the United States (with tinplate only around 1 %), while aluminium represents only 40% in the UK and 12% in Germany.

Changes in the relative prices of tinplate and aluminium will have a preponderant influence on the struggle being waged between these two materials in the marketplace. The current tendency is to favour tinplate owing to the fall in tin prices over the past two years; aluminium has registered price increases of up to 50%. Over the long term, however, this trend may change.

There are two principal techniques currently used in the manufacture of metal tins: they apply to three-piece tins and two-piece tins, respectively.

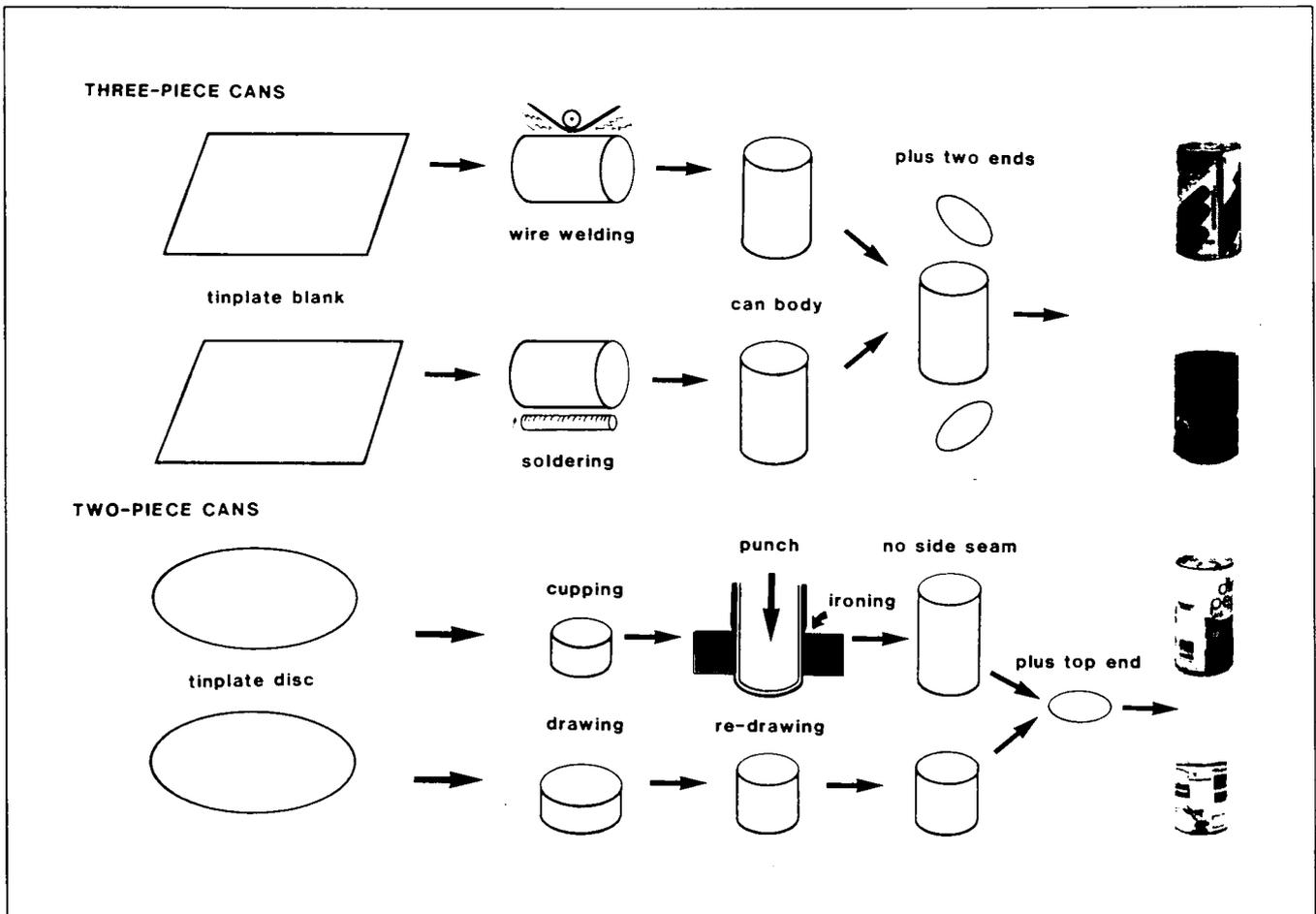
Three-piece tins are thus described because they are made up of a body and two ends, which are subsequently joined to the body of the tin. After rolls or sheets of tinplate are cut to the desired size, coated and, possibly, printed with a graphic design, the "blanks" that form the body of the tin are rolled on a mandrel to make them cylindrical before being sealed lengthwise by hard soldering - a technique that is dying out - or electric soldering, sometimes by bonding or welting. The final stage consists of crimping the bottom and/or top, previously punched on a press, on to the body of the tin. This three-piece technique is still used for almost all "general line" tins and for most food tins and aerosol cans.

Two-piece tins, the body of which is manufactured from a single disc of tinplate or aluminium, are made either by a process of cupping-ironing (gradually driving a punch into what will be the tin body, which is in turn inserted in a series of graded annular dies) or by a process of drawing-redrawing (successive drawing of one disc). The former procedure used primarily for beverage cans results in the sides becoming progressively thinner, with only the bottom retaining the initial thickness of the sheet. The process makes possible a tin with a very rigid 0.25 mm bottom and a body that is only 0.10 mm thick, the rigidity of which will be reinforced by the pressure of the beer or soft-drink inside. The second procedure makes it possible to obtain tins with only slightly thinned surfaces and greater resistance; it is generally used in manufacturing relatively short tins such as those for preserved meat, animal food, etc. In contrast to three-piece tins, two-piece tins are printed after being formed.

Figure 1 summarizes the main stages of the procedures described above.

These operations take place on semi-automatic, or sometimes totally automated lines, following a laid-out sequence and at a rate which may exceed a million tins per day and per

Figure 1



production line. Lids, closures and accessories are manufactured on presses by classical cutting and drawing techniques.

A number of key technical developments have occurred over the past few years. Substantial savings in costs have been achieved by changes in production methods; the use of increasingly fine and increasingly resistant steels makes it possible to manufacture beverage cans the sides of which do not exceed 0.09 mm in thickness and whose weight has fallen from 57 g to 30 g in 10 years; reduced tinning, from 3 g/m<sup>2</sup> to +/- 2 g/m<sup>2</sup>; the almost total replacement of hand-soldered wires by electrical soldering for three-piece tins; wide use of hammering of tin ends, which makes it possible to stock tins side by side while saving on materials. There has also been an increase in manufacturing speed: production line rates of 600 three-piece tins a minute and 1 200 two-piece tins a minute have now been reached; and "easy-open" tops, which can be opened by hand, have been developed.

### Major Structural and Geographic Features

The light metal packaging sector has a relatively concentrated structure based on two rather distinct types of firms. Standardized products, manufactured in quantity on large-

ly automated equipment, are dominated by a limited number of sizeable firms in each country. This is true for beverage cans, food tins of standard forms and sizes, stopper rings, etc. The reasons for this concentration are the following: the size of the investments required - a modern line for beverage cans calls for start-up capital of up to 25 million ECU and such sums can be financed only by powerful groups; access to advanced technologies; the concentration of major sector clients such as canneries or breweries; and the advantages of mass production in terms of unit cost. The principal international groups in the sector are listed in Table II.

"Made to measure" products are manufactured in limited quantities for narrower markets. They are often special in form (conical or irregular tins), size (very large or very small capacity tins) or decoration, and are produced by small and medium-sized companies employing from 20 to 200 people. "General line" tins, where product variety and limited volume make maximum flexibility necessary, are largely manufactured by these types of companies.

The geographical distribution of firms is strongly influenced by the nature of the products being manufactured. Metal



**Table II**

| <b>Principal groups</b> | <b>Principal EC businesses or subsidiaries</b>   |
|-------------------------|--|
| American Can (USA)      | American Can UK (UK)   |
| Carnaud (F)             | Carnaud Eurocan (B)<br>Colep (P)<br>Envases Carnaud (E)<br>Eurocan GmbH (D)<br>Faba (I)<br>Schuybroek (B)<br>Spray Box (I)   |
| Cebal (F)               | Cebal Benelux (B)<br>Cebal Italia (I)  |
| Continental Can (USA)   | Continental Can Cy UK (UK)<br>De Clerck (B)<br>Schmalbach-Lubeca (D)<br>Sobemi (B)<br>Thomassen & Drijver (NL)   |
| Crown Cork Cy (USA)     | Crown Cork Belgium (B)<br>Crown Cork Cy Ltd (UK)<br>Crown Cork Italy (I)<br>Crown Cork Nederland (NL)<br>Crown Cork Scandinavia (DK)<br>Emballages Couronne (F)<br>Productos Corticeiros Portugueses (P) |
| National Can (USA)      | Nacanco Deutschland (D)<br>Nacanco Italiana (I)<br>Nacanco Ltd (UK)<br>National Can Iberica (E)<br>National Can Italiana (I)   |
| Metal Box (UK)          | Hellas Can (GR)<br>Superbox (I)  |
| PLM (S)                 | PLM-Ball (D)<br>PLM-Haustруп (DK)  |

Source: SEFEL.

packaging combines relatively low unit value (the sales price of a standard food tin is currently about 0.1 ECU) and high volume. Transporting metal packaging basically amounts to transporting air, and this obviously limits the possibilities for export or distant delivery. For a standard container, the maximum sales radius which a firm may competitively supply, taking transport costs into consideration, is about 300 km.

**Table III****Distribution of Manufacturers by Member State (1)**

|                |    |
|----------------|----|
| Belgium        | 12 |
| Denmark        | 15 |
| Germany        | 57 |
| Spain          | 71 |
| Greece         | 2  |
| France         | 45 |
| Ireland        | 3  |
| Italy          | 72 |
| Netherlands    | 10 |
| Portugal       | 10 |
| United Kingdom | 45 |

(1) Includes only firms that are members of national professional associations representing the sector and excludes integrated concerns (for example, canneries that manufacture their own tins) or small-scale firms. There are no producers of metal packaging in Luxembourg.

Source: SEFEL.

This explains the geographic dispersion of manufacturers in almost all regions of the European Community and the fact that most manufacturers of food tins (the most important product) are located at the centre of regions of agricultural production.

Within the European Community, the distribution of manufacturers by country is as indicated in Table III.

*Consumption Trends*

The economic development of the sector over the past several years has been characterized by relatively weak annual growth of 2 to 3% on average. This growth is primarily due to development of the preserved food industry and to the acquisition of new sections of the market by beverage cans. The situation is distinctly less favourable for industrial packaging due to difficulties in some client sectors (for example, construction) and increased competition from plastic packaging for certain applications (motor oils, cleaning products).

Over the past few years, sectoral development has been strongly influenced by a number of external factors: modifications in individual habits of consumption (for instance, increased demand for products such as packaging for pre-cooked dishes, aerosols); stronger competition from new types of packaging (plastics, compounds based on impregnated cardboard, ultra-light glass) or new preserving techniques (deep freezing, freeze drying); problems of psychological acceptance of certain types of packaging and presentation, particularly for preserved food ("the consumer does not know that there are more vitamins in a tin of preserved food than in fresh vegetables picked over 48 hours earlier"). Faced with the continuous development of non-returnable containers, which pose collection, disposal or recycling problems, national and Community authorities have taken on the twofold task of increasing the proportion of reusable packaging by discouraging the marketing of large quantities of non-returnable containers, and of encouraging new forms of recycling that are favourable to the environment. This concern has taken the form of a number of regulations, such as the EC directive on packaging for consumable liquids and certain national laws that tax non-reusable containers or simply forbid certain types of packaging. Denmark, for instance, has forbidden the sale of beer and other cold drinks in metal tins or non-returnable bottles.

Metal packaging represents less than 2% of household refuse by weight, and beverage cans, in particular, less than 0.5%. However, the situation could be further improved by stressing recycling - which, in the case of metal containers, is technically feasible with only collection and sorting still posing problems - and improved education of the public concerning its responsibilities for protecting the environment. Current difficulties in the aerosol sector relating to the destruction of the earth's ozone layer by propellant gas residues further il-

lustrate the problems encountered by packaging manufacturers with regard to environmental protection.

### Forecast and Outlook

The light metal packaging sector is not expected to undergo any spectacular advance in production in the next few years: divergent development of demand in various user sectors, together with growing competition from plastics in numerous applications, makes stagnation likely or, at best, slight growth over the medium term. Average annual growth of less than 3% in real terms seems realistic.

Certain market segments will, however, fare better than others: the food-preserving industry is likely to grow, and the classical food tin will probably not be replaced by alternative packaging for several decades. The animal food segment is currently showing 6-10% annual growth and shows high potential. According to a recent study, the drinks containers market will grow by about 20% until 1995, and metal tins should maintain, if not increase, their current 12% market share. However, some European manufacturers over-re-

acted to this potential demand in the form of major investments liable to lead to surplus production capacity in certain regions. Packaging for various uses such as paints and detergents can at best maintain its position.

Parallel to these market changes, rather spectacular progress will take place over the coming years with regard to product quality on the one hand and assembly line productivity on the other. This is due to the development of new materials; a continuation of the tendency to diminish thickness and amount of tinning thanks to improved protective coatings; new systems for opening and emptying tins; the adoption of laser soldering; production rationalization through increased standardization; the refinement of printing techniques, allowing packaging to play a greater "publicity" role; and continued increases in productivity on the production line.

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## MECHANICAL ENGINEERING

(NACE 32)

*Dramatic changes and developments have taken place in the mechanical engineering industry, although this has been against a background of declining production and substantial labour-shedding. Technological developments and product innovation have been strong features of the industry in recent years. A recovery in demand, particularly within the Community but also now occurring on a more global basis, has spurred investment; the value of production in 1988 is expected to reach its 1980 level in real terms. Emphasis will continue to be on productivity gains, improvements in the responsiveness of the industry to demand and allied with this, enhanced quality of the product and service provided to the customer.*

Mechanical engineering is a traditional capital goods industry which, with a few exceptions, produces only capital goods or components of capital goods. The industry supplies many sectors of the economy, from agriculture and energy to all the different fields of industry and services, and including institutions in the public sector. Output covers an extraordinarily wide assortment of products, ranging from small units such as miniature ball bearings, individual machines (automatic lathes, robots and hydraulic excavators), to complex industrial plants such as cement works. In terms of products, mechanical engineering is one of the most differentiated and varied sectors of industry.

### Current Situation

With the value of production estimated to be in excess of 180 billion ECU in 1988, mechanical engineering is one of the largest industrial sectors in the Community. Machine exports

outside the European Community amount to about 53 billion ECU compared with machine imports of 21 billion ECU.

The traditional image of mechanical engineering as an industry which produces machines which are then used to convert energy, has long since changed. New technologies, such as hydraulics, pneumatics and microelectronics, have given the sector fresh impetus and have permitted a succession of product innovations. It has also become possible to coordinate machines, apparatus and processes in ever larger systems. The term "Mechanical Engineering" is now, therefore, a very inadequate description of the modern machine construction industry.

Companies in the machine sector tend to be very highly specialized and are accustomed to catering to the special requirements of their customers. This means that as well as standard machines, many special machines are built. The emphasis in manufacturing lies on small scale and one-off production, with mass production as the exception. This characteristic also explains why small and medium-sized companies still predominate in this sector of industry and why concentration is still low compared with other industrial sectors.

Comparison of production levels between the EC on the one hand and the USA and Japan on the other is difficult, since the figures are affected by wide fluctuations in exchange rates over the last few years; average exchange rates for 1986 probably provide the most realistic picture. Based on these figures, machine production in the EC amounted to 164 billion ECU compared with 157 billion ECU in the USA and 121 billion ECU in Japan. In the USA, the market is capable of absorbing 157 billion ECU so that imports and exports bal-

### Main Indicators Mechanical Engineering

| (Million ECU)                     | 1980     | 1981     | 1982     | 1983     | 1984     | 1985     | 1986     | 1987     | 1988     |
|-----------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| Apparent consumption (1)          | 95 358   | 94 461   | 100 575  | 103 352  | 113 450  | 126 278  | 129 331  | 139 661  | 148 951  |
| Net export earnings (1)           | + 24 163 | + 29 869 | + 30 716 | + 29 953 | + 32 971 | + 36 201 | + 34 964 | + 31 721 | + 32 300 |
| Total Community production (1)(2) | 119 521  | 124 300  | 131 291  | 133 305  | 146 421  | 162 479  | 164 295  | 171 382  | 181 251  |
| Employment (1 000) (1)            | 2 859    | 2 726    | 2 597    | 2 456    | 2 379    | 2 386    | 2 390    | 2 370    | 2 350    |

(1) EC 12; 1987: estimate - Orgalime; 1988: forecast - Orgalime; France - electric welding machinery included; data cover companies with 20 employees or more, except for Belgium which cover companies with 5 employees or more.

(2) Sales data used for production figures; however, stocks of finished goods and other unsold items are insignificant.

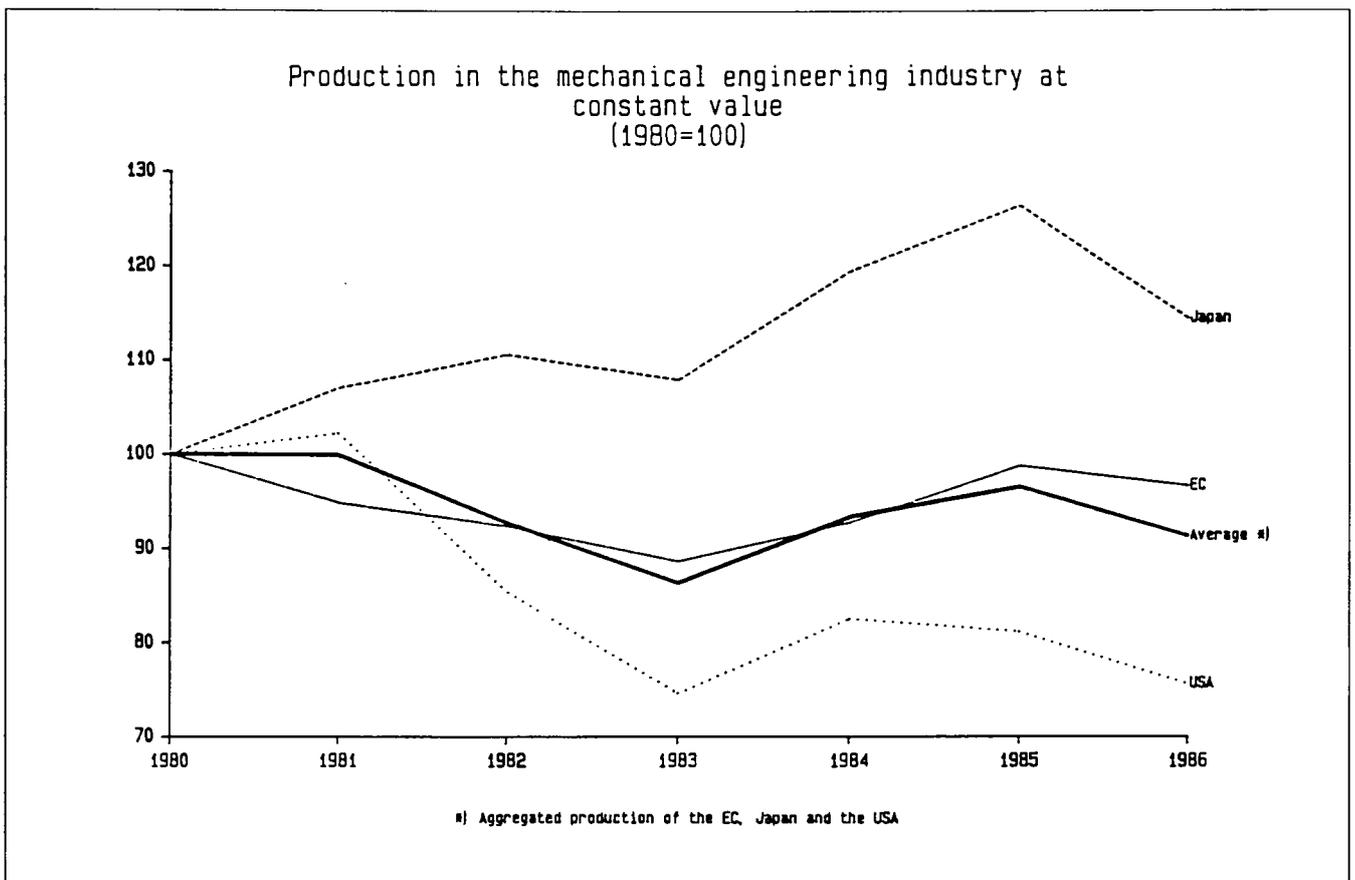
ance. By comparison, market demand in the EC is around 140 billion ECU and 2.6 times more machines are exported than imported. In Japan, a domestic market potential of 100 billion ECU is considerably lower than the production capacity of the industry; hence the value of exports is 8.3 times imports.

By comparison with the industrial countries outside the Community, the machine industry in the EC has been able to maintain its position relatively well over the last few years. This is shown clearly by a comparison with the USA and Japan. The American machine industry suffered a decline in the years 1982 and 1983 which, in real terms, reduced its production by more than a quarter. By 1986, the industry had not really recovered from this downturn, but recently there have been signs that US companies are receiving more orders as a result of the lower value of the dollar. The Japanese machine industry has also suffered setbacks in production over the last few years. 1983 was a year of recession for the industry, as was 1986 when the Japanese orientation in the American market rebounded. In constant terms, Japan produced 14% more machines in 1986 than in 1980. About half of this growth resulted from the export/import ratio which rose once again in the period under review.

### Consumption Trends

Since 1980, machine production in the EC has undergone a very distinct cyclical development which partly mirrors fluctuations in investment activity in Western Europe but is also due to world-wide trends in demand. From 1981 to 1983 the volume of production dropped yearly, so that in 1983 production was 10% below the 1980 level. In addition to the decline in Western European investment which began in 1981 after the second oil price crisis, 1982 and 1983 registered a fall in exports not only to non-European industrial countries, but also to the developing countries - who were by then deeply in debt - and the oil-producing countries.

1984 saw the onset of a new trend, with the upturn in production, in its early stages, based mainly on the pull of imports into the USA and the competitiveness of European prices due to the strength of the dollar. Since 1985, the external stimulus to production has been increasingly replaced by a revival of demand within the Community; trade within the EC is relatively intensive. However, this was not enough to completely offset the setbacks suffered in exports. Since 1987, the investment boom has become more differentiated and this still dominates the picture in 1988. High growth rates in



Graph 1

UK, Italy and the two new Member States, Spain and Portugal, compare with rather more reticent demand for machines in the other countries.

The decline of EC machine exports to third countries in 1986 and 1987 is only partly the result of the European manufacturers' competitive disadvantage due to the weak US dollar, which resulted in a loss of market share, particularly in the USA. It is also the result of a general curbing of imports by the OPEC countries, insolvency in some developing countries and a shortage of hard currency in Eastern Europe and the People's Republic of China. Since then, there have been signs of a slight recovery in exports due to growth of sales to the rest of Western Europe and the newly industrialized countries of the Far East.

### Export Trends

The overall unsatisfactory development of the mechanical engineering industry in the EC over the years 1980 to 1987 can hardly be explained by a lack of competitiveness, as the comparison with Japan and the USA shows. It is mainly due to very sluggish investment activity internally and a progressive decline in formerly important export markets, due to a lack of financing possibilities. During the entire period under review, total economic growth within the Community has never been sufficient to stimulate expansionary investment to any large extent. Moreover, exchange rate uncertainties and the problems of insolvency in a growing number of countries increased the investment risk. At the same time, high real interest on deposits made alternative uses of funds more attractive. Although comparatively lively investment activity developed in most industrial countries in the services sector, this is the sector with which the mechanical engineering industry does not have a strong inter-relationship.

### Employment Trends

In 1988 machine production in the EC will probably return to the 1980 level, although with comparatively lower employment levels; a labour force of around 2.4 million compared with almost 2.9 in 1980. The majority of the 500 000 lost jobs were cut in the three slack years 1981 to 1983, but in the years of the subsequent upward trend, growth was too weak to trigger off a noticeable increase in employment. In the last two years slight reductions in employment have been experienced, because manufacturers are now working at more or less stagnating capacities and trying to reduce costs in order to maintain international competitiveness in the face of a lower dollar.

### Factors Behind Production Trends

Despite these unfavourable indicators which resulted in overall stagnation, the machine industry has undergone exciting developments since 1980. With the tremendous advances in microelectronics, producers have made an enormous step forward. While in the initial stages, microelectronics in the machine were still used to improve control in stand-alone operation, they now permit communication within entire machine systems. The processing machine is combined with mechanical handling devices, robots and with the testing machine - controlled by computer. New production concepts have been developed which offer the investor greater production flexibility. These applications range from the now common CAM (computer-aided manufacture) to the vision of CIM (computer-integrated manufacture).

Due to substantial efforts in innovation, machine manufacturers in the EC are leading these technological developments for most types of machines. This development has also

**Table I**  
**Production and Foreign Trade (1)**

| (Million ECU)         | 1980    | 1981    | 1982    | 1983    | 1984    | 1985    | 1986    | 1987    | 1988    |
|-----------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| <b>Production (2)</b> |         |         |         |         |         |         |         |         |         |
| Current value         | 119 521 | 124 330 | 131 291 | 133 305 | 146 421 | 162 479 | 164 295 | 171 382 | 181 251 |
| Index                 | 100.0   | 104.0   | 109.8   | 111.5   | 122.5   | 135.9   | 137.5   | 143.4   | 151.6   |
| Constant value        | 119 521 | 113 287 | 110 369 | 105 838 | 110 820 | 117 934 | 115 428 | 116 968 | 119 996 |
| Index                 | 100.0   | 94.8    | 92.3    | 88.6    | 92.7    | 98.7    | 96.6    | 97.9    | 100.4   |
| Imports Extra-EC      | 11 145  | 12 399  | 13 462  | 13 984  | 15 825  | 17 912  | 18 260  | 19 424  | 20 900  |
| Index                 | 100.0   | 111.3   | 120.8   | 125.5   | 142.0   | 160.7   | 163.8   | 174.3   | 187.5   |
| Exports Extra-EC      | 35 308  | 42 268  | 44 178  | 43 937  | 48 796  | 54 113  | 53 224  | 51 145  | 53 200  |
| Index                 | 100.0   | 119.7   | 125.1   | 124.4   | 138.2   | 153.3   | 150.7   | 144.9   | 150.7   |
| X/M                   | 3.17    | 3.41    | 3.28    | 3.14    | 3.08    | 3.02    | 2.92    | 2.63    | 2.55    |

(1) EC 12; 1987: estimate - Orgalime; 1988: forecast - Orgalime; France - electric welding machinery included; data cover companies with 20 employees or more, except for Belgium which cover companies with 5 employees or more.

(2) Sales data used for production figures; however, stocks of finished goods and other unsold items are insignificant.

Sources: Orgalime, Eurostat.

**Table II**  
**Investment Trends, EC 12**

| (Million ECU) | Gross investment |
|---------------|------------------|
| 1980          | 4 240            |
| 1981          | 4 289            |
| 1982          | 4 266            |
| 1983          | 4 514            |
| 1984          | 5 042            |
| 1985          | 6 050            |
| 1986          | 6 874            |

Sources: Orgalime, Eurostat.

led to a fundamental change in the range of goods and services offered by the machine industry. It is no longer sufficient to produce individual high-performance machines: the customer now requires machines which can be used in systems; often, not only is the hardware required, but also the appropriate software and, increasingly, consulting and training services. This has led to considerable changes in both the personnel structure and qualifications required by machine manufacturers. As a result, all Member States report shortages of qualified skilled workers and engineers at present, despite declining employment totals in the industry. Nevertheless, good training systems in most Western European countries and the traditional willingness of manufacturers to satisfy specific-to-customer requirements with individual solutions, mean that the machine industry in the EC is better able to cope with these altered requirements than competitors in other countries. The trend to a higher proportion of services within the total range of goods and services naturally increases the weight of personnel costs, which in most EC countries - and particularly in Germany, the Benelux countries, France and Denmark - are already extremely high by international comparison. On the other hand, offering an individual solution for problems instead of a standard solution reduces the price-sensitivity of demand. Thus many factors indicate that technical developments are more to the advantage of the industry than to its disadvantage.

### *The Position of Firms in the Industry*

In the early 1980s, the profit situation of most mechanical engineering companies worsened dramatically with declining production. This finally resulted in a drop in equity values. In 1985 and 1986, improved demand for machines made it possible to normalize profits, but this development showed signs of slowing in 1987, since the depreciation of the dollar proved to be a source of losses on foreign markets.

Many of the larger companies in the mechanical engineering sector have shown rather poorer profit performances than the average for the smaller and medium-sized companies. The larger companies produce more standard products

which are subject to greater international price competitiveness; in addition, these companies are also more heavily committed in the construction of large plants, an area which is now suffering particularly from the decline in demand from the OPEC countries, the State-trading countries and the insolvent developing countries. However, with easier access to the capital markets, the larger companies do have financing advantages. In future years, company financing requirements for investment and for research and development will rise noticeably. New flexible production procedures, which the industry is making possible through innovation, are only just beginning to be used in the industry's workshops. Their application is triggering off a chain of reorganization in installed production capacity which will go way beyond the usual expenditure on investment. At the same time, given increasingly shorter innovation cycles, companies will have to make great efforts in research and development in order to remain competitive. Research and development figures for the mechanical engineering industry are only available for Germany. However, these figures show that, for the past few years, this category of provisions for the future has clearly gained in importance in comparison to investment in plant and machinery.

### *Major Structural and Geographic Features*

The mechanical engineering industry can be further divided into homogenous sub-sectors which are partly limited by technological aspects, but mainly by customer groups. Here national divisions show certain deviations, but it can still be assumed that there are about 30 such sub-sectors in mechanical engineering. Some of the largest sub-sectors are machine tools, power transmission engineering, mechanical handling equipment, printing and paper machinery, agricultural machinery or construction equipment and building material machines, which each take a 5% share or more of production.

As many of these sub-sectors depend on very specific influencing factors such as, for example, structural shifts or special business trends among their customers, their development can deviate greatly from the general trend in mechanical engineering. Thus in the last few years textile machinery, printing and paper machinery, and rubber and plastic processing machinery have done extremely well, while agricultural machinery and tractors, mining machinery, prime movers and the plant construction industry have fallen far behind.

Unfortunately, existing data are insufficient to compile an aggregated breakdown on size of companies in the EC machine manufacturing industry. However, it is clearly true of all Member States that this industry consists mainly of smaller companies. As an example, the industry structure in Germany is indicated by the following: of the 4 643 companies with 20 employees or more in 1986 only 158 employed more than 1 000, while on the other hand almost 3 000 companies employed

less than 100 persons. Such figures justify describing the mechanical engineering industry, as a whole, as an industry of medium-sized companies. The variety of production and very extensive specialization, with a high proportion of one-off and small-scale lines of production, obviously offer conditions in which the smaller production units can remain competitive. In principle, the completion of the internal market will not change this. However, in the preliminary stages some concentration with international involvement in the industry is occurring. This is due mainly to companies outside the Community who want to position themselves in the market prior to 1992.

The cost structure of the mechanical engineering industry differs from that of manufacturing industry as a whole. Material costs account for a slightly lower than average share, while personnel costs are very clearly above average. This shift mirrors the high expenditure on design and production technology which is a consequence of the individuality of customer requirements. This also necessitates the employment of personnel with above average qualifications, who are therefore more expensive. The cost structure also shows, for example, that dependence on energy is low, and that mechanical engineering is not a particularly capital-intensive industry.

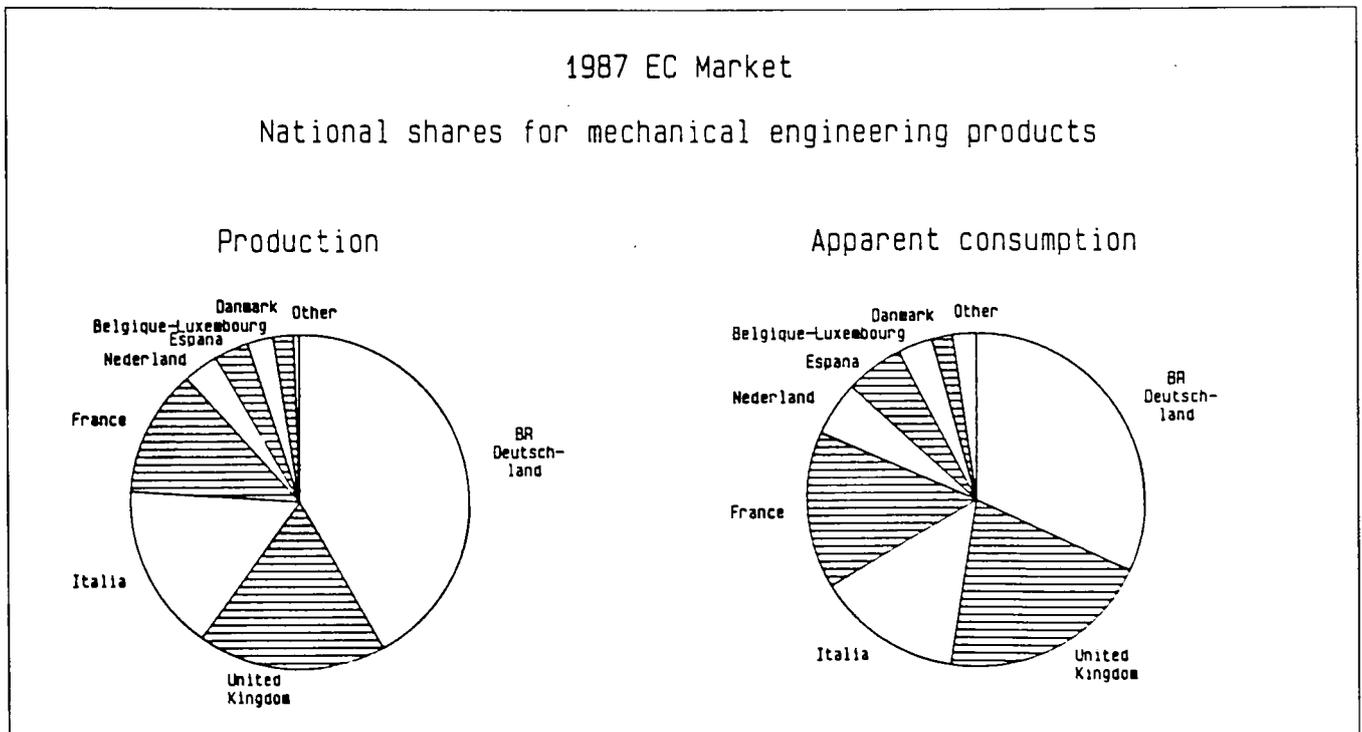
The regional structure of machine production in the EC clearly has its main centre in Germany, which in 1987 accounted for 42% of the total. The UK (18%), Italy (16%) and France (12%) provide a major share of the balance. The Netherlands and Spain each account for a 3% share, Belgium 2% and Denmark just under 2%; Portugal, Ireland and Luxembourg with 0.2% each and Greece with 0.1% com-

plete the picture. Within the individual Member States, there are again special regional centres for machine production; in Germany, for instance, these are Nord Rhein-Westfalen and Baden-Württemberg; in the UK the South East region; in Italy Lombardia; in France the Bassin Parisien and Centre-Est.

The country breakdown obviously reflects, to a certain extent, the size of the individual Member States. However, over and beyond this, relative production capacities can be indicated by figures for machine production (ECU values) per capita of the population in 1987. This results in several interesting changes in the order: Germany (1 183), Luxembourg (752), Denmark (608), UK (544), Italy (488), Belgium (419), the Netherlands (405), France (373), Spain (146), Ireland (93), Portugal (38) and Greece (17).

### Trends in Each Member State

The development trends described for the Community as a whole, apply by and large to all the Member States. However, since 1980 there have been several remarkable shifts, due to the fact that the mechanical engineering industry has been better able to hold its own in some countries than others. This can be seen from the machine production shares within the EC: Germany and Italy have shown a clear increase, compared with losses for the UK and France. The key reason for these differences is varying export success. This applies to trade within the Community but also particularly to deliveries to third countries, and suggests that the German and Italian machine industries are highly competitive internationally and



Graph 2

have probably increased their competitiveness in the 1980s, while the UK and French ones are less competitive.

## Forecasts and Outlook

### *Short-Term Forecast*

For 1988 there are signs of revival in mechanical engineering; this year - in contrast to 1987 - increasing investment activity within the Community is no longer being negated by declining demand in external markets. The value of machine production in real terms has been able to grow this year by 2%, and there should not be any significant deviation from this overall trend in the individual Member States. However, this growth will not be sufficient to completely reverse the slightly declining trend in the numbers of persons employed. In order to maintain international price competitiveness, machine producers need to reduce personnel costs by increasing productivity.

For 1989, as yet, no clear picture of future economic development has emerged. The institutes forecast slower growth in major countries in the Community and the mechanical engineering industry would be affected to some degree by such a trend. On the other hand, the latest developments in demand for machines could also be seen as meaning that investment activities in the Member States may rise as much in 1989 as they have in 1988. World-wide trends in demand will also remain an important factor and assuming no serious economic setbacks, could continue to be slightly positive. Indications are, therefore, that the machine industry could achieve a small growth rate once again in 1989.

### *Medium-Term Outlook*

Several medium-term trends are relatively easy to forecast: the mechanical engineering industry is offering new machine

technologies which provide more flexible and economical production possibilities to the user. Demand in this area is likely to accelerate. In the industrialized nations this will trigger autonomous investment which will mainly serve the modernization of production capacities. Within the Community there could also be an impetus from the implementation of the single market with companies wishing to increase their competitiveness by full-scale rationalization.

This also applies, to a very great extent, to the mechanical engineering industry itself, as new system techniques offer greater progress in productivity and more flexibility in the next few years. Many smaller companies may have problems with these investments, which will call for high financial expenditure, but good sales should provide the wherewithal for investment.

In machine production, the trend is away from the stand-alone machine towards integrated computer controlled machine systems. Product innovations and the ability to offer customers an increasing number of services as well as the hardware will be a factor in competitiveness. Particularly in these areas, the EC mechanical engineering industry has strong advantages in the international market.

Over the medium term, the assumption is that the demand for machines will rise relatively steadily. This will be more pronounced in the highly industrialized countries and will mainly relate to production systems for the processing industry. EC machine construction will enjoy high and probably even increasing competitiveness and will be able to respond to the growth in demand. The medium-term outlook is therefore for a considerable improvement in industry performance compared with the last few years.

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# AGRICULTURAL MACHINERY

(NACE 321)

*This industry is one of the main components of the machine manufacturing industry and one of the oldest, but despite its traditional character it has come under the influence of new technology and is manufacturing increasingly efficient and sophisticated equipment. Europe leads the world in the manufacture and export of agricultural machinery. However, over the last 10 years the industry has been severely hit by falling demand from farmers who are its sole customers. This has led to substantial restructuring, with the result that today the industry is very internationalized and specialized. It is also marked by excess capacity, which makes it extremely vulnerable to competition.*

## Current Situation

Since the middle of the 1970s there has been a general drop in agricultural machinery sales. This is due first and foremost to the two oil crises which gave rise to spectacular increases in the price of fuels and fertilizers, making it more difficult for farmers to purchase equipment. Another contributing factor is the increase in the price of land which has resulted in farmers investing less, particularly in agricultural machinery. Thus in 1986 tractor sales reached their lowest level for 20 years.

## Production Trends

Since the early 1980s, the difficulties encountered by farmers have had an adverse effect on the production of Community agricultural equipment both in the tractor and the machinery sectors.

World tractor production reached its highest point in 1976, with 1.76 million units. Since then it has undergone a steady decline (1.14 million units in 1984). Although Community production, which represents 30% of world output, has slumped, it has been less affected than industries elsewhere in this decade. This is partly due to the fact that American firms have transferred a large part of their production capacity to Europe, so that today American multinationals account for 40% of total Community output. The EC is not only the largest world producer of tractors, but also the largest exporter.

The agricultural machinery sector has also suffered from shrinking markets and Community production has dwindled

In terms of earnings the industry can be divided almost equally into two sectors: production of tractors and the manufacture of other agricultural machinery. The tractor and combine harvester sector is dominated by large firms which are often multinational, while the remaining products (harvesters, presses, rotary hoes and trailers) are the reserve of small- and medium-sized firms.

In a region of such diverse geography and economics as the European Community, the agricultural machinery industry naturally produces a wide range of implements from the most sophisticated combine harvesters to the simplest of rotary hoes and ploughs. Altogether about 450 different types of machines are produced in the Community. Diversity is therefore the keynote of the industry.

## Main Indicators Agricultural Machinery

| (Million ECU)                  | 1980  | 1981   | 1982   | 1983   | 1984   | 1985   | 1986   | 1987 |
|--------------------------------|-------|--------|--------|--------|--------|--------|--------|------|
| Apparent consumption (1)       | 7 048 | 7 852  | 8 393  | 9 838  | 10 214 | 11 479 | 12 471 | N/A  |
| Net export earnings (1)        | 2 050 | 2 285  | 2 117  | 2 189  | 2 453  | 2 588  | 1 869  | N/A  |
| Total Community production (2) | 9 258 | 10 322 | 10 810 | 12 334 | 13 037 | 14 821 | 14 946 | N/A  |
| Employment (1 000) (3)         | N/A   | N/A    | N/A    | N/A    | N/A    | N/A    | 134.5  | N/A  |

There is no significant agricultural equipment industry in Luxembourg and Ireland.

(1) EC 7 There are no trade figures for Greece, Portugal, Denmark, Ireland and Luxembourg.

(2) EC 10 There are no production figures for Greece and Portugal.

(3) EC 10 There are no available figures for Spain and Portugal.

Sources: CEMA, Eurostat.

since the end of the 1970s. There has been a redistribution of production within the Community as well. France has given up producing certain types of equipment while Italy and Denmark have greatly increased their production of combine harvesters and rotary hoes. But not a single segment - be it harvesters, combined harvesters or threshing machine presses - has seen its total production increase since 1980.

### Consumption Trends

Consumption of agricultural machinery in the EC fell 25% between 1977 and 1982 and over the last five years demand for practically all types of machinery has continued to decline by between 20% and 40%. The demand for agricultural tractors in the EC, which reached 300 000 units in the mid-1970s, fell to 296 000 in 1979 and 190 000 in 1985.

This drop in sales is a sign not only of the difficulties experienced by farmers but also the tendency to buy more powerful tractors and machinery, though this trend seems to have slowed down over the past three years. There has also been a marked preference in recent years for tractors with four driving wheels. In 1985 these represented 55% of the market as against 32% in 1979. The same trend can be seen throughout the sector, i.e. a drop in the volume of the fleet and an increase in the power of new machinery.

### Export Trends

In 1986 the EC 7 exported 2 549 million ECU worth of agricultural machinery while imports represented 680 million ECU. Net export earnings totalled 1 869 million ECU in 1986, down from about 2 500 million in 1984 and 1985. This represents an export-import ratio of 275%. The surplus is dis-

tributed fairly evenly over the two sectors with 55% for tractors and 45% for agricultural machinery. However, imports of machinery are twice as great as those of tractors.

Since 1980 Community exports have fallen about 15% in real terms. Tractors have been hardest hit, with the volume of exports halved from the 62% they represented in 1981. The OECD is the largest outlet for Community exports, buying 71% of tractors and 57% of other machinery. Developing countries follow with 28% of tractors and 35% of machines. Countries with planned economies still account for only a marginal share of extra-EC exports (1% of tractors, 8% of agricultural machines).

### Employment Trends

About 150 000 people are directly employed in the agricultural machinery industry in the 12 Community countries. Approximately the same number of people work in distribution and maintenance. Over the last 10 years there has been a dramatic drop in manpower levels in all EC countries except Italy and Denmark which have managed to keep numbers stable.

Agricultural machinery also affects employment levels in farming itself. About 11 million people are employed in agriculture in the EC, i.e. about 9% of civilian jobs. In 1970, agriculture accounted for 15 million jobs but regular productivity increases brought about by concentration of farming on larger acreages and the efficiency and power of machines has caused numbers to drop and today a new generation of machines is set to replace manual labour on a large scale in areas such as grape harvesting, fruit picking and milking.

**Table I**  
**Production and Foreign Trade**

| (Million ECU)        | 1980  | 1981   | 1982   | 1983   | 1984   | 1985   | 1986   | 1987 |
|----------------------|-------|--------|--------|--------|--------|--------|--------|------|
| Production (1)       |       |        |        |        |        |        |        |      |
| Current value        | 9 258 | 10 322 | 10 810 | 12 334 | 13 037 | 14 821 | 14 946 | N/A  |
| Index                | 100   | 111.5  | 116.8  | 139.2  | 140.8  | 160.1  | 161.4  |      |
| Constant value (1)   | 9 258 | 8 794  | 8 905  | 9 024  | 8 807  | 8 738  | 7 827  | N/A  |
| Index                | 100   | 95.0   | 96.2   | 97.5   | 95.1   | 94.4   | 84.5   | N/A  |
| Imports extra-EC (2) | 482   | 550    | 614    | 633    | 677    | 657    | 680    | N/A  |
| Index                | 100   | 114.1  | 127.4  | 131.3  | 140.5  | 136.3  | 141.1  | N/A  |
| Exports extra-EC (2) | 2 532 | 2 835  | 2 731  | 2 822  | 3 130  | 3 245  | 2 549  | N/A  |
| Index                | 100   | 112.0  | 107.9  | 111.5  | 123.6  | 128.2  | 100.7  |      |
| X/M                  | 5.25  | 5.15   | 4.45   | 4.46   | 4.62   | 4.94   | 3.75   | N/A  |

(1) EC 10 (there are no production figures for Greece and Portugal; the industries in Luxembourg and Ireland are insignificant).

(2) EC 7 (there are no trade figures for Greece, Portugal, Denmark, Ireland and Luxembourg).

Sources: CEMA, Eurostat.

**TABLE II**  
**1986 Production and Internal Market in Community Countries**

| (Million ECU)   | B   | DK  | D     | E   | F     | I     | NL  | UK    |
|-----------------|-----|-----|-------|-----|-------|-------|-----|-------|
| Production      | 454 | 641 | 6 322 | 343 | 2 202 | 2 956 | 425 | 1 603 |
| Internal market | 284 | 535 | 4 771 | 533 | 2 685 | 2 066 | 556 | 1 280 |

Denmark figures are estimated.

Sources: CEMA, Eurostat

### *The Position of the Firms*

A number of factors, such as the American agricultural crisis, the debt of Third World countries and the difficulties encountered with the common agricultural policy, have led to wide-ranging structural changes in the agricultural machinery industry implemented by the large firms which dominate the market.

The strategy of North-American firms has had a major impact on the structure of the European market. A number of these have relocated production in Europe, with some, like Ford, removing all their production capacity from the United States. Today, 90% of American and European production is concentrated in Europe as against 76% in 1980. The idea behind this move on the part of American firms was to lower production costs while at the same time increasing their share of the market. The fact that part of European production is re-exported to the United States is a measure of the success of this strategy.

Alongside North American firms such as Ford, John Deere, Massey Ferguson and Case, there are also a number of European companies which have branched out from large car-manufacturing groups (Fiat, Renault, Daimler-Benz) and local manufacturers who dominate their own domestic markets (Xavier Fendt and Durtz in Germany, Ebro-Iberica in Spain). Except for International Harvester (taken over by Case) and Leyland (which has given up the agricultural machinery business) no large company has disappeared from the market over the last 10 years despite the steady decline. This is because these firms, which are often very diversified, are extraordinarily resistant and manage to maintain their position despite occasional heavy losses. This situation, coupled with the chronic excess capacity in the industry, has sharpened competition and resulted in a permanent struggle to increase market shares.

### *Major Structural and Geographical Features*

During the last decade, the Community's share of foreign trade has remained relatively stable. The most significant change has been the decline in North American exports, which was the main reason for the relocation of North American production to Europe and Japan. Japan, which still

exports relatively little in this field, has gradually increased its share of world markets, especially in the small- and medium-sized tractors segment, by courting expanding markets in the Middle and Far East.

Protectionism and opposition to foreign investment have closed markets in much of the developing world to European groups. A number of Third World countries have set up their own local industries, some of them quite large-scale. Their main products are tractors, generally modelled on Western European or Comecon designs. Many European manufacturers export tractor parts which are assembled in the country but, with the development of local production, sales of kits are on the wane. India is a large exporter of tractors with an annual production of some 80 000 units. Turkey has also established its own industry and now manufactures most of its own components, making it less dependent on European firms but Pakistan and Iran remain major buyers of tractor parts for local assembly.

Technological changes are occurring throughout the international industry. Assembly-line work has undergone large-scale automation with the introduction of computer-aided design, computerized production management, numerical control and robots. The tractor sector has followed much the same path as the car industry with custom-made tractors, greater manufacturing flexibility and improved safety and comfort features.

Although the general trend is towards more powerful equipment there is also a fast-developing market for smaller machines for gardens, parks and golf courses. The Japanese are already very active in this market, with firms like Yanmar and Honda exporting mainly to the United States. Japanese firms are also forging links with North-American manufacturers which could enable them to break into the European market, where they are as yet only poorly represented.

### *Trends in each Member State*

Germany is the largest manufacturer and exporter of agricultural machinery in the Community. It leads above all in the combine harvester segment although it also has a large tractor output. Exports, which account for 56% of output,

totalled 2 billion ECU in 1986 representing a trade surplus of 1.7 thousand million.

The reverse is true in France, which has the largest trade deficit in the Community owing to the fact that the agricultural industry is quite large and consumes more than the local suppliers can produce. Some 43% of requirements are supplied by imports and only 33% of national production is exported. This is a particularly low figure in a Community industry which is largely export-oriented.

Italy is the second largest producer in the Community. Some 42% of its production is exported and imports represent only 11% of consumption. Fiat is by far the largest manufacturer in the industry which had a trade surplus of 890 million ECU in 1986.

In the United Kingdom farming is much more intensive, with less land being farmed than in France, or even Italy and Germany. The demand for agricultural machinery is consequently lower, yet the United Kingdom is one of the main world producers of tractors and exports almost 60% of its production. At the same time, owing to the extreme specialization of the market, it imports up to 45% of its requirements in agricultural machinery. The trade surplus (320 million ECU in 1986) is based solely on tractor exports to countries outside the Community. As far as trade between Community countries is concerned, the United Kingdom recorded a deficit of 320 million ECU in 1986.

Spain has very little trade in agricultural machinery in relation to other Community countries of comparable size. Local industry produces mainly to meet local requirements, but as a large part of the country is given over to agriculture, Spain is also dependent on imports. Spanish membership in the EC has meant upgrading its agricultural methods and purchasing more sophisticated equipment with the result that the share of imports has increased and Spain now has a trade deficit of 190 million ECU.

Belgium, the Netherlands and Denmark manufacture agricultural machinery but no tractors. Since their own farming is very specialized and domestic markets are fairly restricted, most of the production is exported (up to 80% in the Netherlands). However imports are also relatively high. Denmark, which has a long agricultural tradition, is the fifth largest producer in the Community and has managed to keep fairly free of foreign penetration, which is somewhat atypical of the Community.

## Forecast and Outlook

Manufacturers of agricultural machinery have had to adapt to shrinking agricultural markets by implementing a series of rationalization programmes, accompanied by company closures and job cuts. In spite of these drives the industry is still only operating at 70% of capacity. Although it is still a net exporter the industry is having to face increasing competition from Japanese firms and international rationalization schemes on the part of North-American firms.

A number of independent European producers have adopted the solution of going into partnership with other Community firms to compensate for the lack of an international base. The increased trade that is likely to result is expected to lead to greater specialization in a market that is already extremely interpenetrated. As a spin-off the quality and range of products should improve, though production and demand are expected to increase only slightly.

In contrast to recent trends, 1987 was a good year for the agricultural machinery industry in the EC. However this is not likely to signal more than a temporary improvement due to replacement of equipment. It may well run out of steam by 1990.

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# MACHINE TOOLS FOR METAL WORKING

(NACE 322)

*The EC machine tools industry has undergone a relatively drastic restructuring process over the last eight years with a reduction in the number of companies engaged in the sector and a decline in employment of around one fifth. However, over the last three years, the industry has experienced healthy recovery. This recovery was initially export-led by strong demand from third countries; more recently demand within the Community has picked up. Moderate growth is expected over the medium term, although this will take place against a background of intensified global competition.*

## Current Situation

The EC is the largest producer and consumer of machine tools in the world. Because of the technical quality of its machine tools, the EC has a strong export position. However, over the last decade, a number of countries (particularly in the Far East), have become aware of the strategic importance of the machine tool industry and have focused their efforts on developing this sector. Between 1980 and 1987, this drive led to a redistribution of markets and the EC output levelled out. EC machine tool exports also lost their momentum and imports from countries outside the Community have increased although 1987 saw a falling-off of this trend. The EC still has the edge as far as innovation potential is concerned, but this can only be maintained if re-investment, dependent on profitability and sales, continues.

A machine tool for metal working is a machine driven by an external energy source, which cannot be handheld while in operation, and which works metal by cutting, forming, physical and chemical processes or a combination of these techniques. The machine tools which operate by cutting metal shavings and by chemical processes account for just under

three-quarters of total Community output in terms of value, and machines which operate by changing the shape of the material, for just over a quarter. There are, however, countries (e.g. Belgium) in which the production of machines which operate by changing the shape of the metal largely outstrips the production of those which operate by cutting.

Machine tools may be categorized by the type of machining which they carry out. The turning lathe category includes all machine tools which have a rotating part while the tool itself remains stationary. In all other cutting machine tools (boring machines, drilling machines, milling machines, grinding machines and screw-cutting machines) and shaping tools (presses, forging machines, shearing tools, stamping machines, tools for machining metal bars, sections, tubes, sheets and strips), the part is held stationary and the tool is mobile. Technical efforts have always been geared to designing a machine capable of several different operations (turning and screw cutting on turning lathes for example) and reducing transport time and handling operations between machines. Numerical control of machine tools, which has developed over the last 20 years, has provided electronics-based solutions to these two problems. These solutions have changed the whole focus of technical research, which until then had concentrated solely on mechanical applications. One electronic development is the numerically-controlled machining centre, with automatic changeover of tools for boring, milling, drilling, etc. which are kept in a storage area. Numerical control applications are gradually spreading to the whole range of machine tools.

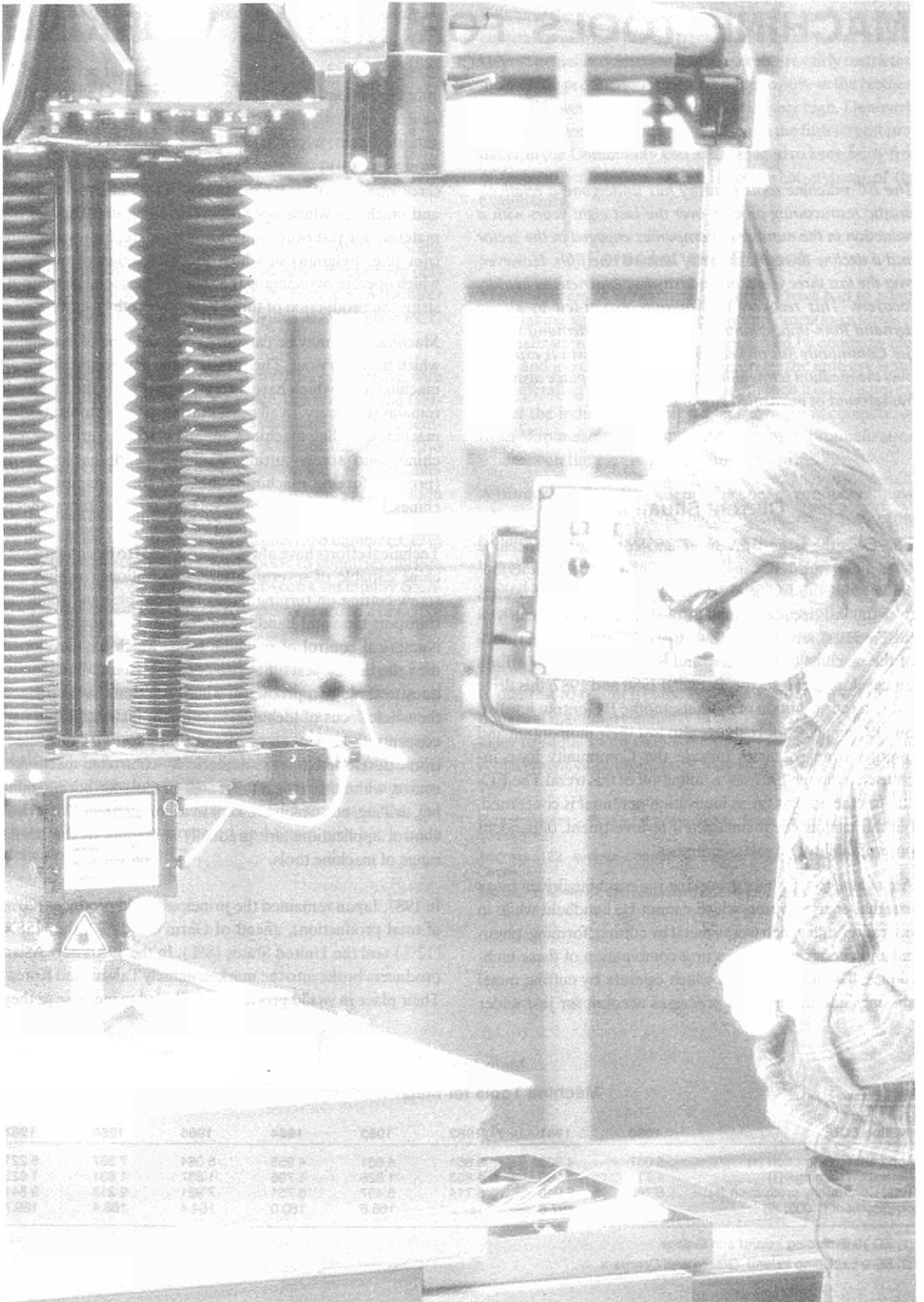
In 1987, Japan remained the principal world producer (20% of total production), ahead of Germany (19%), the USSR (12%) and the United States (8%). In the 1980s new Asian producers broke into the market, namely Taiwan and Korea. Their place in world production will tend to increase as they

## Main Indicators Machine Tools for Metal Working

| (Million ECU)                  | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  | 1987  |
|--------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Apparent consumption (1)       | 5 057 | 4 960 | 4 861 | 4 661 | 4 955 | 6 084 | 7 387 | 8 221 |
| Net export earnings (1)        | 1 711 | 1 980 | 1 853 | 1 826 | 1 796 | 1 837 | 1 831 | 1 623 |
| Total Community production (1) | 6 768 | 6 940 | 6 714 | 6 487 | 6 751 | 7 921 | 9 218 | 9 844 |
| Employment (1 000) (2)         | 215.4 | 197.6 | 187.2 | 166.6 | 160.0 | 164.4 | 168.4 | 169.7 |

(1) EC 10 Excluding Ireland and Greece.

(2) EC 9 Excluding Ireland, Greece and Denmark.



**Table I**  
**Production and Foreign Trade**

| (Million ECU)        | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  | 1987  |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Production (1)       |       |       |       |       |       |       |       |       |
| Current value        | 6 768 | 6 940 | 6 714 | 6 487 | 6 751 | 7 921 | 9 218 | 9 844 |
| Index                | 100.0 | 102.5 | 99.2  | 95.8  | 99.7  | 117.0 | 136.2 | 145.5 |
| Constant value       | 6 768 | 6 323 | 5 663 | 5 201 | 5 135 | 5 753 | 6 487 | 6 772 |
| Index                | 100   | 93.4  | 83.7  | 76.8  | 75.9  | 85.0  | 95.8  | 100.1 |
| Imports extra-EC (1) |       |       |       |       |       |       |       |       |
| Current value        | 984   | 971   | 971   | 877   | 1 066 | 1 414 | 1 811 | 1 695 |
| Index                | 100   | 98.7  | 98.7  | 89.1  | 108.3 | 143.7 | 184.0 | 172.3 |
| Exports extra-EC (1) |       |       |       |       |       |       |       |       |
| Current value        | 2 695 | 2 951 | 2 824 | 2 703 | 2 862 | 3 251 | 3 642 | 3 318 |
| Index                | 100   | 109.5 | 104.8 | 100.3 | 106.2 | 120.6 | 135.1 | 123.1 |
| X/M                  | 2.74  | 3.04  | 2.91  | 3.08  | 2.68  | 2.30  | 2.01  | 1.96  |

(1) EC 10 Excluding Ireland and Greece. 1987 Denmark figures from Eurostrategies estimates.

Sources: CECIMO, Eurostat.

acquire greater technical control over local industries and as a result of the relocation policy of American companies.

In 1987 the output of machine tool companies in the Community totalled 9 786 million ECU. However, in real terms value has remained virtually the same as in 1980.

Between 1980 and 1984, EC machine tool production fell by 25% in constant ECU and by the end of 1987, despite three years of spectacular recovery, had only just managed to regain the value levels recorded in 1980.

EC manufacturers are the largest machine tool producers in the world. The Federal Republic of Germany rivals Japan as the world leader.

### *Consumption Trends*

Although machine tools are indispensable capital goods, the sector is almost totally dependent on the investment decisions of its major clients: the metal-working industry, transport industries (cars, aerospace, railways), shipbuilding, the electrical and electronics industry, manufacturers of machinery for textiles, agriculture, the building industry and the machine tools industry. It is therefore difficult to predict how sales in this area will develop. Most machine tools manufactured in Europe are manufactured to order on the basis of customer specifications. This method allows short-term planning but rules out any medium-term forecasting.

Machine tool consumption is closely related to the characteristics of the new materials requiring machining (e.g. steels or alloys with specific properties), and the change in shape and design of the constituent parts of metal products to be built.

The EC market is the largest consumer of machine tools in the world; Germany alone is the largest consumer of machine tools of the world market economies. Within the Community, German consumption represented on average 42% of the European total (over the last eight years). Italy comes next with 16.5%, followed by the United Kingdom with 15.75%, France 15.0%, Spain 5.0%, Belgium 2.5%, the Netherlands 2.0%, Denmark 1.5% and Portugal 0.75%. Consumption in Italy is second only to that of the United States and Japan.

### *Export Trends*

Exports to non-Community countries rose slightly until 1984, increased sharply in 1985, and fell off in 1987 as a result of the fall in world demand. It is however interesting to note that trade between Community countries has developed since 1984 under the influence of the increasing inter-penetration of the EC economies and the extension of the Community to 12 members. From 1980 to 1987, the increase in trade

**Table II**  
**1987 Production by Member State**

| (Million ECU) | Production |
|---------------|------------|
| BLEU          | 141        |
| Denmark (1)   | 58         |
| Germany       | 5 555      |
| Spain         | 499        |
| France        | 665        |
| Italy         | 1 938      |
| Netherlands   | 51         |
| Portugal      | 12         |
| UK            | 925        |
| Total         | 9 844      |

(1) Eurostrategies estimate.

between Community countries almost paralleled consumption, since the internal trade index for the period rose from 100 to 160.2.

During the same period the import index for extra-Community exports rose steadily from 100 in 1980 to 172.3 in 1987. This period, therefore, saw a gradual decline in the export/import ratio. However, net export earnings have remained strongly positive although as a proportion of total production exports have fallen from 40% in 1980 to 33% in 1987. Export growth remains a volatile indicator: in 1981, 1984, 1985 and 1986, the value of exports increased while in other years moderate declines were registered. In 1987, the import penetration level remained the same as in 1980.

### *Employment Trends*

In 1980, the EC metal-working machine tool industry employed a work force of about 215 500. By 1987, the number had fallen to 169 700, with an all-time low of 160 000 being recorded in 1984. Staff cuts were introduced when the sector was hit by a slump between 1981 and 1984. A number of job losses have also resulted from both efforts to rationalize equipment and from technical developments, which resulted in productivity gains. The average number of employees per company of 120 is fairly typical in this industry. Very few machine tool manufacturers employ more than 1 000 people and companies with as many as 500 tend to be rare. There are many which employ between 100 and 500 but also a considerable number with fewer than 100.

### *Major Structural and Geographical Features*

The machine tool industry comes under the category of small and medium-scale businesses. The reason for the reduced scale of most businesses is both technical and historical. There are about 30 broad categories of machine tools, with largely varying dimensions within each category, and a series of sub-categories related to specific processes. Virtually all machine tool companies grew up around a single gifted craftsman, who developed a specific product to serve an industry in the locality or region.

In 1987 the industry consisted of 1 403 companies. Italy had the largest number (450) followed by Germany (390), which has a greater number of large companies, the United Kingdom (200), France (148) and Spain (144). Although Community production in 1987 had recovered sufficiently to

reach 1980 levels, nearly 100 companies disappeared in the meantime indicating substantial re-structuring in the industry. During the eight reference years Germany's production represented an average 54% of Community machine tool output, with Italy accounting for 18.6%, the United Kingdom 11.5%, France 8.7%, Spain 4.2%, Belgium 1.3%, Denmark 0.9%, the Netherlands 0.6% and Portugal 0.2%.

### *Factors behind Production Trends*

In technical terms, a key factor is the spread of numerical control and the introduction almost everywhere of the graphic communication mode, simulating the movement of the tool on a screen. CO2 laser techniques have also developed extremely rapidly in machining centres (small machining centres, five line cutting gantries, laser robots). Microcomputers for steering functions, management of parts, and manufacturing and quality control are now virtually commonplace in the industry.

### *Trends in each Member State*

In 1987, the situation in the EC machine tool industry was very different from what it was in 1980. France and the UK were the countries most heavily hit by the crisis. However, as a result of restructuring measures and inflows of foreign capital from other European countries. Japan and America, the situation has improved in these two countries, which rank respectively third and fourth in the EC in terms of production.

Germany had maintained and enhanced its leading position in the EC. Italy, which is also an active exporter, and Spain have particularly dynamic domestic markets.

Although the value of production in real terms remained stationary for the Community as a whole between 1980 and 1987, it increased in Germany (by 9.6%), in Belgium (by 4.7%) and in Spain (by 39.6%). It fell in Italy (by 9.8%), France (by 31.3%), the Netherlands (by 31.7%) and the United Kingdom (by 26.7%). The drop in production value did not occur everywhere at the same time. Belgium, Spain, Italy, the Netherlands and the United Kingdom reached their low point in 1983, whereas in Germany and France it came in 1984.

Apparent consumption trends differed considerably between Member States. Over the 1980s, consumption in current prices rose dramatically in Spain and Denmark, by 90% in Germany and 70.6% in Italy. It remained slightly below the

**Table III**  
**Production Excess over Consumption**

| (Million ECU) | 1980  | 1981  | 1982  | 1983  | 1984  | 1985   | 1986  | 1987  |
|---------------|-------|-------|-------|-------|-------|--------|-------|-------|
|               | 1 711 | 1 980 | 1 853 | 1 826 | 1 796 | 1 837? | 1 831 | 1 623 |

Source: CECIMO

average in Belgium (49%), the Netherlands (48.5%) and France (48.1%). In two Community countries consumption actually fell: Portugal (-2.6%) and the United Kingdom (-0.2%).

In all EC countries, except Portugal and the Netherlands, the export/import rates deteriorated from 1980 to 1987. The export-production ratio also fell everywhere except Belgium, the Netherlands, Portugal and Denmark. The weakening of the Community's export position was particularly marked in France, Spain and the United Kingdom.

### **Forecast and Outlook**

On the basis of investment plans in client sectors of the machine tools industry in the EC, Community production would appear to be set to rise in real terms at an annual rate of 2.5% between 1987 and 1993. Growth is likely to be particularly rapid in Spain (4.1%).

Despite a shift in emphasis, the EC market should continue to grow more quickly (+ 3.2% per annum) than production with continued growth in Community imports.

There is likely to be particularly strong demand in southern Europe (Italy, Spain and Portugal) and from countries in Eastern Europe.

World demand, excluding that in the Community should recover slightly in the next few years after the stagnation recorded in 1987. The lower value of the US dollar may mean a lower growth in demand for European machine tools in the US. As a result, Japan and other Asian producers may intensify their European export drive to fill the gap.

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# ENGINEERS' CUTTING TOOLS

(NACE 322.2)

*After a marked drop in production in some Member States in the early 1980s, 1983 saw a turnaround and the sector now expects the growth recorded in the period 1984-87 to continue over the next few years.*

This sector covers manufacture of engineers' cutting tools, including hardmetal products, milling cutters, gear cutters, screwing taps and dies, and twist drills and reamers.

## Current Situation

In common with most industries, the engineers' cutting tool industry has suffered from the economic recession during the early 1980s.

For this industry 1980 was the first year of recession. However, cutbacks in production did not take place until 1981 and some turnaround was experienced in 1983 when production in value terms returned to slightly above the 1980 level. Subsequently, the situation continued to improve with a marked upturn in growth over 1984 and the recovery has been maintained with output in nominal terms rising by an average 12% over the period 1984-86.

As shown in Table II, Germany accounts for the largest share of production (69%) and output has grown most rapidly in this Member State; the current value of output almost doubled over the period 1980-87. Production in the United Kingdom, after dropping dramatically between 1980 and 1981, has shown signs of recovery since 1984. France is slightly up over 1980 production levels whereas Italy has

maintained its production. However, in constant terms there has been a decrease everywhere except in Germany.

## Export Trends

Exports and imports have tended to follow the same trend. As far as exports are concerned, these depend heavily upon world exchange rates and continue to be a source of concern.

Imports of cutting tools from industrialized countries are part of the regular pattern but those from Third World countries can be a major source of concern.

## Forecast

In general, the industry has passed a troublesome period over the last decade. 1986 and 1987 have shown some improvement and the industry is optimistic that this favourable trend will continue.

The creation of the single market in 1992 should be of benefit to the industry.

Engineers' cutting tools are already for a large part covered by ISO standards, which have been introduced in most Member States. However, there are one or two exceptions which still have to be resolved.

ECTA: European Cutting Tool Association  
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Tel: (44 742) 663 084; Telex: 547676; Fax: (44 742) 670 910

Table I  
Production and Foreign Trade

| (Million ECU)    | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  |
|------------------|-------|-------|-------|-------|-------|-------|-------|
| Production (1)   |       |       |       |       |       |       |       |
| Current values   | 1 111 | 731   | 712   | 1 152 | 1 283 | 1 478 | 1 615 |
| Index            | 100.0 | 66.0  | 64.1  | 103.7 | 115.5 | 133.0 | 145.4 |
| Constant values  | 1 111 | 666   | 601   | 923   | 976   | 1 074 | 1 137 |
| Index            | 100.0 | 59.9  | 54.1  | 83.1  | 87.8  | 96.7  | 102.3 |
| Imports Extra-EC | N/A   | 265.5 | 265.4 | 256.6 | 316.4 | 393.3 | 433.1 |
| Index            | -     | 100.0 | 100.0 | 96.6  | 119.2 | 148.1 | 163.1 |
| Exports Extra-EC | N/A   | 212.7 | 224.7 | 227.3 | 283.3 | 330.8 | 330.1 |
| Index            | -     | 100.0 | 105.6 | 106.9 | 133.4 | 155.5 | 155.2 |
| X/M              |       | 0.80  | 0.85  | 0.89  | 0.90  | 0.84  | 0.76  |

(1) Figures include Germany, France, Italy, UK only.  
Source: ECTA.

**Table II**  
**Production in Four Large Member States**

| <b>(Million ECU)</b> | <b>1980</b>  | <b>1981</b> | <b>1982</b> | <b>1983</b>  | <b>1984</b>  | <b>1985</b>  | <b>1986</b>  |
|----------------------|--------------|-------------|-------------|--------------|--------------|--------------|--------------|
| Germany              | 570          | 319         | 324         | 729          | 828          | 998          | 1109         |
| Index                | 100          | 56          | 57          | 128          | 145          | 175          | 195          |
| France               | 100          | 104         | 106         | 96           | 98           | 113          | 120          |
| Index                | 100          | 104         | 106         | 96           | 98           | 113          | 120          |
| Italy                | 166          | 169         | 151         | 130          | 138          | 148          | 162          |
| Index                | 100          | 102         | 91          | 78           | 83           | 89           | 98           |
| United Kingdom       | 275          | 139         | 131         | 198          | 220          | 219          | 225          |
| Index                | 100          | 50          | 48          | 72           | 80           | 80           | 82           |
| <b>Total</b>         | <b>1 111</b> | <b>731</b>  | <b>712</b>  | <b>1 152</b> | <b>1 283</b> | <b>1 478</b> | <b>1 615</b> |
| Index                | 100          | 66          | 64          | 104          | 115          | 133          | 145          |

Source: ECTA.



# TEXTILE MACHINERY

(NACE 323.1)

*The EC textile machinery industry is one of the most heavily export-oriented sectors in the Community. Export earnings have grown steadily over the 1980s although the value of output declined, in real terms, over the first half of the period. Demand patterns, especially with regard to developing countries tend to be relatively volatile given the strong influence of exchange rate movements. In Community markets and those in other industrialized textile producing countries, the emphasis is increasingly on the degree of automation and technological innovation in textile machinery. This trend, which is likely to further specialization within the EC industry, will be an important factor in the continued success of textile machine manufacturers in developed markets. However, demand for traditional textile machinery will still be important especially in markets where the production of textiles continues to be labour intensive; over the longer term, competition in these markets is likely to intensify with the development of indigenous textile machine capacities.*

NACE 323.1 covers the manufacture of textile machinery and accessories for textile machinery but excludes sewing machines and other machinery and equipment in use for processes between the finished textile fabric and production of finished textile goods and products. The major categories of textile machinery are used in the following processes:

- spinning
- weaving
- knitting
- dyeing, printing, finishing.

No satisfactory unit of measurement can be meaningfully applied to analysis of textile machinery, ancillary equipment and accessories. Even within one class of machines (e.g. weaving machines or looms), the variety of specifications,

diversity of degrees of automation and scope of production capability are extensive. Moreover, the use of weight as a physical measure is both inaccurate and seriously misleading, since the higher-technology, electronically-controlled machines are in many instances more compact and lighter in weight than the less productive, simpler machines. Therefore, the only truly comparative measure used to combine data for different European countries is to compare, in ECU, the actual monetary value of machinery and equipment produced and/or delivered.

## Current Situation

The EC is a major producer of textile machinery and accounts for around 55% of the global exports of this sector. Substantial restructuring has occurred in the 1980s as the industry has sought to maintain its competitive position in both domestic and export markets.

The Japanese textile machinery industry is an important competitor in the Far East and South East Asian region. Japan's exports to neighbouring countries in the Far East accounted for around 44.3% of its total exports. Japanese exports to North America increased relatively rapidly over the early part the 1980s but have since shown a declining trend. However, exports to Europe have recently displayed steady growth, rising 10.5% over 1984 and 1985 and 13.7% over 1986. Japanese deliveries to Europe accounted for 13.2% of its total exports in 1986. Despite isolated "performances", Japanese textile machinery sales represent a so far marginal, although fast-growing competitive factor for EC manufacturers in European markets. In absolute terms, Japanese exports to the USA and to the EC have been relatively modest during this period, and depended largely on sales of weaving machines and ancillaries. Except in some smaller sectors, it seems that Japanese textile machinery

### Main Indicators (1) Textile Machinery

|                          | 1980      | 1981      | 1982      | 1983      | 1984      | 1985      | 1986      |
|--------------------------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|
| Apparent consumption (2) | 2 486.2   | 2 076.6   | 2 260.2   | 2 600.0   | 2 518.2   | 2 434.0   | 2 614.5   |
| Net export earnings (3)  | + 1 783.2 | + 1 883.8 | + 1 701.8 | + 2 191.3 | + 2 193.3 | + 2 672.3 | + 2 784.6 |
| Total EC production (4)  | 4 294.1   | 4 040.9   | 4 131.1   | 4 412.0   | 4 789.0   | 5 218.6   | 5 395.7   |
| Employment (1 000) (2)   | 120.4     | 108.2     | 98.6      | 93.8      | 90.9      | 90.7      | 87.9      |

(1) Data include sewing machines, but these represent a small percentage of total production.

(2) EC 8: excluding Ireland, Spain, Greece and Portugal.

(3) EC 10: excluding Spain and Portugal; 1980: excluding Greece.

(4) EC 8: excluding Ireland, Greece, Portugal and Spain. 1986 Netherlands estimated - Eurostrategies.

sales represent a minor competitive threat to EC manufacturers in European markets, Japan's main thrust of competition remaining in Asian markets.

Competition from developing countries has been confined to the production of more basic, low-technology machinery, which is often manufactured under licence from EC manufacturers; this mainly represents an import substitution policy. Exports of textile machinery from Third World countries are usually too small to figure in detailed international statistics. Nevertheless, a trend of the past few years has been the emergence of a growing number of indigenous textile machinery makers in Far East and South-East Asian countries. However, to date their production has been confined to domestic markets or markets in close geographical proximity.

The Swiss textile machine industry is a key player in the world market. This highly efficient and technologically advanced producer of textile machines is able to secure a large share of market demand even in countries with strong indigenous textile machine making capacities.

### Consumption Trends

Demand within the EC accounts for around 30% of total Community production. This percentage has fallen sharply over the 1980s indicating stagnant demand within the Community at least over the early part of the 1980s. It is evident that a substantial volume of production has been re-directed to third country export markets. However, despite relatively strong export growth, the value of production in real terms fell every year until 1984, when some - albeit marginal - recovery in production levels began.

Over the last couple of years there has been some reversal in the above trend as stronger growth in European markets has counterbalanced slower growth in demand elsewhere.

There are some exceptions to this as for example the continued strong growth in demand from the People's Republic of China.

### Export Trends

The EC textile machinery industry is heavily export-oriented in terms of both extra-Community trade and trade between Member States. Over the 1980s an increasing share of production has been exported outside the Community reaching a level exceeding 70% in 1986.

Export markets include industrialized countries - the US is an important market - the NICs, and the developing countries. However, in 1987 the proportion of extra-Community exports destined for developing countries had fallen from 21% in 1981 to around 15% in 1987. The importance of the Latin American market in 1981 is in sharp contrast with its current status, a fall-off attributable almost entirely to severe liquidity problems and a consequent inability to produce capital investment funds to match the re-equipment needs of the textile industries in the region. Conversely, the picture in the Far East and South-East Asia is very different: this region has consistently proved a major buyer of EC textile machinery in more recent years, and the remarkable emergence of the People's Republic of China in this respect has been a key factor in the development of this trend. In 1987 the PRC alone absorbed about 9% of EC textile machinery exports.

In nominal terms the value of extra-Community exports has grown at an average annual rate of 10% per year over the period 1980-86. Net export earnings of the Community industry approached 3 billion ECU in 1986 representing an approximate 3 to 1 export/import ratio. However, this ratio has fallen from 3.8 in 1980 to 3.3 in 1986 due to faster growth of imports into the Community. A major factor accounting for this latter trend is the strong position of the Swiss textile machinery in-

Table I  
Production and Foreign Trade (1)

|                      | 1980    | 1981    | 1982    | 1983    | 1984    | 1985    | 1986    |
|----------------------|---------|---------|---------|---------|---------|---------|---------|
| Production (2)       |         |         |         |         |         |         |         |
| Current value        | 4 294.1 | 4 040.9 | 4 131.1 | 4 412.0 | 4 789.0 | 5 218.6 | 5 133.1 |
| Index                | 100.0   | 94.1    | 96.2    | 102.7   | 111.5   | 121.5   | 119.5   |
| Constant value       | 4 294.1 | 3 700.9 | 3 446.9 | 3 414.4 | 3 520.2 | 3 696.9 | 3 574.5 |
| Index                | 100.0   | 86.2    | 80.2    | 79.5    | 81.9    | 86.1    | 83.2    |
| Imports Extra-EC (3) | 617.5   | 662.6   | 694.2   | 748.5   | 891.2   | 1 063.4 | 1 217.4 |
| Index                | 100.0   | 107.3   | 112.4   | 121.2   | 144.3   | 172.2   | 197.1   |
| Exports Extra-EC (3) | 2 364.7 | 2 546.4 | 2 482.1 | 2 450.3 | 3 082.6 | 3 735.5 | 3 998.6 |
| Index                | 100.0   | 107.7   | 105.0   | 103.6   | 130.4   | 158.0   | 169.1   |
| X/M                  | 3.8     | 3.8     | 3.6     | 3.3     | 3.5     | 3.5     | 3.3     |

(1) Data include sewing machines but these represent a small percentage of total production.

(2) EC 8: excluding Ireland, Greece, Portugal and Spain. 1986: Netherlands estimated - Eurostrategies.

(3) EC 10: excluding Spain and Portugal; 1980: excluding Greece.

Source: Eurostat.

dustry in the EC, which accounts for a major proportion of total textile machinery imports into the Community.

### Major Structural and Geographic Features

There are more than 1 100 companies in the EC engaged in the manufacture of textile machinery, many of which are either small or medium-sized. Of these companies 400 and 350 are located in Germany and Italy respectively. These figures relate to EC 8 and cover company membership of CEMATEX; very small companies may not be included in this total and there may be a relatively large number of such companies which undertake sub-contract work for the mainstream machinery manufacturers.

**Table II**  
**Industry Structure by Member State, 1986**

|                 | Number<br>of companies | Employment    |
|-----------------|------------------------|---------------|
| Belgium         | 36                     | 3 891         |
| Denmark         | 5                      | 400           |
| Germany         | 400                    | 42 000        |
| Spain           | 60                     | 3 000         |
| France          | 80                     | 6 017         |
| Italy           | 350                    | 26 100        |
| Netherlands     | 8                      | 1 500         |
| UK              | 180                    | 8 500         |
| <b>EC total</b> | <b>1 119</b>           | <b>91 408</b> |

Source: CEMATEX.

In most of the European textile machinery producing countries pertinent to this report, elements of "restructuring" - some modest, but others very extensive - have tended to make it difficult to describe the industry structure. However, some of the more significant occurrences are detailed below.

In the spinning sector, the spinning machinery activities of SACM in France have been discontinued, as have the yarn processing and yarn preparation machinery ranges of ARCT. Meanwhile, a recently formed group, SAMT, now embraces some of these "lost" elements. Rieter of Switzerland has acquired the German spinning machinery maker Schubert & Salzer, whose main competitor in Germany, Schlafhorst (also the world's largest manufacturer of spinning and winding machines) had already taken a controlling interest in a fellow-German spinning machines maker, Zinser.

In the UK, major changes have taken place in the spinning, knitting and finishing machinery fields in the past decade, one notable aspect being the relative proliferation of so-called "management buy-outs".

Three main factors determine consideration of the overall structure and locational features of the EC textile machinery

industry. Firstly, the very high proportion of export sales of European companies outside the EC market area indicate the global - rather than regional-specific - nature of the industry; and this is exemplified, for instance, by the fact that most major European textile machinery manufacturers have fully or majority-owned "daughter-companies" in the important United States market (also to serve the adjacent Canadian and Latin American regions), and some have similar arrangements (or ventures jointly with "local" companies) in other key regions such as the Far East. Secondly, as already stated, the high degree of specialization refers not merely to broad product categories such as spinning, fabric forming, etc., but also to specialization within these categories. Pressures on order volumes and profit margins and increased local competition in some developing markets has tended to heighten this movement towards greater specialization; one aspect, for example, is the strategy of some major manufacturers to significantly reduce the number of variations of machine types within a particular product category or group - which meanwhile has enabled them to optimize the production of machine parts and to more precisely match production activity to actual order levels. Thirdly, the restructuring process involving close-downs, acquisitions, mergers, etc. has affected not only respective machinery sub-sectors within Member States but has increased restructuring at the international level (exemplified by the Rieter-Schubert & Salzer merger).

Table III shows the geographical distribution of textile machinery production in the EC.

**Table III**  
**Production by Member State, 1986**

|                | (Million ECU) | Index<br>(1980=100) |
|----------------|---------------|---------------------|
| Belgium        | 259           | 153                 |
| Denmark        | 33            | 146                 |
| Germany        | 2 826         | 135                 |
| Spain          | 250           | N/A                 |
| France         | 424           | 121                 |
| Italy          | 1 281         | 120                 |
| Netherlands    | 254           | 147                 |
| United Kingdom | 259           | 75                  |
| <b>Total</b>   | <b>5 637</b>  | <b>131</b>          |

Source: CEMATEX.

Germany is by far the largest producer with a share of 50% of total EC production. In the period 1980-86, output in real terms grew considerably in Belgium (+16%) and the Netherlands (+7%). In contrast, production in the UK declined over the same period by 42%.

For obvious reasons, the industry in each Member State tends to be concentrated close to where the textile industry is located. In Germany, for example, a main centre of manu-

facturing is Nordrhein-Westphalia (near to and west of the Rhine); and in France, the two main centres are the Alsace and the region close to the Belgian border. In Italy, machinery production takes place mainly in the North, next to the major textile manufacturing activities in the foothills of the Alps. In the UK, the industry is located in the North (Lancashire and Yorkshire), close to the cotton and wool production areas, as well as near the East Midlands' hosiery and knitwear producing industries. An important feature of this regional concentration is that decreasing employment in textile machinery manufacturing has compounded the existing high level of unemployment as a result of the reduction in textile manufacturing operations. Certain of the worst affected areas have therefore been receiving government subsidies.

### *Factors Behind Production Trends*

International trade often increases as a result of international specialization, and within the EC specific product groups tend to dominate the overall production and sales picture for the respective countries. Thus in one country the emphasis is mainly on spinning and yarn processing machines while in another on weaving machines. It is useful, therefore, to assess the individual main categories of textile machinery according to their sector-specific groups.

In overall terms, machines for yarn production and fabric finishing form the largest segment of production.

#### **Fibre and yarn production and processing machinery**

The product range includes fibre extruding and spinning machines; those items of machinery involved in fibre preparation for spinning (i.e. bale opening and blending, carding, combing, drawing, and roving; the actual spinning machines; the yarn preparation processes of twisting/doubling/winding; and yarn texturizing). It is interesting that most major producing countries (Germany, Italy, Switzerland) operate a

two-way trade in these machines, a reflection of the fact that, within the EC, there is such a great diversity of machines that one country can be both a major exporter and importer of similar class machines to and from another country.

#### **Weaving and knitting machines**

This category centres on primary weaving and knitting machines but also includes the substantial share accounted for by auxiliary equipment and devices. (Switzerland enjoys a dominant position in the production and sale of weaving machines, even though extensive restructuring in recent years has left Switzerland with just one manufacturer - albeit the world's largest.) Important producers of weaving machines are located in Belgium and Italy. Germany holds a commanding position in world-wide supply of warp knitting machines, just as one UK supplier of carpet tufting machinery (a subsidiary of a US-based group) dominates this sub-sector of the fabric-making machinery industry.

#### **Finishing machinery**

This category is largely made up of those items of machinery and equipment concerned with fabric finishing (including dyeing and printing) processes, although it also includes such yarn treatment processes as yarn dyeing and mercerizing. German manufacturers retain a predominant position within the EC, although other producers are located in Italy and the UK.

### *Employment Trends*

CEMATEX figures covering EC 8 record 1986 employment at 91 408. The total number of employees in the EC textile machinery sector in 1986 compares with 98 500 in 1982; this represents a less substantial decline over the five-year period (1982-87) than was recorded between 1980 (110 300) and 1982. Even in the face of a degree of "consolidation" involving mergers and closures, the EC industry has maintained a relatively constant position as a major provider of employment.

**Table IV**  
**Production by Segment, 1986.**

| (% share)                | Germany | (1) France | Italy | UK    |
|--------------------------|---------|------------|-------|-------|
| Machines for:            |         |            |       |       |
| Spinning                 | 24      | 25         | 33    | 26    |
| Weaving                  | 13      | 20         | 19    | (2) 8 |
| Knitting                 | 14      | 13         | 20    | 13    |
| Dyeing, finishing, other | 22      | 23         | 28    | 16    |
| Parts, accessories       | 27      | 19         | -     | 37    |

(1) France - 1987 figures.

(2) Including tufting machines.

Source : CEMATEX.

## *Position of Firms in the Industry*

It is a common problem for all European textile machinery manufacturers that "destructive" price competition, made even more pronounced by sometimes violent currency exchange rate fluctuations and pressure from many customers for "soft" credit terms, has made depressed profit margins a permanent fact of life. As a consequence, the costs attendant on widening the global search for additional sales in order to optimally spread the relatively high level of fixed costs, have exacerbated the situation. However, the traditionally substantial level of investment on research and development activities (often of the order of 5-10% of turnover) has been sustained to maximize the return from technical and product innovation. A further not insignificant cost factor related to technical marketing activity has been the proliferation in recent years of "international" textile machinery exhibitions triggered by the growing influence of markets in recently developed and still developing markets for textile machinery.

## *Trends in Member States*

In the German textile machinery industry, figures for 1987 show that spinning and finishing machinery accounted for the largest share of German exports at 29% and 18%. The rate of incoming orders is still showing an above average growth trend. The growth rate of weaving machinery exports was pronounced, whereas in other areas business appeared to have moderated.

The US market accounted for 21% of Germany's total extra-Community exports. Other main markets include Taiwan (9.1%) and the People's Republic of China (7.4%). Intra-Community trade absorbed 30% of Germany's total exports. Recent growth to the Latin American market has been much better, rising by 17% over 1987 although from a comparatively low base. The African market has, at best, stagnated with only marginal nominal growth.

Italy's textile machinery sector is extremely diverse, and highly labour intensive with some 350 firms employing over 25 000 employees. Compared with their counterparts in other Member States, the Italian industry has relatively few large companies - a factor that tends to work to advantage in accommodating maximum specialization and the vitally-important close personal contact customers.

Unlike most other textile machinery producing countries, Italy's total output and export profile is spread much more evenly across all the main sub-sectors. The main priorities of the industry are increased use of advanced textile technology aided by the latest microelectronics and robotics technology to secure higher productivity and efficiency levels, reduced costs and shorter, more economical manufacturing cycle times. Equally important is the Italian emphasis on strong after-sales service - "does not end when the machine is assem-

bled in the customer's plant but continues throughout the life of the installation".

Exports account for 74.1% of all French textile machinery output and as much as two-thirds of this total is delivered to industrialized nations. Most exports are to countries which are economically and financially stable and able to maintain regular trade relations. Around 80 companies are involved in the French industry between them employing more than 6 000 persons. This sector is characterized by a prevalence of medium-sized firms, and total production is shared between nine activity areas led by the primary weaving and spinning machinery manufacturers. Machine productivity and efficiency has benefited over the years from technological innovation:

- In spinning, annual production of yarn per spindle went from 62.8 kg in 1960 to 122 kg in 1983.
- In weaving the annual production of cloth per loom rose from 14 300 m<sup>2</sup> in 1960 to 43 700 m<sup>2</sup> in 1983.

With "very high" current levels of activity and order books described as "excellent", the British textile machinery sector is enjoying a booming demand from its home market and strong performance in world markets. The industry can claim world leadership in several areas of technology - notably tufting, yarn spinning and processing and the manufacture of non-wovens. The People's Republic of China for the first time topped the list of export markets for British machinery. The sector employs 8 500 persons in around 180 firms. The number of firms in the different sub-sectors is as follows: spinning and yarn processing - 27, fabric producing (knitting, weaving, tufting) - 22, dyeing and finishing - 38, ancillary equipment and general textile accessories - 73.

There are a relatively large number of small companies producing textile machinery in Spain, of which around 60 are members of CEMATEX through their national association. The activity of these companies covers the production of machinery equipment and accessories for the entire textile manufacturing and processing chain including spinning, weaving, knitting, dyeing, printing, finishing and making-up and laboratory and control devices and apparatus. Over the last four years export sales have increased substantially. Intra-Community trade accounts for around 24% of total sales and 36% of total exports. Of the different sub-sectors, knitting and finishing machines are the most prominent, followed by spinning and - some way behind - weaving and making-up machinery. The industry is engaged in marketing efforts to increase its share of the US market.

The Belgian textile machinery manufacturing sector is modest in size by world standards, but in the past five years it has recorded remarkable growth in terms of both total deliveries and in the value of export sales. Belgium has 24 textile machinery manufacturing plants and 12 accessories manufacturers, between them employing some 5 000 people. Many of

these plants are vertically integrated, producing all components; Belgian textile machinery builders boast two of Europe's most modern factories.

In Belgium, four companies account for 80% of the sector's total activity, and each of these - Picanol, Houget Duesberg Bosson, Van de Wiele and Gilbos - are acknowledged as being in the international forefront of their particular area of speciality.

The textile machinery manufacturing sector in the Netherlands has only eight companies between them employing some 1 500 people. However, it plays an important part in the overall infrastructure of the European textile machines industry; the Stork group, an international leader in textile printing technology, is based in the Netherlands.

### **Forecast and Outlook**

The future for European textile machinery is optimistic. Overall growth is likely to continue although short to medium-term fluctuations will be a characteristic. The expansion in demand for textile products owing to world population growth and the increasing prosperity of many regions will ultimately provide a growth market for textile machinery. In addition to the expected gradual rise in demand, the already apparent upward trend in requirements for speciality textiles - high performance raw materials and end-products - will continue. These trends will bring both opportunities and challenges for textile machinery makers.

In the textile manufacturing sector the likelihood of significant downward pressure on prices - and, therefore, profit margins - as a result of intensified global competition will mean that textile producers will tend towards the production of these standard items in more economical, cost-effective ways. This will shift demand for textile machinery to maximum automation and robotization moving towards totally automated installations in which all, or most, processes are linked automatically. Meanwhile, other textile manufacturers will opt for greater specialization where much higher value-added potential lies. In both cases, the challenge for the textile machinery makers will be the incorporation of further technological developments. These overall trends spell out a clear message for the future: the already impressive levels of R&D investment and activity on the part of the major machinery builders will, in many cases, need to be consolidated and sometimes extended.

It is hoped that the recent strengthening of the European textile machinery will prove to be an important contributory factor in maintaining the leading world-wide position of European manufacturers. Moreover, the trend towards increasingly high technology development, in which computer control and electronics-based systems will play a vital part, will provide the kind of challenge which will attract a substantial number of highly qualified people whose energy and expertise will be needed increasingly in the foreseeable future.

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# LIQUID PUMPS

(NACE 328.9)

*EC pump production has shown signs of recovery since 1984 against a background of ongoing technological changes in the industry. Growth in demand has come mainly from within the EC. However, net export earnings have been relatively stable over the 1980s. The fastest growing market segments are reciprocating and rotary pumps.*

The manufacture of liquid pumps comes under the NACE code 328.9. Other items are included in this NACE category but the information and statistics below exclusively covers the manufacture of liquid pumps. This includes the following:

- hand pumps
- reciprocating pumps
- rotary pumps
- centrifugal pumps
- other pumps
- parts for pumps.

## Current Situation

The influence of macroeconomic trends can be clearly seen in developments in the pump industry over the last few years. The general stabilization of input prices, the fall in interest rates and the trend towards higher productivity have all contributed to the revitalization of the pump industry in the European Community. However, more recently, the depreciation of the US dollar has undermined competitiveness and limited the export performance of EC suppliers.

As a whole, current pump production in the EC has been steadily (albeit slowly) recovering since 1984; the output of the industry grew at an average annual rate of 3.6% in value terms over 1984-87. In 1987, the EC's share in the (Western) world market was around 50%. Germany and the United Kingdom are the main producers in the EC. In the period 1981-87, production increased in Germany but declined in the UK.

## Consumption Trends

In 1987, manufacture of original pump equipment totalled 2.9 billion ECU (excluding parts) in nominal terms. This compares to 2.5 billion ECU in 1981. Whilst production of standard centrifugal pumps increased by an average of 3% per year between 1981 and 1985, since then there has been virtually no movement in this market, with 1987 levels still about the same as two years earlier. On the other hand the growth in production of reciprocating and rotary pumps has been more encouraging, increasing by 6% and 7% per year, respectively, between 1981 and 1987. Overall however, the underlying trend appear to be less promising, with negative real growth apparent since 1985.

## Export Trends

In terms of trade, pump exports have virtually followed trends in production. Estimated total pump exports to the rest of the world reached around 1.7 billion ECU in 1987, representing a 3.4% annual average increase in value over the six-year period 1981-87. Traditional markets have been countries outside the EC. However, since 1981 a stronger marketing stance has been adopted with respect to intra-EC trade in view of slower growth in demand elsewhere; intra-EC trade grew at an average annual rate of 9.2% over the same period. Exports to the Middle East, from where orders have decreased as a result of the slump in oil prices, have fallen as well as to the rest of the Third World, where demand has, for the most part, been constrained by foreign exchange difficulties. Meanwhile, imports have increased at a slightly faster rate than exports rising an average annual 6.5% between 1981 and 1987, and from 0.4 billion ECU at the start of the period to 0.6 billion ECU by the end of 1987.

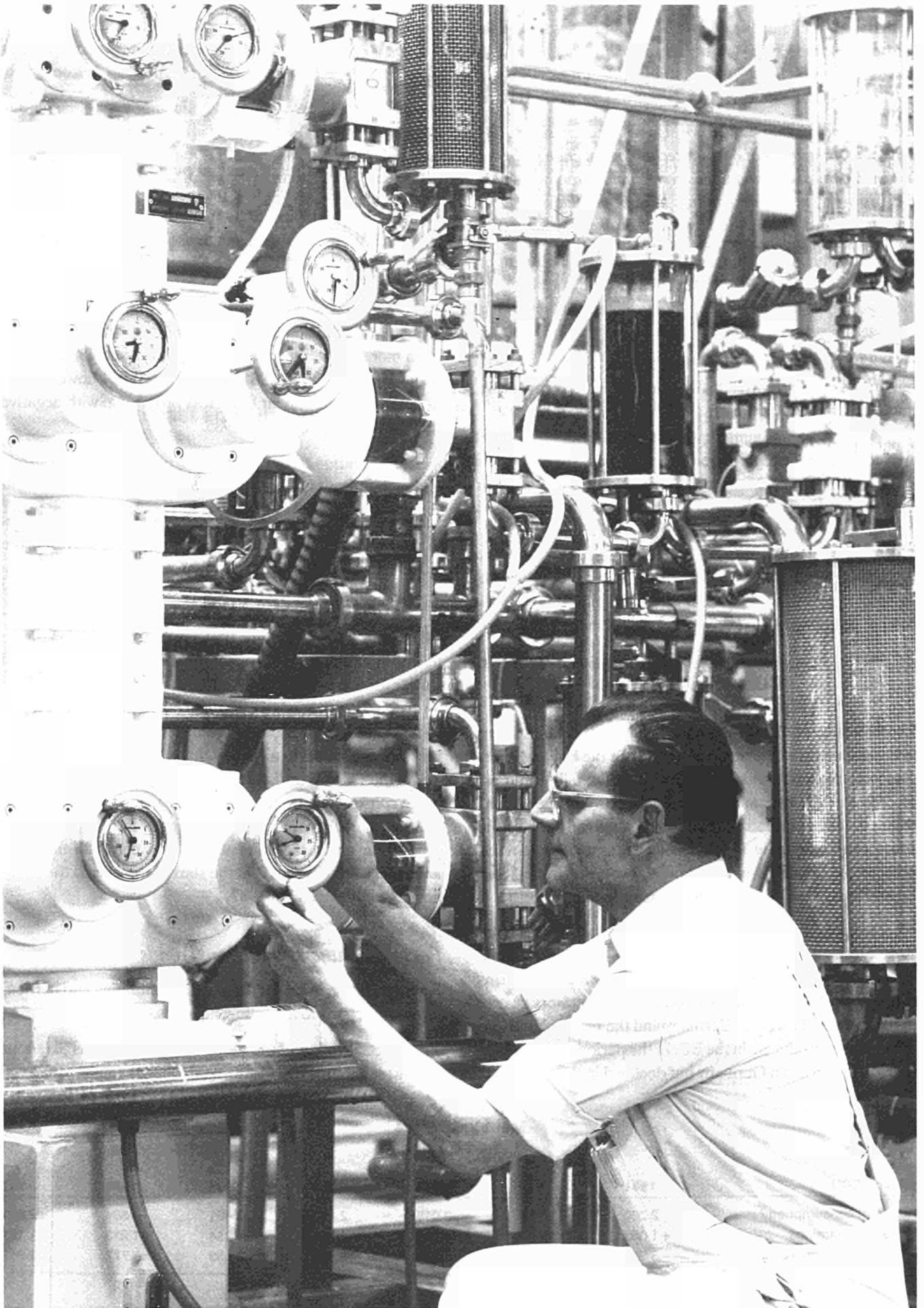
## Factors Behind Production Trends

Reorganization in the industry is still continuing and particularly with regard to the following areas.

The rationalization of the pump industry in terms of labour saving technology (computer-controlled machine tools) will

## Main Indicators Liquid Pumps

| (Million ECU)        | 1981    | 1982    | 1983    | 1984    | 1985    | 1986    | 1987  |
|----------------------|---------|---------|---------|---------|---------|---------|-------|
| Apparent consumption | 2 200   | 2 238   | 2 018   | 2 160   | 2 401   | 2 564   | 2 621 |
| Net export earnings  | + 1 050 | + 1 092 | + 1 118 | + 1 169 | + 1 254 | + 1 213 | 1 191 |
| Total EC production  | 3 250   | 3 330   | 3 136   | 3 329   | 3 655   | 3 777   | 3 812 |



**Table I**  
**Total Pump Production (1)**

| (Million ECU) | 1981         | 1982         | 1983         | 1984         | 1985         | 1986         | 1987         |
|---------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Belgium       | 62           | 59           | 57           | 56           | 65           | 60           | 48           |
| Denmark       | 143          | 145          | 153          | 161          | 171          | 182          | 192          |
| Germany       | 1 306        | 1 378        | 1 400        | 1 506        | 1 643        | 1 801        | 1 834        |
| Greece        | 24           | 31           | 24           | 26           | 29           | 20           | 30           |
| Spain         | 54           | 65           | 59           | 67           | 61           | 69           | 67           |
| France        | 412          | 439          | 457          | 470          | 609          | 508          | 497          |
| Italy         | 358          | 378          | 259          | 290          | 228          | 358          | 373          |
| Netherlands   | 157          | 163          | 135          | 136          | 125          | 152          | 151          |
| UK            | 734          | 672          | 592          | 617          | 724          | 627          | 620          |
| <b>Total</b>  | <b>3 250</b> | <b>3 330</b> | <b>3 136</b> | <b>3 329</b> | <b>3 655</b> | <b>3 777</b> | <b>3 812</b> |

(1) Including parts.  
Source: Europump.

continue. Moreover, this development has taken place in the face of fierce competition, where the key to market dominance lies in better and more cost-efficient technology. As a result of this there will be a steady decline in employment levels.

There has also been a change in the types of materials used: more plastics and steel instead of casting.

More control pump systems are being developed, which has increased value-added in the sector. Variable speed control is also being introduced; this is still expensive but holds strong growth potential.

There are only a few European company groupings such as KSB or Gunfas. Most manufacturers are small companies serving market niches.

## Forecast and Outlook

The impact of the single market is likely to be particularly felt by the medium-sized companies. To remain competitive they will need to look for joint ventures in other EC countries.

Despite close coordination among national associations in the European pump-producing countries, certain protectionist policies still persist. It is hoped that such trade barriers will be removed as a result of the harmonization of trade rules by 1992.

The completion of the internal market should enhance the ability of manufacturers to adjust to an expanded domestic demand base as well as to compete successfully in world markets.

**Table II**  
**Pump Production by Market Segment, 1987**

| (Million ECU) | Hand pumps | Reciprocating pumps | Rotary pumps | Centrifugal pumps | Other pumps | Total original equipment | Parts      | Total production |
|---------------|------------|---------------------|--------------|-------------------|-------------|--------------------------|------------|------------------|
| Belgium       | 0          | 2                   | 1            | 23                | 4           | 30                       | 18         | 48               |
| Denmark       | 2          | 6                   | 19           | 81                | 5           | 113                      | 79         | 192              |
| Germany       | 31         | 414                 | 270          | 719               | 58          | 1 492                    | 342        | 1 834            |
| Greece        | 20         | 0                   | 0            | 0                 | 10          | 30                       | 0          | 30               |
| Spain         | 0          | 1                   | 2            | 48                | 3           | 54                       | 13         | 67               |
| France        | 3          | 18                  | 47           | 339               | 3           | 410                      | 87         | 497              |
| Italy         | 0          | 27                  | 37           | 252               | 0           | 316                      | 56         | 372              |
| Netherlands   | 0          | 0                   | 0            | 41                | 35          | 76                       | 76         | 152              |
| UK            | 4          | 23                  | 35           | 232               | 120         | 414                      | 206        | 620              |
| <b>Total</b>  | <b>60</b>  | <b>491</b>          | <b>411</b>   | <b>1 735</b>      | <b>238</b>  | <b>2 935</b>             | <b>877</b> | <b>3 812</b>     |

Source: Europump.

**Table III**  
**Production and Foreign Trade**

| (Million ECU)    | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  | 1987  |
|------------------|-------|-------|-------|-------|-------|-------|-------|
| Production       |       |       |       |       |       |       |       |
| Current value    | 3 250 | 3 330 | 3 136 | 3 329 | 3 655 | 3 777 | 3 812 |
| Index            | 100.0 | 102.5 | 96.5  | 100.9 | 112.5 | 116.2 | 117.3 |
| Constant value   | 3 250 | 2 809 | 2 514 | 2 260 | 2 655 | 2 658 | 2 623 |
| Index            | 100.0 | 86.4  | 77.4  | 69.5  | 81.7  | 81.8  | 80.7  |
| Imports Extra-EC | 395   | 449   | 427   | 485   | 590   | 485   | 548   |
| Index            | 100.0 | 113.7 | 108.1 | 122.8 | 149.4 | 122.8 | 138.7 |
| Exports Extra-EC | 1 445 | 1 541 | 1 545 | 1 654 | 1 844 | 1 698 | 1 739 |
| Index            | 100.0 | 106.6 | 106.9 | 114.5 | 127.6 | 117.5 | 120.4 |
| X/M              | 3.66  | 3.43  | 3.62  | 3.41  | 3.13  | 3.50  | 3.17  |

Source: Europump.

EUROPUMP: European Committee of Pump Manufacturers  
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# FLUID POWER EQUIPMENT

(NACE 328.3)

*The EC is a major producer of fluid power equipment accounting for 30% of total world production. After the strong growth of recent years which began in 1983, the rate of growth in output is expected to slow in future to around 2% per year. This is due to expected sluggish growth in demand and more competitive conditions in world markets.*

This sub-sector comprises the manufacture of fluid power equipment, that is equipment for operating machinery by hydraulic or pneumatic means and is part of NACE 328.3; this code covers the manufacture of pumps and other equipment such as valves, cylinders and flow line assemblies for operating machinery by hydraulic or pneumatic means.

## Current Situation

Production of fluid power equipment in the Community represents 30% of estimated world production and is only second in size to the US industry, which accounts for 45% of world production. Japan occupies third place with about 20% of the total.

EC production exceeded 4 billion ECU in 1987 and has expanded since 1980 at an average annual growth rate of 4.7%. Germany is responsible for more than 50% of total EC production. In the 1980s, the UK production declined. Hydraulic pumps and valves and pneumatic components are the biggest segments and are at the same time showing the fastest growth.

## Consumption Trends

The equipment on which hydraulic fluid power equipment is used can be conveniently divided into three categories: mobile, static and other.

Mobile applications, which make up the largest consuming sector, include power transmission and control on agricultural machinery (NACE 321.1), construction and earth moving equipment (NACE 325.4) and mechanical handling and lifting equipment (NACE 325.5).

The static sector includes metal-working machine tools (NACE 322.1), coal cutting and mining equipment and hydraulic roof supports (NACE 325.1), and equipment for the processing of rubber and plastics (NACE 324.3).

The other miscellaneous applications for oil hydraulic fluid power equipment are in transport and marine applications (NACE Class 36), including offshore drilling platforms.

The above excludes fluid power transmission and control equipment for the automotive (NACE Class 35) and aerospace industries (NACE 364.1), which are more appropriately considered under their respective industries.

Pneumatic power transmission and control equipment is largely confined to low-force, high-speed applications, often of an indoor and less rugged nature where the advantages of an inert medium, air, and the smaller components resulting from lighter duties, make pneumatic power an obvious choice, e.g. in textile machinery (NACE 323.1), food processing equipment (NACE 324.1) and bottling and packing plants (NACE 324.2), and in factory automation.

The market for the products of the fluid power equipment sub-sector is therefore largely dependent on the demand, world-wide, for new construction plant or of newly automated manufacturing facilities, the remainder of the demand being for replacement parts or for custom built equipment for specific purposes. For these two applications the industry is well served by an efficient and wide-ranging distribution system for the former and a host of hydraulic and pneumatic engineering firms, often coming into the small business category, for the latter.

The European Community itself provides a very large ready made market for all the mobile and static equipment listed above, but an increasing proportion is being met by equipment imported from outside the Community, principally Japan, the USA, Switzerland and Scandinavia. To that extent, the opportunity to incorporate fluid power components of EC manufacture is lost. On the other hand, the export of equipment such as that listed above is an important element in the sales of EC manufacturers, so components consumed

## Main Indicators Fluid Power Equipment

| (Million ECU)              | 1980         | 1981         | 1982         | 1983         | 1984         | 1985         | 1986         | (1) 1987     |
|----------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| Apparent consumption       | 2 668        | 2 596        | 2 796        | 2 705        | 3 011        | 3 548        | 3 706        | 3 665        |
| Net export earnings        | + 248        | + 247        | + 266        | + 261        | + 290        | + 359        | + 373        | + 375        |
| <b>Total EC production</b> | <b>2 916</b> | <b>2 843</b> | <b>3 062</b> | <b>2 966</b> | <b>3 301</b> | <b>3 907</b> | <b>4 279</b> | <b>4 040</b> |

(1) Estimated.

**Table I**  
**1987 Production By Market Segment**

| (Million ECU)        | D            | F          | I          | UK         | Others     | Total 1987   | Total 1990   |
|----------------------|--------------|------------|------------|------------|------------|--------------|--------------|
| Hydraulic pumps      | 401          | 38         | 80         | 46         | 56         | 621          | 659          |
| Motors               | 135          | 40         | 14         | 23         | 21         | 233          | 248          |
| Valves               | 388          | 25         | 74         | 77         | 55         | 619          | 657          |
| Cylinders            | 234          | 46         | 30         | 45         | 35         | 390          | 414          |
| Hoses and fittings   | 138          | 61         | 40         | 97         | 34         | 370          | 393          |
| Systems              | 119          | 30         | 44         | 54         | 25         | 272          | 289          |
| Other                | 323          | 20         | 42         | 55         | 46         | 486          | 514          |
| <b>Subtotal</b>      | <b>1 738</b> | <b>260</b> | <b>324</b> | <b>397</b> | <b>272</b> | <b>2 991</b> | <b>3 174</b> |
| Pneumatic components | 502          | 121        | 120        | 210        | 95         | 1 048        | 1 112        |
| <b>Total</b>         | <b>2 240</b> | <b>381</b> | <b>444</b> | <b>607</b> | <b>367</b> | <b>4 039</b> | <b>4 286</b> |
| Index (1980 = 100)   | 170          | 138        | 114        | 91         | 139        |              |              |

Source: CETOP.

in the Community often find their way as "hidden exports", partially counterbalancing the "hidden imports" of components on equipment imported from the USA or Japan.

### *Export Trends*

Extra-Community direct exports represent around 16% of total production; by comparison intra-Community trade is much more extensive. Imports, mainly from the US, account for about 8% of EC consumption. There is therefore a small favourable trade balance in fluid power components.

However, many components are exported as part of other machinery and equipment and are thus "hidden exports".

### *Employment Trends*

In line with other sectors of the mechanical engineering industry, employment in the sector fell during the early 1980s but is now stable.

### *Factors Behind Production Trends*

While the medium used in pneumatic equipment is self-explanatory, the hydraulic fluid generally used is mineral oil; hence the frequent use of the term "oil-hydraulic" in many published accounts. There is, however, a growing interest in non-oil based hydraulic fluids and these are already mandatory for underground use, e.g. in coal mining.

A recent but increasingly important development is the integration of electronics with hydraulic and pneumatic fluid control equipment using the technical and commercial advantages of compact high quality and reliable hydraulic and pneumatic systems with the latest electronic technologies.

### *Industry Structure*

The structure of the fluid power equipment industry reflects the large intra-EC and external trade of components. Many manufacturing companies are multinational, selecting the most economical location for the manufacture of components and trading different sizes, designs and classes of components to maximize production efficiency. At the same time a broad range of items is maintained for marketing both within the Community and in export markets.

The greatest concentration of fluid power component production is in the heartland of Europe, Germany and Switzerland, which are well placed for ease of land communication and favoured with a well-trained workforce, technologically slanted education system, and progressive banking and commercial facilities. Countries with small production are located on the periphery of the Community and are mainly engaged in the supply of domestic needs and meeting special export opportunities arising from long-standing connections with previous colonial markets.

Profitability levels in the sector are indicated by the latest figures for UK companies in which profits before taxation were 5.7% of turnover.

### **Forecast**

The industry faces slower growth in demand as a result of overall slower growth in the world economy. The rate of increase in world trade, which declined to 3% in 1988, is expected to return to 4% in 1989. The greatest opportunities for the Community based manufacturer is therefore in gaining an increased share in world trade. In this sector, competition with US manufacturers is expected to intensify in the

market for both EC manufactured equipment incorporating EC manufactured components and for components themselves in the world market. Net exports by Japan are likely to slacken in 1988 but, due to the policy of Japanese companies to secure manufacturing partnerships within the Community, competition from Japanese designed equipment containing fluid power components is not likely to diminish: only its country of origin will shift. The great challenge to EC component manufacturers will be to meet the quality, reliability and design requirements of these new customers.

The forecasts given for this sub-sector therefore reflect restraints on world output and the underlying world trends in demand for construction (and hence construction equipment) and modern manufacturing facilities (and hence automation and other advanced manufacturing processes).

Of the Community Member States, two have special significance for the fluid power industry. In Germany, where the industry is third in the world league of producers of fluid power components, only 1.8% output growth is expected in 1989; the UK industry anticipates a fall in the rate of growth from 2.9% in 1988 to 1.9% in 1989. Both countries have the design and manufacturing capabilities for increased component manufacture but slower growth in demand and more competitive conditions in the market are likely to constrain growth in the industry.

A 2% increase in output volume in 1989 and 1990 is therefore optimistic but well within the capabilities of the sub-sector.

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# INDUSTRIAL TRUCKS

(NACE 325.5)

*The industry is characterized by a moderate but stable growth pattern. Since 1980 world market share has dropped from about 40% to 25% and imports broadly match exports. Technical change on the demand side has led to more sophisticated equipment for modern warehousing, while on the supply side it has resulted in more automated production, leading in turn to a flat demand for labour. While the number of firms has diminished, the number of plants has remained stable.*

According to Council Directive 86/663/EEC of 22 December 1986, self-propelled (powered) industrial trucks are defined as any wheeled vehicles, not running on rails, which are designed to carry, tow, push, lift stack or tier in racks any kind of load. They are controlled by an operator, who walks with the truck or rides on a specially arranged driving platform which is fixed to the chassis or which can be raised.

To compile statistics on supply and demand is difficult. The Fédération Européenne de la Manutention (FEM) produces statistics (as do JIVA - Japan Industrial Vehicles Association, ITA - Industrial Truck Association, etc.), but they exclude various countries and not all producers in the Member States are members of the association. In addition, such statistics are only made available to members.

Rather than using the EC Directive's 18 categories, the following breakdown of the sector is used in this industry profile:

- counterbalanced fork-lift trucks, i.e. battery-powered counterbalanced trucks and diesel/petrol/LPG counterbalanced trucks, rough-terrain (cross country) and side-loading trucks
- other stacking lift trucks (narrow-aisle), i.e. reach trucks, straddle trucks, pallet stackers, lateral and front-stacking trucks, platform high-lift trucks, trucks with elevated operators, high and medium-lift order-pickers
- low-lift non-stacking lift trucks, i.e. pallet trucks, platform trucks and horizontal order-pickers

- non-lift trucks (non-lifting platforms), i.e. platform trucks, industrial tractors and shunting tractors.

## Current Situation

### Consumption Trends

Except for a slight downturn in the early 1980s, the world market for industrial trucks has grown fairly consistently over the past 10 years.

The European Community represents about one quarter of the world market for industrial trucks, a position which has remained fairly constant over the past six years.

Community demand peaked in 1980, when 122 000 units were sold. Subsequently, EC industry underwent a process of restructuring and consolidation which meant that purchases of industrial trucks were deferred where possible. 1986 was again an excellent year for European industry as a whole, and the truck market grew especially well in Spain, Italy, France and Germany (partly due to an accumulated backlog). 1987 saw a stabilization with only marginal growth.

Moderate growth is predicted for the future as the EC countries have already reached saturation point, and most trucks sold serve as replacements rather than adding capacity.

As is apparent from Table III, the EC market is largely dominated by counterbalanced trucks.

The reason for this is that the counterbalanced truck is very flexible and suitable to many different applications. Over 60% of these counterbalanced trucks are powered by diesel, petrol or liquid petroleum gas and thus may only be used in areas where pollution, exhaust fumes, cleanliness, noise etc. are relatively unimportant, i.e. for external rather than internal use.

However, the trend is away from the all-purpose counterbalanced truck towards a more specialist truck. This is a techni-

### Main Indicators Industrial Trucks

| (Million ECU)                 | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  | 1987  |
|-------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Apparent consumption          | 1 251 | 926   | 934   | 1 029 | 1 391 | 1 636 | 2 021 | 2 290 |
| Net export earnings           | N/A   | N/A   | N/A   | N/A   | N/A   | N/A   | 221   | 81    |
| Total EC production           | 1 426 | 1 181 | 1 221 | 1 285 | 1 505 | 1 728 | 1 898 | 2 047 |
| Share of world production (%) | 39.4  | 31.7  | 29.4  | 30.8  | 25.3  | 24.8  | 22.6  | 25.10 |
| Employment (1 000)            | 51    | 40    | 36    | 36    | 44    | 46    | 45    | 41    |

**Table I**  
**Market Structure**

| (Number of trucks)                 | 1978           | 1979           | 1980           | 1981          | 1982          | 1983          | 1984          | 1985           | 1986           | (1) 1987       |
|------------------------------------|----------------|----------------|----------------|---------------|---------------|---------------|---------------|----------------|----------------|----------------|
| Diesel/gas-powered counterbalanced | 43 820         | 47 049         | 49 359         | 35 536        | 32 993        | 32 509        | 34 666        | 39 595         | 45 199         | 45 798         |
| Battery-powered counterbalanced    | 28 225         | 28 554         | 32 284         | 22 920        | 21 279        | 20 526        | 21 894        | 23 797         | 25 783         | 27 029         |
| <b>Total counterbalanced</b>       | <b>72 045</b>  | <b>75 603</b>  | <b>81 643</b>  | <b>58 456</b> | <b>54 271</b> | <b>53 034</b> | <b>56 560</b> | <b>63 392</b>  | <b>70 982</b>  | <b>72 827</b>  |
| Narrow-aisle                       | 13 819         | 14 208         | 20 464         | 16 858        | 15 364        | 14 556        | 15 660        | 18 747         | 20 823         | 20 335         |
| Low-lift non-stacking              | 12 933         | 13 379         | 17 340         | 14 761        | 15 692        | 15 660        | 18 225        | 18 729         | 20 872         | 20 958         |
| Non-lift                           | 1 917          | 1 970          | 2 573          | 1 784         | 1 756         | 1 613         | 1 674         | 1 316          | 1 468          | 1 499          |
| <b>Total EC market</b>             | <b>100 714</b> | <b>105 160</b> | <b>122 020</b> | <b>91 859</b> | <b>87 083</b> | <b>84 863</b> | <b>92 119</b> | <b>102 184</b> | <b>114 145</b> | <b>115 619</b> |

(1) Estimate: Eurostrategies.  
Source: Eurostrategies.

cal response to the factor of warehousing costs: the universal counterbalanced fork-lift truck requires too much space to be used in narrow aisles. Companies avoid extending or building new warehouses; instead they make much better use of their existing warehouse space. This explains the large increase in narrow-aisle trucks which require less aisle width than conventional trucks. Also for economic reasons, low-lift trucks replace conventional counterbalanced trucks when horizontal transport is necessary.

The small remainder of the market consisting of platform trucks and tractors has remained stable in absolute terms, but has lost some of its share of the market. These trucks have a very long life-span and therefore replacement demand is low (usual buyers are the railways, post offices, etc.). There is also much product substitution in this area (e.g. the use of small agricultural and road vehicles such as Daimler-Unimok).

Within the EC, the overall market share of France, Germany, Italy and the United Kingdom has remained relatively constant over the last 10 years, with these four countries together making up 80% of the industrial truck market.

However, a breakdown by Member State shows that Italy, the Federal Republic of Germany and Spain have slightly increased their market share, while the UK share has declined.

The United Kingdom and France started using trucks earlier than the other EC countries and are thus closer to their saturation point than Germany and Italy. Thus the large decrease in the United Kingdom's share from 24% in 1978 to 16% in 1987 can be explained by this factor in conjunction with the evolution of the UK into a more service oriented (as opposed to manufacturing) economy.

More efficient factories, better space utilization and overall improved cost-control, coupled with greater specialization, has resulted in less counterbalanced trucks. The level of technological development in materials handling equipment is higher in countries such as France, the United Kingdom and Germany than it is in Ireland, Greece and Portugal (Italy occupies an intermediate position). Germany, Denmark and France have far fewer counterbalanced trucks than Ireland, Portugal and Greece. In Spain, Italy and Greece, the narrow-aisle and low-lift trucks have more than doubled their mar-

**Table II**  
**Market Structure by Member State - 1987**

| (Number of trucks)                 | BLEU         | DK           | D             | GR         | E            | F             | IRL        | I             | NL           | P          | UK            | EC total       |
|------------------------------------|--------------|--------------|---------------|------------|--------------|---------------|------------|---------------|--------------|------------|---------------|----------------|
| Diesel/gas-powered counterbalanced | 1 477        | 1 184        | 12 305        | 157        | 2 909        | 9 196         | 231        | 6 154         | 3 903        | 346        | 7 936         | 45 798         |
| Battery-powered counterbalanced    | 791          | 519          | 6 284         | 77         | 2 079        | 4 501         | 78         | 7 169         | 1 675        | 151        | 3 705         | 27 029         |
| <b>Total counterbal.</b>           | <b>2 268</b> | <b>1 703</b> | <b>18 589</b> | <b>234</b> | <b>4 988</b> | <b>13 697</b> | <b>309</b> | <b>13 323</b> | <b>5 578</b> | <b>497</b> | <b>11 641</b> | <b>72 827</b>  |
| Narrow-aisle                       | 493          | 683          | 7 538         | 38         | 1 238        | 3 397         | 22         | 2 651         | 729          | 55         | 3 491         | 20 335         |
| Low-lift non-stack.                | 765          | 523          | 6 052         | 24         | 926          | 6 106         | 14         | 2 052         | 1 101        | 34         | 3 361         | 20 958         |
| Non-lift                           | 41           | 20           | 702           | 11         | 29           | 220           | 0          | 199           | 46           | 16         | 215           | 1 499          |
| <b>Total</b>                       | <b>3 567</b> | <b>2 929</b> | <b>32 881</b> | <b>307</b> | <b>7 181</b> | <b>23 420</b> | <b>345</b> | <b>18 225</b> | <b>7 454</b> | <b>602</b> | <b>18 708</b> | <b>115 619</b> |

Source: Eurostrategies.

**Table III**  
**EC Market by Member State, 1987**

| (ECU 1 000)                        | BLEU          | DK            | D              | GR           | E              | F              | IRL          | I              | NL             | P             | UK             | EC total         |
|------------------------------------|---------------|---------------|----------------|--------------|----------------|----------------|--------------|----------------|----------------|---------------|----------------|------------------|
| Diesel/gas-powered counterbalanced | 30 181        | 24 194        | 251 521        | 3 204        | 53 488         | 181 350        | 4 382        | 119 453        | 79 777         | 6 362         | 150 775        | 904 687          |
| Battery-powered counterbalanced    | 12 016        | 7 887         | 95 466         | 1 169        | 28 425         | 65 985         | 1 104        | 103 447        | 25 448         | 2 062         | 52 351         | 395 360          |
| <b>Total counterbal.</b>           | <b>42 197</b> | <b>32 081</b> | <b>346 987</b> | <b>4 373</b> | <b>81 913</b>  | <b>247 335</b> | <b>5 486</b> | <b>222 900</b> | <b>105 225</b> | <b>8 424</b>  | <b>203 126</b> | <b>1 300 047</b> |
| Narrow-aisle                       | 21 197        | 29 349        | 323 876        | 1 640        | 47 858         | 140 828        | 875          | 108 220        | 31 341         | 2 137         | 139 514        | 846 835          |
| Low-lift non-stack.                | 4 484         | 3 062         | 35 468         | 139          | 4 822          | 34 501         | 76           | 11 432         | 6 450          | 181           | 18 318         | 118 933          |
| Non-lift                           | 677           | 327           | 11 706         | 189          | 442            | 3 537          | 3            | 3 155          | 761            | 244           | 3 336          | 24 374           |
| <b>Total</b>                       | <b>68 554</b> | <b>64 819</b> | <b>718 037</b> | <b>6 337</b> | <b>135 095</b> | <b>426 201</b> | <b>6 439</b> | <b>345 707</b> | <b>143 777</b> | <b>10 987</b> | <b>364 294</b> | <b>2 290 189</b> |

Source: Eurostrategies.

**Table IV**  
**Industrial Truck Production**

| (Million ECU) | Constant value | Index |
|---------------|----------------|-------|
| 1980          | 1 426          | 100.0 |
| 1981          | 1 064          | 76.6  |
| 1982          | 998            | 70.0  |
| 1983          | 967            | 67.8  |
| 1984          | 1 062          | 74.5  |
| 1985          | 1 151          | 80.7  |
| 1986          | 1 197          | 83.9  |
| 1987          | 1 243          | 87.2  |

Source: Eurostrategies.

ket share at the expense of universal trucks over the past 10 years (this is also true for low-lift trucks in France). The future trend is towards even more sophisticated equipment.

The total market for industrial trucks in the EC is 2.3 billion ECU. However, this figure should be treated with caution for a number of reasons: the second-hand trucks market is not included and discounts - which can be difficult to quantify - are common. Counter-trade with Eastern Bloc countries also distorts the figures.

The price of narrow-aisle trucks has risen considerably; this is due to the fact that today's narrow-aisle trucks are so sophisticated that they can be used in aisles only 1.8-2 metres wide. This sophistication is due to modern hydraulics, mechanics and electric components, which are inevitably more costly.

A comparison by country shows that Germany has the largest market, which can be explained by the manufacturing bias and size of its economy.

#### *Factors Behind Production Trends*

The European Community accounts for about one quarter of the total world industrial truck production. As recently as 1980, this figure was closer to 40%. Since then there has been a slow but steady decline in the Community's market share, although in absolute terms, after the drop in production over 1981 and 1982, numbers have increased steadily.

1986 was a year of world-wide rationalization. Certain American companies relocated their production to Europe and the Far East. The Japanese self-imposed export limitations in order to avoid dumping measures being taken against them, with the result that their production decreased. As a result of these developments the market share of the Community increased in 1987.

**Table V**  
**Top Five EC Manufacturers, 1986**

| Company      | Company headquarters (country) | Company turnover (million ECU) | Industrial truck sales (million ECU) | Truck sales/ company turnover (%) | Employees in the whole company | Production/ assembly plants (country) |
|--------------|--------------------------------|--------------------------------|--------------------------------------|-----------------------------------|--------------------------------|---------------------------------------|
| Linde        | D                              | 1 821.3                        | 644.5                                | 35.4                              | 19 252                         | D, F                                  |
| Lansing      | UK                             | 350.9                          | 343.9                                | 98.0                              | 5 238                          | D, F, UK                              |
| Jungheinrich | D                              | 448.6                          | 336.8                                | 75.1                              | 5 123                          | D, F                                  |
| Lancer Bros. | UK                             | 117.0                          | 114.6                                | 97.9                              | 1 781                          | D, E                                  |
| Fiat         | I                              | 19 852.8                       | 91.1                                 | 0.5                               | N/A                            | I                                     |

Sources: Annual reports, Fördermittel Journal.

The value of Community industrial truck production reached 2.1 billion ECU in 1987, but the indices reveal some interesting details.

Of the 1986 production of 2 billion ECU, 1.5 billion, or three-quarters, was produced by the top five Community manufacturers. Part of this figure may however be accounted for by off-shore production, e.g. by European multinationals such as Jungheinrich.

On the other hand, non-Community manufacturers (mainly American and Japanese) now have production plants within

**Table VI**  
**Total EC Employment**

|      |        |
|------|--------|
| 1978 | 52 565 |
| 1979 | 49 479 |
| 1980 | 50 624 |
| 1981 | 39 653 |
| 1982 | 35 925 |
| 1983 | 35 488 |
| 1984 | 43 540 |
| 1985 | 45 837 |
| 1986 | 44 549 |
| 1987 | 40 515 |

Source: Eurostrategies.

EC countries. Many US companies such as Hyster, Clark and Caterpillar streamlined their American production to adjust to market demand and increased production in Europe. Indeed, the US company Hyster produces few industrial trucks in the United States, and far more in Scotland, Northern Ireland and the Netherlands.

### *Import and Export Trends*

Of the total 115 620 units sold within the EC in 1987, 28 651 were imported from outside the Community. Almost exactly the same number, 29 129, were exported by the Community, a slight decrease compared with 1986.

Net export earnings dropped markedly from 1986 to 1987 due to a sharp decline in value of exports to countries outside the Community while the value of imports has remained relatively constant.

### *Industry Structure*

Over the 1960s and 1970s the industrial truck industry experienced continuous growth which peaked in 1978 (in terms of the number of employees). Subsequently, in the late 1970s

**Table VII**  
**Number of Production Plants in the EC**

|      |     |
|------|-----|
| 1978 | 115 |
| 1979 | 110 |
| 1980 | 111 |
| 1981 | 114 |
| 1982 | 112 |
| 1983 | 113 |
| 1984 | 110 |
| 1985 | 112 |
| 1986 | 115 |
| 1987 | 113 |

Source: Eurostrategies.

and early 1980s, costs and salaries increased and profits turned into losses. Steinbock nearly went bankrupt, was sold to Lancer Boss and in the process shed two-thirds of its personnel. Fenwick (then the market leader in France), Saxby, Lansing Bagnall, etc., all went through similar processes resulting in lay-offs.

In the mid-1980s demand rose, and in their desire to outdo the Japanese, many companies moved part-time employees back to full-time employment. Over the last few years improved productivity achieved through highly automated (just-in-time) production lines developed by firms such as Lansing, Still, Linde, and Jungheinrich, has meant that no additional labour has been needed to generate increased output.

Although the industry went through a process of concentration, the actual number of production plants has remained stable over the past 10 years.

## **Forecast and Outlook**

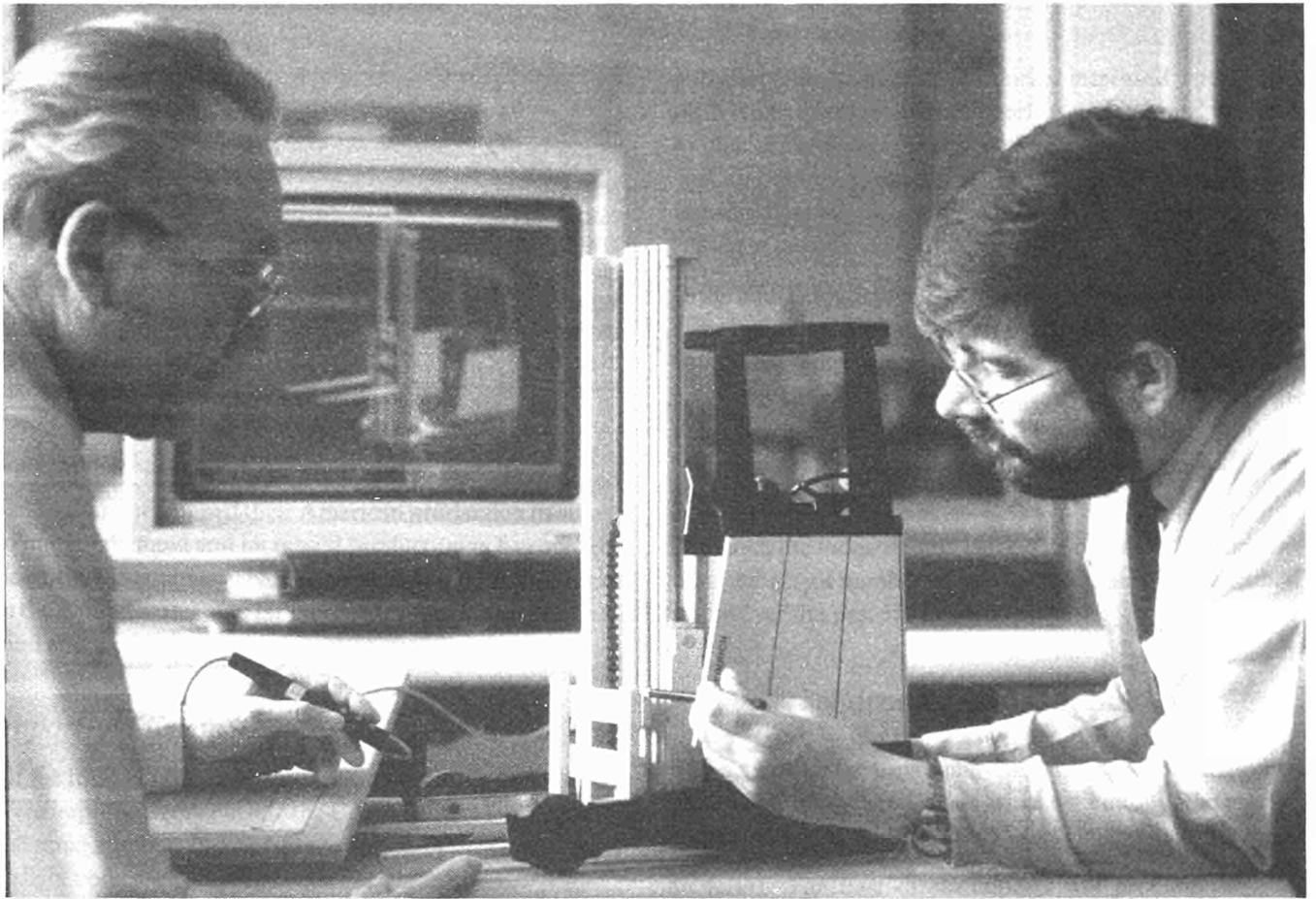
The outlook for the Community industry is optimistic. Moderate growth is predicted world-wide, with most of the market expansion taking place in Third World countries.

In future, Far East direct imports will probably slow as Japanese production will most likely relocate to a Community country. This, together with the relocation of US production plants to the EC, will mean some further increase in EC production and exports.

The trend towards increasingly sophisticated and higher value-added equipment will continue.

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## INFORMATION TECHNOLOGY

(NACE 33)

*The EC information technology industry has gone through a period of rapid development. But since production does not match demand, the share of imports on the market, as well as the foreign trade deficit, have grown enormously in the 1980s. However, despite increasing competition, especially from Asian manufacturers, the EC industry has become more competitive. Double-digit growth rates - representing high market potential - can be anticipated in the coming years.*

Information technology has become the collective term for office machines, data processing and telecommunications since these individual sectors have increasingly come to overlap in recent years.

The following analysis is limited to office machines and data processing. Since the data available is insufficient, a general study of all 12 EC Member States cannot be carried out. The following analysis is limited to eight countries: France, Belgium/Luxembourg, Germany, the Netherlands, the United Kingdom, Italy and Ireland. On the basis of foreign trade data, we assume that the above-mentioned countries can be taken to be representative of the EC as a whole.

### Current Situation

The EC information technology industry went through a period of rapid development in the first half of the 1980s. With an average annual growth rate of 16.5%, production for office machines and EDP equipment more than doubled, from 13.6 billion ECU in 1980 to 29.2 billion ECU in 1985.

Foreign trade involving information technology goods showed strong growth. Extra EC exports of office machines and EDP equipment rose at an average annual rate of 26.7%, from 2.8 billion ECU in 1980 to 9.1 billion ECU in 1985. During the same period, imports rose at an average annual rate of 25.9%, from 4.4 billion ECU to 14.1 billion ECU.

The Community's domestic market expanded from 15.3 billion ECU in 1980 to 34.2 billion ECU in 1985. Turnover in the information technology industry grew annually by an average of 22.1%, from 13.9 billion ECU to 37.6 billion ECU.

### Foreign Trade

While the share of imports into the EC market amounted to 29% in 1980, this proportion rose to 41% by 1985, reflecting a lag between growth in production (16.5%) and imports (25.9%). However, the export/import ratio remained fairly stable between 1980 and 1985.

Shifts in international competitive positions are also reflected in imports from the USA and Japan. In 1985, office machines and EDP imports from the USA represented 61% of total EC imports of such goods. Japanese products held a 19% share of imports. In 1987, with imports of 15.3 billion ECU for office machines and EDP equipment, the USA share fell to 49% while the Japanese share rose to 25%.

The USA and Japanese shares of extra-EC exports, on the other hand, remained relatively unchanged, at 30% and 2% respectively, between 1985 and 1987. Exports and imports within the Community grew by 19% and 12%, respectively, between 1985 and 1987, suggesting an increased orientation towards the internal market.

### Main Indicators

#### Office Machines and Data Processing Equipment

| (Million ECU)              | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  | 1987 |
|----------------------------|-------|-------|-------|-------|-------|-------|-------|------|
| Apparent consumption       | 1 528 | 1 780 | 2 295 | 2 694 | 3 165 | 3 419 | 3 438 | N/A  |
| Net export earning         | -166  | -245  | -290  | -370  | -551  | -498  | -515  | -663 |
| Total Community production | 1 362 | 1 535 | 2 006 | 2 324 | 2 614 | 2 921 | 2 923 | N/A  |
| Employment (1 000)         | 209.5 | 201.8 | 208.0 | 214.5 | 218.4 | 221.9 | 228.5 | N/A  |

EC 8: Belgium, Germany, France, Ireland, Italy, Luxembourg, the Netherlands, and the United Kingdom.

**Table I**  
**Production and Foreign Trade**

| (Million ECU)    | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  | 1987  |
|------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Production       |       |       |       |       |       |       |       |       |
| Current value    | 1 362 | 1 535 | 2 005 | 2 324 | 2 614 | 2 921 | 2 923 | N/A   |
| Index            | 100   | 113   | 147   | 171   | 192   | 215   | 215   | N/A   |
| Constant value   | 1 362 | 1 388 | 1 657 | 1 807 | 1 930 | 2 062 | 2 026 | N/A   |
| Index            | 100   | 102   | 122   | 133   | 142   | 151   | 148   | N/A   |
| Imports extra-EC | 443   | 567   | 682   | 869   | 1 251 | 1 403 | 1 260 | 1 405 |
| Index            | 100   | 128   | 154   | 196   | 282   | 317   | 285   | 317   |
| Exports extra-EC | 277   | 322   | 392   | 499   | 700   | 905   | 745   | 742   |
| Index            | 100   | 117   | 142   | 180   | 253   | 327   | 269   | 268   |
| X/M              | 0.6   | 0.6   | 0.6   | 0.6   | 0.6   | 0.6   | 0.6   | 0.5   |

EC 8: Belgium, Germany, France, Italy, Ireland, the Netherlands, Luxembourg, United Kingdom.  
Source: Eurobit.

### *Employment*

Available official employment figures are insufficient to convey the actual contribution of this sector to employment. The growth of information technology services is not sufficiently taken into account by official statistics.

Taking into consideration the importance of information technology services such as software development, consulting, training, value added networks (VANs), and hardware and software services, the real number of those employed in information technology, which according to official statistics is around 230 000, could be several times greater and might well be in the order of one million. In addition, in the future these branches should be counted among those sectors that create new jobs on a large scale.

### *Factors behind Production Trends*

Two principal factors underlie the exceptionally dynamic development of the European information technology market: firstly, rapid technical progress in EDP made it possible to market, at short intervals, equipment that was increasingly efficient in terms of capacity and computing time and to open up new markets in almost all production and service sectors, including those outside traditional EDP areas, through a number of product innovations.

Secondly, increasing competition on the world market has necessitated extensive rationalization and modernization of the EC economy. As a result, modern office and information technology solutions are increasingly being recognized as an appropriate means for improving economic efficiency and optimizing products.

The main reason for the increase in imports is, apart from changes in relative production costs, the sustained strong position of USA manufacturers and the rapid advance by Asian

competitors. With the decline of the American dollar, the EC office machine and EDP industry entered a phase of consolidation in the mid-1980s which led to a pause in the growth of production and foreign trade in 1986 and 1987.

### *Positions of Firms*

The competitiveness of the EC office machine and EDP industries can be measured by the growth of turnover and international market shares. Comparing the turnover of the 25 largest EDP manufacturers on the world market for data processing in 1982 and 1986 makes it clear that:

- despite a 155% growth in sales, the American share of the world market fell from 81% to 68%
- with a 429% growth in sales, Japan's share of the world market grew from 8% to 17%
- the EC increased its market share from 12% to 15%, with sales growth of 234%.

### **Forecast and Outlook**

Development is characterized by the efficient exploitation of new markets and rapid integration of previously distinct markets. The internationalization of the office machine and EDP markets was already under way at the beginning of the 1980s and will be reinforced in the coming years.

In addition to geographical market integration we can also observe the integration of previously separate sector markets. This involves the increasing merging of office and data technology with communication technology (telematics).

Rapid changes in the economy and administration of office organization have placed new and greater demands on access to information and communication among individual economic activities. Rapid technical innovations in data

processing and telecommunications as well as increasing integration within these fields are making it possible to meet demands for information processing and data communication.

The advances that can be achieved through deregulation of the communications markets and international harmonization of system architectures and technical standards are of decisive importance for the growth prospects and international competitiveness.

The sector development described above would not have been possible without the simultaneous advances made in software. Only the development of more efficient and, particularly, more widely applicable standard software for the most varied applications in almost all sectors of the economy made it possible for hardware to penetrate new markets.

The EC software market showed double-digit annual growth in the past several years. For the coming years, similar growth rates can be anticipated as a result of advances in artificial

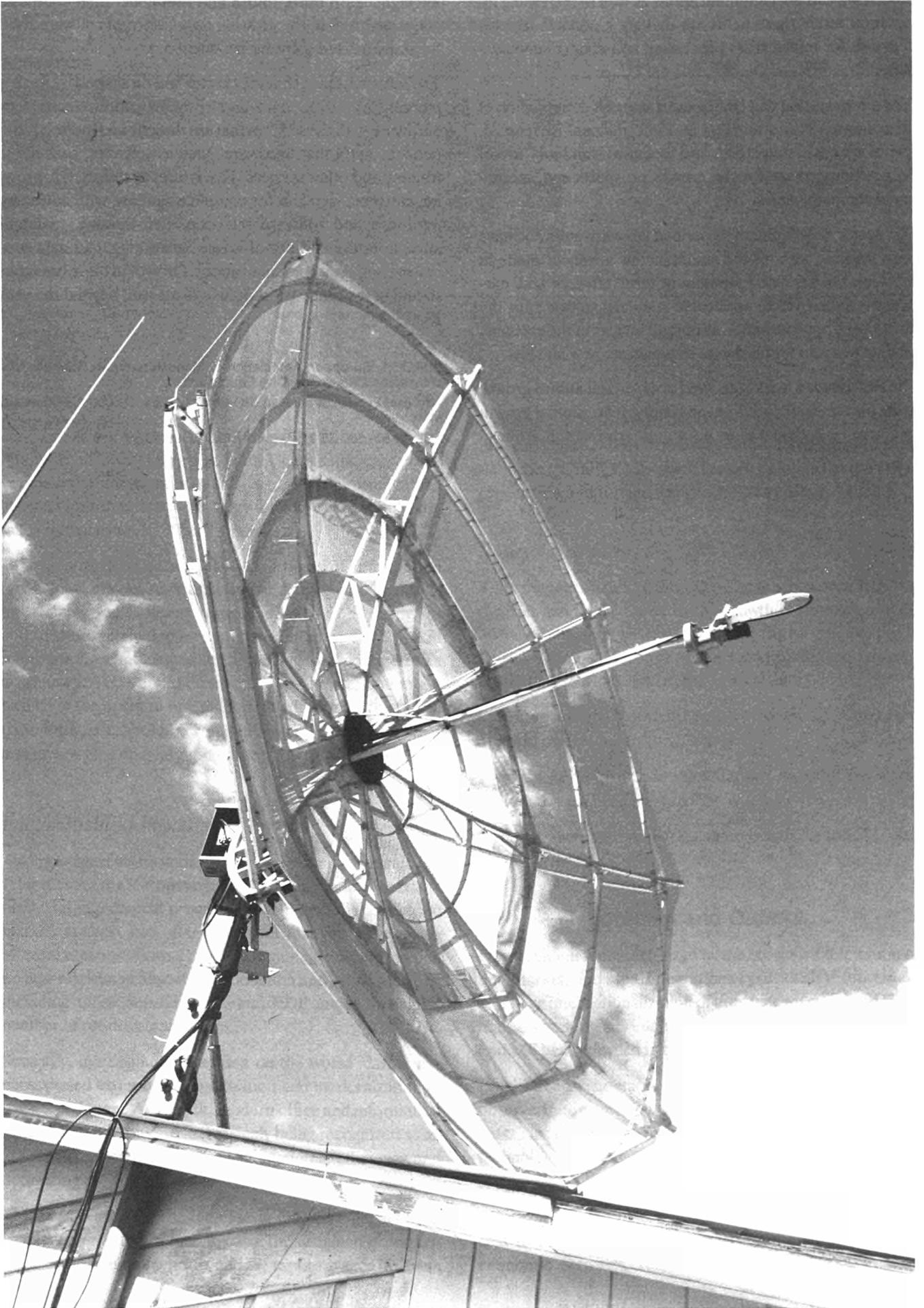
intelligence; in third, fourth and fifth generation computer languages; and in the growing importance of software tools for standardized software production.

The information technology sector will be shaped by further merging of office, data and communications technology hardware with the services that are directly and indirectly dependent upon that hardware, such as software, consulting, training and other services. This is already reflected in growing customer demand for complete systems, with advice on hardware and software selection, staff-training, maintenance, in-house and out-of-house networking, and data processing and data communications. Growth in these branches should consistently be in double digits well beyond the year 2000.

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# TELECOMMUNICATIONS EQUIPMENT

(NACE 344)

*Faced with the twofold challenge of rapidly changing technology and deregulation, the EC telecom industry is modifying its structures and organization. Despite today's highly fragmented markets, the prospect of the completion of the internal market and an EC policy framework encourage the vigorous formation of alliances. The short-term outlook for the industry is for moderate growth which should increase with the opening up of private markets in 1990 and the subsequent development of Integrated Services Digital Network (ISDN). Production, stunted in the short term by very dynamic imports, should improve in the medium term thanks to the increased competitiveness conferred by the internal market.*

The telecom equipment industry includes:

- public and private switching (including telex switching and X25 products)
- transmission (equipment for lines and termination points)
- terminals (telephone sets, telex, teletex, fax machines, videotex terminals).

It also includes related equipment (answering machines; testing, analysis, and simulation equipment) but does not include cables and radiocommunication equipment (mobile telephones, radio paging, micro-wave links, satellite electronics).

## Current Situation

Unlike the former American structure (Bell System) combining an equipment manufacturer and services operator under a single private monopoly, the EC telecommunications industry left only the manufacture of equipment to private firms, while public PTTs had the monopoly over the operation of services and the distribution of equipment. With

this structure Europe has set up a modern network comprising 123 million trunk lines in 1987 - behind the United States (126 million trunk lines) but well ahead of Japan (49 million trunk lines), with the rest of the world accounting for only 150 million trunk lines. The situation varies according to the country, however, (see Table I) and is characterized by a fragmentation of the market that is prejudicial to the competitive position of EC manufacturers. Thus, in the field of time-division switching, EC industries have developed six major switching systems (System 12, System X, E10, MT, EWSD, Proteo) as compared to four in North America (ESS5, DMS, GTD5-EAX, DCO) and three in Japan (NEAX61, FETEX and D70).

The EC telecom industry still represents 31% of world production (e.g. planned economies), behind the United States (33%) but ahead of Japan (17%). The term PTT refers in general to the public network operators but includes in this context the privately owned British Telecom and Mercury firms. As seen in Table II, the PTTs are the main clients of EC manufacturers, absorbing two-thirds of total production.

**Table I**  
Distribution of Trunk Lines in 1987

| National Data  | Trunk Lines | Trunk Lines per 100 Inhabitants | Digitization Rate 1986 | ISDN Commercial Launch Date |
|----------------|-------------|---------------------------------|------------------------|-----------------------------|
| Belgium        | 3 398       | 34.5                            | 8%                     | 1991                        |
| Denmark        | 2 650       | 52.0                            | 30%                    | 1990                        |
| Germany        | 27 552      | 45.6                            | 0%                     | 1988                        |
| Greece         | 3 500       | 35.0                            | 0%                     | 1995                        |
| Spain          | 10 236      | 26.2                            | 3%                     | 1991                        |
| France         | 24 804      | 44.6                            | 49%                    | 1988                        |
| Ireland        | 796         | 22.3                            | 30%                    | 1991                        |
| Italy          | 19 106      | 33.3                            | 6%                     | 1990                        |
| Luxembourg     | 170         | 45.9                            | 20%                    | 1991                        |
| Netherlands    | 6 234       | 42.7                            | 6%                     | 1991                        |
| Portugal       | 1 653       | 15.8                            | 0%                     | 1995                        |
| United Kingdom | 22 900      | 40.8                            | 4%                     | 1989                        |
| Total EC       | 122 999     | 38.1                            | 13%                    | -                           |

Source: BIPE.

## Main Indicators Telephone and Telegraph Industry

| (Million ECU)              | 1980   | 1981   | 1982   | 1983   | 1984   | 1985   | 1986   | 1987   |
|----------------------------|--------|--------|--------|--------|--------|--------|--------|--------|
| Apparent consumption       | 9 104  | 10 090 | 10 822 | 11 655 | 13 048 | 14 431 | 14 519 | 15 411 |
| Net exports earnings       | 1 119  | 1 252  | 1 361  | 1 186  | 1 218  | 1 074  | 872    | 228    |
| Total Community production | 10 223 | 11 342 | 12 183 | 12 841 | 14 266 | 15 505 | 15 391 | 15 639 |
| Employment (1 000)         | 280.3  | 259.8  | 240.8  | 235.2  | 227.7  | 215.4  | 200.7  | 197.8  |

In addition to network equipment, the PTTs are also the largest purchaser of professional and private terminals, causing manufacturers to be particularly dependent on PTT investment budgets. PTT research programmes, study contracts, subsidies, etc. have made possible the development of advanced technologies.

**Table II**  
**European Telecom Equipment Markets**

|   | %   |
|---|-----|
| British Telecom                                     | 14  |
| Deutsche Bundespost                                 | 14  |
| Societa Italiana Per l'exercizio del telefono (SIP) | 13  |
| France Telecom                                      | 11  |
| Telefonica  | 5   |
| PTT Telecommunicatie                                | 3   |
| Other EC PTTs                                       | 7   |
| Other EC clients                                    | 23  |
| Extra-EC exports                                    | 10  |
| Total EC production                                 | 100 |

Source: BIPE.

Thanks to this technological excellence, the EC industry is ready to deal with the ISDN revolution, whose impact is being felt throughout the telecommunications field. Through considerably enhanced data transmission facilities, ISDN will help bring the telecommunications and information technology sectors closer together, beyond the current sharing of a common technology. ISDN, which will make new advanced services available, nevertheless requires the modernization of networks (switches as well as transmission cables must be digital) and of private equipment (whether systems or terminals).

This major technological change has led to a reconsideration of the existing structure, under the pressure of the deregulation process begun in the United States, Japan and the United Kingdom. The EC Commission has undertaken the task of controlling evolution towards a new structure through proposals - including the Green Paper - and directives. In the immediate future, each country must guarantee the independence of an agency in charge of sector regulation. They must also separate their monopoly activities from their competitive activities in order to avoid cross subsidies and abuse of their position. Their monopoly over the supply of equipment, which is almost total in some countries, will be terminated (the first handset, or modems, for example) by mid-1990. The opening of the European market is dependent on the achievement of harmonized standards, which will soon be the responsibility of ETSI (European Telecommunications Standard Institute), created in April 1988. Of 10 European Telecommunications Standards (NET), two have been in effect since July and will become compulsory throughout the Community and the EFTA countries after a transition period.

## Production Trends

### Network equipment

The production of network equipment, the strong point of the European telecom industry, amounted to 8.4 billion ECU in 1987, divided between public switching (2/3) and transmission (1/3).

The production volume of central office switches is growing slightly but is decreasing in value because of decreasing prices due to fiercer competition on the world market and the spread of inexpensive time-division technology. All EC countries have some production units, but only some of them have mastered the necessary technologies and are exporting in quantity. The situation also varies according to equipment levels in different countries (see Table III). The most advanced are actively working on network digitization and ISDN testing (to be launched commercially in 1989). The others, benefiting from the Community programme STAR (Special Telecommunications Action for Regional Development, 700 million ECU for 1986-1990), are continuing to improve their networks by rapid digitization. Most of the countries are installing CCITT No 7 links so as to anticipate the development of intelligent networks (wide-area Centrex, reverse charge cells, etc.).

**Table III**  
**Market Segmentation in 1987**

|                        | %   |
|------------------------|-----|
| Network equipment      | 54  |
| Professional equipment | 38  |
| Residential equipment  | 8   |
| Total production       | 100 |

Source: BIPE.

**Table IV**  
**Product Segmentation in 1987**

|                   | %   |
|-------------------|-----|
| Public switching  | 37  |
| Private switching | 15  |
| Transmission      | 22  |
| Telephone sets    | 9   |
| Other terminals   | 15  |
| Miscellaneous     | 2   |
| Total production  | 100 |

Source: BIPE.

In transmission, digitization, including the conversion to optical systems, has begun to replace rival technologies since the end of the 1970s. 1987 saw the launching of the first so-called intelligent transmission products, i.e. multiplexers. The production of cable network equipment is strongly influenced by national conditions.

### Professional Customer Premise Equipment(CPE)

The production of CPE, valued at 6 billion ECU for 1987, is showing a reasonable rate of growth (+5% from 1986) which is, however, below market growth. One explanation for this is the drop in the dollar, which reinforced the competitiveness of North American manufacturers and thus affected exports, but it is also a result of foreign domination of the products with the highest growth rates. Private telephone equipment (PABX, key telephone systems - KTS) and telex equipment are close to saturation (80% replacement markets). The Americans are benefiting from the boom in data transmission products (+30% on local area networks, LAN), where their technological lead is acknowledged, while Japanese deliveries have exploded because the market for fax machines, where they have a virtual monopoly, almost doubled. However, private switching, estimated at 2.4 billion ECU, remains the most important production area.

### Residential CPE

This sector, dominated by South-East Asia, is the weakest point of the European telecom industry. Valued at 1.3 billion ECU, production includes telephone sets and answering machines as well as videotex terminals. Only for this latter product is trade in balance, owing to the special case of France (production of Minitels estimated at 200 million ECU in 1987 for 3.45 million terminals installed). The slight deficits observed for telephone sets and answering machines (not counting the grey market of fraudulent imports) mask a more serious threat of imports after the deregulation of the terminals market, as happened in the United Kingdom.

### International Trade

A drop in exports together with a sizeable rise in imports caused an appreciable deterioration in foreign trade in 1987. This phenomenon reflects the EC industry's lack of competitiveness for certain products which can primarily be seen in trade with the United States and Japan.

**Table V**  
Foreign Trade in 1986

| (%)               | Exports | Imports |
|-------------------|---------|---------|
| EFTA              | 19      | 27      |
| United States     | 6       | 23      |
| Canada            | 0       | 6       |
| Japan             | 0       | 25      |
| Rest of the world | 75      | 19      |

Source: BIPE.

Germany, France, Belgium, the United Kingdom and Italy account for 85% of exports outside the EC - the first two countries alone accounting for 50% of exports. The EC telecom industry has a large customer base inherited from its

long-standing presence on the international market. The biggest single market, the United States, remains its most important client, but the EC only provides 5% of USA imports. The EFTA countries account for about one-fifth of exports, while exports to Canada and Japan are negligible. The rest of the world is the largest market accounting for three quarters of exports outside the EC.

The shares held by exporters to the Community, who control 6% of the EC market, are more balanced. In 1987, Japan became the main supplier for the EC, ahead of the EFTA countries and the United States, but they each account for approximately one-quarter of Community imports. The main importer is unquestionably the United Kingdom (almost one-third), while the markets of the Netherlands and of Denmark have been heavily penetrated by non-EC competitors. This is why the EC, which shows a deficit for most of the countries that have a developed telecommunications industry (United States, Canada, Japan, Sweden), only achieves a trade balance thanks to other markets, controlled as the result of industrial links of long standing.

Intra-Community trade today represents about 7% of the market. It is marked by the strength of German exports, the other countries being relatively balanced, and by the importance of UK and Dutch imports.

### Factors behind Production Trends

198 000 people were employed in telecommunications manufacturing in 1987, a continuous drop since the transition from electromechanical technology to electronic analogue technologies, and then to digital. This falling trend will continue with the intensification of digitization, and above all owing to recent - as well as future - industrial restructuring. Growth in total productivity can be assessed at 7% annually for the period 1980-1987, without taking into account the considerably enhanced performance of materials. Workers have been much more severely affected than managerial staff and employees, representing fewer than 40% of all employees in 1987, and their share is diminishing. Managerial and professional engineering employment is relatively stable and the outlook remains favourable for software engineers, whose skills are particularly sought after.

**Table VI**  
Production Cost Structures

| (%)                    | Electro magnetic | Semi-electronic | Totally electronic | Digital electronic |
|------------------------|------------------|-----------------|--------------------|--------------------|
| Material               | 47               | 58              | 70                 | 78                 |
| Salaries               | 12               | 7               | 5                  | 3                  |
| Other production costs | 41               | 35              | 25                 | 19                 |

Source: Standard Electric Lorenz Annual Report 1986.

Eighty per cent of R&D costs (themselves often well above 10% of turnover, and above 20% for network equipment), goes towards equipment software, while software accounted for only 20% in developing analogue technology a decade earlier.

The EC has launched pre-competitive Community research programmes for which it provides 50% of the financing, the other 50% being provided by participating firms (some of them belonging to EFTA). Esprit (European Strategic Programme for R&D in Information Technologies), devoted to information technologies (data processing, telecommunications, components), has total funding of 8 billion ECU over five years. RACE (R&D for Advanced Communications Technology in Europe), although its total budget is only 1.1 billion ECU for 1987-1991, is specifically intended to make possible the establishment of an integrated broadband communication network in the Community from the mid-1990s.

### Industrial Structure

Mergers and acquisitions are transforming the structure of the industry. 1986 saw the emergence of two European heavyweights with the formation of ALCATEL NV (ITT-CGE) and the takeover by Siemens of GTE's continental subsidiaries. But restructuring continues. Concurrent with the formation of the national champions, Ascom in Switzerland (Hasler and Autophon in June 1987) and GPT in the United Kingdom (GEC and Plessey in April 1988), major firms are trying to reinforce their position. Thus, the Bosch group strengthened its control of ANT and of TeleNorma in December 1987 and of Jeumont-Schneider (80% in July 1988), while SAGEM has held a majority of shares in SAT (58%) since June 1988. After its failure in November 1987 in negotiations with Italtel, Telettra (FIAT group) has also consolidated its position through an agreement with Telefonica (February 1988) that allows it to control Telettra Espanola.

The main issue - the search for a partner for Italtel - set Siemens and the AT&T/Olivetti team against one another, Alcatel and Ericsson being out of the running. For the Swedish firm Ericsson, this was the means, after Spain (purchase in September 1986 of Telefonica's shares in Intelsa), France (takeover of the CGCT with Matra in April 1987) and the United Kingdom (purchase in June 1988 of Throne-EMI's shares in TET), of affirming its position in the Community. AT&T, despite its entry into the Dutch market (since August 1983, cooperation with Philips in APT, of which AT&T has held 60% since January 1988) and, perhaps, the Spanish market (partnership with Telefonica, takeover of Marconi in June 1987 by APT and Amper), is still waiting for a major European success. AT&T's takeover in July 1988 of GTE's public switching activities allowed it, in the absence of compensation, to move ahead of its Canadian rival Northern Telecom in the United States, the latter's European

objectives being clear: takeover in October 1987 of ITT's shares in STC and the opening in January 1989 of a factory in Metz (France) for the manufacture of PABX. IBM, which launched a European PABX in October 1987, shares this interest with the Japanese (Fujitsu in Spain or NPC, Toshiba and Matsushita in the United Kingdom).

**Table VII**  
**Ranking of Telecom Equipment Manufacturers in 1987**

| (Million ECU)               | Country | Telecom sales | World market share (%) |
|-----------------------------|---------|---------------|------------------------|
| AT&T                        | US      | 9 000         | 12.5                   |
| ALCATEL NV (CGE 56.3%)      | EC      | 6 800         | 9.5                    |
| SIEMENS                     | EC      | 5 400         | 7.5                    |
| NEC                         | JAP     | 4 400         | 6.1                    |
| NORTHERN TELECOM (BCE 52%)  | CAN     | 4 100         | 5.8                    |
| MOTOROLA                    | US      | 3 000         | 4.2                    |
| ERICSSON (WALLENBERG 37.5%) | SWE     | 2 800         | 3.9                    |
| IBM                         | US      | 2 100         | 2.9                    |
| FUJITSU                     | JAP     | 1 700         | 2.4                    |
| GPT (GEC 50%-PLESSEY 50%)   | EC      | 1 600         | 2.2                    |
| PHILIPS                     | EC      | 1 500         | 2.1                    |
| BOSCH                       | EC      | 1 300         | 1.8                    |
| HITACHI                     | JAP     | 1 200         | 1.6                    |
| GTE                         | US      | 1 000         | 1.3                    |
| ITALTEL (IRI 26%-STET 74%)  | EC      | 900           | 1.3                    |
| Others                      | -       | 25 000        | 34.9                   |
| World total                 | -       | 71 800        | 100.0                  |

Turnover reflects company structure in July 1988. Radiocommunication equipment and cables are taken into account although they do not form part of the indicator.

Source: BIPE.

The European members of EFTA are well represented, and Ericsson and Nokia are obligatory partners in plans for digital mobile telephones. The latter, under the aegis of the CEPT (European Conference of Postal and Telecommunications Administrations), represents the first truly European market.

As of mid-1988, there were about 1 000 manufacturers in the EC, but only 30 groups account for over 20 million ECU worth of sales of telecommunications equipment. Three groupings emerge:

- the major Europeans, with Alcatel, Siemens, Ericsson and Philips slightly in the background
- the major nationals, including GPT, Bosch, Italtel, MATRA, SAGEM, STC, RACAL, Telettra
- and a very large number of smaller and more specialized manufacturers.

The sector is highly concentrated, with the first 10 groups controlling 82% of production; this is even more obvious in the case of individual countries. With the exception of UK firms, profitability is modest (with profits standing at about 3% of turnover) and has dropped for a number of manufacturers in comparison with 1986.

**Table VIII**  
**EC Ranking of Telecom Equipment Manufacturers**  
**in 1987**

|                                   | Production share (%) |
|-----------------------------------|----------------------|
| ALCATEL NV (CGE 50, 3%-ITT 37%)   | 28                   |
| SIEMENS                           | 18                   |
| GPT (GEC 50%-PLESSEY 50%)         | 7                    |
| ERICSSON (WALLENBERG 37.5%)       | 6                    |
| BOSCH                             | 6                    |
| PHILIPS                           | 6                    |
| ITALTEL (IRI-STET)                | 4                    |
| MATRA                             | 3                    |
| SAGEM                             | 2                    |
| STC (NORTHERN TELECOM 27.5%)      | 2                    |
| TELETTA (FIAT 90%-TELEFONICA 10%) | 1                    |
| RACAL                             | 1                    |
| APT (AT&T 60%-PHILIPS 40%)        | 1                    |
| Others                            | 15                   |
| <b>Total EC</b>                   | <b>100</b>           |

Source: BIPE.

### Forecast and Outlook

The production of equipment should remain relatively stable in 1988, with the internal market compensating for an expected fall in exports. The year 1989 will be marked by the actual launching of ISDN. Solidly supported by PTT investments, ISDN should make possible a 2% growth in volume. In the medium term, professional equipment should take over, ensuring 3.5% growth, on the assumption that the EC manages to limit import penetration of their internal market. Deregulation of the terminals market could facilitate penetration by foreign products, as it did the United Kingdom in the early 1980s.

Fax machines and optical systems will see the strongest growth (above 30%), ahead of data transmission equipment, local networks and multiplexers. PABX production will remain stable, because relatively untouched by the moderate development of Centrex switches (central office switches offering firms a service comparable to PABX). The deregulation of the telephone-set market will make possible the creation of a general market, such as is already the case in the United Kingdom and, increasingly, in France. The strong growth created, from 20-40% according to sector, will occur to the detriment of public procurement but will produce a more competitive supply. The prospects for the production of videotext terminals are becoming quite uncertain. On the

one hand, Minitel, which is at present distributed at no cost in France, may charge a fee, which would unsettle the market. On the other hand, success with the general public is not yet assured in Germany, and other countries are only at the launching stage. The production of telex equipment, facing competition from fax and teletex, will decline.

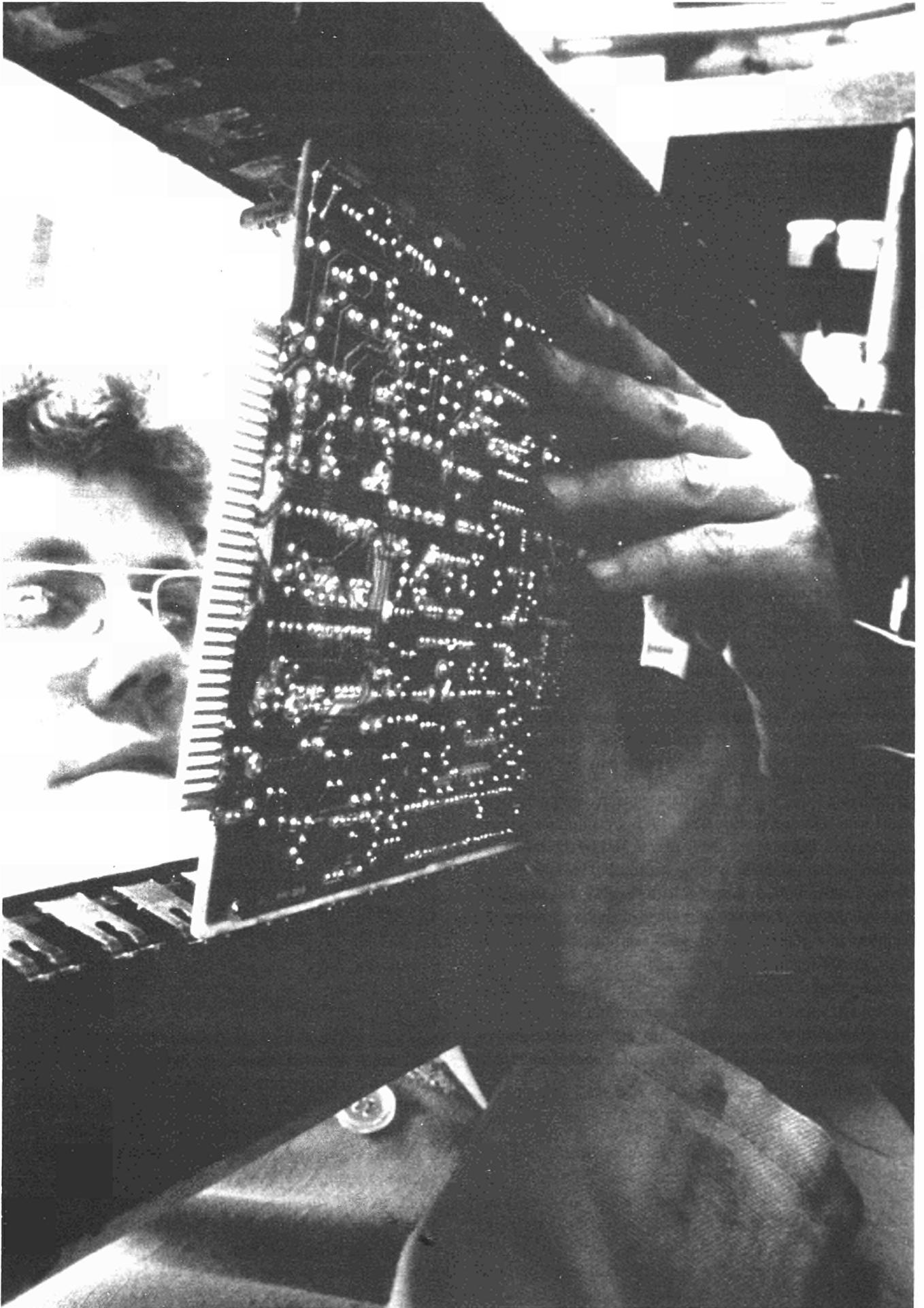
Most other types of equipment will remain relatively stable although undergoing significant qualitative changes as the result of a market shift towards ISDN products. Production of electromechanical central office switches will thus continue to decline and be limited to the extension of existing systems before being phased out altogether by 1995. By contrast, production of time-division central office switches will benefit from PTT equipment plans and should conform to narrow band ISDN standardization as of 1990. The transition to broad band ISDN will take place after 1995, based on fibre optics infrastructures. Towards 1990, the first products for "intelligent networks", described in the ONP (Open Network Provision) recommendations of the Green Paper, will be available. This should lead to the appearance of products that integrate data processing and telecommunications by means of non-specialized processors, for both network and professional equipment. Linked to ISDN developments, videophones will probably not become a mass product because of their high cost and the need to create a market. Moreover, important R&D work on image coding and CODEC integration is still being carried out. Fibre optics should begin to make its way into homes towards the year 2 000, giving new impetus to a sector threatened by saturation.

The Community will undergo two major changes as the result of the establishment of the internal market and deregulation:

- intra-Community trade is bound to develop strongly and will undoubtedly be marked by annual growth exceeding 15%
- the private market (professional and residential) not covered by the PTTs will constitute an important - but highly competitive - opportunity for European suppliers.

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# ELECTRONIC COMPONENTS

(NACE 345)

*Growth in the output of electronic components slowed sharply over 1986 and 1987; the nominal value of output grew by around 3% for each of these years compared with an average annual increase of 13.4% between 1980 and 1985. Germany produces about 30% of total EC output which reached 14 billion ECU in 1987; this compares with output valued at 28 billion ECU in each of Japan and the US. Global competition is intense in this industry, with increased production and export activity amongst South-east Asian companies. Cooperation amongst EC firms, assisted by governments, is aimed at pooling R&D resources and increasing investment in the industry. Through these efforts, the EC industry aims to increase production and market shares, making it less dependent on American and Japanese companies, and also able to compete more successfully in world markets.*

In 1987 the EC electronic components industry (including active, passive and electro-mechanical components) achieved a manufacturing output estimated at more than 14 billion ECU. This represented a 3.2% rate of growth over the previous year.

Active components include semiconductors (integrated circuits and discrete semiconductors) and electronic valves and tubes; passive components include capacitors, resistors and wound components (small transformers, chokes, coils and other inductors); electromechanical components include connectors, relays, switches and printed circuits.

## Current Situation

The electronic components industry suffers from large cyclical swings; 1986 was an especially bad year for this industry and 1987 showed little improvement. The previous average

growth rate of the electronic components industry was about 8% per annum.

Germany, France, the UK and Italy together account for more than 80% of European production, with shares of 35%, 21%, 19% and 9% respectively. To put the the EC components industry into a world-wide context, its output is significantly smaller than that of the US or Japan, whose production figures in 1986 were approximately equal at 28 billion ECU.

The EC components industry accounted for 13% of the total output of the Community electronics industry in 1986. Components accounted for 23% of the Japanese electronics industry and 16% of the American industry. Nearly half of the components production was associated with active devices (see Figure 1) and integrated circuits have the highest share of European production.

The EC market for components totalled more than 16 billion ECU in 1986, with over 50% accounted for by active components. The market declined by nearly 2% compared with the previous year but is expected to have grown by 4% in 1987. By comparison, the USA provided a market worth more than 29 billion ECU in 1986, while Japan consumed components to the value of 23 billion ECU.

## Employment Trends

There were 261 960 people employed in the components industry in 1987.

## Export Trends

The EC electronic components industry registered a slight surplus in 1986 with net export earnings of nearly 500 million ECU. However, trade trends between 1980 and 1986 were generally unfavourable; the surplus decreased from 1.2 billion ECU in 1980 to less than 500 million ECU in 1986. In 1984 the trade balance was negative.

## Main Indicators Electronic Components

| (Million ECU)        | 1980    | 1981    | 1982    | 1983    | 1984   | 1985   | 1986   | 1987   | 1988   | 1989   | 1990   |
|----------------------|---------|---------|---------|---------|--------|--------|--------|--------|--------|--------|--------|
| Apparent consumption | 6 083   | 6 241   | 6 737   | 8 271   | 12 378 | 13 125 | 13 117 | N/A    | N/A    | N/A    | N/A    |
| Net export earnings  | + 1 246 | + 1 539 | + 1 839 | + 1 492 | - 11   | + 104  | + 498  | N/A    | N/A    | N/A    | N/A    |
| Total production     | 7 329   | 7 780   | 8 576   | 9 763   | 12 367 | 13 229 | 13 615 | 14 060 | 15 079 | 16 015 | 16 844 |

**Table I**  
**Estimated Production of Electronic Components by Country (1987)**

| (Million ECU)                 | BLEU | DK  | D     | E   | F     | IRL | I    | NL   | UK    | Total |
|-------------------------------|------|-----|-------|-----|-------|-----|------|------|-------|-------|
| Active components             | 10   | 6   | 1 835 | 97  | 1 570 | 214 | 713  | 780  | 1 164 | 6 389 |
| Passive components            | 153  | 43  | 932   | 70  | 383   | 40  | 154  | 226  | 257   | 2 258 |
| Electro-mechanical components | 195  | 90  | 2 152 | 125 | 910   | 168 | 408  | 215  | 1 150 | 5 413 |
| Total                         | 358  | 139 | 4919  | 292 | 2863  | 422 | 1275 | 1221 | 2571  | 14060 |

Source: EECA - Bis Mackintosh.

**Table II**  
**Extra-EC Exports of Electronic Components**

| (Million current ECU) | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  |
|-----------------------|-------|-------|-------|-------|-------|-------|-------|
| Active components     | 897   | 1 064 | 1 167 | 1 382 | 2 760 | 2 977 | 2 825 |
| Passive components    | 953   | 1 057 | 1 234 | 1 247 | 1 270 | 1 272 | 1 231 |
| E-Mech components     | 2 907 | 3 210 | 3 761 | 3 960 | 4 104 | 4 468 | 4 361 |
| Total                 | 4 757 | 5 331 | 6 162 | 6 589 | 8 134 | 8 717 | 8 417 |

Source: EECA - Bis Mackintosh

**Table III**  
**Extra-EC Imports of Electronic Components**

| (Million current ECU) | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  |
|-----------------------|-------|-------|-------|-------|-------|-------|-------|
| Active components     | 1 755 | 1 887 | 2 154 | 2 657 | 4 918 | 5 089 | 4 481 |
| Passive components    | 617   | 617   | 735   | 809   | 1 024 | 1 105 | 1 107 |
| E-Mech components     | 1 139 | 1 288 | 1 434 | 1 631 | 2 203 | 2 419 | 2 331 |
| Total                 | 3 511 | 3 792 | 4 323 | 5 097 | 8 145 | 8 613 | 7 919 |

Source: EECA - Bis Mackintosh

**Table IV**  
**Extra Community Export/Import Ratio**

|                    | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 |
|--------------------|------|------|------|------|------|------|------|
| Active components  | 0.65 | 0.68 | 0.68 | 0.69 | 0.70 | 0.69 | 0.71 |
| Passive components | 1.18 | 1.30 | 1.29 | 1.24 | 1.08 | 1.05 | 1.03 |
| E-Mech components  | 1.57 | 1.60 | 1.67 | 1.60 | 1.35 | 1.36 | 1.34 |

Source: EECA - Bis Mackintosh

## Active Components

Active components include two major groups of components: semiconductors (integrated circuits and discrete devices) and tubes (valves and CRTs).

The production of active components was 6.2 billion ECU in 1986 with Germany, France, the UK and Italy accounting for more than 80% of the total. The largest producer is Germany with a 29% share, followed by France (24%), the UK (19%) and Italy (11%). EC's production can be compared to the 1986 market for active components of 8.7 billion ECU. Integrated circuits (ICs) represent the major share output for the industry, followed by tubes and, finally, discrete components.

Production of semiconductors in the EC is more heavily biased towards the technologically simpler discretely than is the case in the US or Japan. In Europe the split is 35%

discrete and 65% ICs, compared to 16% discrete for the USA and 22% for Japan. The main producer of ICs is Germany with 29% of output, followed by the UK (24%), France (21%), the Netherlands (11%) and Italy (6%).

Production of tubes in the EC reached over 2.1 billion ECU in 1986, an 11% growth over the previous year. It is expected that 1987 production will also show growth, but at the much lower rate of 4%. The major producer of tubes is Germany, with 30% of total EC production. It is followed by France, with 26%, and Italy, with 18%. The UK accounted for 15% of 1986 production, the Netherlands 9% of production.

Integrated circuits represent the largest portion of the production of active components in Europe and are of great strategic importance to the European electronics industry. The strong European position in colour picture tubes allow it to keep a foothold in consumer electronics.

**Table V**  
**Share of 1986 EC Production**

| (Million ECU)           | Production | % Share |
|-------------------------|------------|---------|
| Integrated circuits     | 2 635      | 19      |
| Connectors              | 2 625      | 19      |
| Tubes                   | 2 151      | 16      |
| PCBs                    | 1 576      | 12      |
| Discrete semiconductors | 1 432      | 11      |
| Capacitors              | 1 093      | 8       |
| Switches and relays     | 1 009      | 7       |
| Wound products          | 602        | 4       |
| Resistors               | 492        | 4       |
| Total EC                | 13 615     | 100     |

Source: EECA-Bis Mackintosh

### Industry Structure

For many years, the European-owned semiconductor industry has been under pressure from the Japanese, who have the advantages of strong government support and a preponderance of vertically integrated companies. European-owned production has long been augmented by the activities of American-owned producers in Europe and these are now being supplemented by Japanese semiconductor operations.

Within the EC, as with the US and Japan, great importance is attached to having an indigenous (i.e. European) source of leading-edge components.

Over the last few years, a spate of joint ventures and mergers has imbued the European industry with new vigour such that its share of its own market has risen from 36% in 1984 to 43% in 1987. Examples include the Megaram project of Siemens and Philips, the SGS/Thomson and Plessey/Ferranti mergers.

The benefits resulting from such actions are:

- a pooling of research resources;
- a pooling of marketing resources;
- an increase in production volumes and the achievement of "economies of scale".

Scale is important because investment and R&D costs are so high that they can only be afforded by large companies. In the future more pressure can be expected from the American and Japanese suppliers who currently dominate the supply

of many component types (e.g. DRAMs). Many of them have established production and assembly facilities within Europe. In addition, increased competition is coming from companies located in the newly industrialized countries of South-east Asia (e.g. Korea, Taiwan).

To counter the dependence on imported ICs, which supply an estimated 45% of Europe's requirements, there is a need for European companies to either consolidate further, achieve a larger market share and the economies of scale that can result, or to identify specific niche markets that can be exploited.

Unlike in the US, the emergence of a new semiconductor company in Europe is a rare event. However, innovative products have come from new European companies:

- ES2 in the field of ASICs;
- IMMOS with its transputer;
- Mietec with power ICs.

The European semiconductor industry is not so different in structure from other industries. Despite the common market, European companies have had difficulty in crossing national frontiers and treating Europe as one market.

A significant European chip collaboration across borders is the proposed collaborative venture called Joint European Submicron Silicon Initiative, or JESSI. It is the largest project undertaken by the industry and government and aims to develop the design and manufacturing techniques for advanced integrated circuits such as 16 M bit and 64 M bit DRAMs, 4 M bit SRAMs and a European microprocessor.

### Factors behind Production Trends

The major forces of change in the electronic components industry relate primarily to active components.

Over the next 10 years it is expected that CMOS technology will continue to be the basis of SRAM and DRAM memory devices produced by the semiconductor industry. Over this period, chip capacity will increase from the 1 M bit DRAM to 4 M bit to 16 M bit DRAMs.

Although Bipolar technology will continue to be used for the faster logic and microprocessor circuits that are required, there is a continuing trend away from bipolar and N-MOS,

**Table VI**  
**EC Production of Active Components**

| (Million ECU)  | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  | 1987  | 1988  | 1989  | 1990  |
|----------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Active         |       |       |       |       |       |       |       |       |       |       |       |
| Current value  | 3 154 | 3 282 | 3 712 | 4 385 | 5 858 | 5 973 | 6 218 | 6 389 | 6 957 | 7 382 | 7 834 |
| Constant value | 3 154 | 3 007 | 3 135 | 3 512 | 4 468 | 4 343 | 4 413 | 4 420 | 4 827 | 5 120 | 5 435 |

Source: EECA-Bis Mackintosh

P-MOS in favour of C MOS. By 1992, C MOS technology is expected to account for more than half of IC shipment.

Dramatic growth has occurred in the market for ASIC's with shipments growing at more than 40% per annum between 1983 and 1985. This growth is expected to continue and the ASIC share of the total IC market is predicted to grow from 20% in 1986 to nearly 50% in the early 1990s. Other high growth markets will be associated with the 1 megabit dynamic RAM, the 32 bit microprocessor, and ICs for digital signal processing.

**Table VII**  
**IC Technologies % (by value)**

|                 | 1982 | 1987 | 1992 |
|-----------------|------|------|------|
| C MOS           | 12%  | 38%  | 57%  |
| Bipolar analog  | 22%  | 21%  | 19%  |
| Bipolar digital | 23%  | 15%  | 14%  |
| NMOS + P MOS    | 43%  | 26%  | 10%  |

Source: ICE Status 1988.

An interesting development that can be expected to affect the market over the next 10 years is the BICMOS chip containing the high-speed bipolar circuits as well as the low-cost CMOS memory devices on the same chip.

It is expected that gallium arsenide-based ICs will be developed, produced and start being used in those applications requiring very fast switching and processing speeds. Their market share will however remain small.

The development of special microprocessor chips based upon the use of a reduced instruction set (RISC) will become of greater importance to the industry and it can be expected that such chips will be manufactured and used in large numbers. The same can be said of parallel processors such as the Transputer developed by INMOS.

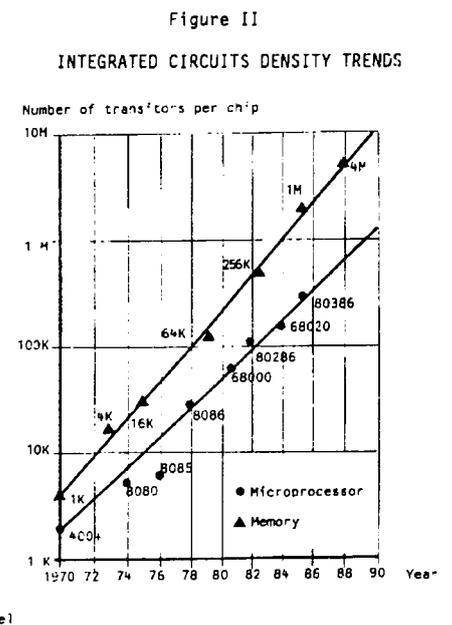
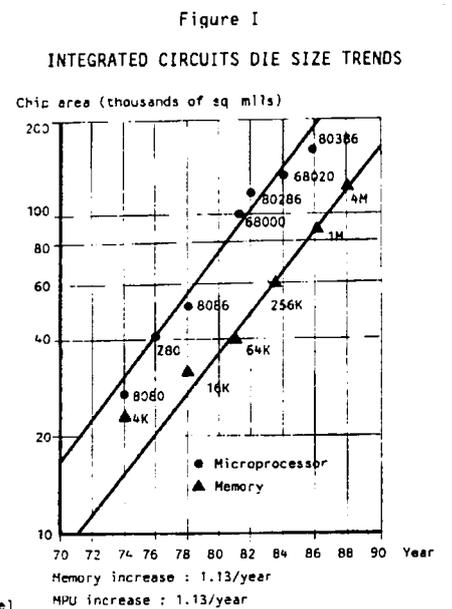
Parallel to these developments there will be a general increase in the use of semi-custom circuits and application specific ICs (ASICs). Such chips provide the user with the ability to obtain customized circuits at a fraction of the old cost. As stated by a major computer and office systems company, "To survive in the computer industry companies need to have the ability to design on silicon". The ASIC and the Silicon Compiler provide that means.

The trends in IC technology are summarized in Figures I and II, which shows the increase in wafer size, the increase in chip size, the decrease in feature size and the increase in chip complexity.

The production of ICs is subject to the technological trends shown in Figure I. As a consequence there has been a steady increase (on a logarithmic scale) in the number of transistors per chip. These trends are expected to continue and result in 500 M transistors per chip becoming available by the year 2000.

IC feature sizes of less than 0.35 micron (the limit of optical lithography) require the use of electron beam or X-ray lithography. Such techniques are being developed and introduced by the leading IC manufacturers.

A significant factor affecting the growth of the European IC industry is the availability of the required production and test equipment. As chip complexity increases and feature sizes are reduced the tolerance requirements placed on production equipment become much more severe. At the same time, as the wafer size is increased this restricted tolerance has to be maintained over a larger area.



Much of the precision equipment used is now of American or Japanese origin. For EC companies to compete they must match the US and Japanese companies in terms of production facilities. This being the case, EC companies have become largely dependent upon the US and Japan for this equipment (advanced high-precision lithography for example).

However, European companies have developed precision electron beam equipment that may be used to provide the electron beam lithography required for the leading-edge sub-micron feature size ICs. The equipment is competitive with that available from US and Japanese sources.

### *Research and Development*

To assist the development and competitiveness of the European IT industry, the Commission of the European Communities (CEC) launched the European Strategic Programme for Research and Development in Information Technologies, known as ESPRIT.

The programme was first put forward in May 1983 and adopted in February 1984. The Esprit programme involves consortia of IT companies, academic institutions and research organizations situated within the EC in a series of pre-competitive research programmes on a cost-sharing basis.

One of the areas defined within Esprit as an enabling technology is advanced microelectronics and there are a number of initiatives covered in Esprit, including a five-year programme to advance submicron MOS and submicron Bipolar technology.

Another initiative concerns research into III-V materials with a view to developing memory circuits. There is also a programme aimed at the development of optoelectronic ICs where optical components and conventional processing circuitry are integrated onto the same IC. The microelectronics support programme (MEL) received 166 million ECU over the 1983 to 1985 period.

In addition, the Esprit programme has also supported the development of CAD systems and the equipment needed for the testing of complex ICs. The aims of the CAD programme are to develop the CAD infrastructure needed to handle VLSI circuits. Esprit has also established a communications network for participants in the programme called EUROKOM. As of spring 1987 the number of users of this service had reached 1 300.

### *Consumption Trends*

Increasingly, the equipment and systems manufacturers are realizing the importance of having access assured to leading-edge ICs. Without these chips they are unable to develop the competitive products that are required.

IC manufacturers mainly outside Europe enjoyed buoyant conditions in 1987, recovering from the earlier slump. Manufacturers are looking forward to more gentle growth now in what is becoming a more mature market. Hopefully, the huge peaks and troughs in supply and demand will be smoothed out as IC users learn to plan their requirements more precisely.

The chip shortage that resulted from the Japanese switching production from the 256 kbit dynamic RAM to the latest generation 1 Mbit RAMs has had adverse effects in Europe. The delays encountered in setting up for 1 Mbit production and the initial yield problems experienced resulted in a shortage of both chips. Prices increased dramatically and the major users have had to pass these on in the form of more expensive products. The price of memories is expected to remain comparatively high this year.

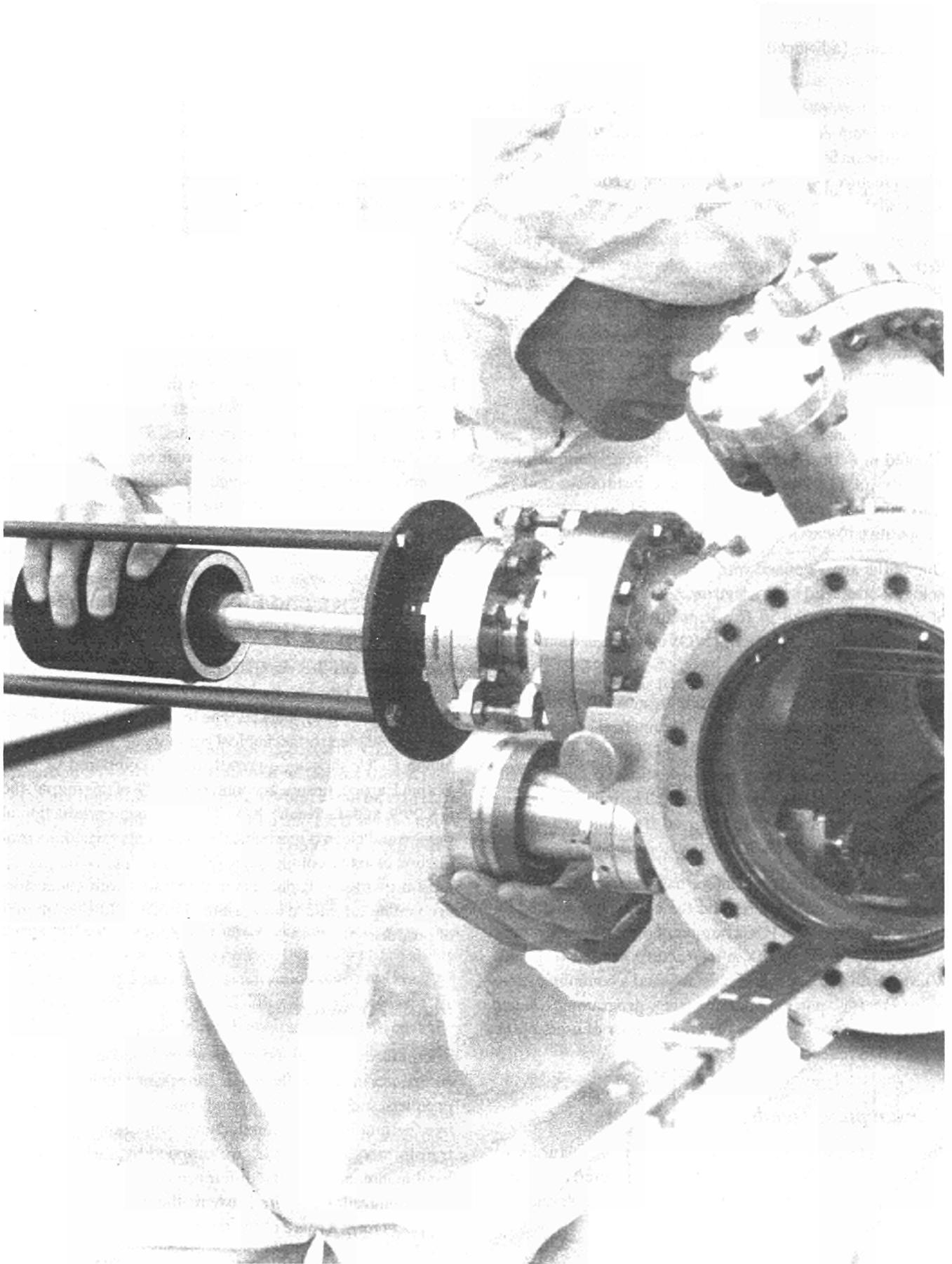
Among the significant new markets emerging are ISDN, which should give profitable opportunities. Also, the rapid increase in the use of electronics by the automotive industry will provide a major boost to the electronics components sector. It is expected that within five years, 50% of the cars produced in Europe will contain electronic engine management systems, providing a huge potential market for microcontrollers, power ICs, sensors and actuators.

## **Passive and Electro-mechanical Components**

The Europeans are significant producers of passive electronic and electro-mechanical components and have a 25% share of the world market. The European production of passive and electro-mechanical components in 1986 was 7.4 billion ECU, showing a growth of 2% compared to 1985. Within Europe, France accounted for 17% of this output, the UK 19% and Germany 40%. The European production of passive and electro-mechanical components exceeds its production of active components. Of this production output, almost a quarter is capacitors and resistors with connectors accounting for a third and printed circuits a further quarter of production.

### *Industry Structure*

The industry is made up of many small and medium-sized companies in each of the major European countries. Certain products, such as capacitors and connectors, are dominated by a few multinational manufacturers while others, PCBs and transformers for example, are supplied by a whole host of local manufacturers. The difference is mainly in the degree of customization required; where this is high, small local suppliers form a share of the industry.



**Table VIII**  
**Extra Community Export/Import Ratio**

|                    | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 |
|--------------------|------|------|------|------|------|------|------|
| Active components  | 0.65 | 0.68 | 0.68 | 0.69 | 0.70 | 0.69 | 0.71 |
| Passive components | 1.18 | 1.30 | 1.29 | 1.24 | 1.08 | 1.05 | 1.03 |
| E-Mech components  | 1.57 | 1.60 | 1.67 | 1.60 | 1.35 | 1.36 | 1.34 |

### *Factors behind Production*

The technology of passive components is relatively mature. The most important technological change is the trend to surface mounting, which necessitates producing components to conform with this technology. It is also bringing about certain market share changes, the most notable being the trend from plastic to multilayer ceramic capacitors. The former is largely the preserve of European companies and the latter of US companies.

### *Consumption Trends*

The European market for passive and electro-mechanical components in 1986 was valued at 5.2 billion ECU which represented an increase of 4% over the previous year.

Connectors account for the largest share with almost one third of this market. This is followed by printed circuits with almost a quarter of the market and finally, capacitors and resistors which together account for another quarter of the total.

Germany (31%), the UK (23%) and France (17%) were the largest consumers in this market.

### **Forecast and Outlook**

European production of components is predicted to grow by 5.7% in real terms over the period 1988 to 1990.

Major growth is expected in active components at an average yearly rate of 6.1% (CAAGR) over the period.

Electro-mechanical components are growing at an average rate of 5.8%, while passive components are expected to see 4.2% growth.

IC and tubes will show the strongest growth within the active components sector, particularly in Germany and Italy. In the UK and France the production of tubes is growing faster than ICs. The slowest growth rate is in discrete components and production is actually falling in the UK and Italy.

The major growth area in electro-mechanical components is PCBs, particularly in Germany and Italy. However, only slow growth is expected in France. The production of PCBs in the UK fell during the period 1985 to 1988, as did all electro-mechanical products. However, some recovery is predicted in the UK, with slow growth to 1990. The largest product within the sector, connectors, is growing strongly in Germany, France and Italy.

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## ELECTRICAL AND ELECTRONIC ENGINEERING

(NACE 34)

*The electrical and electronic engineering sector occupies a key position in the EC, since it is linked with most other industries by close supply relationships which result from the technical and economic diversity of its products. The sector is an industrial leader in terms of production volume and numbers employed. Its development has been marked by periods of vigorous growth. In 1987, the electrical and electronic engineering industry employed a workforce of more than 2.3 million and reported a turnover of 182 billion ECU; exports to third countries totalled more than 36 billion ECU.*

The electrical industry's manufacturing range covers the entire spectrum of electrical and electronic products. Production is classified by the following main product groups: capital goods, consumer goods, and primary products and assembly. The emphasis is on capital goods which account for about two thirds of total output. This covers products in the areas of electric power engineering (electricity generation, transformation and transmission), telecommunications, measurement and control and automation, medical engineering and electronic equipment for motor vehicles, aircraft and spacecraft, all of which have extended vertical ranges of manufacture. Since this sector has developed so strongly over the past few years, the telecommunications and electronic components sectors are described separately in the chapter on Professional Electronic Equipment (Chapter 12). However, figures for these two sectors are included in the statistics for electrical and electronic engineering.

Major growth areas in past years were the "electronics" sectors of measurement, control and automation, telecommunications and electronic equipment. Consumer durables, domestic electrical appliances, consumer entertainment electronics

and lighting equipment make up around one fifth of production. In the area of primary products, electronic components play a key role in the technical and economic development process.

### Current Situation

The 1986 employment level places the Community's electrical and electronics industry on a par with the US and the Japanese industry even though its output is considerably lower than in these two countries. The main reasons for this may be differences in the vertical range of manufacture and specialization as well as supply relationships that are inter-linked in a different way. In terms of exports, the EC industry is second after Japan and ahead of the United States; in terms of imports, it also holds the mid-position between the two other countries. The size of the EC electrical market, presently valued at around 180 billion ECU, is estimated to represent approximately one fifth of the world electrical market. The EC market is characterized by a large variety of products and particular technical and regional markets.

### Consumption Trends

The widely diversified product spectrum of the electrical and electronics industry is matched by a variety of users; products go directly as consumer goods into private households, are dependent upon public-sector demand or are supplied to industry for manufacturing purposes or as capital equipment. However, a considerable proportion of electro-technical products are used as primary or intermediate inputs by the electrical industry itself, which is its own best customer. This accounts for the exceptionally extended vertical range

**Main Indicators  
Electronic and Electrical Engineering**

| (Million ECU)            | 1980    | 1981    | 1982    | 1983    | 1984    | 1985    | 1986    | 1987    | 1988    |
|--------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Apparent consumption (1) | 100 291 | 107 422 | 116 558 | 124 231 | 138 491 | 152 863 | 160 822 | 168 505 | 177 603 |
| Net export earnings (1)  | +6 305  | + 6 231 | +6 703  | + 6 680 | +6 612  | +6 938  | + 5 683 | +2 820  | +1 439  |
| Total EC production (1)  | 106 596 | 114 105 | 123 790 | 131 509 | 145 894 | 160 965 | 168 264 | 173 802 | 181 794 |
| Employment (1 000) (1)   | 2 705   | 2 570   | 2 472   | 2 388   | 2 381   | 2 396   | 2 393   | 2 368   | 2 342   |

(1) EC 12; 1987: estimate - Orgalime; 1988: forecast - Orgalime.

of manufacture compared with other sectors, and a net value-added exceeding that of all other capital goods industries. Thus, for instance, most electronic components are further processed in electrical manufacturing plants and more than one-third of the electrical industry's purchases of machinery and equipment consists of electrotechnical products. (Apart from electrotechnical products, the list of supplies of primary materials and commodities from other sectors of industry is led by non-ferrous metals and semi-finished metal products. Next come suppliers from the mechanical engineering and the chemical and plastic processing industries.)

The growth of the electrical and electronics industry in the 1960s and early 1970s was followed by a dramatic decline after the first oil crisis. The second half of the 1970s was again marked by sustained growth which, however, did not reach the high rates of previous years. Heavy losses followed in the period up to 1982, but, in subsequent years, a recovery produced above-average growth rates which lasted until 1986. Over the next few years a distinct upturn is indicated.

The developments outlined above are both the cause and effect of substantial structural changes which took place within the main product groups, capital goods, consumer goods and components rather than between these groups. In the growth process which began in 1983, the electronic segments gathered momentum recording the strongest growth; output now exceeds conventional electrical engineering, the products of which also increasingly come within the electronics field. Considerable growth rates were also experienced by domestic electrical appliance sectors, light fittings and lamps, though these clearly showed slower growth patterns.

The growth and development of intra-Community trade in electro-technical goods has been substantial, and with the creation of the single market this trend is likely to intensify.

## Export Trends

Over the 1980s, the market demand for electrotechnical products in the EC grew faster than the output of the electrical and electronic industry. The import penetration rate rose continuously from 14.1% (in 1980) to 19% (in 1987). The import ratio has followed a similar trend in the United States where it increased from 12.6% to 19.04% in 1986. By contrast, Japan's import ratio moved downwards; at 3% in 1986, it was even lower than in the early 1980s.

On the other hand, the export ratio of the EC electrical and electronics industry had risen only slightly by 1985, falling again in 1986 to nearly its 1980 value of 19.2%; the Japanese ratio (25.6% in 1980) remained almost unchanged, only falling to 22.2% in 1986. Over the same period, the US export ratio dropped from 14.1% to 11.3%.

Even though extensive changes in currency parities make realistic comparisons difficult, a few obvious differences between the three markets are shown in the 1986 figures. At 243.7 billion ECU, the value of the US market exceeded that of the EC countries (162.6 billion ECU) by roughly one third and the Japanese market (177.6 billion ECU) by just over one fourth, although, at around 221 billion ECU, US and Japanese production capacities were similar. Large differences in external trade exist between the two countries: with exports of 49 billion ECU, Japan lay ahead of both the EC (35 billion ECU) and the United States (25 billion ECU), but at the same time, featured as the smallest importer. The EC countries held the mid-position after the United States in the area of imports; rapid import growth in the Community has entailed a sharp reduction of export surpluses.

These developments took place against the background of an overall strong expansion in electrical exports of the western industrial nations; the total trade value of these countries

**Table I**  
**Production and Foreign Trade**

| (Million ECU)        | 1980    | 1981    | 1982    | 1983    | 1984    | 1985    | 1986    | 1987    | 1988    |
|----------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| Production (1)       |         |         |         |         |         |         |         |         |         |
| Current value        | 106 596 | 114 105 | 123 790 | 131 509 | 145 894 | 160 965 | 168 264 | 173 802 | 181 794 |
| Index                | 100.0   | 107.0   | 116.1   | 123.4   | 136.9   | 151.0   | 157.9   | 163.0   | 110.5   |
| Constant value (2)   | 106 596 | 104 774 | 104 558 | 105 189 | 111 732 | 118 134 | 119 854 | 120 758 | 124 500 |
| Index                | 100.0   | 98.3    | 98.1    | 98.7    | 105.0   | 110.8   | 112.4   | 113.3   | 116.8   |
| Imports Extra-EC (1) |         |         |         |         |         |         |         |         |         |
| Current value        | 14 184  | 17 342  | 20 026  | 22 228  | 26 786  | 29 478  | 29 358  | 32 558  | 35 000  |
| Index                | 100.0   | 122.3   | 141.2   | 156.7   | 188.8   | 207.8   | 207.0   | 229.5   | 246.8   |
| Exports Extra-EC (1) |         |         |         |         |         |         |         |         |         |
| Current value        | 20 489  | 23 573  | 26 729  | 28 908  | 33 398  | 36 416  | 35 041  | 35 378  | 36 439  |
| Index                | 100.0   | 115.1   | 130.5   | 141.1   | 163.0   | 177.7   | 171.0   | 172.7   | 177.8   |
| X/M                  |         | 1.45    | 1.36    | 1.33    | 1.30    | 1.25    | 1.24    | 1.19    | 1.09    |

(1) EC 12; 1987: estimate - Orgalime; 1988: forecast - Orgalime.

(2) Million 1980 ECU.

Sources: Eurostat, Orgalime.

reached 200 billion ECU in 1986. The relative export shares of the major exporting countries shifted, since the increase in the Japanese share to around one-fourth was achieved at the expense of other countries.

The different internal market conditions and the strong market inter-relationships of the European Community with the world market are more evident when the export structure is reviewed in terms of major product areas. For example, more than 40 % of Japanese exports are concentrated in the consumer entertainment sector of electronics. Here, the Japanese industry accounts for nearly two-thirds of world exports. US exports are also focused on the "electronics" segments. The European electrical and electronics industry has not reached nearly as prominent a position in any given product segment. The industry is represented relatively evenly in all areas. Two-thirds of world electrical exports are capital goods, one-fourth are consumer goods and one-tenth electronic components. This corresponds closely to the structure of European electrical and electronic exports.

### *Employment Trends*

The growth achieved in more recent years was not sufficient to stop the fall in employment. The only period in which job reduction came to a standstill was from 1983 to 1985, the years of particularly vigorous growth. At the same time, the structural pattern of the labour force changed in favour of higher-qualified employees in the engineering and software professions.

### *Factors Behind Production Trends*

Over the past few years, the production pattern of the electrical industry has had to adapt to many new technological developments and their applications. Shifts in production patterns have been both demand and technology induced and individual product areas have experienced considerable differences in growth. This is particularly true of the electronics sectors: at short intervals, the price/performance ratio is seen to improve dramatically. Moreover, new applications are constantly developed. Import pressure from third countries grows more intense as the technological developments become more widespread at the international level and production takes place in relatively lower labour cost countries.

The advance in productivity observed since the early 1980s as a result of the development of production and employment has gathered speed. This is primarily due to technological innovation which affects both products and the production process in the electrical and electronics industry.

The statistical material available allows only general statements to be made about the development of the electrical industry and the picture provided by the data is limited. In addition to the industry performance shown in the statistics, the electrical and electronics industry increasingly provides services for which no exact method of statistical coverage exists. Part of the services provided in the form of planning, design and engineering work, preparation of software, financing consultancy, maintenance and training are charged to the customer and are reflected in the overall sales volume; but to a considerable degree the cost of such services is "concealed" in plant and equipment prices. The value of these elements cannot be verified and will vary from one product area to the other, from company to company, and from order to order. This leads to a tendency to underestimate growth in these services.

With the expansion of large-scale plant business and the rapid advance of electronics, the proportion of industrial services has grown considerably. For an increasing number of electro-technical products - especially in growth-intensive areas - new business depends on the provision of these services. In addition, as a result of the integration and interaction of different product areas, more and more problem-oriented and hence service-intensive, user-specific solutions have to be found. Today, many employees are involved in supplying these industrial services and their contribution to turnover is correspondingly high.

### *The Position of Firms in the Industry*

Starting from a very low level in the early 1980s, on the whole, the financial situation of the electrical and electronic companies has changed for the better against a background of generally improved economic activity. However, compared with the industry's major competitors and especially the newly industrialized countries, the cost structure is extremely unfavourable. Both the labour-cost disadvantage and substantially shorter machine operation times in the EC countries strengthen the tendency for investment to shift to

**Table II**  
**Investment Trends**

| (Million ECU)        | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  | 1987  | 1988   |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
| Gross investment (1) | 4 724 | 4 803 | 4 917 | 5 429 | 6 755 | 8 392 | 9 396 | 9 715 | 10 045 |

(1) EC 12: 1984, 1985, 1986: excluding Greece; 1987: estimate - Orgalime; 1988: forecast - Orgalime.  
Sources : Eurostat, Orgalime.

third countries and/or favour the purchase of primary products from these countries. This will ultimately have negative effects on the labour market in the EC countries.

### *Major Structural and Geographic Features*

To the general public, the image of the electrical and electronics industry is synonymous with the names and achievements of the big companies which can look back on a long tradition and many pioneering successes in pursuit of technological progress. Yet this image is deceptive: it conceals the fact that, in statistical terms, the firms classified under 'electrical and electronic engineering' are impressive by their sheer number and all EC countries have seen a tremendous expansion in both number and diversity of products. The electrical industry offered opportunities to many new businesses which established themselves in the market with new products, tempering the relative importance of the big companies. Nevertheless, the big groups inside the Community are of great importance and account for around one-third of production and employment. Similarly, companies with a workforce of 1 000 to 10 000 which, in terms of numbers, account for only a small share of the total, make an above-average contribution to production and employment, while businesses with up to 200 employees, though representing around 90% of the total number, achieve only one-fifth of total output.

Recently, electrical and electronic manufacturers have been increasingly active in restructuring and re-grouping. Besides corporate integration at the international level, cooperation and joint ventures for purposes of research and standardization have gained in importance.

In the individual EC Member States, the corporate structure generally follows the rough structural pattern outlined above. On the basis of 1987 production at current prices, shares of the individual EC Member States are shown in Table III.

**Table III**  
**Production Shares by Member State, 1987**

|                | % Share |
|----------------|---------|
| Belgium        | 2.3     |
| Denmark        | 1.2     |
| Germany        | 39.5    |
| Greece         | 0.4     |
| Spain          | 5.8     |
| France         | 14.8    |
| Ireland        | 0.5     |
| Italy          | 10.9    |
| Luxembourg     | 0.1     |
| Netherlands    | 5.8     |
| Portugal       | 0.5     |
| United Kingdom | 18.2    |

Sources: Orgalime, Eurostat.

Within the individual Member States, the industry is concentrated in particular areas such as Baden-Württemberg, Bavaria and North-Rhine Westphalia in Germany, the Paris basin in France, northern Italy and the South-West, the West Midlands and the North-West of the United Kingdom.

Compared with average growth for all EC Member States, Spain, especially, has improved its position. Above average growth has also been recorded in Ireland, the UK, Germany and the Netherlands.

## **Forecasts and Outlook**

### *Short Term Forecasts*

Over 1988, demand is expected to grow at a steady rate within the Community, matched by real growth of around 3.5% in Community production. However, a slightly increased percentage of Community demand is anticipated to be met by extra-Community imports.

Employment is likely to decline slightly as the EC industry continues to aim for productivity gains in order to remain competitive in the global environment.

### *Long Term Outlook*

Structural changes set in motion over the early 1980s, in the direction of technology-intensive production methods, will be key elements in the future of the industry as they continue to contribute to favourable growth prospects. In microelectronics -which is still developing - the electrical industry found an instrument offering a wealth of innovative applications. The basic application of microelectronics is the handling of information. This implies advances in electro-mechanical engineering where physical work is replaced by machines, and further progress in the fields of information handling and organization.

Electronic data processing, telecommunications and automation systems have all developed new dimensions as a result of the progress of microelectronics. Many problem solutions are made possible by microelectronics, and entirely new fields of application are opened up.

The demand for software, on average, has grown three times as fast as the overall demand for electro-technical and electronic products. Of great relevance also is the trend towards integration of software directly into hardware. The consequence is that systems knowledge will in future be implemented to a lessening degree by the linkage of standard components via software but rather by its direct inclusion in complex, application-specific integrated circuits. This systems knowledge, i.e. the know-how, for instance, in communications technology, in mechanical engineering, in the

control of industrial processes or in motor vehicle construction, is the traditional strength of the European industry.

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# INSULATED WIRES AND CABLES

(NACE 341)

*Europe has a large production base to meet EC and foreign demand with production spread widely over all Member States. The European industry is among the world leaders in technology and is involved in strong R&D activity. Quality and reliability are guaranteed by standards especially in the field of optical fibre cables. European cable companies rank at the top. The outlook for short- and medium-term markets is not regarded as encouraging. Nevertheless the Community will remain a net exporter of cables.*

Insulated wires and cables concern mainly two kinds of product: telecommunications cables and wires and cables for the transmission and distribution of electrical energy. These two families of products are similar in the cable manufacturing process but very different in technology, markets and industrial structure.

Telecommunications cables are crucial to many of the latest developments in information technology. Ranging from simple wires which connect telephone handsets to the wall to armoured cables, coaxial cables and submarine cables, this group covers a large variety of products.

Electrical energy cables are fundamental to all industrial and commercial activities and to domestic life in all parts of the Community. Wires and cables supply energy from the centres of electrical generation to the individual point of utilization.

## Current Situation

Cable manufacture is important in every Member State. There are over 250 manufacturing facilities and each

Member State is well able to meet domestic market requirements both technically and in terms of volume.

## Main Technological Developments

### Optical fibre cables

The introduction and development of optical fibre technology in the market place has been rapid and such links are now installed on most of the busy inter-city connections in Europe. A recent estimate indicated that about 70% of all long distance calls in Europe are now transmitted over optical fibre for part of their distance. Although predominant for long-distance connections, optical fibres are still less attractive over short distances despite the continuing decreasing price of fibre.

### Electrical energy wires and cables

At present the main areas of technical development in cable in Europe are concentrated on improving techniques, improved insulation (for efficiency/effectiveness), improved safety in use (fire and fume hazard), better materials utilization, and technology barriers (e.g. super conductivity).

Europe can justifiably claim a lead in all these areas with a particularly strong approach in the area of safety and fire and fume hazard.

## Industry Structure

The production capacity of European cable makers is well above current demand. Improvements in technology, better production techniques and diminishing export opportunities have generally led to underutilization of capacity.

However, in other areas, European cable manufacturing is a highly dynamic industry:

## Main Indicators

### Insulated Wires and Cables

#### Telecommunications Cables and Electrical Energy Cables

| (Million ECU)              | 1980  | 1981  | 1982    | 1983  | 1984  | 1985  | 1986  | 1987  |
|----------------------------|-------|-------|---------|-------|-------|-------|-------|-------|
| Apparent consumption       | 5 657 | 5 646 | 5 641   | 6 145 | 6 817 | 7 470 | 7 710 | 8 242 |
| Net exports                | + 678 | + 895 | + 1 025 | + 913 | + 709 | + 796 | + 592 | + 406 |
| Total Community production | 6 335 | 6 541 | 6 666   | 7 058 | 7 526 | 8 266 | 8 302 | 8 648 |

Figures for telecommunications cables in Spain, Portugal and Greece are not included.

**Table I**  
**Production and Foreign Trade**  
**Insulated Wires and Cables**

| (Million ECU)    | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  | 1987  |
|------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Production       |       |       |       |       |       |       |       |       |
| Current value    | 6 335 | 6 541 | 6 666 | 7 058 | 7 526 | 8 266 | 8 302 | 8 648 |
| Index            | 100   | 103   | 105   | 111   | 119   | 131   | 131   | 137   |
| Constant value   | 6 335 | 5 772 | 5 622 | 5 659 | 5 109 | 6 004 | 5 842 | 5 950 |
| Index            | 100   | 91.1  | 88.7  | 89.3  | 80.7  | 94.8  | 92.2  | 93.9  |
| Imports extra-EC | 210   | 247   | 299   | 356   | 478   | 557   | 555   | 638   |
| Index            | 100   | 118   | 142   | 170   | 228   | 265   | 264   | 304   |
| Exports extra-EC | 888   | 1 142 | 1 324 | 1 269 | 1 187 | 1 353 | 1 147 | 1 044 |
| Index            | 100   | 129   | 149   | 143   | 134   | 152   | 129   | 118   |
| X/M              | 4.2   | 4.6   | 4.4   | 3.6   | 2.5   | 2.4   | 2.1   | 1.6   |

Sources: EUROPOWERCAB and EUROTLCAB.

- Strong R&D activity gives a world lead with a wide spread of technology (non-ferrous metallurgy, insulation physics and rubber chemistry, high-tech materials, superconductivity and electrical engineering for power cables while optical fibre cables technology dominates R&D for telecommunications cables).
- It is estimated that up to 5% of turnover is spent on R&D.
- There has been substantial rationalization and cross-fertilization in the industry within national boundaries.

Production is spread widely over all countries. There are more than 100 companies making cables in Europe. The largest factories are each capable of producing cable worth around 100 million ECU per year. A well-developed system of intra-Community trade already exists. In a mature commodity market with well-entrenched local operations a level of over 12% interchange already shows a high degree of interaction.

Optical fibre cables probably represent about 20% of the output of telephone cable makers. Optical fibre cables are made by cable manufacturers from fibres which are usually supplied by a specialist optical fibre company. There are no optical fibre cable makers in Europe who do not also produce copper telecommunications cables. The industry is based on cable making, not on glass making or copper drawing or telecommunications equipment manufacture, all of which require different technologies.

Most telecommunications cable makers are also parts or subsidiaries of companies which make cable for power applications as well, though there are some which are allied to the telecommunications equipment industry.

### *Consumption Trends*

#### **Telecommunications cable market**

Consumption of telecommunications cables in Europe has been relatively static in real terms over the last decade, having

**Table II**  
**Production and Foreign Trade**  
**Telecommunications Cables**

| (Million ECU)    | 1980    | 1981    | 1982    | 1983    | 1984    | 1985    | 1986    | 1987    |
|------------------|---------|---------|---------|---------|---------|---------|---------|---------|
| Production       |         |         |         |         |         |         |         |         |
| Current value    | 1 673.3 | 1 774.6 | 1 820.3 | 1 852.9 | 2 051.7 | 2 128.7 | 2 007.6 | 2 140.6 |
| Index            | 100     | 106.1   | 108.8   | 110.7   | 122.6   | 127.2   | 120.1   | 127.9   |
| Constant value   | 1 673.3 | 1 616.8 | 1 535.3 | 1 485.6 | 1 392.9 | 1 546.2 | 1 412.8 | 1 472.6 |
| Index            | 100     | 96.6    | 91.8    | 88.8    | 83.2    | 92.4    | 84.4    | 88.0    |
| Imports extra-EC | 71.0    | 98.5    | 117.0   | 147.5   | 215.0   | 231.9   | 209.8   | 230.0   |
| Index            | 100     | 138.7   | 164.8   | 207.7   | 302.8   | 326.6   | 295.5   | 323.9   |
| Exports extra-EC | 275.5   | 366.9   | 460.5   | 446.9   | 459.7   | 535.5   | 413.3   | 357.8   |
| Index            | 100     | 133.2   | 167.2   | 162.2   | 166.9   | 194.4   | 150.0   | 129.9   |
| X/M              | 3.9     | 3.7     | 3.9     | 3.0     | 2.1     | 2.3     | 2.0     | 1.6     |

Source: EUROTLCAB.

**Table III**  
**Production and Foreign Trade**  
**Electrical Energy Cables**

|                                | 1980    | 1981    | 1982    | 1983    | 1984    | 1985    | 1986    | 1987    |
|--------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|
| Production (million ECU)       | 4 661.2 | 4 766.2 | 4 845.9 | 5 205.1 | 5 474.2 | 6 137.5 | 6 295.6 | 6 507.2 |
| Quantities (1 000 tonnes)      | 1 887.5 | 1 797.4 | 1 712.9 | 1 654.8 | 1 700.1 | 1 745.0 | 1 883.3 | 1 979.3 |
| Index (quantities)             | 100.0   | 95.2    | 90.7    | 87.7    | 90.1    | 92.4    | 99.8    | 104.9   |
| Imports extra-EC (million ECU) | 139.3   | 148.2   | 182.1   | 208.3   | 263.0   | 325.0   | 344.8   | 408.0   |
| Quantities (1 000 tonnes)      | 36.7    | 33.8    | 38.4    | 42.2    | 51.8    | 53.9    | 63.2    | 93.3    |
| Index (quantities)             | 100.0   | 92.1    | 104.6   | 115.0   | 141.1   | 146.9   | 172.2   | 254.2   |
| Exports extra-EC (million ECU) | 612.7   | 774.8   | 863.5   | 821.9   | 726.9   | 817.1   | 734.0   | 685.7   |
| Quantities (1 000 tonnes)      | 212.3   | 237.5   | 295.9   | 237.6   | 200.1   | 226.4   | 188.1   | 186.1   |
| Index (quantities)             | 100.0   | 111.9   | 139.4   | 111.9   | 94.3    | 106.6   | 88.6    | 87.7    |
| X/M                            | 4.4     | 5.2     | 4.7     | 4.0     | 2.8     | 2.5     | 2.1     | 1.7     |

Source: EUROPOWERCAB.

risen from about 1 500 million ECU in 1980 to 2 000 million ECU in 1987, an increase of only about 4% per year. This figure does not include Spain, Portugal and Greece, which could add approximately 15% to the total. The number and length of communication channels provided during the period has increased enormously, but as technological developments have reduced the cost per channel equally dramatically, the total revenue to the cable makers has stayed roughly in line with price inflation.

Most of the market for telecommunications cables is accounted for by the national public telephone network operators (PTTs): in some countries as much as 90% of business is with PTTs. Because these organizations are strongly influenced by political decisions, the dynamics of the market vary in different countries. Strongest growth is in trunk (long-distance) traffic, where technological developments have substantially reduced cable costs; in local networks, which depend on more conventional cable, the market is stagnant. Coupled with the reduction in costs due to improved production technology, over the next few years sales are likely to grow at less than 4% per year.

A major feature of telecommunications cable is the need for high quality. There has been close liaison between the cable makers and the PTTs in Europe. As a result of this liaison a network of national standards has grown up in each country. The existence of these national standards will continue for some time. However, European cable makers are working together through bodies such as ETSI, CEPT and CCITT to create standards for the future, especially in the field of optical fibre cables.

#### **Electrical and power cable market**

Overall in Europe home demand for electrical cables is on a gently rising plateau. Home markets are mature with the current basic infrastructure well-established. Basic demand is

likely to keep pace with growth in the GDP with occasional boosts from the establishment of new generating capacity and the extension of the Eurogrid. The rise in the standard of living will increase demand while simultaneously installations based on old (insulation) technology will require replacement as they reach the end of their useful life: cables installed in buildings tend to live the life of the building.

#### *Export Trends*

EC cable makers have always been the world's most important source of cables with average annual exports over the last decade topping hundreds of thousands of tonnes. The last few years have seen diminishing export opportunities coupled with substantially increased imports, although they still represent only about 7% of the domestic demand for both telecommunications and power cables.

Many previous principal export markets are now self-sufficient and sluggish markets in the Middle East oil-producing countries are due to a tendency for greater home production.

In addition, competitors in the Far East (Japan, Korea, Taiwan), the Middle East (Saudi Arabia, Turkey) as well as Yugoslavia and Finland increase world market export capability.

Opportunities still exist for EC cable makers in countries where levels of technology required are beyond the capabilities of home production in particular for advanced types of optical fibre cables, or for capital and technical expertise to other cable producers in the world.

The Community remains a net exporter of cables with an exports to imports ratio of 1:8 expected in 1990. Nevertheless overall prospects for European producers in export markets cannot be regarded as encouraging.

## *Employment Trends*

The production of cable is essentially a capital-intensive activity: machines are set up to run automatically and produce large quantities of one type of cable. Employment in the industry is therefore comparatively low, and while it cannot always be separated from other cable-making activities in a company, there are probably only around 15 000-20 000 people in Europe earning their living from the manufacture of telecommunications cables. The pace of technological development in both the cables themselves and the methods of producing them is such that this figure is likely to fall rather than rise.

## *World Competition*

### **Telecommunications cables**

There are more copper telecommunications cables made in the EC than in any other area of the world; although the USA still dominates the production of optical fibre cables, Europe has a powerful position in world markets. Exports outside the Community are around 15%-20% of total production. They are centred on those countries where standards are similar to those of the manufacturing countries, usually for historical reasons.

Major producers outside Europe are the USA, Japan, Korea and Taiwan, with Australia making significant progress. A number of other countries such as Malaysia and India now have their own production, but they have tended to concentrate on import substitution and are not so far significant in export markets. The Japanese industry enjoyed considerable success for a number of years, but recently the strength of the yen has created difficulties. The Koreans and Taiwanese have become more aggressive in export markets. The Americans have tended to concentrate on their home market, although this may now be changing.

## **Electrical and power cables**

Production of cable in major world centres in the mid-1980s is estimated as follows: Europe (39%), Japan/Far East (25%), USA/South America (36%).

Cable makers are one of the single largest outlets for wrought copper - over 1.3 million tonnes per year are sourced from extra-Community producers. There is also a heavy requirement for insulation materials, plastics and elastomers, as well as aluminium steel, zinc and tin/lead. European cable makers absorb about 65% of Europe's requirement of copper in wire and rod form.

## **Forecasts and Outlook**

### *Short-term Forecast*

In 1988 and 1989 production will be up 4% per year both for telecommunications cables and for electrical energy cables industries despite a slight reduction in extra-Community exports. Extra-Community imports may increase slowly each year. Intra-Community trade will continue to grow.

### *Medium-term Forecast*

This trend will continue for another four or five years. The export market is very likely to decline slowly as foreign demand is satisfied by local manufacturing. The export/import ratio is decreasing for insulated wires and cables, especially for telecommunications cables.

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# POWER TRANSFORMERS

(NACE 342)

*The European transformer industry has been in a state of decline throughout the 1980s. Development is not anticipated in the sector, where there is already overcapacity. The survival chances for the industry are therefore likely to depend on further convergence of sectoral activity and a further reduction in number of suppliers.*

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## Current Situation

Considerable changes took place in the European transformer industry from 1980 to 1987. During those years, the demand for liquid-filled power transformers showed a downward trend for a number of reasons.

In most EC countries, electricity consumption has decreased considerably. This is primarily due to temporarily unfavourable developments in the economic activity of individual Member States and the utilization of energy saving measures, especially by industry.

With infrastructure investment by the electricity supply industry being widely completed in most EC countries, ample network capacity reserves are now available. Current development of electricity consumption in most EC countries does not call for expanded network capacity, i.e. new transformers. Demand for electrical energy is weak in individual Member States, especially in industry, since the present low level of economic activity and spare network capacity make extension investment unlikely.

Declining demand in domestic markets eventually led the EC transformer industry to increase export efforts in order to utilize existing capacity. Overseas demand has continued to exist. As the result of nearly worldwide surplus capacity in transformer manufacturing, the transformer industry could contract new business from overseas only under extremely demanding conditions.

Since 1985, the export business has been hard hit by the transformer industry's loss of international competitiveness throughout the 1980s, especially compared with Asian and Eastern-bloc suppliers. The chronic currency shortage of Third World countries has also resulted in slowing demand, an additional handicap being the build-up of local transformer manufactures to satisfy domestic demand.

This unfavourable development in the area of exports has most keenly affected transformer manufacturers in those EC countries with relatively small domestic markets, as these are highly dependent on exports.

The development of demand described above has led to structural changes in the European transformer industry in the past few years. Because of existing overcapacity, most national transformer industries have had to shut down production facilities and restructure their range of products.

## Forecast

Industry agrees that no economic recovery of the EC transformer market can be expected up to the year 1990. Moreover, the slight increase in private and industrial electricity consumption foreseen in some Member States is not expected to prompt electricity suppliers to extend their networks, since enough reserve capacity is available. The completion of large-scale investment programmes to increase electricity generating capacity and extend distribution networks suggests that, in some countries, transformer sales will decrease considerably. This state of decline is expected to continue long beyond 1990. Furthermore, the lack of a coherent EC energy policy regarding the future role of electricity generation is keenly felt.

Low world market prices for other sources of primary energy have undoubtedly created a dilemma for the electricity supply industry with regard to long-term strategy. In the case of a steep rise in oil prices, which cannot be excluded, the importance of electricity supply within overall EC energy policy will have to be redefined. Industry would therefore welcome a long-term energy policy at both the national and the Community level.

A look at the US transformer market may provide an indication of the direction the European transformer industry will have to take if it wants to survive. In the past few years, the US market has seen a remarkable concentration of the transformer industry. In the area of distribution transformers and transformers of medium ratings, five firms supply 80% of the US market, while in the EC, with a 33% larger population, 50 transformer manufacturers hold the same market share. In the area of large transformers, similar differences exist: three US firms cover around 95% of the US market against 15 firms in the EC. A comparison suggests that the survival of the EC transformer industry probably depends upon a further convergence of activity, linked to a corresponding reduction in the number of suppliers.

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# HIGH-TENSION SWITCHGEAR

(NACE 342)

*European Community switchgear production has grown to almost 2.7 billion ECU, overtaking that of the United States and Japan. The sector provides employment for around 40 000 persons, primarily in Germany, France, the United Kingdom and Italy. These four countries are the major contributors to Community supply.*

High-tension switchgear is part of the electrical system, needed at all stages of the production-transport-distribution chain. It fulfills various functions, the most important of which are up-stream and down-stream protection and control of high-tension equipment. The best known category of products in this group is that of high- and medium-tension circuit breakers.

For practical reasons, the term "high tension" is used in this study to refer to high and medium tension (1 kV). Within the European Community, there is no consistent, logical differentiation made between these two categories which would allow coherent regrouping and comparison. When used with the necessary qualifications national data can, however, be compared.

The Community's production of and trade in high-tension switchgear does not yet exhibit any geographical logic. The European market is still largely a juxtaposition of national markets, which explains why only 18% of Community exports are intended for other Member States. One of the difficulties in this area is the lack of uniform standards and specifications.

## Current Situation

Global production of high-tension switchgear rose to 8.9 billion ECU in 1986, broken down as follows:

- EC-30%
- Japan-27.5%
- United States-28.5%
- rest of the world-14%.

However, Comecon and China have not been taken into account in this breakdown.

Apart from the Community as a whole, the United States is the world's largest producer, with the largest national market. Per capita energy consumption is 1.8 times higher in the United States than in other OECD countries, and the percentage of electricity used is increasing.

Japan also has a sizeable national market owing to its high population density, which requires a very high level of network protection. Japan is also a dynamic exporter.

The other major producers are in Europe, making the EC the largest production zone; European manufacturers tend to specialize in this type of equipment. Other major producers include Sweden and Switzerland, as well as a growing number of newly industrialized countries, particularly Brazil, India and the South-East Asian countries.

The relative position of the three large production zones has remained largely unchanged since 1980.

A slight drop in the US share of production is linked to weaker investment in electrical equipment on the national market. However, it has been possible to contain the fall in high-tension switchgear by investing in maintenance and the improvement of network efficiency. Japan, for its part, registered a growth in production. This seems to have been stronger since 1983, but the effect of the dollar-yen exchange rate must be taken into account in any evaluation. The Community share of production remained stable over this entire period.

**Table I**  
**Production Shares by Member State in 1986**

| (%)            |       |
|----------------|-------|
| BLEU           | 25    |
| Denmark        | 1.0   |
| Germany        | 36.0  |
| Greece         | 0.2   |
| Spain          | 5.0   |
| France         | 32.5  |
| Ireland        | 1.0   |
| Italy          | 13.0  |
| Netherlands    | 2.5   |
| Portugal       | 0.1   |
| United Kingdom | 7.0   |
| Total EC (1)   | 100.0 |

(1) Total may not add up due to rounding.

Source: CAPIEL.

However, this hides a rather strong increase in world production at a time when most industrialized countries developed large-scale nuclear programmes.

### Major Geographical Features

Community production statistics available for 1986 break down as follows:

Germany and France, with roughly equal shares, account for over two-thirds of Community production. A major part of the last third consists of Italian production which is a third of the German share but double the United Kingdom's. This leaves the other eight Member States with 11.5% of supply; of these eight, only Spain has a significant production base.

The absence of complete statistics on the 1980s as a whole makes it impossible to evaluate comparative performance in the EC 12. Figures are, however, available for the seven Member States.

The ranking for 1986 shows no significant change from that of 1980, with only minor variations in 1983. Only France has noticeably shifted position, gaining almost 7% of the total.

The value of global production grew by 10% between 1980 and 1983 and by 30% between 1983 and 1986. The latter increase took place at a time when the European countries were developing nuclear programmes on their own markets and abroad; France was renewing a large portion of its circuit-breaker installations; Italy and Germany hoped to increase their shares of the world market.

**Table II**  
**Development of Production Shares**

| (%)            | 1980  | 1983  | 1986  |
|----------------|-------|-------|-------|
| BLEU           | 3.7   | 3.4   | 2.7   |
| Germany        | 41.9  | 50.6  | 38.9  |
| France         | 28.0  | 26.2  | 34.8  |
| Italy          | 13.6  | 9.0   | 13.7  |
| Netherlands    | 4.0   | 2.7   | 2.6   |
| United Kingdom | 8.8   | 8.1   | 7.3   |
| Total EC       | 100.0 | 100.0 | 100.0 |

Source: CAPIEL.

### Export Trends

In 1986, world trade in high-tension switchgear rose to 1.6 billion ECU - 18.0% of global production. This may appear low in the context of international specialization linked to intra-branch trade of electrical equipment. However, this specialization is less pronounced than for other capital equipment, primarily as the result of protected public procurement. Consequently, the amount of high-tension switchgear exported remains relatively small.

The shares held by major producers are as follows:

- EC-55%
- Japan-23%
- United States-12%
- rest of the World-10%,

and the export ratio (exports/production):

- EC-19%
- Japan-36%
- United States-3.5%
- rest of the World-10.2%.

The Community accounts for over half of the world market, but even so its export ratio is relatively low. Moreover, a large part of its export market consists of developing countries whose solvency is at times uncertain. The EC industry needs to aim at improving its export ratio while shifting its orientation towards dynamic and profitable markets.

Japan has made this qualitative effort with greater success. It is the most export-oriented of the four zones owing to its ability to position itself on foreign markets with products that are integrated in industrial installations. Taking advantage of geographical proximity, it has thus been very active in the expanding Asian market.

The United States export ratio is very low but the U.S. lead in world production allows it to cover 12% of the market. The U.S. is commercially established in Latin America and South-East Asia (although less so than Japan) and has production bases in Europe through its multinational firms. Its share of the market can therefore be expected to grow.

Finally, owing to the degree of industrialization required for this type of switchgear, performance by "rest of the world" is concentrated in certain industrialized countries such as Sweden, Switzerland, and Canada.

Intra-Community exports represent 10% of world trade - only 18% of total EC exports. The Community market has become largely a market of maintenance, renewal and improvement, since there is limited scope for network expansion.

World market shares held by EC Member States are as follows:

Germany's foreign trade performance is very close to that of Japan (23% of the world market). France's share is greater than that of the U.S. (12% of the world market), while its production is about three times lower.

The United Kingdom has maintained its share of world trade at almost 10%, even though it currently produces half as

much as Italy. British exports continue to rely on traditional Commonwealth trade.

**Table III**  
**Share of World Trade**

| (%)            | Share of total EC exports | Share of total world exports |
|----------------|---------------------------|------------------------------|
| BLEU           | 2.3                       | 1.28                         |
| Denmark        | 0.6                       | 0.34                         |
| Germany        | 40.3                      | 22.18                        |
| Greece         | 0.6                       | 0.34                         |
| Spain          | N/A                       | N/A                          |
| France         | 25.6                      | 14.00                        |
| Ireland        | 0.3                       | 0.18                         |
| Italy          | 10.4                      | 5.72                         |
| Netherlands    | 3.5                       | 1.94                         |
| Portugal       | N/A                       | N/A                          |
| United Kingdom | 16.4                      | 9.02                         |
| Total          | 100.0                     | 55.00                        |

Source: CAPIEL.

Intra-Community trade is not very significant in the context of total world trade; the trade flows are shown in Table IV.

As might be expected, the four largest suppliers of intra-EC trade are the main producers. However, the relative trade shares differ substantially from the relative shares of EC production.

**Table IV**  
**Intra-EC Trade in 1986**

| (%)            | Share of Intra-EC Exports | Share of Intra-EC Imports |
|----------------|---------------------------|---------------------------|
| BLEU           | 4.5                       | 12.2                      |
| Denmark        | 0.8                       | 8.9                       |
| Germany        | 35.9                      | 14.0                      |
| Greece         | 2.6                       | 5.7                       |
| Spain          | 3.3                       | 6.3                       |
| France         | 17.0                      | 9.6                       |
| Ireland        | 0.9                       | 2.7                       |
| Italy          | 10.8                      | 19.8                      |
| Netherlands    | 8.1                       | 7.5                       |
| Portugal       | 0.1                       | 2.9                       |
| United Kingdom | 16.0                      | 10.4                      |
| Total          | 100.0                     | 100.0                     |

Source: CAPIEL.

Germany is the major exporter, with a share equal to its production share. France and the United Kingdom, with shares less than half as large as Germany, are at comparable levels for exports as well as imports.

These three countries - and, to a much lesser degree, the Netherlands - show a positive intra-Community trade balance.

Italy is the fourth country with a significant share of exports, but its trade position is characterized by its import volume, which is the largest in Europe.

### *Employment Trends*

The EC high-tension switchgear industry employs some 35 000 to 40 000 people, primarily in the four largest producer countries:

- Germany-12 000
- France-7 500
- United Kingdom-6 500
- Italy-3 500.

### *Trends in Member States*

#### **Germany**

Germany provides over one-third of EC production. Two major items today account for 67% of turnover: circuit breakers and metal switchboxes. The following table shows their relative stability as a share of production in the 1980s:

The national market is characterized by regional division. Demand is decentralized and diversified, with numerous producers and distributors of electricity (approximately 600 companies) in both the public and private sectors.

**Table V**  
**Breakdown of German Production**

| (%)                      | 1980 | 1983 | 1986 |
|--------------------------|------|------|------|
| Circuit breakers total   | 18.0 | 16.6 | 18.3 |
| High tension share (1)   | 9.5  | 9.8  | 9.9  |
| Medium tension share (1) | 8.5  | 6.8  | 8.4  |
| Metal switchboxes total  | 51.8 | 54.4 | 48.3 |
| High tension share (1)   | 21.1 | 24.8 | 14.3 |
| Medium tension share (1) | 30.7 | 29.6 | 34.1 |
| Total                    | 69.8 | 71.0 | 66.7 |

(1) Medium tension is from 1 to 52 kV; high tension is 52 kV.

Source: CAPIEL.

Germany is responsible for 40.3% of total EC exports and 35.9% of intra-Community exports. This traditional export dynamism is of long standing, made necessary by Germany's lack of captive colonial markets.

#### **France**

France provides 32% of the Community's high-tension switchgear production. It primarily produces high-tension metal switchboards and circuit breakers (35% of production in 1986, an increase of 9 percentage points over 1980), medium-tension circuit breakers, and high- and medium-

tension distribution and connection equipment (medium tension from 1 to 72.5 kV; high tension 72.5 kV).

The national market is dominated by the central role of the EDF (Electricité de France) and is currently being affected by the drop in investment for electricity production: after having declined until 1983 the market grew, owing to power plants being brought into service, programmes for circuit breaker renewal and the strengthening of transport and distribution infrastructure. Since 1986, EDF investments have been declining.

In international trade, France accounted for 25.6% of all EC exports and 17% of intra-Community exports.

### Italy

In 1986, as in 1980, Italy accounted for 13% of the Community's high-tension switchgear production.

In 1980, production of medium-tension predominated over high tension equipment, accounting for 64% of the total (mainly circuit breakers). While complete data for the decade are lacking, production of high tension equipment increased between 1985 and 1986 by 29% and 36%, respectively, indicating change in the balance.

The national market is largely but not exclusively dominated by ENEL (Ente Nazionale per l'Energia Elettrica, a centralized public agency). ENEL has shown itself to be the most dynamic agency for both medium- and high tension. It invests in new installations as well as renewal.

Italy accounts for 10.4% of total EC exports and 10.8% of intra-Community exports. The industrializing countries are among its largest customers.

### United Kingdom

The United Kingdom represents about 7% of Community production. Distribution between medium- and high tension (before 1987: medium tension from 1-52 kV; high tension 70 kV, since 1987: medium tension from 1-70 kV; high tension 70 kV) is as follows:

**Table VI**  
**Breakdown of U.K. Production**

| (%)            | 1980  | 1983  | 1986  |
|----------------|-------|-------|-------|
| High-tension   | 40.6  | 33.9  | 30.9  |
| Medium-tension | 59.4  | 66.1  | 69.1  |
| Total          | 100.0 | 100.0 | 100.0 |

Source: CAPIEL.

Medium tension represents an increasingly important share of production - more than two-thirds at present.

Production has stabilized at a level 30% below that of 1980. The national market contracted until 1986 and is now being

modified by privatization. Until now, national demand has come from several public partners, the most important of which is the CEGB (Central Electricity Generating Board), which is in charge of production and transmission, with distribution left to other companies. Privatization will probably result in a division of functions in the production-transmission-distribution chain.

### Other EC Member States

Since the eight remaining Member States show similar performance on the Community high-tension switchgear market, they will be grouped together in this monograph.

Their principal common characteristic is their continually weak share of Community production and exports, totalling 11.5% and 10%, respectively.

While sharing important traits, however, each country's national market differs from that of the others:

- BLEU privileges France in its trade exchanges. It is at present undergoing a period of national austerity and is heavily cutting back public investments and production. In addition, the national network, which is primarily maintained by two semi-State-owned companies, continues to be over-equipped despite the growth in energy consumption. Belgium is therefore turning towards foreign markets, primarily small European markets, in an attempt to maintain production.
- Denmark is primarily linked to Germany and the Netherlands for imports and to the United Kingdom for exports. Its electricity network is administered by a number of firms.
- Spain is the only one of these small countries with a sufficiently large production base to supply a relatively significant share - 4.8% - of Community production. The national market is characterized by an electricity network owned by a number of private or semi-State-owned companies whose investment can be maintained at a high level, given the take-off of industry during the past several years, primarily since Spain's entry into the EC.
- Greece and Portugal are the smallest EC producers, with 0.18% and 0.13% of Community production, respectively; they chiefly supply medium-tension equipment. In Greece, production is largely carried out by subsidiaries of foreign firms, particularly German firms. The electrical network is entirely maintained by a public company: DEM (Greek Electricity Corporation). In Portugal, the production-transport-distribution chain is in the hands of a State company, EDP (Electricidade de Portugal).
- Ireland differs from the rest of Europe because of its trade and production links with the United States. These affect 40% of Ireland's exports and 22% of its exports. This privileged partnership between the two countries derives

from the establishment of U.S. production subsidiaries on Irish territory, allowing the groups that own them to enter the Community market at minimal cost.

- The Netherlands has a strong relationship with Germany. Thus, German trade flows represent 32% of Dutch exports and 55% of imports. On the national market, firms producing high-tension switchgear must deal with numerous operators in the production-transport-distribution chain.

### Forecast and Outlook

As the industry and domestic electricity networks are well developed (and the firms producing high-tension switchgear cannot depend on energy substitution markets), the sector cannot rely on domestic sources for growth. Thus, increasingly, exports remain the key to success for the electrical industry.

However, European competitiveness is often fragile and requires a steady domestic market in order to become stronger. Partly for this reason the European electrical equipment industry is being restructured by a move towards international alliances. The increase in industry concentration is aimed at improving profitability through economies of scale and competitiveness on international markets.

On the Community market, regulatory differences among client firms (utilities) will make the opening up of public procurement a complex and probably long drawn out process.

It is difficult to see how equipment markets can be opened up in countries where the production of electricity is public unless the same process occurs in those countries where production is private. On the other hand, the opening up of the Community market may accelerate industrial concentration.

Strong growth on a world scale cannot be expected:

- the developed countries will merely improve and maintain their networks
- the OPEC countries' installations will remain limited
- the developing countries will not be in a position to invest.

Only the newly industrialized countries represent development potential, but it is short term to the extent that they risk becoming competitors as soon as they have reached a certain level of industrial maturity. At present, they require products, capital and training.

At the same time as the industry structure and markets are developing, the nature of products is changing. There are more and more integrated systems comprising monitoring and control, and new shunting and protection equipment for "strong current" and "weak current" together.

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# LOW-TENSION SWITCHGEAR

(NACE 3420)

*The value of EC output of low-tension switchgear rose to almost 5 billion ECU in 1986, representing almost 30% of world production. Growth in demand is expected to be slow but steady over the next few years. However, substantial product development driven by electronics is anticipated, although at present it is difficult to gauge the scope or speed of such change.*

Low-tension switchgear consolidates all machine-related control and protection equipment within an electrical system. It is thus basic equipment for all industrial processes - from the most simple to the most complex.

## Current Situation

Since trade between Europe and the two other dominant zones (the United States and Japan) is relatively unimportant, European industry depends crucially on the dynamism - or lack of it - in the internal market. However, the European market is not really homogeneous. There is great diversity of distribution networks, practices, etc. The zone in fact comprises two sub-markets: one in Northern Europe, primarily centred on Germany, and the second bringing together the Mediterranean countries of Europe around France and Italy. It is also divided between widely differing, and very powerful, manufacturers and users.

This compartmentalization is not definitive and is evolving since today's industrial alliances presage tomorrow's re-distribution of production potential.

Current market logic in Europe includes a large market share for Switzerland and Sweden.

The EC, owing to its production capacity, should be able to achieve coherence if it manages to establish a single policy that permits it to approach optimum utilization within the framework of the internal market.

Total world production of low-tension switchgear rose to 16.4 billion ECU in 1986 (in general, performance in this sector is closely linked to industrial GDP of the countries under consideration) and was distributed as follows:

- EC-28.7%

- United States-26.3%
- Japan-15.0%
- rest of the world-30.0%.

This distribution brings out the importance of the "rest of the world" group in the manufacture of this type of equipment. However, most of this 30% is provided by a few countries such as Brazil, India or the four "dragons" of South-East Asia (South Korea, Taiwan, Hong-Kong and Singapore) and by industrialized countries such as Sweden, Switzerland and Canada.

Japan is relatively weak in this sector, specializing in high tension and industrial equipment and preferring to subcontract a portion of low-tension switchgear production to its Asian trading partners. The U.S., which concentrates on machine tools and industrial plant, nevertheless supplies over one-fourth of world production, placing it just behind the EC.

Low-tension switchgear is a strong point of the Community, which specializes in this type of product and is the world's leading producer.

In terms of the production shares of the three major industrialized zones, the ranking has remained the same since 1980, although the Community lost seven percentage points to Japan.

US performance in 1983 was due to the renewal of the electricity network, involving major investment to deal with a strong increase in demand for electrical energy.

**Table I**  
**Relative Production Shares by Member State**  
**in 1986**

|                | Production share of EC<br>low-tension switchgear<br>(%) | Share of national<br>industrial GDP in<br>the EC industrial GDP |
|----------------|---|---|
| BLEU           | 2.8   | 3.24  |
| Denmark        | 1.1   | 1.73  |
| Germany        | 41.2  | 36.82   |
| Greece         | N/A   | 0.53  |
| Spain          | 5.6   | 6.14  |
| France         | 22.6  | 20.20   |
| Ireland        | 1.2   | 0.30  |
| Italy          | 11.3  | 14.25   |
| Netherlands    | 2.3   | 3.16  |
| Portugal       | N/A   | 0.62  |
| United Kingdom | 11.9  | 13.01   |
| Total          | 100.0   | 100.0   |

Source: CAPIEL.

Japan's orientation is towards the expanding markets of the Pacific zone; this added to the increasing degree of product sophistication explains its growing share of world production.

### Major Geographical Features

Comparison between national shares in low-tension switchgear production and in the Community's industrial GDP shows a marked correlation between the two, both within the EC and on a global level.

Germany is the largest producer of low-tension switchgear, with France's output some 50% of Germany's. Italy and the United Kingdom both have shares equal to half that of France.

The eight other members thus provide only 18% of Community supply. Among them, only Spain occupies a significant position. Output in Greece and Portugal is minimal.

**Table II**  
Development of Production Shares

| (%)            | 1980  | 1983  | 1986  |
|----------------|-------|-------|-------|
| BLEU           | 3.4   | 2.9   | 2.8   |
| Denmark        | 1.2   | 0.9   | 1.1   |
| Germany        | 40.3  | 40.1  | 41.2  |
| Greece         | N/A   | N/A   | N/A   |
| Spain          | 4.4   | 4.2   | 5.6   |
| France         | 21.0  | 21.7  | 22.6  |
| Ireland        | 0.8   | 0.9   | 1.2   |
| Italy          | 11.6  | 11.5  | 11.3  |
| Netherlands    | 1.5   | 1.7   | 2.3   |
| Portugal       | N/A   | N/A   | N/A   |
| United Kingdom | 15.8  | 16.1  | 11.9  |
| Total          | 100.0 | 100.0 | 100.0 |

Source: CAPIEL.

Germany's position is strengthened by its export dynamism, which has ensured regular growth throughout this period.

France has a similar profile, while Italy has maintained a stable position owing to relatively sluggish investment.

Britain's declining share mirrors developments of EC industrial GDP as a whole.

### Export Trends

Total world exports of low-tension switchgear rose to 5.1 billion ECU in 1986 - that is, 31% of production. The shares of the major producers were as follows:

- EC (intra-EC plus extra-EC)-48%
- United States-17%
- Japan-28%
- rest of the world-7%,

and the export ratio of each of these (exports/production):

- EC-47%, of which 26% intra-EC
- United States-22%
- Japan-62%
- rest of the world-8.1%.

**Table III**  
World Market Shares by Member State in 1986

| (%)            | Share of total EC exports | Shares of total world exports |
|----------------|---------------------------|-------------------------------|
| BLEU           | 2.1                       | 1.0                           |
| Denmark        | 0.6                       | 0.3                           |
| Germany        | 42.6                      | 20.5                          |
| Greece         | N/A                       | N/A                           |
| Spain          | N/A                       | N/A                           |
| France         | 25.0                      | 12.0                          |
| Ireland        | 1.8                       | 0.9                           |
| Italy          | 8.1                       | 3.9                           |
| Netherlands    | 5.6                       | 2.7                           |
| Portugal       | N/A                       | N/A                           |
| United Kingdom | 14.2                      | 6.9                           |
| Total (1)      | 100.0                     | 48.0                          |

(1) Total may not add up due to rounding.

Source: CAPIEL.

Extra-EC exports represent only 25% of the world market. Europe acting as a dynamic whole should be able to improve its trade performance.

The US concentrates on its national market to an even greater degree than the EC does, and its share of the market is also relatively weak in relation to its position in world production. Japan, on the other hand, holds a market share that is much higher than its production share because 50% of total output is exported.

While the EC dominates both production and world market shares, it is absent from South-East Asian markets where Japan and, to a lesser degree, the United States are dominant (74% and 13.5% of local market shares, respectively).

These markets are seeking to diversify away from the US and Japan and are therefore not totally inaccessible to European manufacturers. They are partly open to European exports provided that Community firms use global strategies that allow them to adapt to local demand and to ensure a permanent presence.

A large share of EC exports is oriented towards the developing countries. These are potentially major markets since industrial development involves sizeable investments in electrical equipment, but their insolvency calls into question the implementation of contracts.

Germany is the second largest exporter after Japan (28%), and France is in fourth position, slightly behind the United

States (17%). These two rankings reflect the good performance of European firms, despite their limited size.

In intra-Community trade, distribution is as follows:

In Table IV, which lists each State's share of total intra-Community imports and exports, three groups of countries are distinguishable:

- the two leaders are the Federal Republic of Germany and France, with two-thirds of intra-EC trade; Germany retains its dominant export position and is in second place, behind Italy, for imports,
- Italy and the United Kingdom are the two other countries with an electrical equipment industry able to play a significant role in intra-Community trade,
- the other EC countries play a limited role in Community-wide trade.

While all Member countries are both exporters and importers, trade centres around Germany, France, Italy and the United Kingdom.

**Table IV**  
**Market Shares in Intra-EC Trade in 1986**

| (%)            | Share of total<br>intra-EC exports | Shares of total<br>intra-EC imports |
|----------------|------------------------------------|-------------------------------------|
| BLEU           | 2.9                                | 7.6                                 |
| Denmark        | 0.4                                | 3.0                                 |
| Germany        | 38.9                               | 18.4                                |
| Greece         | 0.0                                | 0.6                                 |
| Spain          | 2.8                                | 6.6                                 |
| France         | 26.3                               | 14.9                                |
| Ireland        | 1.4                                | 2.6                                 |
| Italy          | 8.4                                | 20.3                                |
| Netherlands    | 6.9                                | 9.9                                 |
| Portugal       | 1.2                                | 1.9                                 |
| United Kingdom | 10.9                               | 14.3                                |
| Total (1)      | 100.0                              | 100.0                               |

(1) Total may not add up due to rounding.

Source: CAPIEL

### *Employment Trends*

Between 90 000 and 100 000 people are employed by Community low-tension switchgear firms, mainly in four Community countries:

- France: 19 000
- United Kingdom: about 9 500
- Italy: 6 000
- above all, the Federal Republic of Germany: 47 500.

### *Trends in Member States*

#### **Germany**

Germany supplies 41.2% of total Community production. The most important item in German turnover for low-tension switchgear, throughout the 1980s, has been relays (18%). Other strong points are contactors (about 15% during this period), circuit breakers (about 9% during this period), and control units (13% in 1986).

Markets are provided by highly developed industry, notably mechanical engineering activity, requiring high levels of investment. Thus the German low-tension switchgear industry can depend on a sizable national market.

Germany is the principal European exporter, with 42.6% of total European exports (and 40% of intra-EC exports).

#### **France**

France supplies 22.6% of total Community production. Almost 40% of 1986 turnover was accounted for by contactors (20%) and circuit breakers (19%), two items with contrary growth cycles. The share of the former, linked to investment, has undergone a slight decline since 1983, while the latter, for which development is more closely related to general economy activity, has tended to rise since that time. Relays represented 10% of total production during this period.

With a flagging mechanical engineering industry providing poor markets, France invests less in absolute terms than Germany despite a higher investment rate. On the other hand, the fact that the renewal market has held up well partly compensates for the absence of a true recovery in new installations.

France accounts for one-eighth of world trade, totalling 25% of European exports and 26% of intra-EC exports.

#### **United Kingdom**

The United Kingdom accounted for 11.9% of Community production in 1986, a decline of about four points from 1980. This fall in UK production is primarily explained by a limited de-industrialization as business sought financial profitability at the expense of long-term investment in the first half of the 1980s.

However, contraction of the national market will probably not continue, since estimates for productive investment in 1987 and 1988, as well as the prospects for 1989, are more favourable: at the end of 1987, manufacturers, whose production capacity is being fully utilized and whose profits are at their highest since 1973, stated their intention to increase investments by more than 15% in 1988. A recovery is under way in the oil producing sector and investment prospects are equally positive in the building sector.

## Italy

Italy provides 11.3% of EC production and has demonstrated considerable stability over the past decade. As is the case in Germany, the Italian low-tension switchgear industry is able to depend on a relatively strong mechanical sector for its market. However, this market cannot be termed a "leader", having ceded a degree of decision-making autonomy to the large foreign firms established on its territory.

Italian production is highly concentrated around four types of products: circuit breakers account for a very large share (40%) in relation to other EC countries; next come control aids (22%), contactors (21%) and, finally, relays (14%).

## Other EC Member States

BLEU, the Netherlands and Denmark represent 2.8%, 2.3% and 1.1%, respectively, of Community production, and these shares have remained relatively stable over the entire period under consideration. The ties between the Netherlands, Denmark and, to a lesser extent, BLEU and the Federal Republic of Germany have made Germany their main commercial partner in intra-EC trade of low-tension switchgear:

- Denmark-48% of exports and 64% of imports
- Netherlands-44% of exports and 65% of imports
- BLEU-20% of exports and 63% of imports.

The other dominant European partner in this zone is France, which buys 10% and 32% of the intra-EC exports of the Netherlands and BLEU, respectively, and supplies them with 16% and 40% of their intra-EC imports.

These Member States trade relatively little with the United States, apart from the Netherlands, for which 17.2% of imports are North American. BLEU and Denmark buy 6.9% and 6.4% of their imports from the United States, respectively. The share of exports to the American continent from this group of countries is also quite weak. Thus, BLEU, Denmark and the Netherlands sell 3.2%, 4.1% and 4.6%, respectively, of their exports there.

Ireland supplies 1.2% of Community production and is characterized by an industry which is primarily involved in sub-contracting and is partly under the control of US and Japanese groups. These aim at penetrating the Community market by directly establishing themselves in countries such as Ireland or Spain, where they may also benefit from tax concessions. Sub-contracting for French firms is also very important.

Greece has a modest electrical equipment industry, primarily oriented towards the production of low-tension equipment. Although production statistics are not available, the level of production is clearly very low in relation to that of the

EC. Greece is therefore very dependent on foreign sources. Non-EC countries supply only 20% of Greek needs, leaving the EC with a preponderant role. Within the EC, three countries sell Greece 87% of its intra-EC imports: Germany (47%), Italy (24%) and France (16%).

Spain supplies 5.6% of European production, which is 1% more than in 1980. As is the case in Italy and the United Kingdom, a number of Spanish firms do not have total decision-making autonomy insofar as they are part of transnational European, Japanese or US firms. Domestically, despite strong investment growth (investments in capital equipment increased 46% in volume during the past three years), the utilization rate for production capacity remains high. With domestic demand remaining strong and export opportunities increasing due to the modernization of production equipment, production investment - and, consequently, demand for low-tension switchgear - should continue to grow rapidly.

## Forecast and Outlook

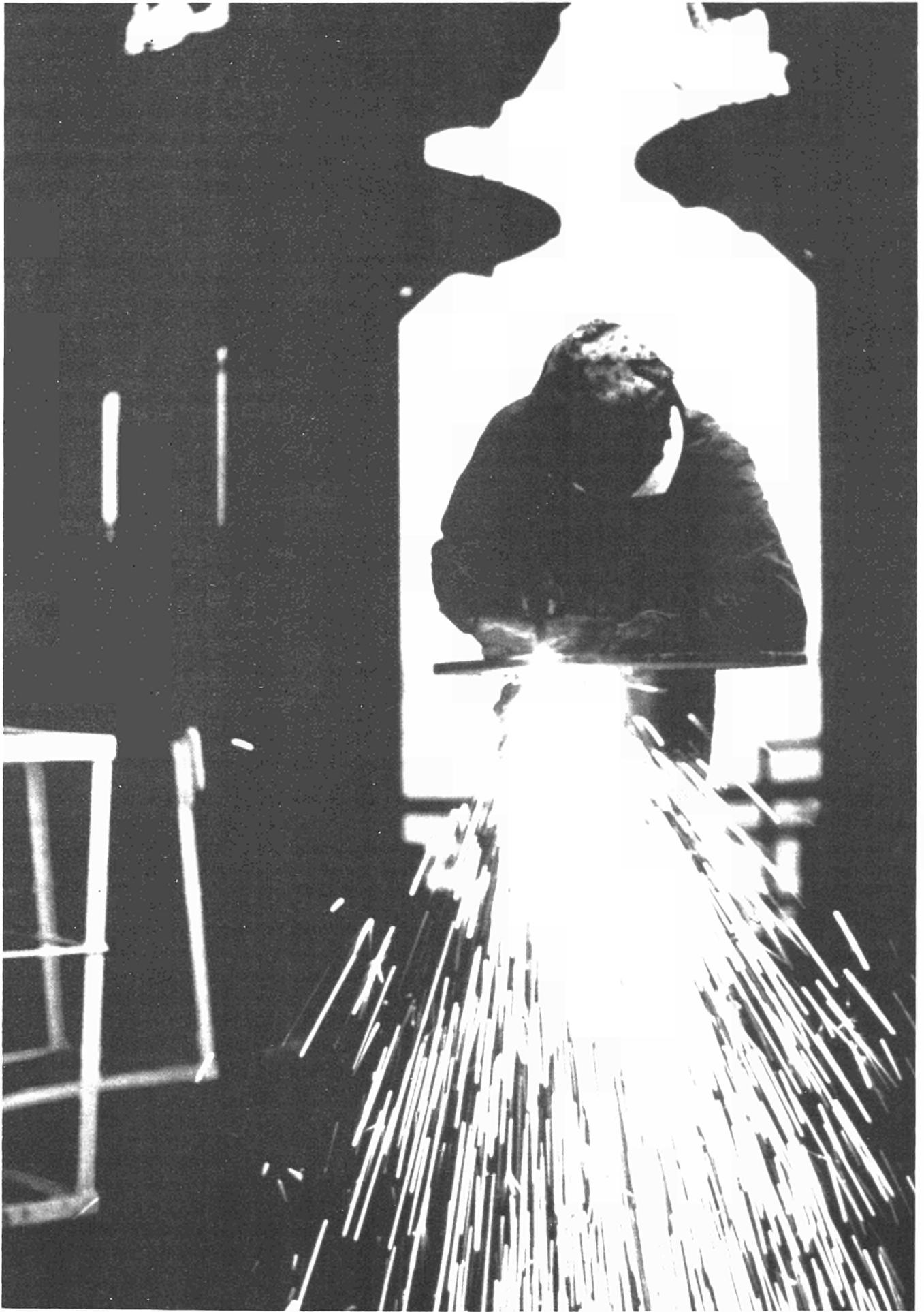
With the completion of the European market in 1992, the domination of the Community market by France, the United Kingdom, Italy and, above all, Germany may be accentuated. However, there is also likely to be an increased US and Japanese presence via multinational firms, particularly in some of the smaller Member States.

Over the next 10 years, market logic will be transformed at the same time as production structures: increasing industrial concentration which began some years ago in Europe will continue. Hence, an important aspect of the industry will be the strategies of large firms across the EC.

Against a background of low general economic growth and with an industry that is already highly developed there will be a decreasing number of markets for energy substitutes, and this sector must depend on a slow renewal of European production capacity.

Moreover, there will be few new developments to compensate for this slowdown within the sector itself. On the other hand, product modification may be imposed by other activities in so far as low-tension switchgear must increasingly submit to constraints imposed by electronics. Demand is thus undergoing extensive modification although the scope and speed of change is, as yet, uncertain.

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# WELDING EQUIPMENT

(NACE: 343.1)

*The market for industrial welding equipment is heavily dependent on activities in industries like shipbuilding, off-shore construction, pipelines and electric power plants, all of which fared badly in the 1980s. After a sharp decline in the early 1980s the rate of decline has flattened out, with the lower US dollar rate worsening export prospects and encouraging imports.*

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## Current Situation

The welding industry studied forms part of NACE subgroup 343.1: manufacture of electrical equipment for industrial use. This subgroup includes units exclusively or primarily engaged in the manufacture of electrical accessories for motor vehicles, industrial electrical furnaces, electrical tools, electric trucks, electroplating equipment, and for the welding industry: electrical welding apparatus.

In view of external trade and development, it has become clear that Community production and sales, although at a very low level after the steep decline of the early 1980s, are beginning to improve. However, it is not clear how that improvement will affect employment.

Robots are a significant technological innovation and are playing an important role in some segments, e.g. spot welding in the automotive industry, and the degree of mechanization is growing every year. Welding and robotics are slowly converging, although the much-heralded growth of this field still lies in the future.

The US market is dominated by a few large companies, while the European market consists of a very large number of small manufacturers, as well as a few larger ones.

The overall financial situation of the industry and its main firms has led to a number of takeovers and/or mergers to improve both the market and financial position. This development must continue if a financially strong and competitive industry is to be established. The current dollar rate of exchange might lead to increased sales by US companies in Europe.

As no official sectoral statistics exist and only EWA members, i.e. firms, make data available, only trends in the 1980s can be described.

Since 1980, production has decreased in the following segments (data valid for Germany, France, Italy, the Netherlands and the UK only):

- equipment for manual welding with coated electrodes
- rotary equipment
- static equipment (except Germany)
- transformers
- rectifiers (except Netherlands)
- machines for single spot and projection welding
- fixed machines (except UK)
- portable machines (e.g. spot welding heads with separate or incorporated transformers)
- butt welding machines (except UK)
- seam welding machines (except UK);

and production has shown an upward trend in the following segments:

- equipment for gas-shielded and submerged arc welding
- MIG, MAG, submerged arc semi-automatic welding (compact and with separate wire feed unit) (except France)
- TIG equipment (except UK).

In geographical terms, production units are to be found in the larger Member States: France, Italy, the United Kingdom and Germany. These units supply not only the domestic market, but also the markets of other countries. The existence of a large number of small manufacturing companies makes it very difficult to provide a detailed description of these markets as a whole.

## Forecast

The expected upturn of the world economy will not have a major impact on the welding industry during 1988-89.

The decline in the market that took place last year is expected to continue. Given the current low exchange rate for the US dollar, sales by US companies in Europe can be expected to increase. Furthermore, competition by Japan and Korea is likely to increase.

Roughly speaking, the German market can be expected to grow, the French market to remain steady and the United Kingdom market to shrink.

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# BATTERIES AND ACCUMULATORS

(NACE 343.2)

*Some growth is expected to take place, more in value than in quantities, as a result of the trend towards more powerful and more compact batteries. New technologies are being developed to extend the life of primary batteries and to reduce their mercury content. Challenges facing the sector are environmental protection measures and imports from low-priced countries in the Far East.*

The leading producers of batteries and accumulators are Germany, France, the UK and Italy. Value-based calculations show that accumulators are the largest segment, representing two thirds of total production.

## Current Situation

The EC battery industry can be subdivided into two main sectors:

- primary batteries
- rechargeable batteries.

In both systems, the production of electric energy is based on a chemical reaction, which is reversible in the case of rechargeable batteries.

### Primary Batteries

The most important applications of primary batteries are: electronic audio equipment (radios, cassette recorders, Walkmen); photo and film cameras; clocks and watches; pocket calculators; toys; hearing aids; and measuring devices.

Different systems are used in primary batteries. The most widespread systems are zinc-carbon and alkali-manganese batteries. Button cells generally function on a silver oxide and air zinc principle, although in recent years there has been a noticeable trend towards the use of lithium.

In 1985, the primary battery segment employed around 16 000 persons spread over 30 companies. These figures are not undergoing much change. There have not been any particular concentration trends in the sector. Some manufacturers, such as Ever Ready, Leclanché, Philips, Ucar and Varta, have brand representation throughout the Community. Other firms are only operating on a regional level.

Factories are situated in Belgium, Denmark, Germany, Greece, Spain, Italy, Portugal and the UK.

Varta is one of the few companies operating in more than one sector; apart from primary batteries, it produces practically the complete range of accumulators.

### Rechargeable Batteries

Accumulators are primarily used as car starter batteries. Other areas of application are: drive batteries for electric carrier vehicles; fixed-installation batteries used to provide emergency power supplies; and air and space travel (acrosspace).

The most widespread operating principle for accumulators is the lead-sulphur system. Special-purpose accumulators work with nickel-cadmium.

In 1985, about 30 lead accumulator manufacturers employed around 38 000 persons, and this figure is unlikely to change in the next few years.

Value-based calculations show that starter batteries hold a two-thirds share in total accumulator production. Table I shows production figures for starter batteries.

The trend towards the development of more powerful and compact batteries has meant that, in the period 1980-86, a slight increase in production value was recorded coupled with a slight reduction in quantities produced. During the same period, production of rechargeable batteries, mainly car batteries, increased both in value and in quantities, large-

Summary Table  
Batteries and Accumulators (1)

|                      | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  |
|----------------------|-------|-------|-------|-------|-------|-------|-------|
| Apparent consumption | 1 820 | 1 956 | 2 148 | 2 137 | 2 325 | 2 598 | 2 620 |
| Net export earnings  | 126   | 101   | 109   | 79    | 113   | 181   | 129   |
| Total EC production  | 1 946 | 2 057 | 2 257 | 2 216 | 2 438 | 2 779 | 2 749 |
| Employees (1 000)    | N/A   | N/A   | N/A   | N/A   | N/A   | 54    | N/A   |

(1) EC 8: excluding Greece, Ireland, Luxembourg and the Netherlands.

**Table I**  
**Starter Battery Production, 1980-85**

|      | (1 000) |
|------|---------|
| 1980 | 40.7    |
| 1981 | 39.2    |
| 1982 | 41.5    |
| 1983 | 42.1    |
| 1984 | 43.3    |
| 1985 | 47.0    |

Source: Eurobat

ly as a result of the favourable situation in the car industry. Member States with their own car industry are the main producers. Production is mainly determined by the number of cars in use, the "life expectancy" of the car and the type of climate.

Starter batteries for motor vehicles are manufactured by 70 factories in the EC. However, at present only 75% of production capacity is being utilized. The most important manufacturing countries are Germany, Spain, France, Italy and the UK. Some large companies, such as Bosch and GM, specialize in the production of starter batteries. Most other large corporations, for example Chloride, Ceac and Varta, manufacture drive batteries and fixed-installation batteries alongside starter batteries. The same is true for the majority of medium-sized companies. Some smaller companies in Germany and the UK also specialize in the production of starter batteries which are marketed on a more regional level (replacement batteries). Over the next few years, the market is expected to grow faster in Greece, Spain and Portugal than in the rest of the Community, due to the higher degree of motorization expected to take place in these countries.

Approximately 4 million drive cells were manufactured in 1985. These are mainly required for drive batteries used in electric carrier vehicles (fork lift trucks). The market for drive batteries is closely related to industrial investment. The same is true for fixed-installation batteries.

Nickel-cadmium accumulators are produced by seven firms in the EC. Exceptional growth figures were recorded for the gas-impermeable version of small device batteries. Factories are located in Germany, France, Italy and the UK. Main producers in this field are Saft and Varta.

### *Product Development*

Approximately 2.7 billion primary batteries were produced in 1985, accounting for one third of total production. This area of production is characterized by a steady stream of innovations as a result of the introduction of new developments in electronics, mainly through miniaturization. An increasing number of products with a low content in, or entirely free from, harmful substances (especially mercury) have been developed, manufactured, and introduced in the market.

Alkali battery sales have recorded a marked increase over the last few years. Such batteries last approximately five times as long as conventional batteries. They now account for approximately 37% of total primary battery production, as opposed to 20% in 1980.

The last few years have also shown a trend towards the production of lithium batteries, although the quantities produced do not as yet play a significant statistical role. Button cells account for approximately 10% of production in this field.

### *Foreign Trade*

Intra-EC trade has risen more sharply than extra-EC trade, i.e. the most important export area for EC manufacturers is the EC market.

The largest exporter and importer is Germany, which, like France, has a slight export surplus. The UK has a balanced trade account, while Italy records an import surplus.

In last few years, there has been increased pressure on the industry due to growing imports from Asian countries, in par-

**Table II**  
**Production and Foreign Trade**

| (Million ECU)    | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  |
|------------------|-------|-------|-------|-------|-------|-------|-------|
| Production       |       |       |       |       |       |       |       |
| Current value    | 1 946 | 2 057 | 2 257 | 2 216 | 2 438 | 2 779 | 2 749 |
| Index            | 100.0 | 105.7 | 116.0 | 113.9 | 125.3 | 142.8 | 141.3 |
| Constant value   | 1 946 | 1 853 | 1 844 | 1 667 | 1 722 | 1 851 | 1 735 |
| Index            | 100.0 | 95.2  | 94.8  | 85.7  | 88.5  | 95.1  | 89.2  |
| Imports Extra-EC | 229   | 279   | 319   | 323   | 358   | 393   | 401   |
| Index            | 100.0 | 121.8 | 139.3 | 141.0 | 156.3 | 171.6 | 175.1 |
| Exports Extra-EC | 355   | 380   | 428   | 402   | 471   | 574   | 530   |
| Index            | 100.0 | 107.0 | 120.6 | 113.2 | 132.7 | 161.7 | 149.3 |
| X/M              | 1.55  | 1.36  | 1.34  | 1.25  | 1.32  | 1.46  | 1.32  |

Source: Eurostat.

ticular South Korea and Japan. This may lead European manufacturers to conclude strategic alliances.

### *Consumption Trends*

Energy requirements are still increasing, although more powerful systems will mean a reduction in the quantities of primary batteries required.

In the case of accumulators, there is a rising demand for maintenance-free, sealed batteries, i.e. batteries which do not need refilling with water. Almost all major manufacturers have followed this trend in their product development, production and sales.

### *Research and Development*

The targets of R&D are to raise performance and quality standards of existing products, and to create substitution products, such as lithium batteries, and new high-power systems for new areas of application. Environmental protection is one of the main areas of concern.

### *Regulatory Trends*

The sector has made major investments in order to remain within recently imposed stringent safety limits for industrial effluents and the emission of waste products into the atmosphere.

The EC is currently preparing guidelines to ensure standardization of battery marking with internationally agreed ISO recycling symbols. This should increase consumer willingness to return batteries after use and has been welcomed by the battery industry as conforming to the goals set by in-

dustry itself: to develop, produce and sell batteries which are low in or free from harmful substances, and to recycle wherever ecologically, technologically and economically possible.

Many Member States have installed separate waste collection for mercury-containing primary batteries. The state of the art is such that these batteries cannot be recycled, with the exception of mercury-oxide button cells. In 1985, the European primary battery industry therefore introduced a mercury reduction programme worth 80 million ECU and intended to implement a step-by-step reduction of the mercury content in alkali-manganese cells. By 1990, these batteries will contain such small amounts of mercury that they can be disposed of with normal household waste. On the other hand, accumulators have always had a high recycling rate (80% for lead accumulators and 40% for nickel-cadmium accumulators).

## **Outlook**

The industry's opportunities lie in its capability to innovate, increase its productivity and manufacture products which meet the highest quality requirements. The risks lie in overcapacity and pressure due to imports from low-priced countries.

As demand in the main consumer sector will probably slow down in future, demand for starter batteries will probably stagnate, or possibly increase only slightly due to demand for replacements.

EUROBAT: Association of European Accumulator Manufacturers  
EUROPILE: Association of European Dry Battery Manufacturers  
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Tel: (41 31) 228 781; Telex: 911407; Fax: (41 31) 211 958

# MUSIC RECORDING

(NACE 345.2)

*The 1980s have brought mixed results for the music recording industry. In the period 1980-85, sales showed a constant decline; since 1985 the overall downward trend has been reversed, largely as a result of the growth in compact disc sales. This trend is expected to continue in the future, although at a more moderate pace. Private copying and piracy continue to present major threats to the industry.*

## Current Situation

The EC's music recording industry is the second largest in the world after the USA. In 1986, total world sales of legitimate sound recordings (i.e. sound recordings reproduced and sold with the authorization of the rightful owner) amounted to 14.2 billion ECU at retail level. US sales represented one third of this amount (4.7 billion ECU) compared with 28% for the EC (3.9 billion ECU). 1987 retail sales continued to grow strongly and totalled 4.4 billion ECU and 4.8 billion ECU in the Community and the USA respectively. World sales for 1987 are not yet available but it is anticipated that they will exceed the 1986 level.

1980-85 was a difficult period for the sector as it suffered constantly falling sales. However, fortunes appear to have been reversed with the introduction of new technological developments such as compact discs (CD) and digital audio tapes (DAT). Compact discs appeared on the market in Europe in 1984 and are proving an enormous commercial success. In terms of turnover, CD sales took off in 1985 and were responsible for the reverse in the downward trend of the previous years.

## Historic Trends

The music recording industry reached its peak in 1978, when the number of units sold and turnover were at their highest levels. Ex-factory sales of singles reached 265 million and long-plays 495 million (364 million LPs and 131 million cas-

settes), producing a total value of 1 622 million ECU (2 000 million ECU at 1980 prices).

In 1980, ex-factory sales of singles had dropped to 245 million and of long-plays to 477.6 million (329.9 million long-plays and 147.7 million cassettes). By the end of 1984, deliveries of singles had dropped by a further 3.4% compared with 1980, to 236.6 million. During the same period, long-plays (232.2 million LPs, 155.8 million cassettes and 6.5 million CDs) had dropped by a dramatic 17.4% (see Table I). Although the value of ex-factory sales had increased from 1 786 million ECU in 1980 to 1 902 million ECU in 1984, in constant terms this represented a fall of 20.3%.

Since 1985, sales of sound recordings in the European Community have picked up, mainly as a result of a rapid increase in CD sales. The value of 1987 ex-factory sales is estimated at 2 509 million ECU which, in real terms, is still nearly 6% below 1980.

In unit terms, sales of singles and LPs continue to decrease. On the other hand, cassette sales are steadily increasing and CDs have risen sharply. Currently, the growth in CD sales more than compensates for the decline in the sales of singles and LPs. Over 1985-87 sales of CDs have doubled every year; in 1985, just under 16 million units were sold in the 12 Member States; in 1986, sales rose to 35.7 million and provisional figures for 1987 show that over 71 million units were sold.

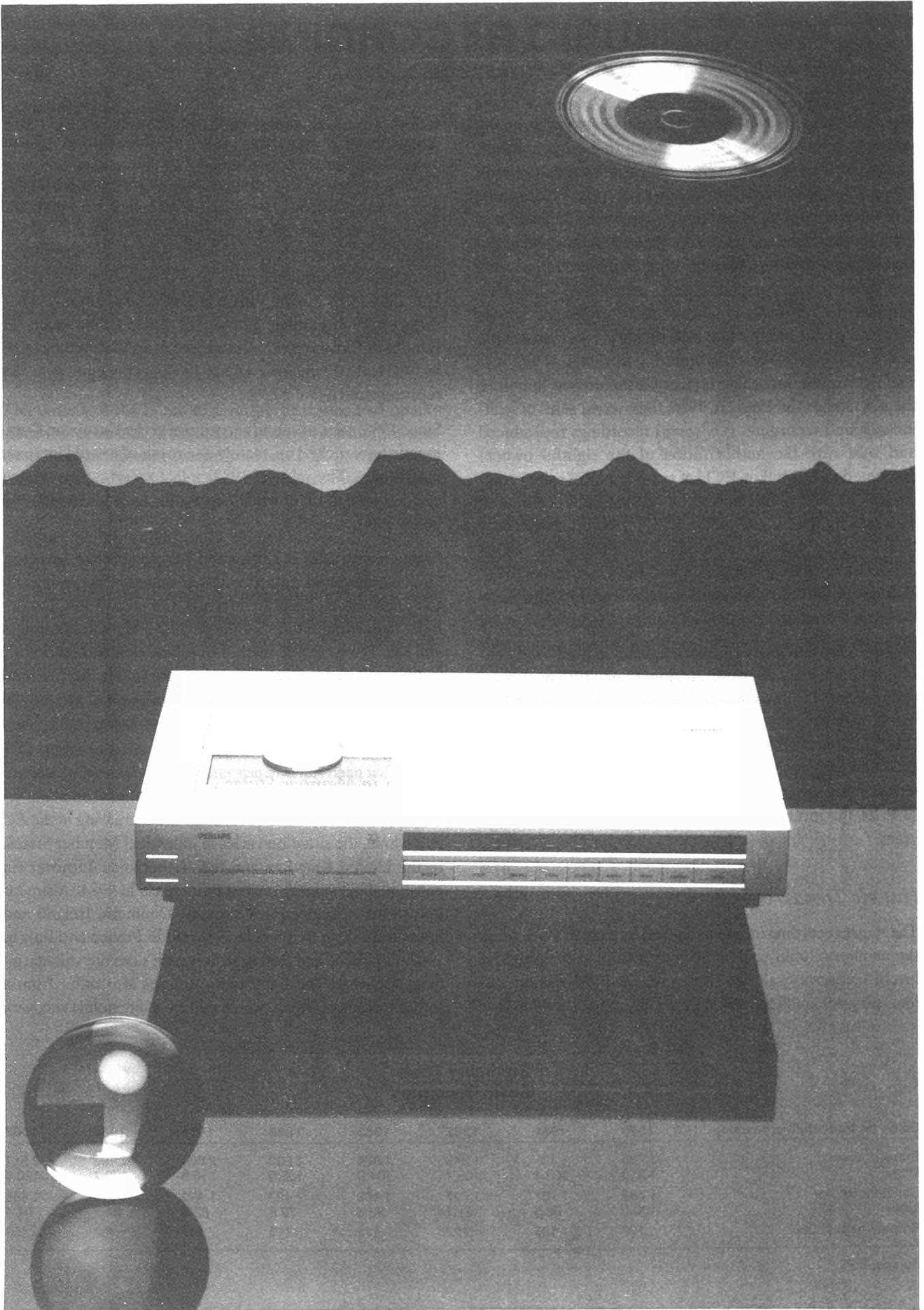
## Trends in Member States

Although sales of sound recordings are increasing in the EC as a whole, the situation varies in individual Member States. In the United Kingdom and the Netherlands, turnover (in constant 1980 values) started to increase in 1984. A similar upturn was witnessed in Germany, Denmark, Ireland and Spain in 1985, in Belgium in 1986 and in France and Italy in 1987. In Greece and Portugal, however, sales are still marginally declining. These last two countries also suffer from a serious piracy problem, which makes an economic recovery

Summary Table  
Music Recording

| Sales (at trade delivery value) | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  | 1987  |
|---------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Current values                  | 1 786 | 1 931 | 1 949 | 1 874 | 1 902 | 2 080 | 2 192 | 2 511 |
| Index                           | 100.0 | 108.1 | 109.1 | 104.9 | 106.5 | 116.5 | 122.7 | 140.6 |
| Constant values                 | 1 786 | 1 757 | 1 627 | 1 469 | 1 423 | 1 492 | 1 514 | 1 686 |
| Index                           | 100.0 | 98.5  | 91.1  | 82.3  | 79.8  | 83.5  | 84.7  | 94.4  |
| Employment (1 000)              | 128   | 125   | 122   | 118   | 115   | 111   | 107   | 103   |

Source: IFPI.



**Table I**  
**Sales by Product, 1980-87 (1)**

|      | Singles/EPs/<br>maxi-singles | Units (1 000) |         |        | Value (1 000 ECU) |                   |
|------|------------------------------|---------------|---------|--------|-------------------|-------------------|
|      |                              | LPs           | Tapes   | CDs    | Current<br>value  | Constant<br>value |
| 1980 | 244 966                      | 329 904       | 147 696 | -      | 1 786 087         | 1 786 087         |
| 1981 | 251 420                      | 312 465       | 157 029 | -      | 1 931 415         | 1 757 483         |
| 1982 | 255 044                      | 290 026       | 162 546 | -      | 1 948 768         | 1 626 700         |
| 1983 | 249 611                      | 253 799       | 148 123 | 2 085  | 1 874 348         | 1 468 999         |
| 1984 | 236 642                      | 232 225       | 155 800 | 6 512  | 1 901 751         | 1 422 610         |
| 1985 | 229 342                      | 224 700       | 171 423 | 15 713 | 2 080 231         | 1 491 719         |
| 1986 | 202 518                      | 211 393       | 193 527 | 35 724 | 2 192 341         | 1 514 371         |
| 1987 | 182 827                      | 197 989       | 210 413 | 71 649 | 2 510 958         | 1 686 069         |

(1) Ex-factory levels.  
Source: IFPI.

for the industry more difficult to achieve. Sales by product in the Member States are shown in Table II.

The improved performance of the European music recording industry over the past three years cannot mask the fact that ex-factory sales are still 6% below 1980 levels and 15% below the record year of 1977 in constant 1980 values.

### *Consumption Trends*

Since 1980, sales of singles have declined and the "maxi-single", which appeared on the market in the early 1980s, has not had a sufficient impact to halt this trend. The CD single is poised to take a significant share of the singles market, in the same way as the CD long-play is currently replacing the vinyl LP.

Although LP sales had already begun to fall in the early 1980s, the arrival of the compact disc has accelerated this decline. In

Japan and the USA, 1987 CD sales already exceeded those of the vinyl LP. In 1988 the same is expected to happen in some of the major EC markets such as Germany and the United Kingdom. Some record companies have even stopped releasing some of the repertoire on vinyl LPs.

Sales of music cassettes have increased slowly but steadily since 1980, although this increase far from compensated for the decline in LP sales during the early 1980s.

Compact discs are only the first stage of digital technology to be marketed as a mass consumption product by the recording industry. The second stage will be the marketing of the digital audio tape (DAT). DATs are smaller and give a better sound reproduction quality than the conventional cassette.

DATs are only just being launched in Europe and sales are expected to take off slowly due to a current controversy caused by the fact that the near-perfect quality of sound reproduction is bound to increase home taping dramatically.

**Table II**  
**Sales by Product in Member States, 1987 (1)**

|                 | Singles/EPs/<br>maxi-singles | Units (1 000)  |                |               | Value<br>(1 000 ECU) |
|-----------------|------------------------------|----------------|----------------|---------------|----------------------|
|                 |                              | LPs            | Tapes          | CDs           |                      |
| BLEU            | 7 968                        | 3 600          | 1 500          | 2 500         | 62 102               |
| Denmark         | 1 303                        | 4 556          | 1 699          | 1 605         | 45 920               |
| France          | 49 400                       | 20 400         | 22 100         | 12 500        | 401 833              |
| Germany         | 38 500                       | 66 500         | 58 000         | 22 000        | 654 087              |
| Greece          | 5 364                        | 4 872          | 67             | N/A           | 25 797               |
| Ireland (2)     | 850                          | 1 000          | 1 700          | 125           | 17 409               |
| Italy           | 6 000                        | 14 800         | 18 000         | 4 500         | 231 483              |
| Netherlands     | 12 100                       | 12 300         | 5 200          | 8 800         | 175 643              |
| Portugal        | 1 358                        | 2 567          | 2 112          | 227           | 17 972               |
| Spain           | 2 218                        | 14 902         | 20 830         | 1 125         | 129 277              |
| United Kingdom  | 63 400                       | 52 000         | 74 400         | 18 200        | 749 277              |
| <b>EC Total</b> | <b>182 827</b>               | <b>197 989</b> | <b>210 413</b> | <b>71 649</b> | <b>2 510 958</b>     |

(1) Ex-factory levels.  
(2) Estimates.  
Source: IFPI.

The music recording industry is therefore currently trying to reach an agreement with the Japanese manufacturers of DATs to ensure that copyright protection is guaranteed: one way of doing this is for manufacturers to introduce a device in the hardware designed to limit or prevent copying. At present, the repertoire available on pre-recorded DATs is still extremely limited.

### *Major Structural and Geographic Features*

There are 22 large vinyl pressing and tape duplication plants in the EC: 3 in the UK, 3 in the Netherlands, 5 in France, 5 in Germany, 1 in Greece, 3 in Spain and 1 in Italy; there are also many small and medium-sized plants. In the UK, for instance, there are a total of 27 vinyl pressing and/or tape duplication plants.

There are 18 CD plants throughout the EC: 5 in the UK, 7 in Germany, 3 in France, 2 in the Netherlands and 1 in Italy.

For many years, the Netherlands served as the manufacturing centre of sound recordings for Europe and, to some extent, for the rest of the world; the three large plants in operation belong to the three big recording multinationals: EMI, CBS and Polygram. The introduction of the compact disc has dramatically changed this production pattern. At present none of the three multinationals manufacture CDs in the Netherlands. This means that, given the decline of the vinyl market, these three factories will have to reduce or discontinue their activities at some point in the future. The two CD plants operating in the Netherlands are small and together employ only 50 people. The Community's CD manufacturing centres are Germany and the United Kingdom.

### *Employment Trends*

Employment in the music recording industry is strongly affected by sales patterns. Moreover, the prosperity or decline of the industry has a strong impact on other, related sectors: the music retail sector, musicians, authors, composers, performers and music publishers.

Employment in the music recording industry peaked in 1978, when 38 000 people were directly employed in the nine Member States and a further 99 000 in the retail sector. Taking into account musicians, authors, composers and music publishing, it is estimated that the livelihood of 230 000 people depended wholly or partially on the industry.

In 1982, employment provided directly by the industry fell 22.9% to 29 300 people (29 800 including Greece). Similarly, employment in the music retail sector fell 9.6% to 89 500 (92 000 including Greece). Detailed statistics on the trends of the level of employment only exist in France and the United Kingdom. In France, employment declined by 45% between 1978 and 1986 and in the United Kingdom by 30% during the

same period. However, in the UK employment seems to be rising again, whereas in France it is still declining.

### *Major Threats to the Industry*

In the past few years, the music recording industry has devoted a great deal of human and financial resources trying to solve or at least keep under control two major problems threatening the industry: private copying and piracy.

#### **Private copying**

Private copying is the most serious problem facing the music recording industry in Europe today. Although many factors have contributed to the slump in sales from 1980 to 1984, home-taping has played a significant role in the recession. 1987 EC retail sales of 4 400 million ECU are estimated to compare to a home-copied equivalent value of 11 000 million ECU. 350 million blank tapes are sold annually and it is estimated that most of these tapes (90-95%) are used to copy copyright-protected material. Although the enormous success of the compact disc seems to have conferred a new lease of life to the recording industry, the importance and impact of private copying should not be underestimated. The recent arrival on the European market of the digital audio tape with a quality comparable to that of the CD means that the problem of private copying will be further exacerbated: unlike analogue cassettes, where successive copies of a sound recording experience a severe loss in quality, DAT enables successive copies of a sound recording to retain the same sound quality as the original.

#### **Piracy**

Piracy is also a serious issue facing the sector. It generally takes one of three forms:

- piracy in the strict sense, which is unauthorized commercial duplication of a sound recording packaged differently from the original legitimate product
- counterfeiting, which is production of the unauthorized copy intended to look as much like the original as possible in order to deceive the consumer
- bootlegging, which is the unauthorized commercial reproduction of a live performance or a broadcast.

In most of the EC, piracy is now relatively well controlled and represents under 5% of total sales. However, in Italy, Greece, Spain and Portugal, the problem is still very serious with piracy in 1986 accounting for 33%, 35%, 30% and 80% of sales respectively. Disturbingly, the 1986 figures for Germany and the Netherlands, while still low, show a significant increase compared with 1984. Total losses in the EC market in 1986 are estimated at 23.6 million cassettes with a retail value of

95 million ECU and at 5.8 million LPs with a retail value of 30.2 million ECU.

A recent phenomenon not included in these figures is the unauthorized copying of early "back catalogue" material. This material, which includes classic recordings by artists such as Cliff Richard or Elvis Presley, is generally more than 25 years old and may therefore be out of copyright in some Member States. IFPI maintains that such unauthorized copies cannot be sold in markets with longer protection periods. A case is currently before the European Court of Justice and is due for hearing in October 1988. The scale of the problem - which accounts for sales of several million ECU per annum - is such that urgent action is needed to harmonize the duration of copyright protection between Member States.

However, the major problem for the EC industry is not piracy in its home markets. Piracy in other regions - in particular the Far East, Middle East and Africa - is on a much larger scale. Worldwide, the industry lost in the region of USD 1 billion (984 million ECU) in 1986, and this figure does not include markets where economic and legal conditions make legitimate penetration impossible. Probably well in excess of 30% of the repertoire copied is owned by EC companies or features European artists. This represents a considerable loss of licensing income for the EC record industry.

Whereas progress has been made over the last few years, particularly in the Far East where tough new laws have been adopted in Malaysia, Singapore and, most recently, in Indonesia, piracy in much of the world still accounts for over 80% of all sales. Even as traditional sources of pirate material such as Singapore are cleaned up, new factories open up in other countries where protection is still weak. The Gulf States, in particular, seem likely to emerge as the new capital of piracy.

The EC record industry has invested millions of dollars in tape and record production facilities throughout the Third World. This investment could be completely wiped out, with factories being forced to close and local workforces laid off, unless action is taken at the highest level to encourage governments to adopt comprehensive and, above all, enforceable copyright laws.

## Forecast

Growth in the volume of legitimate sales is likely to continue over the next five years. Sales of CDs are forecast to increase at a healthy rate, although the rate of increase is likely to be lower than the 100% increase experienced over the past five years. Sales of LPs will continue to decline at a significant rate but sales of cassettes are likely to increase moderately. Singles will continue to decline but this may be offset by a large increase in the sale of CD singles.

DAT could change the pattern of sales of cassettes. At the moment, DAT has been introduced onto the market of some European countries but has not yet been strongly promoted, largely due to the controversy surrounding this new medium. Moreover, pre-recorded DAT is still scarce and the price of the hardware and software is still unacceptably high. However, when pre-recorded DAT is available and when prices decline, DAT will probably turn out to be as popular a medium as CD.

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# AUDIOVISUAL CONSUMER ELECTRONICS

(NACE 345.1)

*The consumer electronics sector is especially affected by technological innovations. The European manufacturers' share of the Community market has been shrinking under the pressure of Japanese manufacturers and South-East Asian newcomers. Major integrated Japanese electronics groups, with mass production aimed directly at world markets, have accelerated the diffusion of new products and, in 1986, proposed the adoption of a single production and broadcast norm for high-definition television. The years 1986 and 1987 were marked by a stabilization of the value market due to lower prices and by the reaction of European manufacturers, which have been engaged in extensive restructuring and relocation offshore of their industrial activities in order to sustain their competitive edge. At the same time, European manufacturers launched, at Community level within Eureka, a concerted HDTV programme, which has permitted a set of norms to be established. European manufacturers seem to have taken the measure of the industrial and commercial stakes of the Japanese offensive.*

The consumer electronics sector includes audio and video equipment (including non-recorded tapes and discs). The subdivisions we are dealing with exclude home computers and prerecorded tapes and discs as the latter are the province of audiovisual production programming.

## Current Situation

Video equipment, colour televisions and VCRs in particular, account for about two-thirds of the Community market. The primary product of household equipment still remains the colour television (34% of the market). VCRs (18% of the market in 1987) have experienced considerable growth since

1981; 2.5 million units at that time compared with almost 8 million in 1987.

Audio equipment (35% of the EC market) is largely dominated by radio and hi-fi equipment. Sales of compact disc players have risen dramatically since 1983: from 150 000 units in 1983 to nearly 4 million in 1987.

## Technical Trends

This sector has been and will continue to be particularly affected by technological progress. Innovations, many of which are already implemented, will certainly bring about major changes in products and markets because of the broader application of digital sound and image processing, the introduction of high-definition television and the development of communication networks.

The digital processing of audio and visual signals provides improved intrinsic quality, facilitates data storage and extends processing capacities. But the transmission of digital signals requires greater frequency availability and will influence broadcasting networks as well as recording and data storage supports. Digital processing will precipitate the renewal of the entire stock of existing equipment (television sets, videocassette recorders, radio receivers, car radios, etc.) and it will also stimulate the appearance of a whole range of new products whose forerunner has certainly been the compact disc player. These include the Digital Audio Tape Recorder, the laser disc recorder/player and the compact video disc player.

The introduction of high-definition television has caused considerable disputes over the production, broadcasting and receiving standards to be established. At stake is the replacement of the world's entire stock of television sets, particularly Europe's 120 million operating receivers, which has led the Europeans to adopt a progressive attitude tending towards

## Main Indicators Consumer Electronics

| (Million ECU)              | 1980   | 1981   | 1982   | 1983   | 1984   | 1985   | 1986   | 1987   |
|----------------------------|--------|--------|--------|--------|--------|--------|--------|--------|
| Apparent consumption       | 11 350 | 12 200 | 13 487 | 13 318 | 12 925 | 14 304 | 18 550 | 18 398 |
| Net export earnings        | -3 468 | -3 529 | -3 637 | - 254  | -5 117 | -5 409 | -6 439 | -6 675 |
| Total Community production | 7 882  | 8 671  | 9 850  | 8 064  | 7 808  | 8 895  | 12 111 | 11 723 |
| Employment (1 000)         | 160.4  | 151.2  | 146.5  | 145.5  | 134.2  | 133.7  | 131.0  | 126.6  |

**Table I**  
**Market Trends**

| (Million ECU)                      | 1980   | 1981   | 1982   | 1983   | 1984   | 1985   | 1986   | 1987   |
|------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|
| Total consumer electronic products | 11 350 | 12 200 | 13 487 | 13 318 | 12 925 | 14 304 | 18 550 | 18 398 |
| Index                              | 100.0  | 107.5  | 118.8  | 117.3  | 113.9  | 126.0  | 163.4  | 162.1  |
| Constant value (1)                 | 11 350 | 11 115 | 11 375 | 10 678 | 8 774  | 10 389 | 13 221 | 12 657 |
| Index                              | 100.0  | 97.9   | 100.2  | 94.0   | 77.3   | 91.5   | 116.5  | 111.5  |
| Video products                     | 6 645  | 7 110  | 8 105  | 8 470  | 8 526  | 9 815  | 12 039 | 12 024 |
| Index                              | 100.0  | 106.9  | 122.0  | 127.5  | 128.3  | 147.7  | 181.2  | 180.9  |
| Audio products                     | 4 705  | 5 090  | 5 382  | 4 848  | 4 399  | 4 489  | 6 511  | 6 374  |
| Index                              | 100.0  | 108.2  | 114.4  | 103.0  | 93.5   | 95.4   | 138.4  | 135.5  |

Estimated by EACEM and BIPE.

(1) At 1980 exchange rates, in standard purchasing-power (SPP) and at 1980 price (GNP price index as deflator).

Sources: EACEM, and BIPE.

compatibility with existing equipment. This has led to the MAC/Paquet set of norms and more specifically, the D2 MAC/Packet standard endorsed by European manufacturers who are developing prototypes of high-definition digital equipment for professionals and general consumers under the HDTV (Eureka) programme.

The development of direct satellite broadcasting has led to the Franco-German TV SAT-TDF 1 and 2 satellite programmes. Though the German TV-SAT 1 satellite did not live up to initial expectations, the TDF 1 satellite programmed for 1988 should assure the development of MAC broadcasting. In the United Kingdom, BSB has placed contracts for satellites and equipment which will use D-MAC for its programmes starting in autumn 1989. Success in this field should favour the appearance of a range of products linked to programme reception (antennae, decoders, deciphering devices, etc.) despite the development of cable networks within the EC. Network innovations also include the introduction of R.D.S. (Radio Data System) broadcasting on FM radio and domestic networks devoted to home automation. This last type of network is the object of a Eureka programme which is attempting to determine a standard of norms for an Integrated Home System (IHS).

### *Consumption Trends*

The EC market increased in volume by 13% in 1987 (13.2% for video, 12.5% for audio/video equipment). But the lower prices, due to competition from South-East Asian countries, stabilized market value at 18.4 billion ECU, audio equipment registering a drop of about 2% while the drop in the video sector was limited to 0.1%. The market for consumer electronics amounted to 0.8% of household budgets within the Community and stagnation of market values was due partly to the sharp drop in the cost of components imported from South-East Asia, more particularly to the depreciation of the dollar.

#### Color TV:

The market for colour televisions is experiencing moderate growth with 15.6 million units sold in 1987 (+4.5%) compared to 1986 (+16%). Demand now mainly concerns the renewal of equipment and the multiplication of household sets, and centres on large receivers (larger than 52 cm, 42% of the market) and small screens (smaller than 42 cm, 36% of the market). This trend confirms the decline of the middle range products and stimulates imports: 27% of the market is covered by imports (20% in 1986, 19% in 1985), with South Korean imports making considerable inroads on the EC market (7% in 1987, 3% in 1986, 0.7% in 1985) and Japanese imports falling slightly (3% in 1987 compared to 5% in 1986

**Table II**  
**Product Markets**

| (Thousand units) | 1980  | 1981   | 1982   | 1983   | 1984   | 1985   | 1986   | 1987   |
|------------------|-------|--------|--------|--------|--------|--------|--------|--------|
| CTV              | 9 912 | 10 108 | 11 340 | 11 516 | 12 543 | 12 879 | 14 945 | 15 626 |
| VCR              | 1 191 | 2 469  | 4 968  | 5 082  | 4 890  | 5 425  | 6 459  | 7 833  |
| Car radio        | 8 370 | 7 986  | 8 981  | 10 686 | 11 034 | 11 630 | 13 469 | 14 632 |
| CD player (1)    | -     | -      | -      | 143    | 282    | 655    | 2 095  | 3 815  |

(1) Compact disc players not combined and combined including portable and car set.

Source: EACEM.

**Table III**  
**1987 National Markets by Product**

| (Thousand units) | BLNL | DK  | D     | GR  | E     | F     | IRL | I     | P   | UK    |
|------------------|------|-----|-------|-----|-------|-------|-----|-------|-----|-------|
| CTV (1)          | 790  | 190 | 3 750 | 100 | 1 334 | 2 700 | N/A | 2 350 | 285 | 4 127 |
| VTR              | 475  | 80  | 2 050 | 130 | 633   | 1 250 | N/A | 900   | 115 | 2 200 |
| Car radio        | 600  | 190 | 5 200 | 64  | 843   | 2 650 | N/A | 1 300 | 150 | 3 635 |
| C.D. player (2)  | 500  | 80  | 1 250 | N/A | 62    | 640   | N/A | 280   | 3   | 1 000 |

(1) Greece estimated from EACEM.

(2) Spain estimated from EACEM.

Source: EACEM.

and 6% in 1985). EC production in this context increased by 1.5% (+5% in 1986) to 13.3 million units.

Videocassette recorders:

European households continue to purchase VCRs. The market came to over 7.8 million units in 1987 (+21%). Lower prices which were particularly pronounced in 1987 (-26%) produced a negative progression of market values (-11%). Imports of sets and kits accounted for 64% of the market (66% in 1986, 73% in 1985) with huge increases in imports from South Korea (+205%) which now covers 16% of the market (6% in 1986). European production and assembly rose considerably and reached 4.2 million units in 1987 (+32%).

The market for CD players experienced substantial growth in 1987; +82% (3.8 million units). With a drop in prices of approximately 20% the market increased by 48% in terms of value (950 million ECU, 5% of the total market). Imports covered 59% of market demand (76% in 1986) with an increase of South Korean imports (4.5% of the market in 1987). Applications for CD players are spreading rapidly within the entire sector (car radios, portable combination sets, compact video disc players, etc.) which is an important factor in keeping the hi-fi sector from a marked slump.

### *The Position of the Firms*

EC production amounts to approximately 17% of world-wide consumer electronics production. Faced with competition from Japanese and South Korean conglomerates, EC manufacturers have been engaged in extensive restructuring for the past 10 years. The year 1987 saw some important acquisitions but also the reinforced presence of Japanese manufacturers installed in the EC.

Philips, major world producer of colour television sets, purchased the minority participation shares of its subsidiary North American Philips Corp. (NAPC). This operation is part of the international reorganization of the group which is continuing its transfer of production units to Asian countries (video recorder factories in South Korea and Japan) and expansion in China and Asian countries (joint ventures).

Thomson confirmed its commitment to the sector by acquiring Ferguson (consumer division of Thorn-Emi) which is abandoning production in order to specialize in renting, and by restructuring its activities in Germany (relinquishing Dual, industrial consolidation of its subsidiaries Telefunken, Saba and Normende) but above all by acquiring RCA the consumer electronics division of General Electric. The group thus achieves the rank of second largest world producer of colour televisions thereby opening the prospect of the American market.

**Table IV**  
**EC Production and Foreign Trade**

| (Million ECU)      | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986   | 1987   |
|--------------------|-------|-------|-------|-------|-------|-------|--------|--------|
| Production         |       |       |       |       |       |       |        |        |
| Current value      | 7 822 | 8 671 | 9 850 | 8 064 | 7 808 | 8 895 | 12 111 | 11 723 |
| Index              | 100.0 | 110.0 | 124.9 | 102.3 | 99.0  | 112.8 | 153.6  | 148.7  |
| Constant value (1) | 7 882 | 7 900 | 8 307 | 6 465 | 5 301 | 6 460 | 8 523  | 8 065  |
| Index              | 100.0 | 100.2 | 105.4 | 82.0  | 67.2  | 81.9  | 108.1  | 102.3  |
| Imports extra-EC   | 4 560 | 4 719 | 4 913 | 6 632 | 6 737 | 7 393 | 8 395  | 8 670  |
| Index              | 100.0 | 103.5 | 107.7 | 145.4 | 147.7 | 162.1 | 184.1  | 190.1  |
| Exports extra-EC   | 1 092 | 1 190 | 1 276 | 1 378 | 1 620 | 1 984 | 1 956  | 1 995  |
| Index              | 100.0 | 109.0 | 116.8 | 126.2 | 148.3 | 181.7 | 179.1  | 182.7  |
| X/M (in %)         | 23.9  | 25.2  | 26.0  | 20.7  | 24.0  | 26.8  | 23.3   | 23.0   |

1980: BIPE estimates.

(1) At 1980 exchange rates, in standard purchasing-power (SPP) and at 1980 prices.

Source: EACEM.

**Table V**  
**Production of Major Consumer Electronics Products**

| (Thousand units) | 1980  | 1981   | 1982   | 1983   | 1984   | 1985   | 1986   | 1987   |
|------------------|-------|--------|--------|--------|--------|--------|--------|--------|
| CTV (1)          | 9 882 | 10 771 | 11 367 | 12 507 | 11 840 | 12 412 | 13 081 | 13 280 |
| VCR              | -     | 450    | 1 000  | 904    | 1 690  | 2 471  | 3 172  | 4 185  |
| Car radio (2)    | 5 450 | 4 700  | 5 100  | 5 700  | 5 850  | 6 110  | 6 200  | 6 900  |
| CD player        | N/A   | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    |

(1) 1980, 1981, 1982, 1983 and 1984 estimated by EACEM and BIPE.

(2) All estimated by EACEM and BIPE.

Sources: EACEM and BIPE.

The year 1987 was also marked by the appearance of a third European centre of activity. The Finnish group Nokia has achieved the rank of ninth world producer of colour televisions and has become third largest in Europe by taking over part of Oceanic, an Electrolux subsidiary, as well as the other consumer equipment activities of Standard Electric Lorenz (SEL), a subsidiary of Alcatel (CGE group).

Despite the domination of these three companies it should be stressed that the real national situation in many member countries is that medium and small manufacturers often cover a substantial part of their internal market with their own productions, particularly of TV colour sets and high range - hi-fi elements.

The Japanese groups, in order to cope with the rising value of the Yen, the saturation of certain markets and the increasing competition from Korean manufacturers, are accelerating the transfer of production and assembly units to Europe.

Production capacity of their units in particular reached 2.5 million colour receivers, 3.2 million VCRs and over 500 000 CD players, all with diverse value-added content.

The EC industry (of European origin) is dominant in colour television sets and holds a comfortable position in audio equipment (car radios, blank recording tapes and discs, speakers and CD players) and has progressively reconquered part of the market for video recorders by a combination of licensing and self-limitation agreements.

#### *Factors behind Production Trends*

The internationalization of the consumer electronics market has been achieved partly at the expense of the EC industry which lost about 34 000 jobs between 1980 and 1987. This loss of jobs is due to the EC industry's shrinking share of the world markets. But this downturn in employment can also be explained in part by technological changes (more efficient

**Table VI**  
**The Eureka Programmes**

| Project title  | Budget           | Participating firms   |
|--|------------------|---|
| EU 105 (Stockholm 17/12/86)<br>Development of improved systems for stereophonic sound reproduction | 3.6 Million ECU  | B&O (DK), KEF (UK)  |
| EU 147 (Stockholm 17/12/86)<br>Digital audio broadcasting system (D.A.B.)                          | 38.3 million ECU | Blaupunkt (D), DFVLR (D), Philips (NL)  |
| EU 84 (Stockholm 17/12/86)<br>Integrated home system (IHS)   | 21.6 million ECU | GEC, Mullard, STC, Thorn (UK), Electrolux (S), Philips (NL), Siemens (D), Thomson (F) |
| EU 95 (London 30/6/86)<br>Compatible high definition television system (TVHD)                      | 180 million ECU  | Bosch (D), Philips (NL), Thomson/Ler (F), Thorn-EMI (UK)                              |
| EU 148 (Stockholm 17/12/86)<br>Digital electronic mapping of European territory (DEMETER)          | 5 million ECU    | Philips (NL)  |
| EU 55 (London 30/6/86)<br>CARMINAT   | 52 million ECU   | Philips (NL), Renault (F)   |
| EU 45 (London 30/6/86)<br>PROMETHEUS   | 15 million ECU   | BL (UK), BMW, Porsche, Daimler, VAG (D), Fiat (I), Matra, PSA, RNUR (F), Volvo (S)    |

Project leaders are listed under participating firms.

Source: EC.

production methods, automation, etc.) which have boosted productivity substantially and by the relocation offshore of production of labour intensive products to countries in the South-East Asian dollar zone.

The EC industry includes two of the four largest world-wide producers in this sector: the Philips and Thomson groups. Blaupunkt (a subsidiary of Bosch) has maintained a favourable position where car radios are concerned. A third important European centre, the Nokia group, emerged in 1987; the European conglomerates are expanding in search of an optimum size, particularly through growth abroad, while at the same time establishing important R&D programmes which are now grouped together in centres which have an essentially European calling. A tendency to coordinate R&D programmes has resulted from the agreements on standards evolved in the Eureka programmes. But more than 100 independent manufacturers are also very active in this sector.

## Forecast and Outlook

The EC market is forecast to rise 6.3% in 1988 by volume. Video equipment should experience a growth rate of 7.4% by volume with a growth rate of 5% for television, 9% for VCRs and 26% for camcorders. Audio equipment is estimated to increase by 4.3% by volume with a growth of 14% for CD players which will continue to present real opportunities as CDs are purchased more frequently to replace records. The EC market is expected to grow at an estimated annual rate of 5.5% by volume with 4.5% for video (with a growth rate of about 4.4% for television and 6.5% for VCRs) and 3.5% for audio equipment (+17% for CD players) in the longer term.

EACEM: European Association of Consumer Electronics Manufacturers

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# ELECTRICAL HOUSEHOLD APPLIANCES

(NACE 346)

Over the first half of the 1980s, flat consumer demand, adjustments to over-capacity, and increased imports from third countries all created difficult conditions for the electrical household appliances industry. Substantial restructuring has taken place and the industry has largely returned to profitability. However, competition remains intense and there is need for higher capacity utilization and further productivity gains.

NACE 346 covers the manufacture of electrical appliances generally intended for use in the home. It includes the following items:

- microwave ovens
- cookers (free-standing and built-in)
- dishwashers
- home laundry products (including washing machines)
- spin-dryers and tumble-dryers
- refrigeration products (refrigerators and freezers)
- personal care products (such as hair-dryers and electric razors)
- small kitchen appliances
- vacuum cleaners
- irons
- heating products.

## Current Situation

The value of production of white goods in the EC reached 16.2 billion ECU in 1986. In terms of constant value, production has fallen by about 7% since 1980 against a background of substantial rationalization and restructuring in the industry. Production of white goods is a major sub-sector of the electrical engineering industry. The volume of major white goods produced in the EC in 1985 was 40% higher than US and 76% greater than Japanese production.

### Main Indicators Electrical Household Equipment

| (Million ECU)              | 1980   | 1985   | 1986   |
|----------------------------|--------|--------|--------|
| Apparent consumption       | 10 700 | 12 900 | 14 700 |
| Net export earnings        | +1 400 | +1 700 | +1 500 |
| Total Community production | 12 100 | 14 600 | 16 200 |
| Employment (1 000)         | 285    | 224    | 219    |

## Consumption Trends

The early 1980s was a difficult period for the industry; consumption grew marginally in line with generally poor consumer spending growth in most Member States. The last two to three years has seen some resurgence in demand, particularly in the northern European Member States. However, the value of imports into the Community has more than doubled over 1980-86 and in this product area international competition has become increasingly fierce.

An important factor in consumption trends over the 1980s has been the degree of market saturation, which, for many products, has increased sharply over the last three decades. In 1986, 96% of households owned a refrigerator, 87% a washing machine and 79% a vacuum cleaner. Saturation levels for major products are indicated in Table I.

Table I  
Growth of Home Penetration

| (%)              | 1970 | 1980 | 1985 | 1986 |
|------------------|------|------|------|------|
| Refrigerators    | 77   | 93   | 96   | 96   |
| Freezers         | 8    | 30   | 37   | 38   |
| Washing machines | 63   | 79   | 86   | 87   |
| Dishwashers      | 3    | 14   | 20   | 21   |
| Vacuum cleaners  | 60   | 75   | 79   | 79   |

Source: CECED.

These consumption trends are exacerbated by the stagnant population growth in the more advanced Member States and slower growth in the others. However, some counter effect is evident in the more sharply rising number of households due to socio-economic factors such as the rise in the number of single person households.

## Export Trends

The value of extra-EC exports peaked in 1985 at 3.2 billion ECU representing 22% of total production. Over 1986, exports fell marginally although still accounting for a fifth of production. In the 1980s exports became more significant for the industry than in the two previous decades with (current) value increasing by 48% between 1980 and 1986.

Most recently, the export trend has slowed due to greater competition from both South-East Asia and East European countries in third markets; this trend has been reinforced by exchange rate movements affecting the competitiveness of some EC countries. Nevertheless, the EC remains a key competitor in overseas markets given its advantages in product



**Table II**  
**Production and Foreign Trade**

| (Million ECU)    | 1980   | 1985   | 1986   |
|------------------|--------|--------|--------|
| Production       |        |        |        |
| Current value    | 12 100 | 14 600 | 16 200 |
| Index            | 100.0  | 120.7  | 133.9  |
| Constant value   | 12 100 | 8 789  | 11 293 |
| Index            | 100.0  | 72.6   | 93.3   |
| Imports Extra-EC |        |        |        |
| Current value    | 700    | 1 500  | 1 600  |
| Index            | 100.0  | 214.3  | 228.6  |
| Exports Extra-EC |        |        |        |
| Current value    | 2 100  | 3 200  | 3 100  |
| Index            | 100.0  | 152.4  | 147.6  |
| Ratio X/M        | 3.0    | 2.1    | 1.9    |

Source: CECED.

quality and technological advances in product design. This is particularly true for trade with other developed countries.

### Employment Trends

As a result of over-capacity in the 1980s, production rationalization and restructuring has meant a decline in employment. This decline began in the 1970s but accelerated sharply over the period 1980-86, at the end of which numbers employed in manufacturing of white goods had fallen by 20% compared with 1980 employment levels. Current employment in the industry totals around 219 000.

In some Member States, employment levels have been increasing, although only marginally. Productivity has shown a sharp improvement over more recent years and the emphasis on productivity gains is strongly evident in the industry.

### Factors Behind Production Trends

In both nominal and real terms investment has declined as the industry has been involved in reductions of over-capacity and rationalization of production structures. At present, no investment in new capacity is forecast for the industry.

Rising standards of living and increases in mass purchasing power have meant a shift in consumer demand and hence some change in production trends; this is true for both major items and small domestic electrical appliances. Over the period 1980-86, production totals for some items have fallen. The number of cookers produced in the Community fell from 10 million in 1980 to 9.6 million in 1986; similarly, whereas in 1980 refrigerators represented 38% of the market for major white goods, by 1986 this proportion had declined to 34%, and with it total production from 13.7 million units to 13.1 million. Dishwashers, home laundry products and microwave ovens account for an expanding share of the total market, although the latter still represent a tiny proportion of the total. For the EC as a whole microwave ovens represent 2% of total production of white goods; in the US the comparable figure is 10.4% and in Japan the figure is dramatically higher at 42%. The latter figure reflects the drive towards higher technology and hence higher value-added items on the part of Japanese industry.

**Table III**  
**Evolution of Production**

|                          | 1980            |      | 1985            |      | 1986            |      |
|--------------------------|-----------------|------|-----------------|------|-----------------|------|
|                          | (million units) | (%)  | (million units) | (%)  | (million units) | (%)  |
| Major appliances         |                 |      |                 |      |                 |      |
| Refrigeration products   | 13.7            | 37.5 | 12.4            | 35.4 | 13.1            | 34.7 |
| Home laundry products    | 10.8            | 29.6 | 10.5            | 30.0 | 11.5            | 30.4 |
| Cookers                  | 10.0            | 27.4 | 9.2             | 26.3 | 9.6             | 25.4 |
| Dishwashers              | 2.0             | 5.5  | 2.2             | 6.3  | 2.5             | 6.6  |
| Microwave ovens          | -               |      | 0.7             | 2.0  | 0.9             | 2.3  |
| <b>Total</b>             | <b>36.5</b>     |      | <b>35.0</b>     |      | <b>37.8</b>     |      |
| Small appliances         |                 |      |                 |      |                 |      |
| Small kitchen appliances | 60.0            | 54.1 | 70.4            | 56.7 | 70.7            | 57.8 |
| Personal care products   | 28.3            | 25.5 | 29.3            | 23.6 | 26.7            | 21.8 |
| Irons                    | 13.2            | 11.9 | 13.8            | 11.1 | 13.7            | 11.2 |
| Vacuum cleaners          | 9.4             | 8.5  | 10.6            | 8.6  | 11.2            | 9.2  |
| <b>Total</b>             | <b>110.9</b>    |      | <b>124.1</b>    |      | <b>122.3</b>    |      |
| Heating products         |                 |      |                 |      |                 |      |
| Space heaters            | 13.0            | 63.4 | 15.4            | 67.5 | 16.6            | 71.2 |
| Water heaters            | 7.5             | 36.6 | 7.4             | 32.5 | 6.7             | 28.8 |
| <b>Total</b>             | <b>20.5</b>     |      | <b>22.8</b>     |      | <b>23.3</b>     |      |

Source: CECED.

Some smaller domestic appliances have shown particularly strong growth trends over the period; this is particularly true of small kitchen appliances, the production of which grew by 18% in volume terms. The number of personal care products has shown a declining trend in the Community with the total units produced falling 6% between 1980 and 1986.

### *The Position of Firms in the Industry*

The market for domestic electrical appliances has been characterized by relatively fierce price competition at both the domestic and international level. This is reflected in the price indices for household appliances, which show a rate of increase considerably below general product inflation. Over-supply in the market and the resultant pressure on profit levels triggered the rationalization of production capacities in the 1980s which to some extent is still continuing. However, indications are that the industry has generally returned to profitability with some of the major groups such as Zanussi and AEG reporting good results.

Marketing and advertising are important cost elements for the industry especially given the intensity of competition.

### *Major Structural and Geographic Features*

The level of industry concentration in the manufacture of domestic household appliances has always been relatively high compared with other industries; mass production methods and economies of scale are particularly important aspects in the manufacture of these types of products. Over the last two decades, industry concentration has increased, with a decline in the number of manufacturers, and this trend has been heightened by the rationalization process occurring over the 1980s. The number of companies in the industry is continuing to fall.

Production is dominated by large manufacturing establishments and this has contributed towards effective cutbacks in production capacity. A number of the largest European operators have been involved in mergers and acquisitions. Philips acquired Bauknecht in 1986; in 1987, Electrolux took over the Zanussi operations in Italy and Spain; and the Italian companies Ariston and Indesit merged in 1988. There has also been takeover activity at the international level with the purchase of White Westinghouse in the US by Electrolux and most recently the acquisition of Whirlpool (US) by Philips.

The prospect of the 1992 single market is likely to further developments in the rationalization process within the Community.

Some production of domestic electrical appliances occurs in all Member States of the Community. Since transportation costs are an important element of overall costs, proximity to markets is a key factor in location decisions. Germany, France, Italy and the UK together account for around 83% of total Community production. Compared with the other three major producers, the Italian industry is much less concentrated. The average number of employees per company for the EC as a whole is around 500 while the equivalent figure in Italy is half this figure. German manufacturers tend to be more strongly export-orientated and account for around 30% of extra-EC exports.

### *Trends in Member States*

Member States in which consumer demand has been relatively more buoyant include Germany, Italy and particularly the UK where apparent consumption in nominal terms grew by 77% over the period 1980-85.

The sharpest decline in production occurred in France and the UK, where rationalization of the industry has been particularly marked. Similarly, employment levels declined to a much greater extent than in other Member States with French and British employment levels down by around 22% and 34% respectively. Moreover, these trends are still continuing. By comparison, employment in the German industry fell by around 9% between 1980 and 1986.

## **Forecast and Outlook**

Fears that the stock market crash of October 1987 would sharply reduce consumer demand have not materialized. Steady growth in consumption, in the region of 2% to 3% in unit terms, is expected for 1988. However, some product sectors of the market such as microwave ovens and dishwashers are anticipated to grow much faster.

The industry will continue to operate in an intensely competitive environment both domestically and at the international level.

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# ELECTRICAL POWER PLANT EQUIPMENT

(NACE 328)

*The production of electrical power generating equipment, although a very diverse industry, is dominated by a few large firms which supply electricity production companies, most of which are publicly owned. There is considerable overcapacity in the industry and the trend is towards restructuring and associations between the large firms. This should particularly affect Europe, where there are a large number of national suppliers. But associations may also develop between European, American and Japanese companies.*

The electrical power generating equipment industry includes categories of products from various economic activities: mechanical, electrical, electronic, etc. Supply of goods and services in this industry may be broken down as follows:

- nuclear reactors
- boilers and mechanical equipment
- turbines and generators
- control systems
- engineering and maintenance.

Such equipment is for the most part supplied by a small number of large firms, often dominant on domestic markets. These firms are heavily orientated towards exports, both within Europe and in other world markets. They are also often in dominant positions in other areas such as electrical and electronic construction, railway construction or ship-building; power generating equipment may represent a minority activity.

Domestic demand is determined by the investment programmes of European electrical power producers. These are relatively concentrated since, out of the 412 producers within the EC, the first 10 produce 68% of the Community's electricity. As a rule, one or two producers dominate national markets; because of this, there are highly privileged relations between producers of electrical power generating equipment and their electrical power generating clients.

## Current Situation

The power generating equipment industry, as a necessary instrument in electricity generating, affects a vital function in the Community economy. In 1987 the EC generated 1 551 TWh; 54% in fossil fuel thermal power stations, 33% in nuclear-power stations and 13% in hydroelectric-power stations.

## Consumption Trends

The production of electrical power generating equipment is related to electricity generating investment programmes, either within the equipment producers' own country or in importing countries. Production increased greatly between 1979 and 1982 as a result of the second oil crisis which led to increased demand for nuclear and coal-fired power stations. Demand remained high for a few years before beginning to decline from 1985.

**Table I**  
**Electrical Power Generating Equipment**

| (Million ECU) | 1984   | 1985   | 1986   | 1987   |
|---------------|--------|--------|--------|--------|
| EC production | 18 000 | 18 000 | 16 080 | 16 000 |

BIPE estimate (1987).

Source: Eurostat.

The development of the market towards large-scale power stations, combined with the protection of national markets, helped to concentrate production in a small number of firms in a few countries. At the moment there are barely 15 firms with main contractor competence in the 12 countries of the EC, which corresponds to between seven and 10 firms per speciality (nuclear, mechanics and thermal boilers, turbines and generators). Other firms supply control systems, components, and engineering, construction, repair and maintenance services. The opening up of government contracts and the weakening of national protection within the European market have provided an opportunity for reinforcing this industrial fabric, both by concentrating large groups and by revitalizing secondary suppliers. In the United States, a market of comparable value, there are only five significant national suppliers and one of the most important of these, Westinghouse, is closing down its activity in turbines,



generators and distribution equipment in favour of the European firm ABB.

### Export Trends

The United States continues to dominate the nuclear-power station segment on world markets (45% of the total with Westinghouse, General Electric and, a long way behind, Combustion Engineering and Babcock & Wilson), as against 33% for Europe, in second place with seven suppliers. Europe is, however, the leading exporter of turbines and generators with 45% of the total, compared with Japan (35%) and the United States (14%).

In general, the EC industry in this sector is in a relatively strong position. It has highly efficient technologies and dynamic firms capable of taking advantage of the apparent desire of some major American competitors to leave the field. In 1988 the three European firms ABB, Siemens and GEC won 25% of the American turbine and generator market.

### Factors behind Production Trends

One factor affecting current developments is the structural modification of the electricity industry. A tendency towards deregulation is emerging, similar to the trend in the related telecommunications sector. Deregulation has already been under way for several years in the United States; it is just beginning in the UK, where it is coupled with privatization. Whatever form this restructuring might take in the EC, it is probable that there will be a gradual tendency towards keeping electricity generating, transport and distribution distinct. This means that electricity generating could become a competitive field, with several suppliers. Apart from revitalizing the market to some extent, there could be a shift towards smaller power stations of other types, such as gas turbine for example.

The development of co-generation in the United States is an example of this type of new solution: this involves firms constructing mixed power stations which supply both thermal

**Table II**  
**The Top 10 EC Electricity Suppliers - 1987**

| Company   | Country        | Electricity production (TWh) |
|-----------|----------------|------------------------------|
| EDF       | France         | 311                          |
| CEGB      | United Kingdom | 228                          |
| ENEL      | Italy          | 159                          |
| RWE       | Germany        | 123                          |
| VEBA      | Germany        | 68                           |
| BAYERWERK | Germany        | 38                           |
| PPC       | Greece         | 28                           |
| ENDESA    | Spain          | 27                           |
| VEW       | Germany        | 26                           |
| SSEB      | United Kingdom | 24                           |

Source: Eurostrategies.

and electrical energy to meet their manufacturing needs while selling a part of the electrical power to third parties over the grid.

The need to improve power station yields has long been stimulating research, particularly in cryogenic turbogenerators (to improve conductivity) or in MHD (magnetohydrodynamics), a generator placed before the steam turbine.

### Major Structural and Geographical Features

The market is relatively concentrated, with about 400 electricity generators in Europe (in the United States there are over 3 000).

Even so, 350 are to be found in Germany alone and overall the first 10 produce two-thirds of the Community's electricity. The privatization of the CEGB in the UK will no doubt reduce the level of concentration.

The supply of electricity generating equipment is concentrated in 15 European firms which supply heavy plant for

**Table III**  
**Main Power Plant Equipment Suppliers**

| Nuclear Reactors             | Fossil Boilers               | Turbine Generators     |
|------------------------------|------------------------------|------------------------|
| GEC (UK)                     | Babcock Power (UK)           | GEC (UK)               |
| NEI (UK)                     | NEI (UK)                     | NEI (UK)               |
| NNC (UK)                     | Deutsche Babcock (D)         | KWV Siemens (D)        |
| KWV Siemens (D)              | Franco Tosi (I)              | ABB (D)                |
| ABB (D)                      | Ansaldo (I)                  | AEG (D)                |
| Ansaldo (I)                  | Royal Schelde (NL)           | Franco Tosi (I)        |
| Framatome-CGE (F)            | Cockerill Mechanical (B)     | Ansaldo (I)            |
|                              | Alstom (F)                   | ACEC (I)               |
| General Electric (USA)       | Babcock & Wilson (USA)       | General Electric (USA) |
| Westinghouse (USA)           | Combustion Engineering (USA) | Westinghouse (USA)     |
| Babcock & Wilson (USA)       | Foster Wheeler (USA)         | Hitachi (J)            |
| Combustion Engineering (USA) | Mitsubishi (J)               | Toshiba (J)            |
|                              |                              | Mitsubishi (J)         |

Source: Eurostrategies

power stations (nuclear reactors, boilers, turbogenerators). Next come a large number of component suppliers. Each of the three major segments includes some seven firms, except turbines and generators where there are 10. American supply is much more concentrated: there are only two significant suppliers of turbogenerators, General Electric and Westinghouse, and the latter is giving up its activity to ABB.

For some equipment, one country in particular dominates production and is in a position of strength on export markets outside the Community. This is the case for German power boilermaking or UK control systems.

The largest of these firms have a characteristic profile. Their turnover in this activity sector is generally over 1 billion ECU but their activity is highly diversified in other areas, with a strong export orientation. Such geographical and sectorial diversification of the range of activities is essential for firms faced with chronic overcapacity on European electricity generating markets.

After a great deal of restructuring on a national scale during the 1970s, the current evolution of supply is marked by takeovers and associations among the major producers in the sector, whether they belong to the Community or not. Thus after the merger of the Swedish group ASEA and the Swiss Brown-Boveri group, ABB has become the world's leading group for heavy electrical plant. Its presence in Europe and in the Community is essential. The other major groups in the sector are also basing their strategies up to 1993 on partnership agreements which will give them access to Community government contracts when they are opened up. The French group Alstom has taken over the German Kessel Bau group and the UK firm Weir Tram. The American groups Westinghouse and General Electric are also present and active. Already well-established in Spain, the Americans are now looking for associations with the UK (Westinghouse and Babcock International). Mention might also be made of joint projects and alliances between ASEA and Rolls Royce or Alstom and MAN, amongst others.

In a sector dominated by a few large groups, these mergers and partnerships alone are enough to define the future nature of supply, which is likely to become more and more concentrated and international. Access to European government contracts is of fundamental importance and will be strongly contested in those countries where national supply is relatively unstructured and competitive (Greece, Ireland, Portugal, Spain, Belgium, the Netherlands). In the other countries, such access will only be possible through partnerships with major domestic firms.

## *Financial Position*

The profit margins of the major firms on the market have fallen since 1985 due to the shrinking in world demand and the resulting increase in competition. Nevertheless they remain satisfactory, particularly as the firms are diversified and are able to compensate for the decline of certain markets. Groups which are most active in many other, more buoyant sectors (defence, telecommunications) have maintained the best overall results.

## *Trends in Member States*

In conjunction with international restructuring, the market will be characterized by plant investment needs in each of the Member States. Spain, Portugal and Greece genuinely need to expand and replace their electricity generating infrastructures. In the medium term they should be particularly buoyant markets. Within the four major countries, the situation differs from one country to another. Before 1993 France will have few new electricity generating needs. For the most part, investment will concern the renovation of existing power stations (particularly nuclear ones). Germany has major needs in the field of environmentally "clean" technologies (as does the Netherlands). New markets for equipment (gas desulfurization, dust collectors, filters) should develop in these countries followed by Europe as a whole. The German industry already has a considerable technological lead. In the longer term, Germany will need to renovate its ageing power stations. Italy should invest heavily in order to expand its generating capacity. In the United Kingdom the privatization of the generating network is likely to entail a profound modification of contracting bodies' purchasing practices. Investment will be extremely vigorous.

## **Forecast and Outlook**

In 1988 and 1989 production of electricity generating equipment is likely to stabilize, owing to expansion needs and the renovation of power stations in Europe as well as the relative stability of export markets.

The industry continues to have a considerable degree of production over-capacity, developed in the 1970s. However, the necessary major restructurings are already well advanced and the objective on these markets will be to adjust supply to demand.

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## MOTOR VEHICLES

(NACE 351)

Representing about 9% of the EC industrial value-added content, the automotive sector employs 1.7 million people directly (about 8% of the employment in the manufacturing industry), although it is estimated that one out of 10 jobs in the EC depends directly or indirectly on the automobile sector in the largest sense (from third-tier suppliers to servicing and repair shops). Its importance to the Community economy is vital in terms of external trade (21.1 billion ECU of net positive balance or 29% of the total manufactured goods balance in 1986), industrial development and technological innovation. Although the market is not expected to grow by more than 1% - 2% per annum, it should continue to be the largest world market for passenger cars with scope for growth in terms of value as European consumers tend to move upmarket.

As a pace-setting industry, the automobile industry has been and continues to be a focal point of industrial progress not only because of its own growth but also because of its close interrelationships with a wide range of basic industries.

Traditionally oriented towards its internal market where its leading position has been unchallenged for decades, the EC

automobile industry is now facing growing internal and external competitive pressure from other world automotive industries, especially Japan. To face this new environment, which sharply materialized at a time when the EC automobile industry was confronted with overcapacity problems consecutive to the 1979 energy crisis, EC car manufacturers have had to adjust their strategies taking into account the significant changes that were being implemented in products, production processes and competitive requirements. Substantial progress needed to be achieved in the areas of production cost, quality control and overall productivity together with increased investment in research and development. Improved flexibility was also an absolute necessity to restore profitability, especially for volume producers more strongly affected by these changes. Emphasis has been placed on lowering the production break-even points through technological modernization, rationalization and improved utilization of the existing production facilities.

The above improvements were achieved through various means. Plant closures and rationalization of plant layout took place. Most operators, including the component sector, were affected by this trend which was often accompanied by consolidation amongst companies with the objective of generating economies of scale via standardized production and the use of common platforms. Massive reductions of the

### Main Indicators Motor Vehicles

| (Thousands)                | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986 | 1987 | 1988 (forecast) |
|----------------------------|-------|-------|-------|-------|-------|-------|------|------|-----------------|
| Apparent consumption (1)   |       |       |       |       |       |       |      |      |                 |
| Cars                       | 9.1   | 9.1   | 9.3   | 9.6   | 9.2   | 9.4   | 10.5 | 11.3 | 11.1            |
| Vans & trucks              | 1.2   | 1.1   | 1.2   | 1.1   | 1.1   | 1.3   | 1.3  | 1.4  | 1.5             |
| Total                      | 10.3  | 10.2  | 10.5  | 10.7  | 10.3  | 10.7  | 11.8 | 12.7 | 12.6            |
| Net exports                |       |       |       |       |       |       |      |      |                 |
| Cars                       | N/A   | N/A   | N/A   | N/A   | 0.7   | 0.9   | 0.5  | 0.4  | 0.5             |
| Vans & trucks              | N/A   | N/A   | N/A   | N/A   | 0.1   | 0.0   | 0.2  | 0.1  | 0.0             |
| Total                      | 1.4   | 0.7   | 0.8   | 1.3   | 0.8   | 0.9   | 0.7  | 0.5  | 0.5             |
| Total Community production |       |       |       |       |       |       |      |      |                 |
| Cars                       | N/A   | N/A   | N/A   | N/A   | 9.9   | 10.3  | 11.0 | 11.7 | 11.6            |
| Vans & trucks              | N/A   | N/A   | N/A   | N/A   | 1.2   | 1.3   | 1.5  | 1.5  | 1.5             |
| Total                      | 11.7  | 10.9  | 11.3  | 12.0  | 11.1  | 11.6  | 12.5 | 13.2 | 13.1            |
| Employment (1 000)         | 1 833 | 1 772 | 1 718 | 1 686 | 1 663 | 1 655 | N/A  | N/A  | N/A             |

(1) For accounting reasons, apparent consumption may differ slightly from registrations.

workforce occurred partly as a result of the previous measures, but also because of productivity increases. This has especially been the case in France, the United Kingdom, Italy and Spain. Germany, by contrast, was able to increase employment.

Changes also occurred in business practices. Innovative procurement policies were implemented involving modified relationships with suppliers, more efficient delivery systems and increased demand for out-sourcing alternatives in an attempt to reduce vertical integration. The German car assemblers, for example, have reduced their value added share in the final product by an average of about 8% during the period 1978-1986. New standards and quality requirements were also implemented whereby outside suppliers assume full responsibility with regard to quality and warranty. This required substantial changes in industry practices accompanied by large training programmes for labour forces to implement total quality systems similar to the Japanese model.

An essential factor in these improvements involved huge investment in high technology manufacturing processes such as computer-aided manufacturing (CAM) equipment, robotics, and flexible and more efficient productive systems within modernized facilities. In addition, significant changes in product technology are taking place as a result of new R&D strategies and the reduction of product life cycles requiring sophisticated equipment (such as CAD) and improved applied research infrastructures. This trend resulted in the need for massive investments at a time when competition from Japanese industry was heavily felt and most EC markets were faced with a period of stagnation. Generally relying on their capability to self-finance their investment programmes, most car manufacturers were confronted with huge financial requirements while profitability seriously deteriorated. The total fund allocation to capital expenditure by EC car manufacturers reached the impressive amount of 66 billion ECU during the period 1981 to 1986 (about 8% of turnover). This placed the EC automobile industry amongst the leading sectors for cash infusion with levels comparable to the chemicals and foodstuff/tobacco industries. It is not surprising, therefore, that government intervention has played a significant role in the overall process by providing (and/or facilitating access to) funds, but also by trade protection to facilitate the restructuring of the industry.

## Current Situation

The automobile industries of North America, Japan and the EC are of comparable size, each producing approximately 12 million cars and trucks per annum. These three major trading areas dominate total world vehicle production, estimated at around 46 million vehicles.

**Table I**  
**World Production of Motor Vehicles**

| (Millions)      | EC   | North America | Japan | Total world |
|-----------------|------|---------------|-------|-------------|
| 1970            | 11.4 | 9.5           | 5.3   | 29.7        |
| 1980            | 11.7 | 9.4           | 11.0  | 38.8        |
| 1981            | 10.9 | 9.2           | 11.2  | 37.4        |
| 1982            | 11.3 | 8.2           | 10.7  | 36.4        |
| 1983            | 12.0 | 11.0          | 11.1  | 40.0        |
| 1984            | 11.1 | 12.8          | 11.4  | 42.2        |
| 1985            | 11.6 | 13.6          | 12.3  | 44.7        |
| 1986            | 12.5 | 13.3          | 12.3  | 45.2        |
| 1987            | 13.2 | 12.6          | 12.2  | 45.7        |
| 1988 (forecast) | 13.1 | 12.4          | 12.2  | 46.0        |

Sources: JAMA, Automotive News, AID, CLCA, DRI.

## Consumption Trends

In the years following the 1979 energy crisis, the EC automobile industry faced a period of stagnation characterized by slackening motor vehicle sales. Due to the general economic situation, uncertainties created by the oil crisis and restrictive national economic policies, demand for motor vehicles in the EC stagnated at a level of about 10.4 million until 1984.

During this period, cyclical developments differed from country to country; France, Italy and the United Kingdom were hit later than other Member States, such as Germany. In Spain the situation was relatively more stable due to the need to build up the motor vehicle fleet. Smaller EC countries benefited from an earlier up-turn mainly because of replacement demand. Demand was weak both for passenger cars and commercial vehicles. In the latter sector demand for heavier trucks suffered from a greater set-back than demand for light commercial vehicles.

In 1985, demand started to pick up again: EC-wide, sales had reached a level of 10.8 million vehicles and continued to rise, achieving a record 12.7 million in 1987 (+18% over 1985). Demand rose in all sectors and every country benefited from this upturn.

## Passenger cars

In 1987, EC registrations of new passenger cars reached the record level of 11.2 million, which for the first time made the EC the largest world market for passenger cars.

**Table II**  
**Registrations of New Passenger Cars**

| (Millions)   | 1984 | 1985 | 1986 | 1987 | 1988 (forecast) |
|--------------|------|------|------|------|-----------------|
| Total EC     | 9.2  | 9.6  | 10.5 | 11.2 | 11.1            |
| Total Europe | 10.1 | 10.6 | 11.6 | 12.4 | 12.3            |
| Total USA    | 10.3 | 11.0 | 11.4 | 10.3 | 10.0            |
| Total Japan  | 3.1  | 3.1  | 3.1  | 3.3  | 3.5             |

Source: DRI.

Indications for 1988 reveal that demand has started off strongly, in line with 1987 trends. Despite almost universal forecasts of lower sales this year, production volumes for the first few months indicate that no major

downturn is expected to occur although it is unlikely that the 1987 record level will again be reached.

Almost all EC countries have benefited from strong demand, though not necessarily for identical reasons. In the Federal Republic of Germany and the United Kingdom, new car sales have been favourably influenced by high personal disposable income growth and the increase in company car sales (which accounted for about 31% of all cars sold in Germany and 52% in the United Kingdom during 1987). In France, the favourable effect of a reduction in VAT coupled with better credit offers from the commercial banking sector, has helped the market to maintain replacement rates at high levels. In Italy, real income growth explains most of the sustained sales although this has been accompanied by a move towards the lower end of the car segment as a result of the increase in car prices in real terms. Spain continues to catch up with Western European levels of car density, now at 263 vehicles per 1 000 inhabitants compared with an EC average of 359.

**Table III**  
**Registrations by EC Country**

| (Thousands)        | 1984  | 1985  | 1986   | 1987   | 1988 (forecast) |
|--------------------|-------|-------|--------|--------|-----------------|
| Belgium-Luxembourg | 352   | 360   | 395    | 406    | 421             |
| Denmark            | 134   | 157   | 169    | 124    | 120             |
| Germany            | 2 394 | 2 379 | 2 829  | 2 916  | 2 773           |
| Greece             | 66    | 79    | 65     | 51     | 58              |
| Spain              | 520   | 572   | 686    | 916    | 925             |
| France             | 1 758 | 1 766 | 1 912  | 2 105  | 2 071           |
| Ireland            | 56    | 59    | 58     | 54     | 60              |
| Italy              | 1 635 | 1 746 | 1 825  | 1 977  | 2 029           |
| Netherlands        | 461   | 496   | 561    | 556    | 537             |
| Portugal           | 86    | 93    | 110    | 124    | 140             |
| United Kingdom     | 1 750 | 1 832 | 1 882  | 2 014  | 2 004           |
| Total EC           | 9 212 | 9 540 | 10 492 | 11 242 | 11 138          |

Source: DRI.

### Export Trends

While intra-EC trade continues to grow at a steady rate, reflecting the good performance of the European markets, serious difficulties have been experienced in exports to the US market, mainly as a result of the depreciation of the US dollar against all major European currencies. The German specialist manufacturers have been particularly affected by this situation. Import growth over 1986 and 1987 reflects the increased penetration of the Japanese automobile industry, but also higher imports from the Comecon countries.

**Table IV**  
**Intra- and Extra-EC Trade**

| (Thousand units)         | 1985  | 1986  | 1987 (1) | 1988 (forecast) |
|--------------------------|-------|-------|----------|-----------------|
| Volume of intra-EC trade | 3 972 | 4 178 | 4 362    | 4 446           |
| Volume of exports        | 1 922 | 1 744 | 1 748    | 1 606           |
| Volume of imports        | 1 062 | 1 244 | 1 348    | 1 233           |

(1) Partial forecast.

Source: Marketing Systems.

### Trucks and commercial vehicles

The EC truck and van market showed continued strength in 1987, the best year since the early years of the decade. Two or three years ago a major factor behind truck sales was the renewal of the fleet built up in the late 1970s. In 1987 it was new rather than replacement demand that gave the market its strength. Increased intra-European trade made a dynamic contribution to such growth.

**Table V**  
**Vans and Trucks: Registrations**

| (Thousands)             | 1984  | 1985  | 1986  | 1987  | 1988 (forecast) |
|-------------------------|-------|-------|-------|-------|-----------------|
| Vans up to 3.5 t        | 999   | 1 099 | 1 211 | 1 341 | 1 330           |
| Trucks over 3.5 t       | 241   | 249   | 263   | 290   | 280             |
| Total Western Europe    | 1 240 | 1 348 | 1 474 | 1 631 | 1 610           |
| EC                      | 1 138 | 1 222 | 1 341 | 1 497 | 1 480           |
| Total North America (1) | 4 340 | 5 068 | 5 208 | 5 388 | 5 550           |
| Japan (1)               | 2 320 | 2 432 | 2 540 | 2 722 | 2 830           |

(1) All classes (1 to 8).

Sources: DRI, CLCA, Automotive News, JAMA.

The structures of the Community van and truck production sectors are essentially different.

The light commercial vehicle segment is of special interest to most European vehicle manufacturers due to its potential for rapid growth. Although the volume is large, it is also very fragmented, both between types and vehicle manufacturers. Joint ventures and technical cooperation agreements have been concluded by European manufacturers, mainly with the Japanese, interested in segments where they were not previously present or by manufacturers with relatively small volumes. The largest import segment for joint ventures is the car-derived van market which accounts for approximately 42% of the total under six tonnes. This trend has contributed to the large penetration of Japanese models in this segment (about 23%) either through direct imports or assembly in Europe from CKD parts (Spain, the United Kingdom, Federal Republic of Germany).

The truck production industry is now characterized by a reduced number of operators as a result of successive consolidations generated by a mature market with low growth foreseen over the longer term.

**Table VI**  
**Vans and Trucks: Production**

| (Thousands)         | 1984  | 1985  | 1986  | 1987  | 1988 (forecast) |
|---------------------|-------|-------|-------|-------|-----------------|
| Vans up to 3.5 t    | 898   | 1 044 | 1 165 | 1 230 | 1 233           |
| Trucks over 3.5 t   | 330   | 340   | 328   | 346   | 325             |
| Total Western       |       |       |       |       |                 |
| Europe (1)          | 1 228 | 1 384 | 1 493 | 1 576 | 1 548           |
| EC (1)              | 1 187 | 1 342 | 1 458 | 1 532 | 1 505           |
| Total North America | 3 962 | 4 330 | 4 334 | 4 634 | 4 950           |
| Total Japan         | 4 319 | 4 544 | 4 450 | 4 358 | 4 530           |

(1) Excludes double count.

Sources: DRI, Automotive News, JAMA, MVMA.

Amongst the major European manufacturers, in the up to six tonne range, Renault, PSA and Ford have a leading position, while truck production over six tonnes is dominated by Daimler Benz, Volvo and Iveco.

### *Employment Trends*

The level of direct employment in the EC automobile industry has been a direct reflection of the restructuring which has taken place since the early 1980s. Overall, about 178 000 (10%) direct jobs were lost in the industry between 1981 and 1986, although it is believed that the real level is close to 400 000 when considering all sectors involved in automotive activities. France, Italy and the United Kingdom were mostly affected by this trend; only the Federal Republic of Germany achieved a remarkable performance in consistently increasing employment levels (+ 68 000).

In the long run, the downward trend should continue as productivity investments remain high; technical developments in assembly imply a substitution of capital for labour, and output is not forecast to grow significantly over the cycles.

**Table VII**  
**EC Vehicle Output per Employee**

|  | 1981  | 1984  | 1985  | 1986  |
|--|-------|-------|-------|-------|
| EC total vehicle production (millions) | 10.9  | 11.5  | 12.2  | 12.8  |
| EC direct employment                   | 1 833 | 1 686 | 1 663 | 1 655 |
| Vehicles/employees                     | 5.9   | 6.8   | 7.3   | 7.7   |

Source: DRI.

Productivity gains continues to be an area of major emphasis for the EC automobile industry. Industry output per employee increased 30.5% from 1981 to 1986, thanks to major restructuring efforts and substantial investment in advanced manufacturing equipment and processes. This trend is expected to continue over the coming years.

### *The Position of the Firms*

European leadership continues to stimulate VW and Fiat moves towards larger model ranges for better exploitation of market niches (Fiat/Lancia/Alfa, VW/Audi/Seat) although PSA is now seriously positioned to challenge such leadership.

In 1987, Japanese car sales in the EC (1 070 or 9.5% of the market share) rose 2.9% compared with an overall increase of 7.2%. This was the first year since 1984 when Japanese volume increase was below the market growth rate, mainly because the largest volume increases took place in countries where Japanese registrations have limited access (France, Italy, Spain, the United Kingdom and Portugal).

In 1987, car production increased in every single country in Europe with Spain taking the lion's share of the increase (+ 9% to 1.4 million units). The average growth for the Western European market since 1984 is 5.4%, which is the highest average increase for all major production areas, although the Japanese slowdown in growth rate since 1986 is partly due to the transfer of assembly operations to the North American market where output reached 648 000 vehicles in 1987.

Generally speaking, capacity utilization in Western Europe is now adequate (overall capacity is currently estimated at around 14 million passenger cars/year).

### *Financial Performance*

The combined financial performance of the EC automobile manufacturers has improved dramatically since 1984. After combined losses of 2.9 billion ECU for the period 1981 to 1984, 1985 and 1986 has seen auto companies realizing a net profit of 2.3 billion ECU and estimates for 1987 indicate a total profit of around 7 billion ECU.

1987 has been the first of many years seeing almost all auto companies in the black. This turnaround in profitability is mainly the result of the extremely good performance of the EC automotive market, where European car manufacturers enjoy a leading position, combined with the first results of the restructuring efforts. Increased flexibility having been achieved through sizeable reductions of break-even points (mainly by volume producers), the overall competitive position of the industry is now better. However, the profitability of EC operators, debt rates and capacity to finance investments from internal funding, remain below the standards of their US and Japanese counterparts.

**Table VIII**  
**Western Europe: Registrations by Manufacturer**

| (Thousands)  | 1984   | 1984<br>% Share | 1985   | 1985<br>% Share | 1986   | 1986<br>% Share | 1987   | 1987<br>% Share |
|--------------|--------|-----------------|--------|-----------------|--------|-----------------|--------|-----------------|
| VW Group     | 1 377  | 13.6            | 1 524  | 14.4            | 1 710  | 14.7            | 1 844  | 14.9            |
| Fiat Group   | 1 472  | 14.5            | 1 458  | 13.7            | 1 630  | 14.0            | 1 756  | 14.2            |
| PSA Group    | 1 168  | 11.5            | 1 222  | 11.5            | 1 324  | 11.4            | 1 504  | 12.1            |
| Ford         | 1 301  | 12.8            | 1 263  | 11.9            | 1 358  | 11.7            | 1 483  | 12.0            |
| GM           | 1 122  | 11.0            | 1 205  | 11.4            | 1 274  | 10.9            | 1 307  | 10.6            |
| Renault      | 1 108  | 10.9            | 1 129  | 10.6            | 1 235  | 10.6            | 1 313  | 10.6            |
| Rover Group  | 394    | 3.9             | 419    | 4.0             | 409    | 3.5             | 417    | 3.4             |
| D. Benz      | 332    | 3.3             | 395    | 3.7             | 437    | 3.8             | 432    | 3.5             |
| BMW          | 303    | 3.0             | 290    | 2.7             | 297    | 2.6             | 293    | 2.4             |
| Volvo        | 239    | 2.4             | 255    | 2.4             | 268    | 2.3             | 268    | 2.2             |
| Other        | 302    | 2.8             | 305    | 2.9             | 331    | 2.8             | 347    | 2.8             |
| Japanese     | 1 043  | 10.3            | 1 143  | 10.8            | 1 362  | 11.7            | 1 408  | 11.3            |
| Total Europe | 10 461 | 100.0           | 10 608 | 100.0           | 11 635 | 100.0           | 12 372 | 100.0           |

Source: DRI.

## Forecast and Outlook

### Passenger cars

EC car manufacturers are now facing the most challenging and competitive period in their history. The creation of the unified internal market will boost internal and external competition which in its turn will change the face of the industry. Companies will continue to restructure, merge, pursue other forms of strategic alliances and take other new actions. Although the market is not expected to grow by more than 1% - 2% per annum, it should continue to be the largest world market for passenger cars with scope for growth in terms of value as European consumers tend to shift upmarket. All major world players will treat the EC as an "open" market and strategies under development will be aggressively implemented. Despite the current apparent good shape of the industry there are signs of uncertainty about the future. In particular there are concerns about the following:

- the inadequate scale, profitability and financial capability of several operators
- the instability of competition between six nearly equal volume producers
- the competition with potential Japanese transplants in Europe
- the falling revenues from exports to the US mainly as a result of currency fluctuations

- a potential increased flow of exports from the US from both Japanese and American manufacturers
- the emergence of new producers in the Asia Pacific area who are preparing large-scale production for export.

At present, the European producers control a large part of their domestic markets and a high-value export market to the US. In future, several new Japanese players will most probably join the large producers in Europe and strive for access to the upper market segments. If this materializes, shifts in ownership of capacity are likely to occur.

### Vans and trucks

The van and light truck market is likely to continue to show signs of strength in the long run. This sector will continue benefiting from design improvements and technological innovation adapted from the passenger car industry. With regard to large trucks, and in spite of the increasing level of road transportation, the situation remains unclear partly because the market has reached a degree of maturity and partly because there are uncertainties regarding definition of future standardized product lines.

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# MOTOR VEHICLE PARTS AND ACCESSORIES

(NACE 353)

*The role of parts and accessories firms in the European motor vehicle industry is growing. The 1987 revenues of such companies throughout the EC came to 60 billion ECU, or 30% of the overall revenues of the European motor vehicle industry. Original equipment parts account for 60% of these firms' revenues, with the remaining 40% coming from replacement parts. The industry continues to earn a significant trade surplus which stood at 7.4 billion ECU in 1986.*

The EC motor vehicle parts and accessories market should continue to grow by 3% to 4% a year. The EC firms in the industry must continue their considerable competitive efforts of the last few years if they are to meet the growing challenge from their American and Japanese counterparts.

EC motor vehicle parts and accessories manufacturers are operating in an increasingly complex environment. A number of factors have led to restructuring in the industry over the last few years. These factors include fluctuations in the car market, the internationalization of production, keener competition between larger and larger firms, and the faster pace of technological change.

The main objectives are to keep the EC parts and accessories industry competitive and to make sure Europe remains a top producer of motor vehicles as well as all the parts that go into them. Meeting the many demands of car manufacturers

means that parts and accessories manufacturers must have proven technological prowess, a large capacity for innovation and a firm command of the production and distribution processes for parts.

## Current Situation

Traditionally the parts and accessories industry is broken down into two segments: the market for original equipment parts that car-makers buy to put into the cars they make and the market for replacement parts. A third market - that of direct exports outside the EC - is also very important.

## Consumption Trends

### The original equipment parts market

The situation in the original equipment parts market depends on the degree to which car-makers are integrated, on demand trends and on product trends.

In order to reduce costs the least integrated car-makers, such as Fiat, Renault or Peugeot, have suppliers or subsidiaries produce a large number of their parts. The proportion of parts the different car-makers buy from independent firms varies between 55% and 70%. The figure for Japanese car-makers is 80%, while in the American motor industry it is only 30% to 40%.

**Main Indicators**  
**Motor Vehicle Parts and Accessories**

| (Million ECU)                  | 1980   | 1981   | 1982   | 1983   | 1984   | 1985   | 1986   |
|--------------------------------|--------|--------|--------|--------|--------|--------|--------|
| Apparent consumption (1)       | 10 749 | 11 068 | 12 196 | 13 437 | 13 472 | 15 134 | 16 807 |
| Net export earnings (2)        | 4 780  | 5 315  | 5 307  | 5 410  | 6 163  | 6 583  | 5 896  |
| Total Community production (3) | 14 978 | 15 641 | 17 269 | 18 715 | 19 685 | 21 953 | 22 702 |
| Employment (1 000) (3)         | 373.8  | 364.9  | 351.1  | 343.5  | 338.2  | 333.9  | 330.7  |

(1) Germany, France, Italy, Netherlands, and Greece since 1981.

(2) 1980-1985: EC 10

(3) Germany, France, Italy, Netherlands and Greece. In 1986: Germany, France and Italy.

NB: The Eurostat figures, which are the only ones available for the 1980 to 1986 period, are not comparable to figures given by professional sources. This is due to the categories selected. Nonetheless, as they are the only figures available for a fairly long period they still reveal the trends in the main aggregates.

Parts and accessories firms that specialize in complete functions, such as brake systems, dashboard instruments or fuel injection, and follow these functions through R&D to industrialization and marketing to car-makers, enjoy a competitive edge. This is because car-makers need to make their means of production more flexible to keep pace with market swings. The move towards more and more expensive technology as well as that towards better-equipped cars also reinforce this competitive advantage.

### The replacement parts market

The replacement parts market differs greatly from country to country. Market features in the various EC countries depend largely on the characteristics of the cars on the road. Determining factors include size, the comparative sales of model ranges, age, use and legislation.

In Germany, for example, the combination of government inspection of cars on the road and the large proportion of upper-range models sold can explain why Germans spend the relatively high figure of 200 ECU a year per car for replacement parts.

Most cars on Italian roads are small models and the legislation covering vehicles is less strict, so Italians only spend an estimated 140 ECU a year per car for replacement parts.

### Export Trends

Parts and accessories firms mainly sell to the European market but they are seeking to diversify their sales to other

markets such as the United States in order to soften the impact of swings in European demand. The total exports of the EC came to 20 billion ECU in 1985, with nearly half being shipped outside the Community. This market looks likely to grow.

Analysis of the flows of trade (see Table I) shows that the trade surplus of Europe as a whole remained more or less constant from 1980 to 1986. However, the geographical structure of the industry has changed. Germany still accounts for the lion's share and its share is still growing. It rose from 51% of exports outside Europe in 1980 to 63% in 1986. Germany's share of the European market is also growing, rising from a third of intra-European exports in 1980 to 40% in 1986. Its imports are lower and in 1986, its trade with European partners showed a surplus of nearly 2 billion ECU.

France's intra-European trade surplus is only slightly more than a tenth of Germany's, but it nonetheless doubled between 1980 and 1986, while Italy went from a slight deficit to a surplus on the scale of the French one. These two countries also show a surplus of around 700 to 800 million ECU in their trade with the rest of the world. The Netherlands and Belgium have trade deficits, especially with their European partners. The United Kingdom has maintained a surplus of nearly a billion ECU with non-EC countries, but its balance within the EC dipped from a surplus of 230 million ECU in 1980 to a deficit of over a billion ECU in 1986. The trade of the other countries, Ireland, Denmark, Spain, Greece and Portugal, is practically in balance.

Table I  
Imports and Exports

| 1980<br>(Million ECU) | BLEU | DK   | D    | GR  | E   | F    | IRL | I    | NL   | P   | UK    | EC   |
|-----------------------|------|------|------|-----|-----|------|-----|------|------|-----|-------|------|
| Imports intra-EC      | 533  | 84   | 960  | 54  |     | 945  | 48  | 643  | 486  |     | 846   | 4602 |
| Exports intra-EC      | 415  | 31   | 1704 |     |     | 1068 | 9   | 617  | 208  |     | 1079  | 5135 |
| Imports extra-EC      | 175  | 32   | 240  | 17  |     | 151  | 7   | 67   | 137  |     | 201   | 1031 |
| Exports extra-EC      | 117  | 36   | 2680 | 2   |     | 813  | 4   | 720  | 38   |     | 1379  | 5791 |
| Balance intra-EC      | -117 | -53  | 743  | -54 |     | 123  | -38 | -26  | -277 |     | 233   | 533  |
| Balance extra-EC      | -58  | 3    | 2440 | -15 |     | 661  | -3  | 652  | -99  |     | 1177  | 4759 |
| 1986<br>(Million ECU) | BLEU | DK   | D    | GR  | E   | F    | IRL | I    | NL   | P   | UK    | EC   |
| Imports intra-EC      | 1344 | 189  | 1931 | 86  | 196 | 1649 | 50  | 1037 | 905  | 80  | 2322  | 9794 |
| Exports intra-EC      | 753  | 65   | 3914 |     | 294 | 1884 | 6   | 1208 | 435  | 50  | 1232  | 9845 |
| Imports extra-EC      | 202  | 61   | 571  | 23  | 26  | 165  | 11  | 117  | 275  | 56  | 344   | 1855 |
| Exports extra-EC      | 154  | 68   | 4266 | 1   | 127 | 861  | 1   | 927  | 80   | 13  | 1248  | 7750 |
| Balance intra-EC      | -591 | -123 | 1982 | -86 | 97  | 234  | -43 | 171  | -469 | -29 | -1090 | 51   |
| Balance extra-EC      | -48  | 6    | 3694 | -22 | 101 | 696  | -9  | 809  | -194 | -42 | 904   | 5895 |

Source: Eurostat.

## Employment Trends

Some 600 000 people work in the motor vehicle parts and accessories industry for 1 500 companies. In spite of greater production, about 2% of the jobs in the sector are lost each year through productivity-boosting investments and major restructuring moves. This trend is unlikely to change over the next few years.

## Production Trends

The German firms in the industry account for about half of total European production, or 28 billion ECU, with 35% being exported. Of course, their strength comes from the sheer size of the German motor vehicle industry - 40% of European production - and from strict legislation on car maintenance. Europe's biggest group, Bosch, a leader in the field of electronic injection and braking systems, accounts for nearly a quarter of German production, or 7.5 billion ECU (source: Didier Salvadori, *Bulletin du Crédit National*, No 56, Paris, 4th quarter 1987).

France produces about 20% of the European total. Its 170% export-import ratio mainly comes from trade with non-EC countries. The Valeo group, which has just taken over the Neiman group, holds 45% of the European radiator market, 40% of the lighting and clutch market, and 30% of the alternator market.

Italy, Spain and the United Kingdom account for 9%, 11% and 13% of European production respectively. One of the major Italian firms is Magnetti-Marelli. This Fiat subsidiary has a strong European presence with plants in France, Germany and Spain. It concentrates mainly on electronic ignitions with 25% of the European market. Another major Italian firm is Ufima which controls 60% of the carburettor market and 50% of the dashboard instruments market. Many foreign firms from Europe and Japan have built plants in Spain and the United Kingdom. Lucas and GKN, the leading UK groups, also have many overseas plants.

## The Position of the Firms

The EC motor vehicle parts and accessories sector is based on five national industries with differing structures and performance levels. The Germans dominate the market. Their large firms have played a major role in developing new products as is illustrated by Bosch, which was a pioneer in the field of fuel injection, with mechanical and then electronic systems, as well as in the field of anti-blocking system brakes. The leader's vitality pulled many smaller firms along with it.

The size of France's motor vehicle parts and accessories sector makes it the second largest in Europe, but its structure is shakier. The major restructuring moves spawned by the difficult years of the early 1980s have just finished, with three international-scale groups emerging - Valeo, Epeda-Bertrand-Faure and ECIA (PSA group).

The Italian industry was widely dispersed in the early 1970s but the renewed strength of the Fiat group means Italian firms are now vying for a big chunk of the European market. Their strategy consists of moving into the most promising markets in the sector, particularly electronic injection and ignition systems and ABS-type brake systems.

For a long time the UK motor vehicle parts and accessories industry was dragged down by the difficulties which engulfed the national motor vehicle industry. But major restructuring efforts and activity adjustments have left it with considerable potential as is shown by the vitality of the Lucas-Girling and GKN groups.

## Europe vs. the USA and Japan

The high degree of integration in the American industry makes American car-makers the world's biggest producers of motor vehicle parts and accessories. Alongside them, there are many diversified firms with strong market positions in America and around the world. Leaders include Allied-Signal-Bendix for electrical and electronic equipment, and Borg-Warner for gearboxes.

Table II  
1987 Production by Product Category

| (Million 1987 ECU)                  | B     | D      | E     | F      | I     | UK    |
|-------------------------------------|-------|--------|-------|--------|-------|-------|
| Electrical and electronic equipment | N/A   | 4 200  | 1 300 | 1 900  | 1 500 | N/A   |
| Engine components                   | N/A   | 5 700  | 900   | 1 600  | 700   | N/A   |
| Chassis components (1)              | N/A   | 5 500  | 4 400 | 6 200  | 1 200 | N/A   |
| Body components                     | N/A   | 1 000  | N/A   | 1 700  | 1 100 | N/A   |
| Others                              | N/A   | 11 700 | 200   | 200    | 1 100 | N/A   |
| Total                               | 0 900 | 28 100 | 6 800 | 11 600 | 5 600 | 8 200 |

(1) For Spain this figure is for chassis and body components.

Sources: Statistische Bundesamt, FIEV, ANFIA, SERNAUTO, INS Belgium and BIPE.

American firms attach a great deal of importance to the European market and are likely to enhance their presence on the parts and accessories market. The weaker dollar also makes more American exports to Europe seem probable.

Japanese parts and accessories firms, like their German counterparts, have a huge but highly competitive national market. Such a climate favours technological innovation and spurs firms to seek markets abroad, with the United States representing the most inviting outlet.

Europe must carry on with its restructuring efforts to meet these new challenges. It is vital that it develop its technological capacity and prowess in order to provide the European car industry with all the parts and accessories it requires.

### **Forecast and Outlook**

The three markets concerned - original equipment, replacement parts and direct exports - must be examined separately.

Obviously, the original equipment market depends directly on the motor vehicle industry which should see only a slight increase in the numbers of EC-made vehicles in the next few years because 1987 was a peak production year and imports will inevitably rise. This is especially true for the private passenger car market as the production of light utility vehicles is more dynamic. The outlook for growth in value is a bit better because European consumers are buying more expensive cars. This factor combined with new environmental protection legislation improves the prospects for the parts and accessories industry.

The replacement parts market is governed by the number and the state of vehicles on the road as well as changes in consumer behaviour. These changes can either come about spontaneously or be spurred by legislation on vehicle testing or compulsory maintenance. The constitution of the single market by 1992 makes it likely that such measures will spread to the countries where they have been absent up till now. This, combined with the consumer's desire for safer and more comfortable driving, implies that there will be promising demand growth in the replacement parts market. On the other hand, technological advances are resulting in much longer lasting parts and thus slower replacement cycles. On the assumption that EC legislation on compulsory vehicle maintenance is forthcoming, but that price rises will be checked by keener competition, the growth rate for the European replacement parts market should be about 5% a year in volume bringing the value up to 22 billion constant 1985 ECU in 1990, as opposed to 16.6 billion in 1985.

The outlook for growth in motor vehicle parts and accessories markets is good but major adaptation and competitive efforts will be required. Overall volume growth in these markets should reach an average of 3% to 4% over the next few years. There will be marked disparities, however, with electrical and electronic equipment progressing more rapidly than body components which will in turn enjoy faster growth than engine and chassis components.

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# MOPEDS AND MOTORCYCLES

(NACE 363)

*This sector has been characterized by a sharp decline in demand in the 1980s and strong Japanese imports. Recently Japanese manufacturers have reached production agreements with European partners or acquired existing European companies. Some independant EC manufacturers have nevertheless managed to maintain or even increase their market share. This applies mainly to Italian (Piaggio, Cagiva, Aprilia), French (Peugeot) and German (BMW) manufacturers.*

## Current Situation

The EC represented 60% of world production of mopeds in 1974. In 1978 this share decreased to 40% (2 million of 5 million). At the time Japanese share was 44.5%. In 1987, EC production fell to 1 million units while Japan produced 1.6 million. The EC production of motorcycles was 359 000 in 1974, 612 000 in 1981 and 435 000 in 1987 (including Spain). Japanese production figures were 3.4 million in 1974, 4.4 million in 1978 and 3.1 million in 1987.

## Consumption Trends

Consumption has sharply fallen since 1980-1981. The decline in demand has been caused by the drop in the birth-rate, the nature of the demand, especially by young people, in favour of four-wheelers (including second-hand), high insurance costs and by legal requirements (mandatory helmet, expensive and difficult to obtain driving licence).

## Trade

Extra-Community exports represent 27.5% of the EC industry production (CKD vehicles included).

In volume terms, over two thirds of extra-Community exports are accounted for by Italy.

With regards to imports, available statistics reveal considerable market penetration by Japanese manufacturers: this, together with the consumption decline, was a major cause for the EC production decrease. The Japanese presence is stronger in the motorcycle segment (scooter and mopeds excluded), where 58% of registered vehicles are imported from Japan.

There are major agreements between EC manufacturers and licensees for production/assembly of european models (mainly scooters and three-wheelers) in South-East Asia, India, People's Republic of China, Taiwan and the Middle-East.

## Major Structural and Geographical Features

The EC motorcycle industry is mainly concentrated in Southern Europe. Nearly 50% of EC production is assured by Italy (39% of EC moped production and 76% of EC motorcycle production); French manufacturers represent nearly 20%; Spain closely follows with 18%. Japanese manufacturers control 19.2% of EC production through licensing agreements, financial stakes or local plants.

Most part of EC production is carried out in regions with medium to high unemployment rates.

The EC industries located in Italy, France, Spain and Portugal are somehow protected by import restrictions to Japanese vehicles.

In Italy, Piaggio Group (Piaggio, Gilera and Puch) is the largest manufacturer and, with more than 500 000 units per year produced in Italy, it is also the largest European manufacturer. Also Motovespa (largest Spanish producer) is part of Piaggio Group. The other most important italian

**Table I**  
**Production and Employment - 1987**

|                            | BLEU | D    | GR  | E     | F     | I         | NL   | P    | UK  | TOTAL  |
|----------------------------|------|------|-----|-------|-------|-----------|------|------|-----|--------|
| Number of vehicles (1 000) | 48.7 | 61.8 | 3.0 | 255.4 | 280.0 | 738.5 (2) | 28.9 | 50.0 | 1.6 | 1467.9 |
| Employment (1 000) (1)     | 0.5  | 2.0  | 0.1 | 3.0   | 3.0   | 12.0      | 1.0  | 2.0  | N/A | 25.0   |

(1) Direct production estimate. The Industry estimates that there are 100 000 direct and indirect jobs.

(2) Including three-wheelers.

Source: COLIMO

**Table II**  
**Foreign Trade by Country - 1987**

|   | BLEU | DK   | D    | GR   | E   | F    | IRL  | I         | NL      | P       | UK   | TOTAL |
|---|------|------|------|------|-----|------|------|-----------|---------|---------|------|-------|
| Import extra-EC<br>as % of consumptions | 65.0 | 82.0 | 55.0 | 86.0 | 7.0 | 37.0 | 41.5 | 12.0      | 47.5    | 5.0     | 88.5 | 32.0  |
| Exports extra-EC (1 000)                | 2.6  | 0    | 10.6 | 0    | 6.3 | 78.4 | 0    | 250.0 (1) | 0.8 (2) | 3.5 (2) | 1.6  | 353.8 |
| The above as % of production            | 5.4  | 0    | 17.1 | 0    | 2.5 | 30.2 | 0    | 33.8 (1)  | 2.9 (2) | 7.5 (2) | N/A  | 24.1  |

(1) Including CKD

(2) Estimate

Source: COLIMO

**Table III**  
**Source of Extra-EC Imports**

| (% of vehicles imported) | BLEU | DK | D  | GR | E  | F  | IRL | I  | NL | P   | UK | TOTAL |
|--------------------------|------|----|----|----|----|----|-----|----|----|-----|----|-------|
| Japan                    | 90   | 35 | 86 | 81 | 93 | 68 | 99  | 88 | 29 | 100 | 93 | 78    |
| Others                   | 10   | 65 | 14 | 19 | 7  | 32 | 1   | 12 | 71 | 0   | 7  | 22    |

Source: COLIMO

**Table IV**  
**Destination of Extra-EC Exports by Country (1)**

| (% of vehicles exported) | BLEU | D   | E   | F   | I  | P  | TOTAL |
|--------------------------|------|-----|-----|-----|----|----|-------|
| USA                      | 0    | 30  | 0   | N/A | 13 | 0  | 7     |
| Japan                    | 0    | 8   | 0   | N/A | 4  | 0  | 3     |
| EFTA                     | 71   | 38  | 67  | 4   | 44 | 40 | 32    |
| ACP                      | 7    | N/A | N/A | 62  | 6  | 53 | 32    |
| Others                   | 22   | N/A | N/A | N/A | 33 | 7  | 76    |

(1) CKD excluded

Source: COLIMO

manufacturers are Cagiva Group (Cagiva, Ducati, Husqvarna and Moto Morini). Aprilia and the Moto Guzzi-Benelli Group. There are also many other small volume producers.

In France, the largest manufacturer, Peugeot MTC (about 180 000 vehicles in 1987), is producing mainly mopeds and scooters (50/80 cc.); Peugeot scooters and some 50 cc. engines are produced under licence to Honda. The second French manufacturer, MBK, is under full control of Yamaha and is assembling Yamaha scooters and mopeds.

In Spain, Motovespa (Piaggio Group) and Derbi are the main manufacturers, representing more than 50% of the Spanish production. Honda, Yamaha and Suzuki have plants in Spain where they assemble one third of local production.

In the Federal Republic of Germany, the most important manufacturer, BMW, produces large capacity motorcycles, that are well known and appreciated all over the world.

In Portugal, SIS Vehiculos Motorizados LTDA is the largest manufacturer and produces mainly mopeds equipped with engines either from Fichtel & Sachs (FRG) or from Franco

Morini (Italy). SIS is also assembling Yamaha trial bikes using imported parts. The second Portuguese manufacturer is Famel.

In Belgium, most production is carried out by Honda Belgium with a few parts being imported from Japan.

## FORECAST AND OUTLOOK

After a period of market difficulties, at the end of the eighties, better prospects are facing the industry, due mainly to increased urban traffic congestion. This is encouraging more government and local authorities to take provisions also in favour of motorized two-wheelers. As a consequence, some European manufacturers are carrying out a policy of investment and acquisition in order to improve their competitiveness, especially in the area of mopeds, scooters and low capacity motorcycles.

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## SHIPBUILDING

(NACE 361)

*There has been a sharp decline in the EC's merchant shipbuilding production from the peak year of 1976 when the volume of output reached 5.927 million CGRT to 1.719 million CGT in 1987. This corresponds to a drop in the EC share of world production from 26.8% to 18.6%. The main reasons for the decline were the continuing overcapacity in available transportation volumes in a globally declining market as well as growing competitive pressure from large production volumes in Japan and Korea.*

The decline in the order intake of the world's shipbuilding industry, which set in with the first oil crisis of 1973 but did not show its effects on output until 1976 due to the enormous amount of tonnage on order worldwide, has never been reversed. The ensuing fall in prices and lack of work for the shipyards, followed by successive waves of capacity reductions in the traditional shipbuilding countries, has assumed alarming proportions.

The main reason for the crisis in shipbuilding is the existing overcapacity: since 1973, total worldwide fleet volume has increased by 30% whereas transport volume has decreased by 10%.

This overcapacity was further compounded by speculative new orders (especially in 1984) not corresponding to immediate demand and premature replacement of still modern vessels by shipowners seeking to benefit from the low pricing policies of the Far East shipyards. In addition, the upturn in world trade (+3.5% in 1985 and 1986; +4% in 1987) has not been accompanied by an equivalent increase in the volume in maritime transport (+0% in 1985; +3% in 1986; +1% in 1987). Expressed in tonne-miles, worldwide maritime transport decreased by 2.7% in 1985, increased by 6.1% in 1986

but grew by only 0.8% in 1987. The big increase in 1986 was mainly due to the higher volume of oil shipped as a result of the slump in oil prices. As the latter stabilized in 1987, so did maritime transport volumes.

Tonnage in this chapter is expressed in gross tonnes (GT), compensated gross registered tonnes (CGRT - coefficient 1978) and compensated gross tonnes (CGT - coefficient 1984). The two last measures take into account the volume of work required for the construction of a vessel, and is made up of the gross tonnage multiplied by a special coefficient based on the size and type of the particular vessel and agreed under OECD rules in 1976.

### Current Situation

In 1987 industrial production, which has a significant impact on bulk shipping, showed strong growth in the NICs, Japan and the United States. In the EC, it increased by 2.8% and the acceleration in growth was particularly strong in the UK and Italy. However, world shipbuilding declined sharply. The 1987 production figure, at 9 245 million CGT, was significantly lower than the 1986 total (12 139 million CGT) and the 1985 (14 169 million CGT) and 1984 (14 998 CGT) figures, and was the lowest figure since 1965.

World fleets experienced a reduction for the sixth consecutive year. In former years this reduction was brought about by increased scrapping; in 1987 it was caused by lower shipbuilding production. As a result, overcapacity in tankers and bulk carriers diminished considerably.

The figures in Table I illustrate that in traditional EC shipbuilding countries, the industry is mainly suffering from the huge production capacities in Japan and Korea. The latter

### Main Indicators Shipbuilding

|                              | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  | 1987  |
|------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Production (million ECU)     | 1 172 | 1 276 | 1 651 | 1 900 | 1 677 | 1 423 | 1 582 | 1 829 |
| % of world production        | 19.3  | 20.0  | 17.3  | 18.8  | 14.8  | 14.2  | 15.7  | 18.6  |
| Production (million CGT) (1) | N/A   | N/A   | 3 143 | 3 300 | 2 628 | 2 457 | 1 900 | 1 719 |
| % of world production        |       |       | 21.5  | 24.4  | 17.5  | 17.3  | 15.7  | 18.6  |
| Employees (1 000) (2)        | 273   | 251   | 229   | 211   | 195   | 176   | 159   | 139   |

(1) 1982 and 1983: 1978 coefficient (CGRT); 1984-87: 1984 coefficient (CGT).

(2) New shipbuilding and ship repair.

**Table I**  
**World Shipbuilding Production, 1976-87**

|                    | 1976                            |              | 1982                            |              | (2)1984                        |              | 1985                           |              | 1986                           |              | 1987                           |              |
|--------------------|---------------------------------|--------------|---------------------------------|--------------|--------------------------------|--------------|--------------------------------|--------------|--------------------------------|--------------|--------------------------------|--------------|
|                    | 1 000<br>CGRT<br>coeff.<br>AWES | (%)          | 1 000<br>CGRT<br>coeff.<br>1978 | (%)          | 1 000<br>CGT<br>coeff.<br>1984 | (%)          |
| EC 12              | 5 927                           | 26.8         | 3 143                           | 21.5         | 2 628                          | 17.5         | 2 457                          | 17.3         | 1 900                          | 15.7         | 1 719                          | 18.6         |
| Western Europe (1) | 8 286                           | 37.5         | 4 285                           | 29.4         | 3 403                          | 22.7         | 3 089                          | 21.8         | 2 439                          | 20.1         | 2 169                          | 23.5         |
| Japan              | 8 349                           | 37.8         | 5 811                           | 39.8         | 6 951                          | 46.3         | 6 498                          | 45.9         | 5 085                          | 41.9         | 3 795                          | 41.0         |
| Rest of world      | 5 444                           | 24.7         | 4 492                           | 30.8         | 4 644                          | 31.0         | 4 581                          | 32.3         | 4 615                          | 38.0         | 3 281                          | 35.5         |
| of which:          |                                 |              |                                 |              |                                |              |                                |              |                                |              |                                |              |
| Eastern Bloc       | 2 755                           | 12.5         | 1 678                           | 11.5         | 2 192                          | 14.6         | 1 602                          | 11.3         | 1 412                          | 11.6         | 1 093                          | 11.8         |
| South Korea        | 349                             | 1.6          | 880                             | 6.0          | 1 015                          | 6.8          | 1 633                          | 11.5         | 1 971                          | 16.2         | 1 194                          | 12.9         |
| <b>Total</b>       | <b>22 079</b>                   | <b>100.0</b> | <b>14 588</b>                   | <b>100.0</b> | <b>14 998</b>                  | <b>100.0</b> | <b>14 168</b>                  | <b>100.0</b> | <b>12 139</b>                  | <b>100.0</b> | <b>9 245</b>                   | <b>100.0</b> |

(1) Association of West European Shipbuilders: EC 12 plus Finland, Norway and Sweden.

(2) Series revised in March 1986.

Source: EC contract/Lloyd's Register of Shipping.

country increased its market share in an extraordinary way in spite of a decreasing world market.

The expansion of capacity in South Korea was a direct result of targeted government subsidies. Against this background it is obvious that the extremely low labour costs in the Korean shipbuilding industry compared with labour costs prevailing elsewhere are a key factor in the competitiveness of the Korean shipbuilding sector and the continued growth of output; however, this not only placed a heavy burden on the traditional shipbuilding countries, but has also threatened the healthy development of the industry in all other countries, including the developing nations.

Classified by type of ship, 1987 production centred on passenger ships and ferries and other non-cargo carrying vessels such as fishing vessels.

Worldwide new orders received in 1987 amounted to 13.7 million GT/9.74 million CGT, which is slightly higher than in 1986 (9.482 million CGT). New orders for European shipyards focused on passenger ships and ferries, fishing vessels and full container ships. In terms of new orders, the EC market share

**Table II**  
**Hourly Labour Costs, 1987**

|                | ECU | Index<br>(1980=100) |
|----------------|-----|---------------------|
| Belgium        | 61  | 92                  |
| Denmark        | 62  | 115                 |
| Germany        | 69  | 81                  |
| Greece         | 25  | 111                 |
| France         | 59  | 111                 |
| Italy          | 56  | 117                 |
| Netherlands    | 62  | 103                 |
| Portugal       | N/A | 100                 |
| United Kingdom | 34  | 89                  |
| South Korea    | 17  | 189                 |

Source: CESA.

**Table III**  
**Market Share by Segment, 1982 and 1986**

|                                  | World<br>Production<br>(1 000 CGT) |              | EC<br>(%)   |             | Japan<br>(%) |             | South Korea<br>(%) |             |
|----------------------------------|------------------------------------|--------------|-------------|-------------|--------------|-------------|--------------------|-------------|
|                                  | 1982                               | 1986         | 1982        | 1986        | 1982         | 1986        | 1982               | 1986        |
| General cargo vessels            | 4 139                              | 3 062        | 23.4        | 15.7        | 35.1         | 47.6        | 4.0                | 9.8         |
| Bulk containers                  | 4 262                              | 2 093        | 10.1        | 10.9        | 57.3         | 46.6        | 11.1               | 24.7        |
| Tankers                          | 870                                | 646          | 0.8         | 2.0         | 59.6         | 61.6        | 3.9                | 10.8        |
| Gas and chemical tankers         | 2 345                              | 1 193        | 21.5        | 21.2        | 41.6         | 38.6        | 8.0                | 20.0        |
| Fishing vessels                  | 801                                | 890          | 8.2         | 25.3        | 14.9         | 25.4        | 1.1                | 6.3         |
| Other non-cargo carrying vessels | 2 221                              | 1 362        | 24.7        | 38.0        | 15.1         | 20.3        | 0.9                | 0.8         |
| <b>Total</b>                     | <b>14 998</b>                      | <b>9 245</b> | <b>17.3</b> | <b>18.6</b> | <b>39.8</b>  | <b>41.1</b> | <b>6.0</b>         | <b>12.9</b> |

Source: CESA.

**Table IV**  
**New Orders in World Shipbuilding, 1976-87**

|                    | 1976                            |              | 1982                            |              | (2)1984                        |              | 1985                           |              | 1986                           |              | 1987                           |              |
|--------------------|---------------------------------|--------------|---------------------------------|--------------|--------------------------------|--------------|--------------------------------|--------------|--------------------------------|--------------|--------------------------------|--------------|
|                    | 1 000<br>CGRT<br>coeff.<br>AWES | (%)          | 1 000<br>CGRT<br>coeff.<br>1978 | (%)          | 1 000<br>CGT<br>coeff.<br>1984 | (%)          |
| EC 12              | 3 127                           | 19.6         | 2 404                           | 20.8         | 1 780                          | 15.1         | 2 175                          | 21.1         | 1 581                          | 16.7         | 1 971                          | 20.2         |
| Western Europe (1) | 4 660                           | 29.1         | 2 966                           | 25.7         | 2 412                          | 20.5         | 2 479                          | 24.0         | 1 979                          | 20.9         | 2 819                          | 29.0         |
| Japan              | 7 338                           | 45.9         | 4 859                           | 42.1         | 6 040                          | 51.3         | 4 440                          | 43.0         | 3 432                          | 36.2         | 3 121                          | 32.0         |
| Rest of world      | 3 985                           | 25.0         | 3 708                           | 32.2         | 3 326                          | 28.2         | 3 403                          | 33.0         | 4 071                          | 42.9         | 3 800                          | 39.0         |
| of which:          |                                 |              |                                 |              |                                |              |                                |              |                                |              |                                |              |
| Eastern Bloc       | 1 896                           | 11.9         | 1 069                           | 9.3          | 1 144                          | 9.7          | 1 414                          | 13.7         | 1 875                          | 19.8         | 1 059                          | 10.9         |
| South Korea        | 325                             | 2.0          | 1 003                           | 8.7          | 1 181                          | 10.0         | 807                            | 7.8          | 1 352                          | 14.3         | 1 943                          | 19.9         |
| <b>Total</b>       | <b>15 893</b>                   | <b>100.0</b> | <b>11 533</b>                   | <b>100.0</b> | <b>11 778</b>                  | <b>100.0</b> | <b>10 322</b>                  | <b>100.0</b> | <b>9 482</b>                   | <b>100.0</b> | <b>9 740</b>                   | <b>100.0</b> |

(1) Association of West European Shipbuilders: EC 12 plus Finland, Norway and Sweden.

(2) Series revised in March 1986.

Source: EC Contract/Lloyd's Register of Shipping.

increased from 16.7% in 1986 to 20.2% in 1987, and in terms of ships completed it increased from 15.7% to 18.6% over the same period.

South Korea, which is particularly involved in the building of oil tankers, saw its share in production decline in 1987 to 12.9% from 16.2% in 1986; however, it has increased its share in new orders from 7.8% in 1986 to 14.3% in 1987. Japan's share in both total production and new orders declined in 1987, probably as a result of the ongoing restructuring of the Japanese shipbuilding industry but also the higher level of the yen affecting competitiveness.

### Employment Trends

In the EC, there are 71 shipyards building ships of 5 000 GT and above. The workforce of the total industry, i.e. construction of new ships and repairs, comprises 139 000 persons.

**Table V**  
**Ships Completed by Member State, 1983 and 1987**

|                | 1983<br>CGRT (1 000)<br>Coeff. 1978 | 1987<br>CGT (1 000)<br>Coeff. 1984 |
|----------------|-------------------------------------|------------------------------------|
| Belgium        | 173.2                               | 25.9                               |
| Denmark        | 338.5                               | 194.4                              |
| Germany        | 811.3                               | 396.4                              |
| Greece         | 35.7                                | 6.6                                |
| Spain          | 488.7                               | 328.4                              |
| France         | 356.8                               | 207.9                              |
| Ireland        | 19.2                                | N/A                                |
| Italy          | 217.0                               | 224.8                              |
| Netherlands    | 415.8                               | 146.2                              |
| Portugal       | 124.7                               | 26.3                               |
| United Kingdom | 319.3                               | 162.3                              |
| <b>Total</b>   | <b>3 300.2</b>                      | <b>1 719.1</b>                     |

Source: EC Contract/Lloyd's Register of Shipping.

In 1987, EC shipyards continued their restructuring programme. However, they have had to bear the full burden of this restructuring while continued excess capacity in the Far East has prevented them from deriving the full benefits from these cutbacks.

Under this restructuring programme, total manpower levels in shipbuilding and ship repair decreased from 273 000 in 1980 to 139 000 in 1987. Employment levels in new shipbuilding are shown in Table VI.

### Forecast

During the early months of 1988 it became evident that the demand for steel had again increased. Therefore bulk carriers experienced a rise in freight rates of 70%. Other sectors such as tankers and container ships also showed some improvement in freight rates.

A further very important factor is the considerable reduction in shipbuilding capacity in both the EC and Japan. At the beginning of 1988, the prospects for future development were less burdened by high overcapacity in shipping than in previous years. Further positive signals came from a change in Japanese shipbuilding policy, which appears to be moving away from being volume-oriented towards greater emphasis on profit margins. Korean shipyards now also seem to be aiming for profitability, following losses in volume suffered in 1987. However, worldwide overcapacity still remains.

The decline in global shipbuilding activity of recent years is expected to come to an end in 1988-89, when production is forecast to stay in the 8-9 million CGT range; however, the volume of new orders may be at a higher level. For the subsequent period, 1995-2000, the required level of completions will increase to 12.5 million CGT annually and up to 16.9 million CGT in the 1995-2000 period.

**Table VI**  
**Employment in New Shipbuilding, 1975-87**

|                 | 1975           | 1980           | 1981           | 1982           | 1983           | 1984          | 1985          | 1986             | 1987          |
|-----------------|----------------|----------------|----------------|----------------|----------------|---------------|---------------|------------------|---------------|
| Belgium         | 7 467          | 6 523          | 6 347          | 4 680          | 4 104          | 4 060         | 3 923         | 2 995            | 2 548         |
| Denmark         | 16 630         | 11 400         | 11 350         | 11 800         | 11 200         | 10 300        | 10 200        | 7 000            | 7 000         |
| Germany         | 46 839         | 24 784         | 26 521         | 27 600         | 25 966         | 22 189        | 22 260        | 18 184           | 12 875        |
| Greece          | 2 316          | 2 672          | 3 393          | 2 900          | 2 812          | 2 000         | 2 000         | (1)1 709         | 1 621         |
| France          | 32 500         | 22 200         | 22 200         | 21 600         | 21 000         | 16 940        | 15 058        | (1-6)13 700      | (6)8 940      |
| Ireland         | 869            | 750            | 762            | 882            | 550            | N/A           | N/A           | N/A              | N/A           |
| Italy           | 25 000         | 18 000         | 16 500         | 13 750         | 12 800         | 12 800        | (4)12 000     | (4)11 570        | (4-7)9 500    |
| Netherlands (2) | 22 662         | 13 100         | 13 100         | 12 800         | 11 250         | 10 330        | 6 236         | (4)5 400         | (4)3 600      |
| United Kingdom  | 54 550         | 24 800         | 25 345         | 25 000         | 20 486         | 14 655        | (3)10 200     | (3)8 500         | (3)8 000      |
| <b>EC 10</b>    | <b>208 833</b> | <b>124 229</b> | <b>125 518</b> | <b>121 012</b> | <b>110 168</b> | <b>93 274</b> | <b>81 877</b> | <b>(1)69 058</b> | <b>54 084</b> |
| Spain           | N/A            | N/A            | N/A            | N/A            | N/A            | N/A           | 18 000        | 18 000           | (4)17 300     |
| Portugal        | N/A            | N/A            | N/A            | N/A            | N/A            | N/A           | 5 370         | 5 087            | 5 020         |
| <b>EC 12</b>    | <b>N/A</b>     | <b>N/A</b>     | <b>N/A</b>     | <b>N/A</b>     | <b>N/A</b>     | <b>N/A</b>    | <b>10 247</b> | <b>(1)92 145</b> | <b>76 404</b> |

(1) Revised figures.

(2) 1975-84: including military shipbuilding, estimated as: 1975, 1 800; 1978-79, 3 200; 1980, 3 400; 1981-82, 3 200; 1983-84, 2 800.

(3) Excluding Harland & Wolff (Northern Ireland), estimated as: 1985-86, 4 000; 1987, 3 500.

(4) Estimated.

(5) Excluding Greece.

(6) 1986-87: employment in civil new shipbuilding, as well as naval and para-naval activities (transformation, military and off-shore shipbuilding). According to this method, previous years were: 1975, 32 500; 1980, 23 700; 1985, 17 700.

(7) Plus 2 780 currently inactive, of which over 2 000 represent a structural reserve for whom no further employment is foreseen.

Sources: National data.

A forecast increase in new building activity up to the level of 16.9 million CGT per annum for the 1995-2000 period implies a doubling in CGT production over only 10 years, although from a very low level in 1988-89. This forecast requirement could be largely in line with the expected reduction in world shipbuilding capacities, under the condition that capacity cutbacks in Japan follow the pattern of the other industrialized countries and that the rationalization of the ship-

building industry in Korea continues. A further condition is that other countries (developing and centrally-planned) follow a market-oriented investment policy.

CFSA: Committee of EC Shipbuilders' Associations  
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# RAILWAY ROLLING STOCK

(NACE 362)

*Europe has the world's largest railway rolling stock industry with enough production capacity to meet the entire world demand. It is also the world leader in terms of technology, quality and reliability. But, it has been trading in a buyer's market since the early 1980s and is only operating at 50% of its capacity. The outlook for the immediate future is for EC markets to remain stagnant and exports to fall but the situation should improve from 1990 on as several European countries invest in high-speed rail networks.*

The EC industry manufactures railway rolling stock of every definition. Its activity falls into four large categories:

- electric and diesel locomotives, locomotors and motor coaches;
- passenger coaches for railway lines, underground railways and tramways;
- goods wagons;
- spare parts.

Locomotives are mainly produced by divisions within large firms with a variety of activities of which locomotives only account for about 5% of total revenue. Passenger coaches and goods wagons, on the other hand, are often the main business of the firms that manufacture them. The railway rolling stock industry differs fundamentally from other transportation equipment industries in that its products are totally dependent on existing network installations. This means that manufacturers can only develop new equipment in close collaboration with their clients. This factor, added to a

thorough knowledge of the individual technical features of each European network, gives national manufacturers a considerable edge on foreign competition.

## Current Situation

The rail transportation market varies widely from country to country and these variations have a substantial impact on national production. In Europe, the generalized policy of building motorways, the permanent drop in the transportation of mined materials, the migration of heavy industry to coastlines and the unwieldy administration of rail companies vs. the flexibility of road transport, have all contributed to shrinking rail traffic. The drop is in absolute value and not only in percentage of total traffic. Germany is the only Community country where goods traffic produces more earnings than passenger traffic. The vast distances in the United States and the USSR mean that air travel has virtually eliminated passenger rail traffic, but goods traffic is still strong. Both types of traffic continue to grow in China and in India (which has the world's second largest rail network). The acceleration of urban sprawl all over the planet is creating a demand for commuter rolling stock that must be met.

As a whole, Europe is the world's leading manufacturer of railway rolling stock. It has the biggest production capacity and could meet the entire world demand on its own. Europe also leads the world for quality. The exacting technical and reliability standards of our rail networks have allowed - or forced - our manufacturers to produce equipment which is by far the best.

## Main Indicators Railway Rolling Stock

| (Million ECU)  | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  | 1987  |
|--|-------|-------|-------|-------|-------|-------|-------|-------|
| Apparent consumption (1)                               | 1 364 | 1 986 | 2 212 | 2 505 | 2 230 | 2 186 | 2 194 | 2 064 |
| Net export earnings (2)                                | + 317 | + 452 | + 464 | + 470 | + 617 | + 482 | + 418 | + 396 |
| Total Community production (excluding spare parts) (3) | 1 681 | 2 438 | 2 676 | 2 975 | 2 847 | 2 668 | 2 612 | 2 460 |
| Employment (1 000) (4)                                 | 68.2  | 67.8  | 67.1  | 66.7  | 64.6  | 60.9  | 56.8  | 51.6  |

There is no significant railway rolling stock construction industry in Luxembourg, Ireland and Greece.

(1) EC 6 (excluding the UK, Spain and Portugal).

(2) EC 7 (there are no available import and export figures for Spain and Portugal).

(3) EC 8 (there are no available production figures for the UK).

(4) EC 7 (excluding the Netherlands and the UK).

**Table I**  
**Trends in Community Production by Product**

| (Million ECU)     | 1980  | 1981    | 1982    | 1983    | 1984    | 1985    | 1986    | 1987    |
|-------------------|-------|---------|---------|---------|---------|---------|---------|---------|
| Locomotives       | 258.1 | 420.4   | 604.2   | 677.6   | 611.8   | 663.1   | 550.6   | 659.0   |
| Passenger coaches | 906.0 | 1 260.0 | 1 517.5 | 1 696.6 | 1 585.3 | 1 465.6 | 1 433.1 | 1 309.9 |
| Goods wagons      | 517.1 | 757.4   | 554.3   | 600.5   | 650.3   | 539     | 628.2   | 491.5   |

EC 8 (excluding the UK).

Source: UNIFE.

Production from the Eastern bloc cannot for all its size be taken into account due to lack of published statistics. However, its production of all types of equipment is considerable and the main consumer is the USSR. Nonetheless, with their artificial pricing policy, these countries may manage to break into Community markets as has been the case in Greece and elsewhere with private and semi-governmental European organizations. The Eastern bloc has the production means to meet its own development planning goals and to export to friendly Third World countries too.

China and India are big equipment consumers and meet most of their needs from their own production. But they need technology and China in particular buys large numbers of locomotives - diesel from the United States and electric with a few diesel from Europe.

The United States alone produces some 50% to 55% of the world's diesel locomotives. It exports these locomotives all over the world, except to the Comecon countries, Japan and Europe. The stagnant American economy, combined with a radical reorganization of rail networks involving streamlined use of rolling stock, cut locomotive orders from 1 724 to 392 between 1980 and 1986 while orders for goods wagons plunged from 87 083 to 10 000.

As a result, one of the two locomotive manufacturers is dropping its American activity and moving it to Canada and many goods wagon manufacturers have closed down large numbers of their plants. Specialized firms went to the wall when passenger stock orders dried up, leaving demand for urban and commuter rail equipment unmet and opening a market for the Europeans, Canadians and Japanese to share. Protectionist measures require a portion of production to be

made locally, leading exporters to set up American assembly plants and equipment supplies.

Canada's production of railway rolling stock came to CAD 889 million in 1984, CAD 1 172 million in 1985 and CAD 1 108 million in 1986. This is roughly equivalent to 3% of overall European production. Canada produces all types of rolling stock and is an increasingly aggressive player in the international markets. It has been backed up by the technological contributions of one of its European subsidiaries since 1986.

Japan also produces the whole range of railway rolling stock. Production reached YEN 112.59 billion in 1985 and YEN 128.01 billion in 1986, which represents 26% of European production for the same period. Japanese exports have not made big inroads in Europe and are mainly concentrated on the United States, Argentina and South-east Asia.

### *Consumption Trends*

European rail network equipment was renewed after the Second World War. In most countries it was replaced during the 1980s (the 1960s in the case of locomotives). During the same period, the growth of the big cities called for heavy investments in urban transit and equipment for commuter services. In the future, there will be a development of high-speed rail services but their very speed means that the same train can make more trips in less time thus reducing the numbers required to replace standard rolling stock.

Differences from country to country must nonetheless be taken into account, as some countries have favoured other means of transportation. Now they must modernize their rail

**Table II**  
**1987 National Production by Product**

| (Million ECU)     | BLEU | DK   | D     | GR | E     | F     | IRL | I     | NL | P    | UK TOTAL    |
|-------------------|------|------|-------|----|-------|-------|-----|-------|----|------|-------------|
| Locomotives       | 40.5 | 0    | 66.6  | 0  | 10.5  | 268.1 | 0   | 267.6 | 0  | 5.7  | N/A 659.0   |
| Passenger coaches | 70.0 | 25.9 | 217.4 | 0  | 202.9 | 538.0 | 0   | 247.3 | 0  | 8.4  | N/A 1 309.6 |
| Goods wagons      | 18.0 | 5.7  | 190.7 | 0  | 21.1  | 96.9  | 0   | 140.0 | 0  | 19.1 | N/A 491.5   |

Source: UNIFE.

networks in turn. This is the case in Spain, in Italy and, to a certain degree, in the United Kingdom.

The long life of rolling stock - 40 years for locomotives and goods wagons and 25 to 40 years for passenger coaches - raises the gloomy prospect that replacement of existing standard rolling stock will only come about between 1990 and 2010.

### Export Trends

Shrinking orders from home have forced our industry to step up exports. Results vary from country to country. This is because orders must often be combined with exceptional credit terms, especially when dealing with Third World countries. These extras can be decisive when it comes to winning contracts.

Canada and Japan are vying with each other to offer the best terms and Europe is hard-pressed to match them. Within the Community itself financial support for exports varies from country to country. Lack of such support means that Italy and the United Kingdom are the only Member States which export less to developing countries than to the rest of the world.

The six biggest exporters are the United States with 19% of the world market followed in order by France, Germany, Japan, Canada and the United Kingdom with about 8% each.

### Employment Trends

The employment situation has changed greatly over the last few years. There are close links between jobs and orders on the one hand, and investments to boost productivity on the other. The Community industry's workforce - excluding the United Kingdom for which no figures are available - has dropped from 68 000 in 1980 to 56 000 in 1986.

### Factors behind Production Trends

Unlike other transportation equipment industries such as aircraft construction or shipbuilding, the railway rolling stock industry cannot rely on any government support to finance its investments. These investments - crucial because of cut-throat competition - must therefore be raised from private sources. Given the need to modernize most of the factories concerned, the sums involved are just as large as those in other sectors of the mechanical and electrical engineering industry.

Investments have improved productivity in all sectors of the industry. Examples include:

- computer-aided design;
- high-performance computers;
- robots for many jobs, especially cutting, welding and painting;
- widespread use of numerical control machine tools.

But in order to lower production costs with these new technologies and new equipment, which are extremely expensive, they must be used to their full capacity to make the huge investments involved pay off. This, unfortunately, is difficult because machine loading schedules are rarely full. This factor, combined with smaller orders and the resulting shorter production runs, blunts the impact of production-cost savings.

### The Position of the Firms

The economic situation of the 1980s has created a buyer's market. Obviously, an industry which is only operating at 50% of its production capacity cannot enjoy sound financial health. If this figure appears to be exaggerated it is because government support in some countries such as Spain and Italy makes it possible for firms to maintain inflated

Table III  
Production and Foreign Trade

| (Million ECU)    | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  | 1987  |
|------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Production       |       |       |       |       |       |       |       |       |
| Current value    | 1 681 | 2 438 | 2 676 | 2 975 | 2 847 | 2 668 | 2 612 | 2 460 |
| Index            | 100   | 145   | 159   | 177   | 169   | 159   | 155   | 146   |
| Constant value   | 1 681 | 2 135 | 2 017 | 2 168 | 1 933 | 1 681 | 1 630 | 1 429 |
| Index            | 100   | 127   | 120   | 129   | 115   | 100   | 97    | 85    |
| Imports extra EC | 32.0  | 35.0  | 28.3  | 48.7  | 37.6  | 49.1  | 55.2  | 38.2  |
| Index            | 100   | 109   | 88    | 152   | 118   | 153   | 173   | 119   |
| Exports extra EC | 349.6 | 487.1 | 492.4 | 518.7 | 654.3 | 531.0 | 473.5 | 434.0 |
| Index            | 100   | 139   | 141   | 148   | 187   | 152   | 135   | 124   |
| X/M              | 10.92 | 13.92 | 17.40 | 10.65 | 17.40 | 10.81 | 8.58  | 11.36 |

Source: UNIFE.

workforces. In other countries such as France and Germany, serious efforts have already been made to adapt work-force size to demand.

The diverse structure of firms in the industry, the varying degrees of diversification and their forms of ownership - ranging from small family-owned firms to huge State-owned groups - means that aggregated financial results do not give a clear picture of the real situation. Another element that clouds the picture is the unpredictability of orders from rail networks which makes regular working schedules impossible. However, it can be said that overall the industry's profits hover around zero. This situation has caused, and is still causing, radical restructuring. This restructuring is the only way the industry can hope to survive and it can only stem from the firms' own initiative.

### *Major Structural and Geographical Features*

Over the last few years many firms have been fused into national groups. Only two international groups have been created in Europe and both of them - Bombardier (Canada) and BN (Belgium), ASEA (Sweden) and BBC (Switzerland) - involve firms from outside the Community. Within the Community, there are:

- 17 manufacturers (electrical and mechanical) of locomotives;
- 44 manufacturers of coaches and goods wagons;
- 24 manufacturers active in both of the above sectors.

It should be noted that these figures include both big groups with many subsidiaries such as Alstom or BREL, as well as small firms with only one factory. These firms vary greatly in size with work-forces ranging from 50 to 2 000.

Most European countries have a railway rolling stock industry as a direct result of the historical links between the rail networks and their suppliers. The only exceptions are Luxembourg, Ireland and Greece which only have small assembly plants, and the Netherlands which stopped manufacturing coaches and wagons and now imports them from neighbouring countries. Italy has by far the greatest number

of firms - with two-thirds in the north and one-third in the south and Sicily. It is followed by Germany, the United Kingdom, France and Spain.

### *Trends in each Member State*

It must be stressed that the industry is undergoing restructuring everywhere. Belgium has two manufacturers of railway rolling stock left out of the 27 that existed 25 years ago. In France one firm bought out six more, and another firm took over three others, bringing the number of firms down from 17 to eight in the last 10 years. Spain is about to see its State-owned firms taken over - probably by another Community group. Italy's two powerful groups - one private and the other State-owned - are made up of many firms. They face a wide field of private firms which also feel the need for mergers. Seven of them already have strong links but there are still 20 others. Germany presents a very different picture. Its locomotive manufacturers - three electric and three diesel - are all small divisions of powerful groups. In the United Kingdom, a huge State-owned firm competes with two subsidiaries of big industrial groups and some medium-scale independent firms.

## **Forecasts and Outlook**

### *Short-term Forecast*

In 1988, production will be down by 7% on the previous year, mainly as a result of an 18% plunge in export orders from outside the EC, but also because of rail's shrinking goods traffic.

The market outlook for 1989 is for little change within the EC (-0.5%) and a 33% dive in exports outside the EC. The market for goods wagons will continue to dwindle. The expected stability in revenue is mainly due to orders for high-speed rolling stock.

**Table IV**  
**Community Market Trends by Product**

| (Million ECU)     | 1980  | 1981    | 1982    | 1983    | 1984    | 1985    | 1986    | 1987    |
|-------------------|-------|---------|---------|---------|---------|---------|---------|---------|
| Locomotives       | 198.8 | 333.0   | 483.5   | 564.3   | 384.5   | 515.5   | 470.0   | 574.6   |
| Passenger coaches | 799.9 | 1 025.6 | 1 257.2 | 1 442.1 | 1 321.8 | 1 164.6 | 1 202.3 | 1 061.9 |
| Goods wagons      | 414.4 | 627.1   | 471.2   | 729.4   | 524.4   | 505.8   | 521.2   | 428.7   |

EC 6 (excluding the UK, Spain and Portugal).  
Sources: UNIFE and EUROSTAT.

### *Medium-term Forecast*

Production will pick up in 1990 for both domestic and export markets, mainly as a result of high-speed rolling stock gradually going into service in several European countries.

This trend will grow stronger for another four or five years. The export market is very likely to remain stagnant as foreign

clients demand that a larger portion of rolling stock ordered be manufactured locally.

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# AEROSPACE

(NACE 364)

*The Community aerospace industry is the second largest in the world after that of the United States and is far ahead of Japan, its next greatest competitor. Since the early 1980s it has turned around from being a losing industry to a profit-making one with large earnings on foreign markets (more than 50% of production is exported).*

*Although it is strongly geared to military markets the Community aerospace industry has developed its civil aircraft production over the last 10 years through large-scale European programmes (such as Airbus and Ariane), which have been resounding technical and commercial successes. One of the most significant factors in recent years is international cooperation, not only with American and Japanese firms but also with firms in other countries. Business prospects for the European aerospace industry look pretty favourable, especially on civil aircraft markets. Its greatest weakness lies in its dependency on the dollar, as almost all exports are invoiced in this currency.*

With consolidated sales of nearly 36 billion ECU in 1987 the European aerospace industry ranks second in the world behind that of the United States (90 billion ECU) and far ahead of Japan (about 5.5 billion ECU). The European aerospace industry has grown steadily since the early 1980s, with a slight levelling-off in the last two or three years. Provisional figures show 7% growth in earnings for 1987 compared with 9% in 1986. This is a 3.3% rise in constant value compared with 7.1% in 1986.

For 15 years, from 1965 to 1980, the EC aerospace industry relentlessly grew in importance on the international scene. During this period, its market share relative to that of the American industry increased regularly. Thus, the value of EC

production rose from 18% of the value of the American production in 1965 to 20% in 1970, 39% in 1975 and peaked at 52% in 1980. Afterwards, the effect of the rising value of the dollar in relation to European currencies (more than an 82% increase from 1980 to 1985) and, to a lesser degree, the progression of the American military market (more than 67% increase in constant value from 1980 to 1985) increased the American advantage. The low point for the EC aerospace industry was hit in 1985, when production amounted to only 29% of American production. Since 1985, the devaluation of the dollar and the levelling-off the American military budget have resulted in new relative growth for the European aerospace industry. Its value relative to the Americans increased to 43% in 1987. This trend should continue, with the prospect on the 1990 horizon of EC production reaching 50% of the American. Throughout this period, Japanese aerospace production, marginal until the mid 1970s, developed rapidly until 1984 at which time its value represented 15% of EC production. Since then its relative share has just been maintained, in spite of the fact that the Yen has risen against European currencies. In fact the volume of Japanese production has been falling slightly for the past three years

In Europe, aerospace production is essentially shared between four main countries; Great Britain, France, Germany and Italy. The historic leaders in this industry in Europe are France and the United Kingdom. In terms of turnover, their market shares are about equal and depending on the year occupy either first or second place, each with 30% to one third of European production. The share of the German industry grows regularly, notably through its participation in almost all the European cooperative programmes. The German industry takes part in these programmes as a partner of equal footing with the French and UK and now is responsible for about a quarter of the EC production. Italy too has increased

## Main Indicators Aerospace

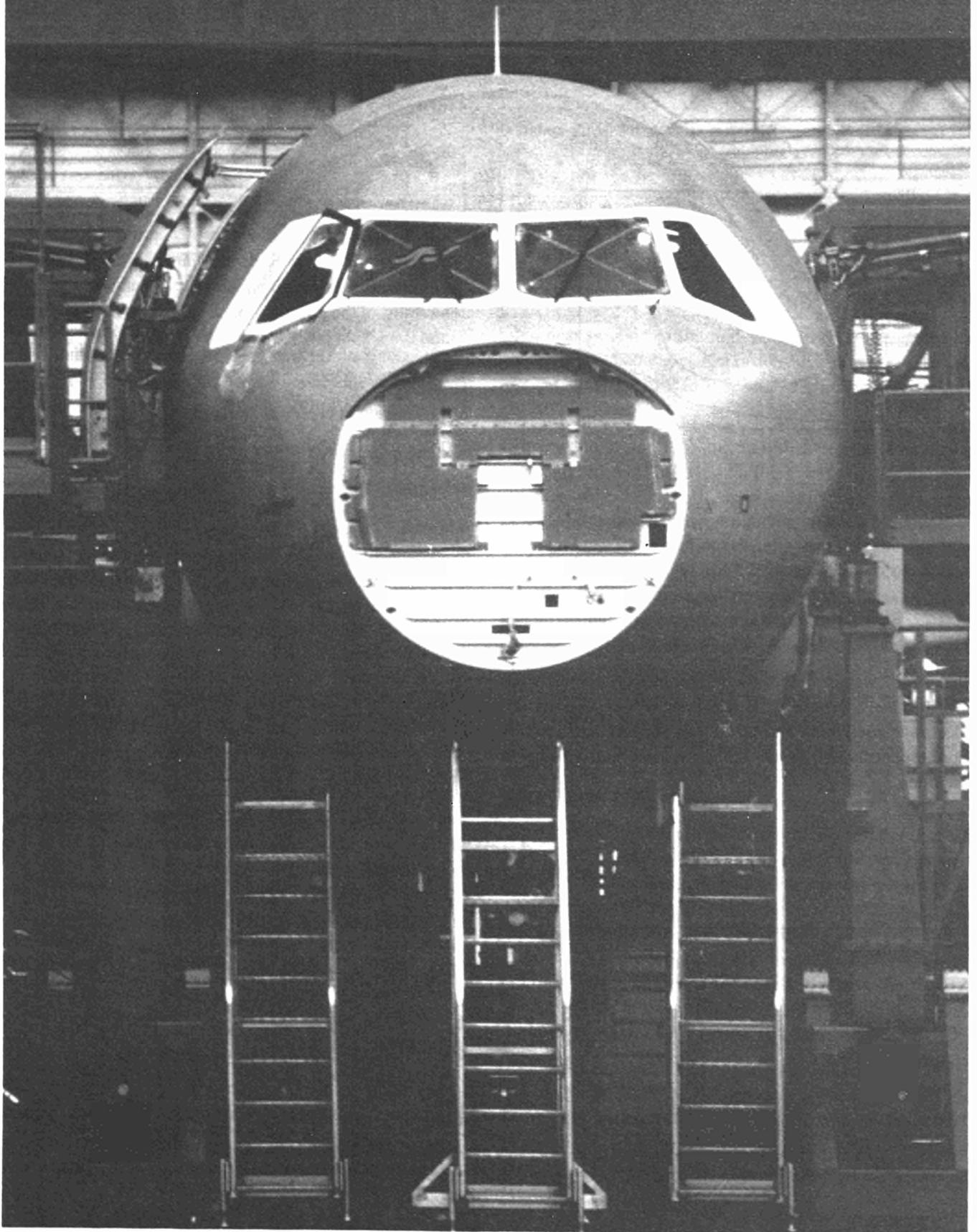
| (Million ECU)                  | 1980    | 1981    | 1982    | 1983    | 1984    | 1985       | 1986     | 1987   |
|--------------------------------|---------|---------|---------|---------|---------|------------|----------|--------|
| Apparent consumption (1)       | 6 298   | 8 110   | 7 779   | 7 945   | 7 314   | 9 228      | 10 781   | N/A    |
| Net export earnings (1)        | -1 140  | -1 736  | -604    | 264     | 1 544   | 1 015      | 1 274    | N/A    |
| Total Community production (2) | 17 252  | 21 370  | 23 915  | 25 572  | 27 942  | 30 669 (2) | 33 485   | 35 850 |
| of which civil production      | (5 158) | (6 347) | (7 175) | (8 209) | (8 858) | (10 243)   | (12 055) | N/A    |
| Employment (1 000)             | 471.6   | 500.3   | 483.2   | 478.4   | 461.9   | 478.2      | 479.0    | 477.0  |

Total Community production is estimated for 1986 and 1987.

(1) Civil production only.

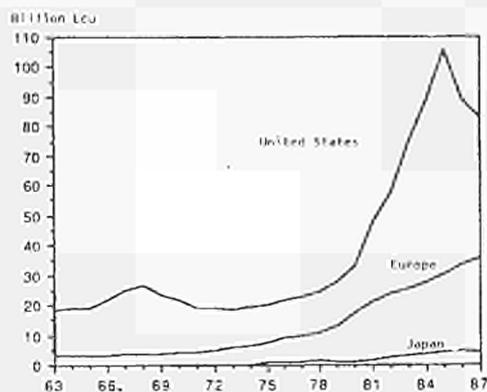
(2) Consolidated production.

**aerospatiale**



its production regularly and depending on the year achieves from 8% to 10% of the total European production. Three other countries, the Netherlands, Belgium and Spain, whose industry is the most recently developed, have noteworthy activity in this field. Their production relies mainly on international collaborative programmes, as well as some national programmes such as small commercial aircraft in the Netherlands and commuter and trainer aircraft in Spain.

Figure 1  
THE GROWTH OF AEROSPACE INDUSTRIES SALES IN THE UNITED STATES, EC AND JAPAN 1963-1987

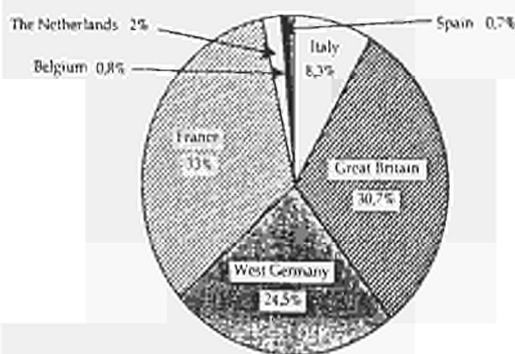


Source : AIA, EC, SJAC - Synthesis : Euroconsult

As far as technical segmentation is concerned, production is divided into airframes (for planes, helicopters and missiles) which accounted for 49.2% of the 1986 total; engines (17.6%); equipment, primarily electronic and hydraulic systems (27.8%) and different items of space equipment (launch vehicles and satellites, 5.4%).

In the last few years the relative importance of equipment has grown, mainly because of the increasing volumes of on-board electronic equipment and the advent of spacecraft production, especially the Ariane launch vehicle and application satellites.

Figure 11  
EC COUNTRIES SHARE OF THE EUROPEAN AEROSPACE PRODUCTION \* - 1986



\* 1986 Total sales: 39 955 million Leu

Source : Professional organizations

The aerospace industry is divided into two sub-sectors, military and civil equipment which will be analyzed separately. The status of the civil aerospace industry is easier to understand if it is split into the following segments:

- commercial jets
- production of commuter aircraft
- helicopters
- engines
- space.

### Current Situation

In both the world and European markets, the two sub-sectors have developed differently. Military production, which is still the main component of the aerospace industry is shrinking in relative terms, whereas the civil branch has undergone rapid expansion and represents an increasingly large share of the business. The production of military equipment fell from 70% of total production in 1980 to 64% in 1986.

Table I  
Production Trends by Product

| (Million ECU)         | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  | 1987  |
|-----------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Breakdown by segment: |       |       |       |       |       |       |       |       |
| airframes             | 10893 | 13365 | 15070 | 15989 | 16601 | 17890 | 19280 | N/A   |
| engines               | 4002  | 5025  | 5613  | 5220  | 5680  | 6630  | 6920  | N/A   |
| equipment             | 4689  | 5978  | 6342  | 7488  | 8671  | 8665  | 10900 | N/A   |
| space                 | 626   | 778   | 1038  | 1134  | 1262  | 1894  | 2100  | N/A   |
| Breakdown by market:  |       |       |       |       |       |       |       |       |
| military              | 14167 | 17678 | 19644 | 20255 | 22002 | 23263 | 25090 | N/A   |
| civilian              | 6043  | 7468  | 8419  | 9576  | 10212 | 11716 | 14110 | N/A   |
| % civilian            | 29.9% | 29.7% | 30.0% | 32.1% | 31.7% | 33.4% | 36.0% | N/A   |
| Total                 | 20210 | 25146 | 28063 | 29831 | 32214 | 35079 | 39200 | 42000 |

Excluding Spain. Non-consolidated production: the figures therefore differ slightly from those given elsewhere.  
Source: Euroconsult, using professional data.

**Table II**  
**Production and Foreign Trade**

| (Million ECU)               | 1980   | 1981   | 1982   | 1983   | 1984   | 1985   | 1986   | 1987   |
|-----------------------------|--------|--------|--------|--------|--------|--------|--------|--------|
| <b>Production</b>           |        |        |        |        |        |        |        |        |
| Current value               | 17 252 | 21 370 | 23 915 | 25 572 | 27 942 | 30 669 | 33 485 | 35 850 |
| Index                       | 100    | 123.9  | 138.6  | 148.2  | 162.0  | 177.7  | 194.1  | 207.8  |
| Constant value              | 17 252 | 19 470 | 20 170 | 20 502 | 21 255 | 22 276 | 23 866 | 24 663 |
| Index                       | 100    | 112.9  | 116.9  | 118.8  | 123.2  | 129.1  | 138.3  | 143.0  |
| <b>Imports extra-EC (1)</b> |        |        |        |        |        |        |        |        |
| Current value               | 2 648  | 5 809  | 6 523  | 6 816  | 8 085  | 8 009  | 6 859  | N/A    |
| Index                       | 100    | 219.4  | 246.3  | 257.4  | 305.3  | 302.5  | 259.0  | N/A    |
| <b>Exports extra-EC (1)</b> |        |        |        |        |        |        |        |        |
| Current value               | 1 508  | 4 046  | 5 919  | 7 080  | 9 629  | 9 024  | 8 133  | N/A    |
| Index                       | 100    | 268.3  | 392.5  | 469.5  | 638.5  | 598.4  | 539.3  | N/A    |
| <b>X/M</b>                  | 0.57   | 0.70   | 0.91   | 1.04   | 1.19   | 1.13   | 1.19   | N/A    |

Production figures for 1986 and 1987 are estimated.

(1) Civil production only. There is no available figure for military imports and exports.

Sources: Euroconsult, Eurostat.

simply because of the faster development of civil production. This trend should continue at least until the early 1990s under the combined influence of the continuing expansion of civil aviation and the levelling or falling-off of military production.

### *Military Production*

The major part of production is, however, still military equipment - fighter and training aircraft, military helicopters and missiles of all kinds. Military production for both the European and export markets accounted for the growth of the European aerospace industry until the early 1980s.

Since 1982 there has been a levelling-off, owing to a slackening of export markets which can be attributed in large part to the fall in oil-based revenue and the hiatus between two generations of equipment. Production programmes have been completed for several large arms systems in the field of fighter planes (Tornado, Mirage F1 and 2000, Harrier) and training aircraft (Alfajet, Hawk). There is likely to be a slack period in the interim before production starts on a new generation of arms systems at present under development, especially the EFA and Rafale fighter aircraft. Missiles and helicopters are also on the threshold of a new generation of systems and the same hiatus is likely to exist here also before production resumes on the new generation.

### *Civil Aircraft Production*

#### **Commercial jets**

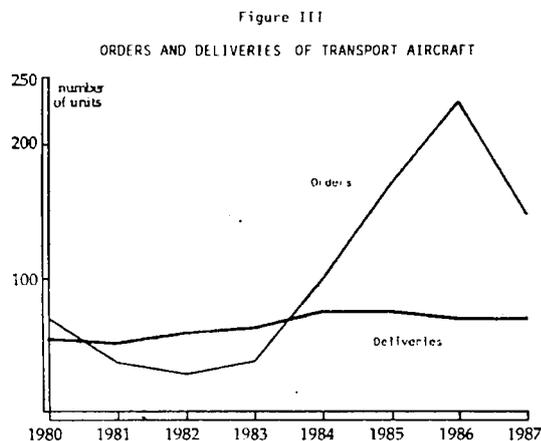
As far as the civil aviation market is concerned, the main event of the last decade has undoubtedly been the re-emergence of the EC industry as a major world producer. From a

marginal position in the mid-1970s when it accounted for barely 5% of commercial jet orders, EC production rose to 12.2% in 1980, 23.5% in 1982 and 30% in 1984, falling back to 22% in 1986.

The reason for the recent drop is that European industries have not been represented on the narrow-fuselage aircraft market, which has been the main growth sector in the last few years. Instead it has concentrated on jumbo aircraft such as the Airbus A 300 and A 310, which have been the mainstays of the European civil industry. The launching of the Airbus A 320, a narrow-fuselage, 120-seater, short-haul aircraft, which started delivery in 1988, should enable the European civil aerospace industry to broaden its share of the world civil aviation market. The industry should also be able to reinforce its position with jumbos and break into the long-haul market from which it has been absent for some time, once the new Airbus A 330 and A 340 start delivery in the early 1990s. European industry will then cover the whole range of market segments for commercial jets.

As a result of the drop in the commercial market at the start of the 1980s, followed by the subsequent recovery, commercial jet deliveries have remained stable over the last few years with 66 aircraft in 1987, the same figure as in 1986. In view of the large increase in orders recorded since 1984 - 642 aircraft in four years - including 294 Airbus A 320, European commercial jet production will expand rapidly in the years to come with the strongest growth sector being short and medium-haul, narrow-fuselage aircraft.

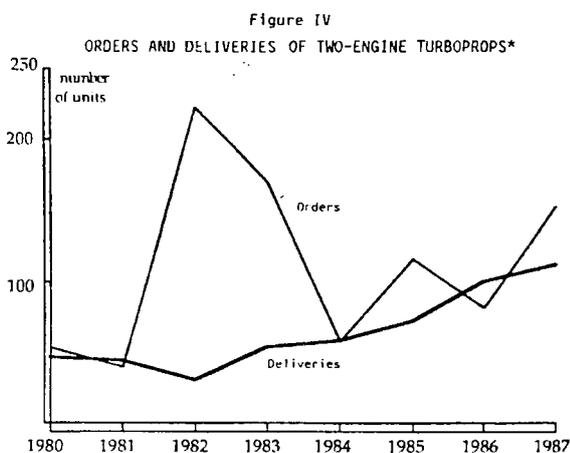
The main European aerospace companies involved in the Airbus programme at the airframe production level are Aérospatiale in France, MBB and Dornier in the Federal Republic of Germany, British Aerospace in Britain, Casa in Spain, Fokker in the Netherlands and Sonaca in Belgium.



European commercial jet production is not limited to the Airbus range but includes aircraft in the 100-seater range or under - Fokker 100 and BAe 146 - for which the market has also grown in the last few years.

### Commuter aircraft

Civil aviation production also includes the manufacture of smaller transport planes for regional service. Commuter turboprop planes are currently a fast-developing segment in which European industry is particularly well-placed. Out of the eight aircraft families in existence in the upper end of the market to which the Europeans have limited themselves (30-seaters or over), European industry manufactures six and has held more than 80% of the market since the beginning of the 1980s. The large European companies involved are Aérospatiale and Aeritalia, which cooperate on the ATR 42 and ATR 72 programmes, Fokker with the F27 and F50, British Aerospace with ATP, Short Brothers with the Short 330 and 360, Saab with the SF 340 and Casa, which produces the CN 235 in conjunction with the Indonesian manufacturer Nurtanio. The rapid growth in deliveries recorded over the last few years is expected to increase further because of the size of the orders already in hand (800 aircraft over the last five years, of which 430 have been delivered).



\* over 30 seats

Source of data : Aérospatiale ; Synthesis : Euroconsult

The European industry also has a share in the market for smaller aircraft, including transport planes with less than 20 seats (about 40% of the world market) and business jets (roughly one third of the world market). As far as the latter segment is concerned, the market is emerging from a long period of recession following the successive oil crises and is beginning to expand again, especially as far as high-quality products are concerned which is where European industry is particularly well-placed.

### Helicopters

Four companies produce helicopters in Europe (Aérospatiale, MBB, Westland and Agusta). The European helicopter industry is the largest exporter of helicopters in the world and holds a third of the American civil market, which accounts for the greater part of the world fleet.

After a period of almost continuous growth until 1982 the helicopter market went into a recession in both the civil and military sectors from which it is just beginning to emerge. European helicopter deliveries reached a peak in 1982 with 752 units and plummeted in 1984 with 320 units. In 1986, more than two thirds of the 362 helicopters delivered went to the civil market. 1986 saw a recovery in turnover and 1987 a period of stabilization, bringing to an end the downward trend.

### Aircraft engines

Since 1980, the European aircraft engine industry has been marked by a period of steady growth similar to that recorded in the airframe production industry and with the same shift towards the civil sector. The expansion of the civil engines sector is not directly linked to the development of European commercial jets which so far have been fitted mainly with American engines. It is due chiefly to the fact that American aircraft are being fitted with engines produced wholly or partly in Europe, for example Rolls Royce RB 211 and CFM 56 engines which are manufactured jointly by General Electric in the United States and SNECMA in Europe.

Prospects for development in the military engine business are linked to development programmes for fighter aircraft and therefore share the problem of the hiatus between two generations of systems. The civil engine business is however well on course with large orders in hand to equip both American and European aircraft and market prospects are such that steady growth can be expected in the years ahead. In 1987, orders for the two large engine categories totalled 192 units for the RB 211 (20-tonne class) for 76 delivered and 520 units for the civil versions of the CFM 56 (10-tonne class) for 352 delivered.

### Space

The space side of the European aerospace industry still represents only a small, but fast-developing share of overall production: 5.4 % in 1987 compared with 3.1 % in 1980.

**Table III**  
**Trends in Foreign Trade of Civil Aerospace Products by Product**

| (Million ECU)        | 1980          | 1981          | 1982         | 1983         | 1984         | 1985         | 1986         |
|----------------------|---------------|---------------|--------------|--------------|--------------|--------------|--------------|
| <b>Exports</b>       |               |               |              |              |              |              |              |
| airframes (1)        | 1 081         | 3 395         | 4 799        | 5 405        | 7 292        | 5 817        | 4 930        |
| engines              | 253           | 351           | 756          | 1 283        | 1 874        | 2 647        | 2 640        |
| equipment and others | 174           | 300           | 364          | 392          | 463          | 560          | 563          |
| <b>Total</b>         | <b>1 508</b>  | <b>4 046</b>  | <b>5 919</b> | <b>7 080</b> | <b>9 629</b> | <b>9 024</b> | <b>8 133</b> |
| <b>Imports</b>       |               |               |              |              |              |              |              |
| airframes (1)        | 1 470         | 4 004         | 4 403        | 4 286        | 4 829        | 4 564        | 3 605        |
| engines              | 883           | 1 325         | 1 564        | 1 877        | 2 501        | 2 638        | 2 471        |
| equipment and others | 295           | 480           | 556          | 653          | 755          | 807          | 783          |
| <b>Total</b>         | <b>2 648</b>  | <b>5 809</b>  | <b>6 523</b> | <b>6 816</b> | <b>8 085</b> | <b>8 009</b> | <b>6 859</b> |
| <b>Balance</b>       |               |               |              |              |              |              |              |
| airframes (1)        | -389          | -609          | 396          | 1 119        | 2 463        | 1 253        | 1 325        |
| engines              | -630          | -974          | -808         | -594         | -627         | 9            | 169          |
| equipment and others | -121          | -180          | -192         | -261         | -292         | -247         | -220         |
| <b>Total</b>         | <b>-1 140</b> | <b>-1 763</b> | <b>-604</b>  | <b>264</b>   | <b>1 544</b> | <b>1 015</b> | <b>1 274</b> |

(1) Excluding the United Kingdom.

Sources: Euroconsult, Eurostat, Synthesis.

It basically covers implementation of scientific programmes and R&D for the European Space Agency and national administrations as well as production of telecommunications satellites. There is also the launching side of the business with the Ariane programme. The space business as a whole has got off to a good start in terms of both the important orbital infrastructure programme under way and the development of the application satellite market. The orders recorded for Ariane launches, which represent almost half the world market for commercial satellite launches, will lead to an increase in the rate of launches to eight or nine a year during the next few years, 50% of which will concern non-European satellites.

### *Export Trends*

More than half of European aerospace production is currently exported. At the start of the 1980s exports concerned mainly military equipment, but with the growth in civil exports the balance gradually shifted so that by 1984 both sectors represented about billion ECU. As no coherent statistics on foreign trade in military equipment are available for Europe as a whole, the data supplied cover the civil sector only. After increasing sixfold between 1980 and 1984, civil aviation exports plummeted in 1985 and 1986 due to a drop in Airbus deliveries and a slump in the civil aviation market. The recession worsened in 1986 when the dollar fell against the ECU, since all orders are invoiced in dollars. The drop in exports in 1985 and 1986 reached a plateau in 1987 and then gave way to a strong recovery in 1988 which should continue in the next few years, as a result of the large number of export orders received over the last year or so.

The largest increase concerns engines, for which export earnings increased tenfold between 1980 and 1986 mainly as a result of sales of RB 211s and parts of CFM 56 engines to American manufacturers.

Imports of civil aerospace equipment have increased much more slowly than exports and underwent a similar recession in 1985 and 1986 as a result of a slump in the market. The beginning of the 1980 marked a turning point for Europe from being a net importer of civil aerospace equipment (with a negative balance of 1.14 billion ECU in 1980) to a net exporter (positive balance of 1.27 billion ECU in 1986). The only loss-producing area is the equipment part of the industry, since the airframe and engine sectors began to make a profit in 1982 and 1985 respectively.

The medium-term prospects point to a continued improvement in the European balance of payments in this area. The EC is a net exporter to all countries except the United States, which is the main and practically the only outside supplier with whom there has been a consistently negative balance. This has by and large stabilized at an average 2.2 billion ECU since 1980 (2.5 billion ECU in 1986). Europe is still the chief export market for the American aerospace industry, especially in the field of commercial airplanes, with deliveries totalling 2 324 million ECU in 1986.

### *Employment Trends*

Because of regular productivity gains and the development of a more highly-qualified work force over the years, increases in production have been achieved with virtually stable manpower levels. After the peak in 1981, when numbers

topped 500 000, levels dropped to 462 000 in 1984. They then rose to 479 000 in 1986 and fell very slightly in 1987 to 477 000 people.

### *The Position of the Firms*

The European aerospace industry is organized around large contracting companies of which seven have a turnover of more than a billion ECU. The fifteen largest companies in terms of sales are:

**Table IV**  
**Major Companies 1987**

|                       | Sales | Employees |
|-----------------------|-------|-----------|
| <b>UNITED KINGDOM</b> |       |           |
| British Aerospace     | 5 733 | 93 038    |
| Rolls Royce           | 2 884 | 42 000    |
| Westland              | 360   | 4611      |
| <b>FRANCE</b>         |       |           |
| Aérospatiale          | 3 609 | 32 827    |
| Dassault              | 2 179 | 14 711    |
| Snecma                | 1 355 | 13 434    |
| Matra                 | 952   | 5 800     |
| <b>GERMANY</b>        |       |           |
| MBB                   | 2 946 | 36 897    |
| Dornier               | 776   | 9 683     |
| MTU                   | 628   | 7 200     |
| <b>ITALY</b>          |       |           |
| Aeritalia             | 1 062 | 13 662    |
| Agusta                | 614   | 9 711     |
| Fiat Aviazione        | 428   | 4 656     |
| <b>NETHERLANDS</b>    |       |           |
| Fokker                | 834   | 11 709    |
| <b>SPAIN</b>          |       |           |
| Casa                  | 334   | 10 595    |

Source: Euroconsult.

The large American aerospace companies are four times the size of their European counterparts. Thus, British Aerospace, N° 1 in Europe, had a turnover of 4 billion ECU in 1986, while Boeing, N° 1 in America, accounted for 16 billion ECU in the same year.

Up to the present, the European aerospace industry has been marked by a polarization of firms involved in this single

sector. If this is also the case in the United States for the large prime contractors (Boeing, McDonnell Douglas, Lockheed, Northrop and General Dynamics), large diversified companies such as General Motors, United Technologies, Allied Signal and Textron are also relentlessly expanding their participation in aerospace programmes. Some of Europe's major diversified groups have also been developing greater participation in the aerospace industry, albeit on a smaller scale until the present. For example Dornier and MTU have joined the Daimler Benz group with participation planned in MBB and Rover has teamed up with British Aerospace.

In Japan, where this industry is still marginal, aerospace production takes place only in large diversified groups in which it remains relatively insignificant (less than 10% of turnover).

### *Profitability*

In recent years, profitability of European aerospace companies has been on average lower than that of their American competitors. This is the result of shorter product series leading to an inferior paying off of R&D costs and a lower effect of the learning curve. This situation has however improved with the growing strength of the European industry. The profitability of the large European aerospace companies was close to that of the American aerospace industry in 1985 (net profit/turnover: 2.9% compared to 3.1%). On the other hand, a sharp devaluation in the dollar in 1986 and especially 1987 greatly affected profits of European aerospace companies which billed about half their turnover in dollars. In 1987 the net profit margin will be in the order of 0.1%. Improvement is expected in 1988 in light of improved behaviour of the dollar and measures taken to increase productivity.

### *Technological Developments*

Aerospace technology is currently undergoing a rapid transformation both in the products and in manufacturing techniques. In the civil sector, the development is in the main orientated towards lower operating costs and greater respect for the environment. In the military sector, the research in stealth (low radar signature) is added to that in manoeuvrability and increased performance. In the space sector, priority is given to the challenges of the routine mastering of launch technology and the lowering of related costs.

**Table V**  
**Developments in Profitability of the Major European Aerospace Companies**

| Net Profit/Turnover | 1980 | 1981 | 1982  | 1983  | 1984 | 1985 | 1986 | 1987 |
|---------------------|------|------|-------|-------|------|------|------|------|
|                     | 1.5% | 1.5% | -0.8% | -0.6% | 2.1% | 2.9% | 2%   | 0.1% |

The companies are Aeritalia, Aérospatiale, British Aerospace, Casa, Dassault, Dornier, Fokker, MBB, Rolls Royce, Snecma, Matra and MTU. Losses for 1982 and 1983 are due to the audit of a single company. For all the remaining companies, profit is at 0.5% in 1982 and 1.3% in 1983. Source: Annual reports of the companies.

One axis of new product development is the possibility of interfacing existing products such as tilt rotor convertiplanes (combination of aircraft and helicopter) and space planes (combination of aircraft and rocket).

Like the products, constituent technologies evolve rapidly. They can be grouped into six major areas:

- aerodynamics and flight control already beginning to be used in flight dynamics (supercritical airfoil) and on-going research in the optimization of flight systems (active control);
- structures and structural material with introduction of new concepts permitted by the development of constituent materials: aluminium lithium, organic and metal composites, high-performance polymers;
- propulsion with research into high performance, fuel efficient engines such as propanes as well as into an improvement in thermodynamics, thanks to the use of high performance materials: ceramics, superalloys, monocrystalline blades and, at the same time into an improvement in exterior and interior noise;
- avionics with new concepts in active control and fly-by-wire technologies, the growing use of opto-electronics and man/machine interface in the cockpit, as well as advanced navigation systems;
- CAD/CAM with the development and use of the most advanced methodologies in computer-aided design and the management of design-manufacturing interface;
- manufacturing technology with the increasing computerization of processes, improvement in flexibility and the development of new concepts for quality assurance and control, especially non-destructive testing, fundamental to this sector.

Until the present and almost by tradition, the European aeronautic industry has played a leading role in the technological innovation of civil aircraft (first jet, first supersonic aircraft, first short range/wide body aircraft, first fly-by-wire controls among other firsts). Today's civil European aircraft are generally technologically more advanced than their American competitors (for example: computerized cockpit, active control and fly-by-wire technologies). In the military sector,

the situation is comparable to that of the United States although it is relatively behind due to the far smaller scale of the domestic market and American emphasis on military R&D in recent years. In the space sector, in spite of a late start and public funding being approximately of that in America, the European technological competence is, on the whole, good in the area of launchers and satellites. The European expertise will increase progressively in the areas not yet covered, such as heavy launchers (Ariane 5), permanent infrastructures (Columbus) and space planes (Hermes).

### *Research and Development*

Considering the rapid technological transformations affecting almost every component and system constituting aerospace production, the ability to maintain a significant R&D effort is the key to a competitive European aerospace industry in the coming years. In the recent past the United States has devoted a considerable effort to military aerospace R&D with public funding for R&D received by the American aerospace industry rapidly rising to USD 15.5 billion in 1986. Industry has contributed a further USD 4.7 billion to R&D. The work in R&D represented a total of 23% of the American aerospace turnover. Public financing of R&D has not followed the same trend in Europe. This stagnation has been partially compensated for by a sharp increase in R&D expenditures by the companies themselves. About 40% of the USD 5 billion spent on R&D (representing 16% of turnover) in the European aerospace industry in 1986 has been financed by the companies themselves. In 1986, the number of European aerospace companies privately financing R&D was double that of their American and triple that of their Japanese competitors.

### *Major Geographical Features*

The aerospace industry is at present undergoing a number of fundamental structural changes involving the development of international cooperation and the rapid introduction of electronics and new materials. Although the development of foreign trade of finished products marked a decisive phase in the internationalization of the European aerospace industry, the development of cooperation has been even more significant. This has developed extensively between European countries as a result of the increasing integration of the

**Table VI**  
**Profitability of the American Aerospace Industry**

| Net Profit/Turnover | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 |
|---------------------|------|------|------|------|------|------|------|------|
|                     | 4.3% | 4.4% | 3.3% | 3.5% | 4.1% | 3.1% | 2.8% | 2.8% |

1987 figure is estimated.

Source: AIA.

**Table VII**  
**Privately Funded R&D Expenses of the European, American and Japanese Aerospace Companies**

| First 10<br>European companies | 1986<br>R&D expenses<br>in % of sales | First 10<br>American companies | 1986<br>R&D expenses<br>in % of sales | First 4<br>Japanese companies | 1986<br>R&D expenses<br>in % of sales |
|--------------------------------|---------------------------------------|--------------------------------|---------------------------------------|-------------------------------|---------------------------------------|
| Snecma                         | 13.50%                                | Northrop                       | 6.75%                                 | Mitsubishi                    | 4.85%                                 |
| Aérospatiale                   | 10.50%                                | Allied Signal                  | 6.20%                                 | Fuhi Hi                       | 3.37%                                 |
| Rolls Royce                    | 7.33%                                 | UTC                            | 5.44%                                 | Kawasaki Hi                   | 3.06%                                 |
| Matra                          | 7.27%                                 | Lockheed                       | 4.80%                                 | I Hi                          | 2.78%                                 |
| Fokker                         | 6.91%                                 | Sundstrand                     | 4.63%                                 |                               |                                       |
| MBB                            | 5.77%                                 | Boeing                         | 4.63%                                 |                               |                                       |
| MTU                            | 5.52%                                 | Martin Marietta                | 4.61%                                 |                               |                                       |
| Casa                           | 4.71%                                 | McDonnell Douglas              | 3.99%                                 |                               |                                       |
| British Aerospace              | 3.52%                                 | General Electric               | 3.64%                                 |                               |                                       |
| Westland                       | 1.66%                                 | Raytheon                       | 3.48%                                 |                               |                                       |

Sources: Annual reports of the companies, Synthesis, Eurostat.

European aerospace industry, but it has also spread to a great extent to non-European countries.

The American aerospace industry is at present the main partner of Europe in a wide range of programmes such as the Anglo-American military aircraft, Harrier and the Franco-American CFM 56 engines. American industry also has a 25% to 30% stake in Airbus; there is an American/European/Japanese consortium for the V 2500 engine and the Italians have a share in the Boeing 767 and the McDonnell Douglas MD 80 and MD 11 aircraft. International telecommunications satellites have also been developed jointly and there is a project for a space station to be built by international teams.

The changes in the competitive positions of the American and European aerospace industries insofar as finished products are concerned are being more and more attenuated by the mutual participation of these industries in each other's programmes.

European industry cooperates not only with the United States but also to a far lesser extent with Japan. This co-operation is mainly on the multilateral programmes outlined above as well as on bilateral projects such as joint Japanese-German helicopter production.

But the special feature of the internationalization of the European aerospace industry is that it has a large network of links with Third World countries, involving all those who have

an aerospace industry to speak of. There are for example fighter planes manufactured jointly by Italy and Brazil, transport planes developed by Spain and Indonesia and European helicopters manufactured under licence in more than 10 countries. This internationalization is likely to continue, not only in the form of increased sub-contracting but also with the development of new cooperation programmes.

### Forecast and Outlook

General prospects for growth in the EC aerospace industry are good. A 3% to 5% volume increase is expected over the next three years. However, the increasing importance of the civil business, more than 60% of which is invoiced in dollars, even on the European market, makes European industry extremely vulnerable to variations in the value of American currency. The weakness of the dollar over the last three years has affected profitability in the European industry and favoured the Americans, who have also been going through a buoyant period because of the enormous growth of the domestic military market, with 380 billion dollars worth of military orders over the last five years. Exports represent only 18% of the business for the Americans.

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## MEDICAL DRESSINGS AND DISPOSABLE DEVICES

(NACE 439.74, 472.2, 481.25)

*This sector has shown steady growth since 1980, both inside and outside the EC. Export trends are usually short-lived and tend to depend on exchange rate fluctuations and new technological developments. The industry has been restructuring significantly to gear up for the post-1992 period. Exports to the US and Japan are expected to increase steadily; the import trend is also upwards for certain products from the Far East and other developing countries.*

The EC medical dressings and disposable devices industry covers several NACE codes. Product groups specifically covered in this section and referred to in the statistics are:

- pharmaceutical impregnated/coated wadding, gauze bandages and similar articles, used for medical or surgical purposes
- first aid boxes and kits
- sheath contraceptives
- surgical and medical examination gloves
- non-retail medical, surgical and hygienic articles made from paper pulp, paperboard or cellulose wadding
- renal dialysis equipment
- transfusion apparatus
- plastic and non-plastic syringes
- hypodermic needles
- other needles, cannulae and catheters.

### Current Situation and Trade Trends

The EC market for medical dressings and disposable devices has been growing substantially, with production more than doubling to 2.1 billion ECU between 1980-87. Just over a third of the production goes into net exports, while a similar percentage of EC consumption is supplied by imports.

In 1980-87 both exports and imports of all categories of goods in the industry have been rising.

Exports to markets outside the EC have increased from 207 million ECU to 443 million ECU, and imports from 183 million ECU to 493 million ECU. Along with intra-EC trade, total exports have risen from 442 million ECU to 1 179 million ECU, imports from 456 million ECU to 1 223 million ECU.

The Community has been running a small overall trade deficit in recent years (around 50 million ECU in 1987). This reflects a steady increase in imports from the EC's two largest trading partners, the US and Japan, accounting for over half of all imports in 1987.

Since 1980, the EC has been recording trade deficits with both the US and Japan (110 and 50 million ECU respectively in 1987).

Performance varies according to subsectors. The EC has been consistently recording trade surpluses in a number of sectors. In others, it has been persistently in deficit; among the latter are sheath contraceptives, surgical gloves, dialysis equipment, hypodermic needles and cannulae and catheters.

During the last three years, a few sectors such as transfusion apparatus have seen a turnaround in performance, with im-

**Main indicators  
Medical Dressings and Disposable Devices**

| (Million ECU)                          | 1980 | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  | 1987  |
|--|------|-------|-------|-------|-------|-------|-------|-------|
| Apparent consumption                   | 955  | 1 078 | 1 197 | 1 323 | 1 480 | 1 793 | 2 040 | 2 121 |
| Net export earnings                    | + 24 | + 10  | -12   | -19   | -35   | -67   | -84   | -50   |
| Production                             | 979  | 1 088 | 1 185 | 1 304 | 1 445 | 1 726 | 1 956 | 2 071 |
| Estimated employment trend (1 000) (1) | 100  | 96    | 93    | 95    | 97    | 102   | 104   | 105   |

(1) Does not include vending only companies. No absolute figures available.

**Table I**  
**Production and Foreign Trade**

| (Million ECU)    | 1980 | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  | 1987  |
|------------------|------|-------|-------|-------|-------|-------|-------|-------|
| Production       |      |       |       |       |       |       |       |       |
| Current value    | 979  | 1 088 | 1 185 | 1 304 | 1 445 | 1 726 | 1 956 | 2 071 |
| Index            | 100  | 111   | 121   | 133   | 148   | 176   | 200   | 212   |
| Constant value   | 979  | 992   | 999   | 1 045 | 1 099 | 1 253 | 1 376 | 1 425 |
| Index            | 100  | 101   | 102   | 107   | 112   | 128   | 141   | 146   |
| Imports Extra-EC | 183  | 247   | 305   | 342   | 409   | 489   | 499   | 493   |
| Index            | 100  | 135   | 167   | 187   | 223   | 267   | 273   | 269   |
| Exports Extra-EC | 207  | 257   | 293   | 323   | 374   | 422   | 415   | 443   |
| Index            | 100  | 124   | 142   | 156   | 181   | 204   | 200   | 214   |
| X/M              | 1.13 | 1.04  | 0.96  | 0.94  | 0.91  | 0.86  | 0.83  | 0.90  |

Source: Campbell Management Consultants.

pressive gains in exports. However, several showed the reverse, with one-time surpluses dwindling steadily, e.g. in wadding and gauze bandages.

Imports of disposable medical products from the newly industrializing countries (NICs) have also begun to appear in significant quantities on the EC market. These are still largely low technology items, for which the NICs have an edge in terms of wage costs. Such products mainly include gauze used for dressings, latex surgical gloves as well as sheath contraceptives.

Export volumes for the entire medical dressings and disposables market are up just over 2% from 1986 to 1987. Since 1980 Community exports have risen in current values by 114%. During the same period, exports to Japan have increased by 60%, and to the US by 450%.

Products exhibiting the sharpest growth in export markets are non-wovens, plastic syringes and catheters and cannulae. The strongest negative trends are shown by wadding, exports of which fell by 500 tonnes between 1986 and 1987. This was almost entirely due to a drop in imports from OPEC countries, as a result of a Saudi Arabian-German joint venture company for converting wadding products set up in Riyadh.

### *Industry Structure*

Disposables are now increasingly manufactured in Europe, the dependency of earlier years on imports from the US having been largely reversed. Nevertheless, many of the larger EC-based disposable device manufacturers are US-owned enterprises. The latter moved in either by establishing their own manufacturing subsidiaries or acquiring established businesses from European owners.

A number of Community companies in the medical disposables field have developed from small, family owned and often conservatively run firms, many of which have tended to

be relatively less adaptable and competitive, both in EC and world markets. In turn, this has facilitated US inroads into what still remains a rather fast developing business area.

### *Developments by Product Segment*

#### **Wadding, Gauze Bandages and Similar Articles**

The number of European companies involved in the manufacture of gauze products has been steadily shrinking over the last two decades. In addition to competition from the NICs and China, the growing replacement of gauze by non-woven dressings has further depressed prospects for EC producers. 1987 imports of gauze to the EC from China and the Asian countries (in particular, South Korea and Taiwan), was over 2 000 tonnes. Another important source of gauze is eastern Europe (mainly Yugoslavia). Imports in 1987 from the other western European countries of the European Free Trade Area (EFTA) were less than 500 tonnes.

However, imports from China have begun to level off, after peaking in 1985. Overall imports of gauze from outside the EC are also on the decline after a 1985 high of 4 202 tonnes; in 1987, they amounted to 3 482 tonnes.

High standards of quality for medical dressings in Germany and the UK has reduced the pressure on local gauze producers.

Other factors favour domestic manufacturers elsewhere in the EC and restrain imports. In France, this mainly involves low average prices from French producers. Spanish companies manufacture dressings which differ considerably in quality and construction from those of other countries. Spanish hospitals are accustomed to using domestically produced goods and, therefore, favour local manufacturers. Italy, on the other hand, is heavily dependent on imports, sourcing 1 226 tonnes of gauze in 1987 from China alone.

Imports aside, the gauze dressings market in Europe is shrinking, being replaced by non-woven and spun lace non-

woven products. France is the most developed market in this respect. However, quality in France has dropped in recent years with non-woven producers bidding for business held by gauze producers, and the latter following suit by trimming back both costs and quality.

Germany is the leading producer of medical bandages in the EC, as well as a heavy exporter. Overseas sales account for about half of total production. Other countries with significant manufacture and exports of bandages include the United Kingdom and France. The US is an important importer for certain specialized bandages e.g. polyurethane splinting bandages and auto-adhesive bandages.

The EC producers market for adhesive dressings and other articles with an adhesive layer is particularly concentrated, with five companies accounting for more than 85% of Community sales.

There is at present a growing tendency for these major international companies to produce in the Far East and import into Europe. High-tech resins have replaced traditional natural resins over the past two decades; at present, more than 90% of all surgical tapes and dressings sold in the EC use a synthetic hypoallergenic adhesive resin.

Important quantities of articles made from wadding are imported from regions such as the Mediterranean countries, the NICs and eastern Europe. Some of the latter are also routed through EFTA countries, for example Austria.

Exports of all waddings and bandages in 1987 were worth 308 million ECU, imports about 280 million ECU. The EC has been running a more or less steady surplus in this sector since 1980, but the Community's surplus with outside trading partners has been rapidly shrinking, having dropped from 49 million ECU in 1980 to merely 3.5 million ECU in 1987. In 1988, it is expected to turn into a deficit.

### Latex Products: Sheath Contraceptives, Surgical and Medical Examination Gloves

Latex sheath contraceptives and surgical gloves are imported in considerable quantities from the NICs, the USA and Austria. Between 1986 and 1987, imports of sheath contraceptives more than doubled in value. Exports also grew by a significant amount, but almost all of this was concentrated within the EC, resulting in a near five-fold increase in the extra-Community trade deficit.

Leading EC exporters of sheath contraceptives are Germany, the Netherlands and the United Kingdom.

Overall, the EC runs a trade deficit in sheath contraceptives of more than 8.6 million ECU.

The largest exporters of surgical gloves in the EC are Germany and the BLEU. The EC is heavily dependent on imports of this product (over 63 million ECU). In this sector also, the EC has been running a large and steadily rising trade deficit since 1980; at present it is over 50 million ECU.

### Paper and Cellulose Based Medical Articles

Products made from paper pulp, paper and paperboard or cellulose wadding and used for surgical, medical or hygienic purposes, are largely manufactured locally in the EC. Raw materials are sourced mainly from Scandinavia.

Non-Community suppliers comprise less than 20% of total imports by volume, a little over 30% in value. The major production areas in the EC for these articles are France, Germany, the Netherlands and the UK.

The Netherlands is, by a considerable margin, the leading exporter, accounting for more than 40% of the total value of EC exports. Nearly all of this is accounted for by a Swedish-owned company.

Table II  
Medical Dressings and Disposable Devices by Product Category, 1987

| (Million ECU)   | EC production value (1) | Extra-EC imports | Extra-EC exports | Net export earnings |
|---|-------------------------|------------------|------------------|---------------------|
| Adhesive dressings, gauze, bandages and first aid boxes | 805                     | 102              | 136              | +34                 |
| Sheath contraceptives                                   | 20                      | 15               | 6                | -9                  |
| Gloves  | 17                      | 63               | 13               | -50                 |
| Medical non-woven articles                              | 193                     | 11               | 17               | +6                  |
| Dialysers   | 270                     | 50               | 49               | -1                  |
| Transfusion disposables                                 | 362                     | 30               | 46               | +16                 |
| Plastic syringes  | 135                     | 28               | 40               | +12                 |
| Other syringes  | 45                      | 10               | 21               | +11                 |
| Other needles, cannulae and catheters                   | 190                     | 151              | 92               | -59                 |
| <b>Total</b>  | <b>2 071</b>            | <b>493</b>       | <b>443</b>       | <b>-50</b>          |

(1) Estimated.

Sources: CMC estimates and Eurostat.

The EC has been a net exporter of products in this group since 1983. Exports were 53 million ECU in 1987, and imports 36 million ECU. The balance of trade with non-EC countries has been steadily rising, and was worth about 6 million ECU last year. However, the Community has a growing deficit with the US, worth more than 3 million ECU in 1987.

### **Dialysers and Dialysis Disposables**

Dialysers and dialysis disposables such as bloodlines are produced in several EC countries. These include France, Italy, Germany and Belgium. Leading sources for imports from outside the EC (accounting for 27% of all imports) are Sweden, the US and Japan.

The high level of the yen has reduced Japanese exports of dialysis disposables over the past two years and Japanese products have been losing ground in a growing market. Imports from Japan fell from 612 tonnes in 1986 to 445 tonnes in 1987 (16.5 million ECU to 14.2 million ECU). Imports from the US have also dropped from their 1982 peak of nearly 30 million ECU and, in spite of the considerable weakening of the dollar since 1986, fell from 15 million ECU to a little over 14 million ECU in 1987.

In general, the last few years have been marked by a sharp rise in intra-Community trade in this field. Non-EC countries count for only 27% of imports compared to 40% in 1982. Meanwhile, the EC's deficit with other countries has fallen to less than 1.5 million ECU, from over 20 million ECU in 1982.

### **Transfusion Apparatus**

Transfusion apparatus consists mainly of bags and bag assemblies and tubing, out of which administration sets are assembled. These products are supplied mainly by EC-based companies. However, certain raw materials are imported from Malaysia. There are also imports of finished goods, from Japan and the US, which together account for some two-thirds of the EC's imports from other countries.

The EC's exports of transfusion apparatus to non-Community markets have been rising rapidly since 1980, and at 46 million ECU, now outweigh imports by 16 million ECU. Total exports to outside markets in 1987 were worth 46 million ECU, compared to 13 million ECU in 1980.

However, the EC continues to record negligible exports to Japan, having run a consistent and rising deficit in this sector since 1980. Exports to the US were worth 7 million ECU last year, compared to a 1983 peak of nearly 8 million ECU. Imports from the US were a little under 7 million ECU.

### **Syringes**

The EC is a major producer of syringes, manufactured by US, Japanese and European-owned companies. Both exports and imports have grown rapidly since 1980, and are presently worth 177 million ECU and 149 million ECU, respectively.

The main countries with manufacturing operations are Ireland, Germany and Belgium, and to a lesser extent Italy and Spain. Ireland accounts for about 45% of exports of plastic syringes, nearly all of which are sold within the EC. The largest exporter to markets outside the Community is Germany. Leading importers of syringes are France (plastic) and Italy (non-plastic); most of these imports are from within the Community. Extra-EC imports of syringes are mainly sourced from Switzerland, although the goods originate initially in eastern Europe. Since 1980, the EC has run a steady deficit in syringes with the US and to a lesser extent with Japan.

Disposable syringes have virtually replaced reusables over the last decade. Their share of exports has however remained steady since 1980, at about 66%. Although the rate of replacement has levelled off in recent years, the next five years are expected to bring further increases in the use of disposables due to the growing threat of AIDS.

### **Hypodermic Needles**

The EC is highly dependent on imports of hypodermic needles from Japan, running a massive deficit (averaging 24 million ECU for each of the last five years) with the country. There are only five important producers in the EC, two of them US owned with production facilities in Ireland. BLEU accounts for more than half of all intra-Community exports.

Japan provides a third of total imports by EC countries, and more than 70% of extra-Community imports. The US is also a major supplier, although imports have declined over the last two years to around 5 million ECU, from a 1983 peak of over 12 million ECU.

### **Other Needles, Cannulae and Catheters**

This segment includes several different types of products, ranging from intravenous devices to drainage tubes and catheters. Some of them incorporate needles, while others do not. Needles are produced in the EC by several companies. They are also imported from the US and Japan. Although the EC's exports of needles have been rising in recent years, it continues to run large trade deficits with both the US and Japan, of 63 million ECU and 14.5 million ECU respectively.

There are a little over 20 important producers in the EC, located in France, the UK, Italy, Belgium, Ireland, Denmark, Spain and Germany. Six of these companies are US owned, while one is Japanese. The US-owned companies are based mainly in Ireland and the UK. EC companies have also been moving manufacturing operations abroad, to the Far East and Scandinavia.

### *Consumption Trends*

Consumption of medical disposables and dressings in the EC has been showing steady growth in recent years, mainly due to two factors: an ageing population as well as a slow but firm

trend towards the use of disposables. While population forecasts indicate that demand will increase further over the next decade, cost containment moves in the health care sector have been focused more on reducing unit prices rather than on consumption itself.

The largest growth in consumption in the past 10 years has occurred in intravenous therapy products, disposable syringes and needles, non-woven disposables, latex gloves for surgical use and contraceptive sheaths; the two latter products continue to experience accelerating growth in consumption owing to widespread concern about the AIDS virus.

### *Employment Trends*

More than 100 000 people are employed in the manufacture of medical equipment and dressings in the EC. Numbers have grown by 10-15% over the past five years. US and Japanese companies, which together employ more than a quarter of the EC's workforce in this sector, have expanded by concentrating on high growth, high technology products, made from non-woven and plastic materials.

Manpower levels in the industry have been growing over the last decade, as a result of both growth on the domestic market as well as expanding export markets.

Approximately half the manpower figure is accounted for by Germany and 20% by the United Kingdom and Ireland combined. The other three large EC countries, France, Italy and Spain, have poorer export performances, mainly due to a tendency for domestic companies to concentrate on the home market. This has resulted in relatively lower manpower levels compared to Germany and the United Kingdom, both of which are strong exporters to world markets. At present, there are considerable developments underway in France, with US and German as well as British corporations buying and seeking to rationalize French manufacturers.

Wage rates tend to vary considerably. On one end of the scale, labour rates are as high as an average 30 ECU per hour; the companies paying these wages are involved in producing higher cost, higher profit plastic disposables. At the other end of the scale, labour rates are less than 10 ECU per hour. Companies paying these rates are typically involved in producing gauze products and in packaging.

### *Research & Development Investment*

In general, R&D on new materials tends to be spun off into the medical devices industry. A minority of international companies are, however, directly involved in seeking new materials which offer improved characteristics for medical use. Often, large chemical producers are the developers of new materials and they sell their product to several companies involved at the conversion stage. European dressings and dis-

posables device manufacturers have been very quick to learn of new product developments and to rapidly adapt to new materials. EC companies are also known for copying each other.

### *Major Structural and Geographic Features*

The world medical device and dressings market has been growing steadily. In general, larger numbers of people throughout the world have better access to health care than ever before, resulting in greater expenditure in the sector. European investors have tended to fare well in these growing markets due to diligent marketing efforts, both through self-financed venture studies and government support. Given continued inputs of R&D, the levels of technology are high; in turn, this has allowed the EC to retain a competitive margin over countries with lower wage costs, particularly the NICs.

There are more than 100 end-product manufacturers of medical dressings and disposable devices in the EC. Over 20 of these companies have manpower levels in excess of 1 000. Others include those with small specialized divisions in this field as well as a number of small and medium-sized enterprises.

The number of companies in the EC accounting for more than a 75% share of medical dressings and disposable devices is tending to decline. Several large international companies, many of them American, have bought smaller ones. This process is now also developing in the opposite direction; a number of EC companies have been making acquisitions in the Community, as well as in the US and elsewhere, with the aim of consolidating their position in the world market.

The EC medical dressings and disposable devices market is fragmented into 12 separate markets. Each country market tends to have its own obstacles for importing companies. This applies not only to differences in the hospital environment from one country to another, but also to continued disparities in manufacturing and sterilization standards.

The major international companies maintain marketing subsidiaries or distribution agents in each of the EC countries. This has been necessary because of the imperatives of language, fiscal and other business environment related factors. After 1992, many of these marketing subsidiaries are expected to be phased out altogether as their strategic importance diminishes.

### *Trends in Member States*

Markets are showing strong positive growth in four of the five major EC countries, Germany, Italy, France and Spain. The United Kingdom is exhibiting cutbacks in the medical disposables market as a result of cost containment efforts in the National Health Service. All other country markets are growing with the exception of Ireland. In recent years, unit prices of

medical disposables in Ireland have been much higher than the EC average. To curb financial pressures, hospitals have found ways to reduce prices of supplies. This has been facilitated by hospital tenders as well as the presence of many new entrants into the market.

There have also been reports of dumping of certain goods on the French market, particularly with product lines expected to be discontinued.

## Forecast and Outlook

All in all, the future looks promising for EC manufacturers of medical dressings and disposable devices. The internal EC market is growing as are export markets. US-owned companies are getting increasingly involved in manufacturing within the EC, and are gearing up to strengthen their positions after the completion of the internal market in 1992.

The only sector that appears dismal is cotton gauze and wadings, where non-wovens are expected to replace the former to an even greater extent. With the continued dismantling of trade and other barriers in the EC, the major companies will be able to look forward to greater economies of scale and perhaps plough back some of the benefits into further developing export markets. Production within the EC is estimated to grow by as much as 20% overall between now and 1992, with growth expected to be split more or less evenly between exports on the one hand, and the internal market on the other.

Imports from the Far East and other developing countries with latex production capacities are expected to increase very significantly over the next five years as a direct result of the AIDS-related increase in consumption of surgical gloves and sheath contraceptives in the EC.

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The industry described in this monograph represents, only in part, EUCOMED, the European Confederation of Medical Suppliers Associations. In addition to the sectors covered above, EUCOMED covers:

- single-use instruments, apparatus, equipment, implants, appliances, substances, objects and combinations thereof
- non-powered implants
- mechanical contraceptive devices
- certain accessories to active powered devices
- infusion and transfusion devices.

For further information on these sectors, you may therefore contact:

EUCOMED, European Confederation of Medical Suppliers Associations  
Address: 551 Finchley Road, Hampstead, London NW3 7BJ, United Kingdom  
Tel: (44 1) 431 2187/435 2087; Telex: 923753 Monref G; Fax: (44 1) 794 5271

# WEIGHING INSTRUMENTS

(NACE 371)

*The weighing machine industry, which was largely mechanical in the past, has come to depend more and more on electronic techniques and products. The technical standardization of these machines within the EC should enable trade to develop considerably in the future.*

The EC weighing machine industry manufactures four main categories of product:

- precision and special purpose weighing instruments (analytical, chemical and precision balances and systems)
- (weighing machines for the retail trade (shopscales, combined weighing and labelling machines, etc.)
- industrial and commercial weighing machines (scales, weighbridges, bagging scales, continuous and discontinuous accumulators, gravimetric sorting machines, hook scales, scales on travelling cranes, hopper scales, etc.)
- household or medical weighing machines (kitchen and bathroom scales, baby scales, bed scales, etc.)

## Current Situation

After increasing from 1982, total European production decreased by 3% in 1987 to a value of a little over 1 billion ECU. Current statistics make it difficult to state the exact share of each of the different sectors, but the industrial and commercial sector is certainly the largest (about 35%).

## Foreign Trade

Exports, which represented 10% to 40% of production depending on the country, have been declining over the last two years. Imports are increasing at an average rate of 10% per year. Competition is stiff in this sector, from both European and Far Eastern products. Measures have had to be taken against unfair competition in certain electronic scales for direct sale to the public that are imported into the EC or assembled there.

## Employment Trends

The EC weighing machine industry employs over 22 000 people in at least 400 firms of different sizes ranging from

small businesses with a handful of employees to the largest firms employing some 1 500 people. Certain firms specialize in the manufacture of one or two products while others manufacture a wide range of machines. The trend seems to be towards diversification so as to cover a wider section of the market.

**Table I**  
**Community Production of Weighing Machines**

| (Million ECU)  | 1982 | 1984 | 1985  | 1986  | 1987 |
|----------------|------|------|-------|-------|------|
| Belgium        | 9    | 6    | 9     | 12    | 10   |
| Denmark        | N/A  | 6    | 32    | 52    | 49   |
| Germany        | 375  | 413  | 498   | 515   | 488  |
| Spain          | N/A  | 75   | 63    | 64    | 72   |
| France         | 107  | 143  | 152   | 171   | 167  |
| Italy          | 91   | 92   | 107   | 99    | 78   |
| Netherlands    | 80   | 65   | 51    | 53    | N/A  |
| United Kingdom | N/A  | 102  | 106   | 108   | 111  |
| Total          | N/A  | 902  | 1 018 | 1 074 | N/A  |

Source: CECIP.

## Technological Trends

Up until the 1970s, weighing machines were basically mechanical. Now, three fundamental evolutions have changed the technological environment of the industry:

- the use of sensors (particularly strain-gauges)
- the introduction of electronics
- the association of peripheral equipment (data-processing systems, automation).

These new technologies have stimulated a whole range of constantly developing new products with multiple applications, particularly in industrial processes and packaging. Because of them, the share of mechanical machines has fallen to less than 10%. Prices in general are dropping.

## Forecast and Outlook

It is difficult to forecast the evolution of this sector. As elsewhere, the opening of the single market will completely change the movement of products. Hitherto, national regulations with regard to weighing machines have held back the

introduction of foreign products. Now, the EC directive and the CEN/Cenelec standards being drawn up will allow the free movement of new machines once they have been certified in a Member State of the EC. Certain national markets which used to be closed to foreign trade will be much more

open to European competition and, to an extent which has yet to be determined, to competition from third countries.

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## FOOD AND DRINK

(NACE 411 to 428)

*The food and drink industry is one of the leading industries in the Community, employing some 2.5 million people and with an estimated turnover of about 365 billion ECU in 1986. This industry transforms a growing share of agricultural production, making it available to the economy as a whole. A distinction is generally made between two categories of users. The main category, representing over 98% of production, includes human and animal foodstuffs and is continuing to increase, although the pace of growth is slow at about 1% per year. The second category, representing less than 2% of production, includes non-food products and is growing steadily at a rate of 5% to 10% per year depending on the product. These cover mostly new materials for developing products, including new energy sources and revolutionary technologies such as biotechnology.*

The scope of the food and drink industry sector includes all activities involved in the processing of agricultural produce with the exclusion of farming.

### Current Situation

#### Consumption Trends

The EC, with a population of 320 million, is a vast and varied market for the food and drink industry. The diversity in cultural values and socio-economic conditions within the market, despite the process of unification, means that it is

structurally highly fragmented, although some common features do exist. Consumer behaviour is conditioned by deeply rooted traditions and habits which vary not only from one country to another but also from one region to another within countries.

Some tendencies common to all European countries influence consumer habits:

- Europe's demographic decline, ageing population and increasing number of unemployed have led to a significant increase in the number of low-income households
- consumers' attitudes to food are changing: more attention is paid to health aspects, the quality/price ratio, etc.
- life styles are changing: more women work, there are more single-parent families, people have more leisure time and new technologies are appearing.

The general development in consumption is towards more elaborate processed products with a higher technological and service element. Thus consumer needs are changing but demand for foodstuffs is growing only slowly or, for certain products, even declining. The major outlet for the food and drink industry remains household consumption and changes in this area are a determining factor in the development of the industry. However, expenditure on foodstuffs as a proportion of overall household expenditure has been declining throughout the 1980s.

On average, the food budget now represents only a quarter of the total household budget whereas in the early 1970s it represented a third.

### Main Indicators Food and Drink

| (Million ECU)        | 1980    | 1981    | 1982    | 1983    | 1984    | 1985    | 1986    |
|----------------------|---------|---------|---------|---------|---------|---------|---------|
| Apparent consumption | 185 246 | 201 447 | 222 109 | 236 259 | 259 985 | 266 824 | N/A     |
| Net export earnings  | + 504   | + 3 528 | + 1 706 | + 473   | + 1 165 | + 2 539 | + 2 342 |
| Production           | 185 750 | 204 975 | 223 815 | 236 732 | 255 150 | 269 363 | N/A     |
| Employment (1 000)   | 2 825   | 2 792   | 2 671   | 2 597   | 2 575   | N/A     | N/A     |

**Table I**  
**Foreign Trade**

| (Million ECU)        | 1980   | 1981   | 1982   | 1983   | 1984   | 1985   | 1986   |
|----------------------|--------|--------|--------|--------|--------|--------|--------|
| Imports extra-EC (1) | 13 394 | 15 004 | 16 381 | 17 680 | 20 066 | 19 776 | 16 250 |
| Index                | 100    | 112.0  | 122.3  | 132.0  | 149.8  | 147.6  | 121.3  |
| Exports extra-EC (1) | 13 898 | 18 532 | 18 087 | 18 153 | 21 231 | 22 315 | 18 592 |
| Index                | 100    | 133.3  | 130.1  | 130.6  | 152.8  | 160.6  | 133.8  |

(1) EC 10 (excluding Spain and Portugal).

Source: Eurostat.

### *Retail Distribution*

As intermediaries between producers and consumers, retail distributors have come to occupy a key role in the food chain. Changes in consumers' needs and hence their behaviour have had a strong impact on the evolution of distribution structures and has altered the balance of power between producers and distributors in favour of the latter.

Under pressure from competition and in order to sustain growth in a static market, distribution structures have tended towards increased concentration through mergers, takeovers and collaborations. There are fewer distributors, but they are larger. They have also diversified, extending the range of products and services on offer. Non-food products from other industrial sectors have made their appearance in supermarkets. Distributors have also crossed Community frontiers to establish themselves in several Member States.

Due to these trends towards concentration, diversification and internationalization, distributors play an increasingly important part in consumer information, advertising, and the marketing of foodstuffs. Large-scale distributors carry a lot of weight, with all the power conferred by the turnover size, capacity to influence consumers, and the ability to exert ever stronger pressure on the food and drink industry so as to

obtain advantageous conditions such as purchase prices, discounts and payment.

### *Major Structural and Geographical Features*

The European food and drink industry is made up of a mixture of firms and sectors with very different structural and operational characteristics. This variety is due to the diversity of market demand, market size and the technologies and traditions particular to each sector and each country. Three factors have brought about major structural changes in the food and drink industry as well as in the industrial landscape generally. These are: the growing interpenetration of the economies of Member States; slow growth rates or even decline in certain branches of production; and growing competition at international and Community level in the context of a stagnant market.

There has been a tendency towards increased concentration. In most Member States and in most branches of the food and drink industry there are fewer firms, and the average size of these firms has increased. As a result, the degree of industry concentration has increased continuously.

However, there are major differences in concentration levels amongst the various European countries. The UK food and

**Table II**  
**Turnover**

| (Million ECU)      | 1980    | 1981    | 1982    | 1983    | 1984    | 1985   | 1986   | 1987   |
|--------------------|---------|---------|---------|---------|---------|--------|--------|--------|
| Belgium            | 10 793  | 11 947  | 12 731  | 13 396  | 14 549  | 15 042 | 14 969 | 14 170 |
| Denmark            | 7 410   | 9 307   | 9 922   | 10 094  | 10 915  | 11 081 | 11 119 | 10 892 |
| Germany            | 52 137  | 55 849  | 61 448  | 65 271  | 68 004  | 69 397 | 72 832 | 72 746 |
| Greece (1)         | 3 332   | 3 971   | 4 430   | 4 389   | 4 568   | 4 836  | 3 985  | 4 194  |
| Spain              | 20 780  | 22 732  | 24 299  | 24 083  | 26 815  | 30 914 | 32 068 | 33 089 |
| France             | 48 219  | 54 305  | 59 009  | 63 360  | 68 979  | 73 583 | 75 583 | 75 341 |
| Ireland            | 5 418   | 5 937   | 6 757   | 7 341   | 7 916   | N/A    | N/A    | N/A    |
| Italy (1)          | N/A     | N/A     | N/A     | N/A     | N/A     | N/A    | N/A    | 84 297 |
| Luxembourg         | 269     | 286     | 318     | 343     | 358     | 381    | 407    | N/A    |
| Netherlands        | 19 132  | 21 273  | 23 258  | 24 154  | 26 353  | 27 035 | 26 740 | N/A    |
| Portugal (1)       | 2 017   | 2 631   | 2 776   | 2 994   | 3 315   | 3 475  | N/A    | N/A    |
| United Kingdom     | 47 594  | 54 415  | 57 419  | 58 785  | 64 838  | 67 065 | N/A    | N/A    |
| EC excluding Italy | 211 683 | 242 653 | 262 367 | 274 210 | 296 610 | N/A    | N/A    | N/A    |

(1) CIAA estimate.

Source: CIAA.

**Table III**  
**Number of Employees**

|                | 1980      | 1981      | 1982      | 1983      | 1984      | 1985    | 1986     | 1987    |
|----------------|-----------|-----------|-----------|-----------|-----------|---------|----------|---------|
| Belgium        | 69 243    | 67 474    | 66 998    | 65 491    | 66 132    | 64 923  | 63 74    | 63 039  |
| Denmark        | 57 913    | 58 004    | 57 660    | 57 672    | 58 498    | 61 312  | 61 737   | 59 200  |
| Germany        | 467 700   | 465 200   | 450 400   | 433 600   | 429 600   | 427 000 | 424 000  | 425 000 |
| Greece         | 50 245    | 55 790    | 51 447    | 51 385    | 55 739    | 49 30   | 3 52 558 | N/A     |
| Spain          | 382 041   | 365 875   | 348 823   | 342 560   | 332 314   | N/A     | N/A      | N/A     |
| France         | 421 100   | 418 600   | 419 000   | 418 200   | 414 000   | 405 700 | 398 500  | 397 300 |
| Ireland        | 55 366    | 54 216    | 51 816    | 49 507    | 48 089    | 45 000  | 43 000   | N/A     |
| Italy          | 443 410   | 433 729   | 425 088   | 407 398   | 397 746   | 392 452 | 389 125  | 385 800 |
| Luxembourg     | 3 172     | 3 200     | 3 227     | 3 277     | 3 250     | 3 247   | 3 236    | N/A     |
| Netherlands    | 136 984   | 134 445   | 130 487   | 126 660   | 125 330   | 125 233 | 124 500  | N/A     |
| Portugal       | 75 361    | 73 420    | 72 250    | 70 669    | 64 219    | 67 149  | N/A      | N/A     |
| United Kingdom | 662 900   | 662 500   | 593 800   | 571 000   | 580 200   | 561 600 | N/A      | N/A     |
| EC             | 2 825 435 | 2 792 453 | 2 670 996 | 2 597 419 | 2 575 117 | N/A     | N/A      | N/A     |

Source: CIAA.

drink industry is the most concentrated in Europe. In general, the structures of the food and drink industry in Northern European countries are very different from those in Mediterranean countries (Italy, Greece, Spain and Portugal), where most firms are small, independent and oriented towards a single product. Concentration levels are much higher within national markets than in the Community as a whole, due to obstacles to trade within the Community.

There are also considerable variations in concentration between different branches of production. In general, the highest concentration levels are to be found in the sugar, oil, wheat, coffee, chocolate, instant products, wine, beer and spirits industries, with some exceptions for certain national markets. The same is true for canned soups, baby foods, frozen foods, breakfast cereals, chocolate confectionery, tinned milk, potato products, fats and margarine. Concentration levels are much lower for milk, flour, fruit and vegetable processing and the meat industry. There is also considerable variety within production sectors. It would seem that several sectors in the food and drink industry are evolving towards a model where there is a dominant core of large firms and a

fringe of small firms which are complementary rather than in competition with the larger producers.

The structure of the firms themselves is also very varied. On the one hand there are large international, European or American firms with transnational interests and a highly diversified product range. Thirty-one of the 500 largest European firms are in the food and drink sector (The Times 1985/86). On the other hand there are small family firms oriented towards certain specialized market segments or regional and local markets.

Parallel with this tendency towards concentration, a movement towards diversification has begun within the food and drink industry sector itself. Slow growth in consumer expenditure on foodstuffs has led firms wishing to sustain their growth rates to diversify into sectors which are preferred by consumers and therefore developing more rapidly than others (e.g. prepared dishes, diet foods, etc.) Products in this category have high value-added content.

The range of production has also increased as firms have extended their activities at national, Community and

**Table IV**  
**Household Consumption of Food and Drink Products**

| (Million ECU)  | 1980   | 1981    | 1982    | 1983     | 1984    | 1985    | 1986     | 1987   |
|----------------|--------|---------|---------|----------|---------|---------|----------|--------|
| Belgium        | 12 333 | 12 538  | 13 073  | 14 095   | 13 715  | 16 053  | 16 817   | N/A    |
| Denmark        | 6 674  | 7 315   | 7 869   | 8 509    | 9 299   | 9 997   | 10 590   | 10 823 |
| Germany        | 272    | 274     | 305     | 326      | 331     | 331     | N/A      | N/A    |
| Greece         | 7 928  | 9 902   | 11 470  | 11 492   | 11 886  | 11 972  | 11 243   | N/A    |
| France         | 48 015 | 53 378  | 57 657  | 60 303   | 65 108  | 69 63   | 9 72 297 | 74 100 |
| Italy          | 53 614 | 58 798  | 66 030  | 72 881   | 78 467  | 81 51   | 7 85 928 | N/A    |
| Luxembourg     | 456    | 493     | 538     | 591      | 611     | 652     | 676      | N/A    |
| Netherlands    | 13 035 | 13 870  | 15 345  | 16 104   | 16 779  | 17 200  | 18 081   | N/A    |
| Portugal       | N/A    | 1 503   | 1 638   | 1 619    | 1 807   | 1 889   | 1 825    | 1 796  |
| United Kingdom | 15 121 | 63 929  | 67 18   | 1 69 428 | 72 926  | 77 37   | 1 72 924 | N/A    |
| EC (1)         | N/A    | 222 000 | 241 106 | 255 348  | 270 929 | 286 621 | N/A      | N/A    |

(1) EC 10 (excluding Spain and Ireland).

Source: CIAA.

**Table V**  
**Share of Food and Drink in Total Household Budgets**

| %               | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 |
|-----------------|------|------|------|------|------|------|------|------|
| Belgium         | 30.3 | 29.6 | 30.1 | 30.9 | 31.0 | 30.7 | 30.5 | N/A  |
| Denmark         | 25.0 | 25.4 | 25.1 | 24.7 | 24.7 | 23.6 | 23.0 | 22.7 |
| Germany         | 24.0 | 23.6 | 23.1 | 22.4 | 22.3 | 21.9 | N/A  | N/A  |
| Greece          | 40.1 | 42.1 | 42.6 | 42.8 | 41.3 | 40.3 | 39.9 | N/A  |
| France          | 17.1 | 17.0 | 16.9 | 16.8 | 17.0 | 16.6 | 16.3 | 16.0 |
| Italy           | 26.1 | 25.5 | 25.5 | 24.9 | 24.1 | 23.4 | 23.6 | N/A  |
| Luxembourg      | 23.0 | 22.9 | 24.0 | 24.5 | 23.6 | 23.3 | 22.5 | N/A  |
| Netherlands (1) | 17.8 | 18.3 | 18.4 | 18.1 | 18.2 | 18.0 | 18.0 | N/A  |
| Portugal        | N/A  | 39.3 | 39.9 | 39.8 | 40.2 | 39.7 | 38.8 | 38.6 |
| United Kingdom  | 23.9 | 23.1 | 22.5 | 22.3 | 22.0 | 21.5 | 20.9 | N/A  |
| EC (2)          | 25.3 | 26.7 | 26.8 | 26.7 | 26.4 | 25.9 | N/A  | N/A  |

(1) Netherlands 1985-1986 CIAA estimate..

(2) EC 10 (excluding Spain and Ireland)..

Source: CIAA.

international levels. In this diversification process, large firms are moving into areas of specialized production traditionally occupied by small and medium-sized firms.

For the same reasons, firms are "going international". A European and international dimension as well as their industrial, financial and commercial links enable them to take advantage of economies of scale, the results of research and the European market. This phenomenon affects mainly those sectors producing highly processed products, as they are the most concentrated and have the most capital-intensive operations.

Continuing consumer demand for new products shows the importance of development activity. Firms have to innovate in order to maintain their market position. Out of 100 new products launched, only 3% succeed commercially. Of this 3% of new products, only 40% have a life cycle of more than 5 years. As a consequence, the cost of new product launches and the risk of failure can only be borne by large firms which

also know the market better and are better placed to negotiate with large distributors.

Small firms can be more flexible, faster and more innovative in their response to the demands of the market and distributors. Thus the development of generic and private label products, which are a sizeable market niche (high in the UK, average in France, low in Italy and Germany), has represented a significant market at low cost for small firms, since distributors define the type of products to be manufactured, finance their advertising and promotion and distribute them through their own networks. The drawback is of course that small firms are then totally dependent on large-scale distributors for the product or products in question.

The food and drink industry has never had the advantage of periods of strong growth, as has been the case for other industries, but it has suffered to a lesser extent from the economic crisis and has not experienced any sharp drop in activity. Diversity and variety, important factors in the adaptability

**Table VI**  
**Number of Firms**

|                       | 1980   | 1981   | 1982   | 1983   | 1984  | 1985  | 1986  | 1987  |
|-----------------------|--------|--------|--------|--------|-------|-------|-------|-------|
| Belgium               | 6 991  | 6 908  | 6 909  | 6 901  | 6 965 | 7 036 | 7 033 | 6 981 |
| Denmark               |        |        |        |        |       |       |       |       |
| (over 6 employees)    | 940    | 921    | 913    | 890    | 841   | 877   | 860   | N/A   |
| Germany (over 10)     | 4 712  | 4 625  | 4 577  | 4 534  | 4 480 | 4 370 | 4 291 | 4 269 |
| Greece                | 465    | 506    | 424    | 456    | 487   | 487   | 517   | N/A   |
| Spain                 | 3 098  | 2 903  | 2 968  | 2 642  | 2 608 | N/A   | N/A   | N/A   |
| France (over 10)      | 3 958  | 3 934  | 3 892  | 3 916  | 3 914 | 3 898 | 4 018 | N/A   |
| Ireland (over 20)     | 440    | 443    | 433    | 428    | 413   | N/A   | N/A   | N/A   |
| Luxembourg (over 10)  | 333    | 314    | 314    | 301    | 291   | N/A   | N/A   | N/A   |
| Netherlands (over 10) | 1 514  | 1 516  | 1 575  | 1 544  | 1 521 | 1 504 | 1 491 | N/A   |
| Portugal (over 10)    | 3 255  | 3 236  | 3 145  | 3 067  | 3 063 | N/A   | N/A   | N/A   |
| United Kingdom        |        |        |        |        |       |       |       |       |
| (over 20)             | 5 381  | 5 458  | 5 329  | 5 419  | N/A   | N/A   | N/A   | N/A   |
| EC (1)                | 31 087 | 30 764 | 30 479 | 30 098 | N/A   | N/A   | N/A   | N/A   |

(1) EC 11 Excluding Italy.

Source: CIAA.

and mobility of the food and drink industry, have allowed it to keep abreast of the evolution of life styles, the technological revolution and the growth in international competition.

### *Investment*

The financing of investment for modernization and development has presented a major problem for the food and drink industry. Firms have a slight self-financing capacity due to price controls, pressure from large-scale distribution, agricultural raw material costs and stabilization policies in several Member States. There is also the low value-added content in production and the fragmentation of industrial structures.

Over the last three years, the upturn in the EC economy (a drop in inflation and sustained growth rates) and the application of liberal policies (the ending of price controls, lower interest rates, deregulation) have allowed the financial situation of many firms to improve. The opening up of national markets in 1992 has encouraged them to start investing in the restructuring and modernization of their industrial plant. The need to grow and to increase profits are propelling the industry towards high value added production, integrating advanced technologies in manufacturing processes.

### *Factors behind Production Trends*

The period of extensive growth stimulated by continual expansion of markets has run out of steam, forcing the food and drink industry to seek possibilities for new growth within the production process itself. Increasing overall production in a stagnant market is difficult and it can no longer contribute to offsetting production costs. Firms are turning to technological innovation, particularly those concerning conservation techniques, products and production processes, the effects of which are industrial restructuring and reductions in staffing levels. High technology means that production systems have become more flexible, enabling firms to produce a wider variety of products with smaller production runs.

As demand stabilizes so competition increases; since new markets are limited, firms try to increase their market share at the expense of their competitors. This competition now concerns scientific research, new applications of technology, finances sources and the qualifications and training of the workforce.

These technological changes are leading to greater concentration in the food and drink industry and to a reassessment of the conditions for survival for the vast majority of small- and medium-sized businesses in the sector. Firms within the Community have benefited up till now from a "comparative advantage" in the industrial production of foodstuffs which has allowed the continued existence of a mixed and sometimes technologically outmoded industrial fabric.

Transnational firms and diversified groups from outside the food and drink industry have entered the sector through the use of new technological processes, in particular biotechnologies, in the manufacture of non-food items from agricultural products. Technological adaptation requires constant and increasing financing. Firms in the EC food and drink industry, despite their good management record, are suffering from a shortage of capital and cash to finance their technological advance. The problem is particularly acute for the small- and medium-sized firms which make up most of the Community food and drink industry and for primary processing firms with low capital accumulation.

The relative stagnation of the food and drink market together with ongoing industrial re-structuring and concentration, the automation of manufacturing processes and the perfecting of more efficient technologies have led on the one hand to a regular though slight decrease in the number of jobs and on the other to increased demand in both production and management for high-level specialized personnel of which there is a shortage.

### *The International Market*

The value-added content created by the food and drink industry affords the Community revenues several times higher

**Table VII**  
**Investment Trends**

| (Million ECU) | 1980    | 1981    | 1982    | 1983    | 1984    | 1985    | 1986    | 1987    |
|---------------|---------|---------|---------|---------|---------|---------|---------|---------|
| Belgium       | 318.4   | 278.0   | 286.0   | 343.9   | 336.7   | 338.3   | 488.8   | 534.8   |
| Germany       | N/A     | 1 988.9 | 2 104.4 | 2 378.3 | 2 234.0 | 2 156.0 | 2 255.4 | 2 534.3 |
| Spain         | 558.5   | 556.1   | 573.4   | 589.3   | 604.3   | N/A     | N/A     | N/A     |
| France        | 1 585.0 | 1 788.0 | 1 804.0 | 1 890.0 | 2 154.0 | 2 252.0 | 2 177.0 | 2 396.0 |
| Ireland       | 225.3   | 209.8   | 214.6   | 213.9   | 224.5   | N/A     | N/A     | N/A     |
| Italy         | 1 106.6 | 1 206.5 | 1 147.5 | 1 102.3 | 1 292.9 | 1 415.8 | 1 504.9 | 1 605.7 |
| Luxembourg    | 14.0    | 17.8    | 12.3    | 13.8    | 14.5    | 20.7    | N/A     | N/A     |
| Netherlands   | 732.6   | 618.2   | 405.9   | 734.8   | 772.5   | 889.3   | 1 047.9 | N/A     |
| Portugal      | 95.9    | 137.5   | 120.9   | 87.9    | 82.1    | 78.1    | N/A     | N/A     |

Source: CIAA.

than would be the case if the same agricultural products were exported unprocessed. Moreover, the export of processed products is the last stage in a process which begins with agricultural supply and continues through production, processing and commercialization. Many economic activities are thus involved and do much to make exporting a priority.

Despite the volume of international trade in foodstuffs, only a few products are marketed at long and even middle distances. There are many obstacles to marketing far from the place of manufacture: transport and storage costs, the relative fragility of the product particularly in terms of freshness, adaptation to the tastes of target populations, national regulations, customs barriers and so on.

This explains why the food and drink industry is in general stronger in densely populated industrialized regions with extensive transport facilities than in countries or regions with high agricultural production levels. It also explains why the major market for the food and drink industry is the Community market and it is on that market that its future is staked.

The promotion of exports in the industrial foodstuffs sector must thus be considered in the widest possible sense. It must include genuine exports of foodstuffs to third countries through the search for new markets and diversification of sales on existing markets as well as the construction of new production units in these countries by sale or direct investment, shareholdings in existing companies, the sale of technology, manufacturing or equipment patents and industrial cooperation agreements.

After reaching very high growth levels between 1970 and 1980, exports to third countries from the Community food and drink industry have grown more slowly in recent years. The deteriorating financial situation of certain developing countries and the stagnation of world demand have led to an intensification in international competition and the spread of aggressive trade practices, particularly on the part of the United States, aimed at markets where Community products were well-established.

Exporting is, by definition, the result of long-term action which requires permanent and considerable effort by the firms involved. These efforts can only take place when conditions are stable and developments can be predicted, justifying long-term commitments. There is a need to emphasize in particular the export of foodstuffs with high value-added content. In this way it will be possible for the processing industry to preserve its competitive export position on world markets. If there is a difference between Community prices and world prices, it is also because the major third countries give financial support to their agriculture and subsidize exports, thus forcing world prices to artificially low levels. Moreover, the disposal from time to time of agricultural surplus on world markets by the Community and its commercial partners creates growing tension in commercial relations.

As a result, more and more countries are campaigning for reforms at world level to the agricultural policies of the principal partners in GATT (General Agreement on Tariffs and Trade) as well as a liberalization of international trade. It is the only solution for avoiding recourse to bilateral agreements on the one hand and retaliatory measures affecting processed products, in particular, on the other.

The elimination of non-tariff barriers is one of the major objectives of multilateral GATT negotiations. These barriers make exports from the Community food and drink industry difficult if not impossible. The same is true for the acquisition of raw materials which modifies competitive positions.

Lastly, considerable distortions exist in the financial and monetary domain, hindering negotiations. They encourage bilateral arrangements and run counter to the liberalization of international trade.

## Forecast and Outlook

Despite its potential and good performance record, the food and drink sector in the Community is not yet ready to face international competition in the 1990s. The world market is

**Table VIII**  
**Exports to Third Countries**

| (Million ECU)  | 1980   | 1981   | 1982   | 1983   | 1984   | 1985   | 1986   | 1987  |
|----------------|--------|--------|--------|--------|--------|--------|--------|-------|
| Belgium        | 633    | 975    | 871    | 787    | 1 057  | 1 019  | 774    | N/A   |
| Denmark        | 1 340  | 1 738  | 1 703  | 1 958  | 2 676  | 2 839  | 2 637  | 2 530 |
| Spain          | N/A    | N/A    | N/A    | N/A    | N/A    | 1 841  | 1 390  | 1 449 |
| France         | 3 405  | 5 182  | 4 727  | 4 224  | 5 457  | 5 622  | 4 956  | 4 734 |
| Italy          | N/A    | N/A    | N/A    | 2 152  | 2 506  | 3 100  | 2 400  | N/A   |
| Luxembourg     | 2      | 1      | 1      | 2      | 2      | 2      | 2      | N/A   |
| Netherlands    | 1 931  | 2 616  | 2 750  | 2 761  | 3 179  | 3 072  | 2 599  | 2 909 |
| Portugal       | 1 510  | 1 738  | 1 814  | 2 136  | 2 800  | 3 108  | 2 356  | 2 309 |
| United Kingdom | 2 184  | 2 555  | 2 736  | 2 782  | 3 049  | 3 256  | 2 535  | 2 548 |
| Total EC (1)   | 11 005 | 14 805 | 14 602 | 16 802 | 18 220 | 18 918 | 17 249 | -     |

(1) EC 7 (excluding Belgium, Denmark, Spain, Ireland and Italy).

Source: CIAA.

**Table IX**  
**Import Trends**

| (Million ECU)  | 1980   | 1981   | 1982   | 1983    | 1984    | 1985    | 1986    | 1987  |
|----------------|--------|--------|--------|---------|---------|---------|---------|-------|
| Belgium        | 447    | 406    | 509    | 602     | 661     | 684     | 587     | N/A   |
| Denmark        | 897    | 1 014  | 1 049  | 1 185   | 1 368   | 1 408   | 1 464   | 1 430 |
| Spain          | N/A    | N/A    | N/A    | N/A     | N/A     | 1 359   | 1 729   | 1 619 |
| France         | 2 305  | 2 699  | 2 923  | 2 969   | 3 260   | 3 150   | 2 927   | 2 944 |
| Italy          | N/A    | N/A    | N/A    | 5 488.3 | 4 740.2 | 5 585.9 | 4 416.7 | N/A   |
| Luxembourg     | 6      | 7      | 7      | 9       | 8       | 8       | 9       | N/A   |
| Netherlands    | 1 347  | 1 586  | 1 660  | 1 965   | 2 217   | 2 305   | 1 602   | 1 477 |
| Portugal       | 4 123  | 5 481  | 5 713  | 5 484   | 6 433   | 6 257   | 4 038   | 4 261 |
| United Kingdom | 4 306  | 4 623  | 5 025  | 4 609   | 6 134   | 6 090   | 5 127   | 4 683 |
| Total EC (1)   | 13 431 | 15 816 | 16 886 | 16 823  | 20 081  | 19 902  | 15 754  | N/A   |

(1) EC 7 (excluding Germany, Greece, Ireland, Italy and Spain.)

Source: CIAA.

dominated by American companies which number eight among the 10 leading companies in the world.

The Community market is a mere assemblage of markets fragmented by non-tariff barriers affecting trade within the Community. These barriers cause distortions in competitiveness and sustain imperfect commercial structures and are the primary reason for slow growth in trade within the Community. The concentration which has been in progress over the last few years has concerned national markets above all. Out of a sample of 46 leading food and drink firms in the Community only half are present in one or two other

countries. There are at the moment few firms which both occupy a dominant position within their particular branch of production and cover the whole of the Community.

The elimination of trade barriers with the creation of the single market in 1992 ought to stimulate the restructuring and concentration process in the EC food and drink industry.

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# VEGETABLE AND ANIMAL OILS AND FATS

(NACE 411)

The vegetable and animal oils and fats industry covers three major types of activity corresponding to different branches. These are :

- in a first stage, processing of oilseeds and fruits into crude oils and fats and into protein meal and cakes, as well as processing of fish into crude oil and fish meal;
- in a second stage, processing of crude oils and fats of vegetable and animal - land and marine - origin, in order to make the latter suitable for edible as well as technical purposes;
- in a third stage, manufacturing of processed oils and fats for margarine, biscuits, confectionary, mayonnaise, bottling,.. for end consumer use.

Each of these activities is presented separately by the relevant professional body.

Eurostatistics have made it possible to give a synthesis for the whole of the vegetable and animal oils and fats industry, as is shown by the Main Indicators table for the period 1980-1985.

## THE OILS AND FATS INDUSTRY

(NACE 411.1;411.3;411;4)

The activities of the EC oils and fats industry can be divided into two parts, the second normally but not necessarily following the first:

- Firstly, the processing of oilseeds, except olives, into crude oil and protein meal. Olive processing is more an extension of agriculture rather than a typical industrial activity. However, residue stemming from olive processing is manufactured at an industrial level, giving rise to a production of roughly 125,000/year of residue olive oil.
- Secondly, the refining, hydrogenation and fractioning of crude oils and fats of vegetable and marine origin,

excluding olive oil. Using the same equipment and in addition to the aforementioned activities, some plants also process lard and tallow, i.e. more or less 1 500 000 tonnes/year, sometimes also olive oil.

## CURRENT SITUATION

The oils and fats industry crushed some 23 000 000 tonnes/year of oilseeds - excluding olives, maize germs, grape and tomato pips etc - giving production figures of approximately:

- crude oils and fats: 6 250 000 tonnes
- protein meal: 16 500 000 tonnes.

Depending on the type of raw material used, the added value ranges from 25 to 75 ECU/1000 kg of seeds or fruits.

Half of the seeds is supplied by the EC agricultural activities, whilst the other half is imported from other countries, especially the USA, Brazil and Argentina.

Oils and fats are used, in descending order for:

- human consumption, roughly 75 %;
- the animal feedingstuff sector, roughly 12.5% in compound feedingstuffs, especially in calf feed;
- technical purposes, roughly 12.5% in the manufacturing of paint, varnish, soap..

Protein meal and cakes are entirely used for animal consumption, either directly or indirectly in compound feedingstuffs.

In addition to oilseed crushing, the oils and fats industry also processes per year some 6.5 million tonnes of crude oils and fats of vegetable and marine origin, excluding olive oil.

The major share of raw material processed by the oils and fats industry is supplied by EC domestic production, but

**Main Indicators**  
**Vegetable and Animal Oils and Fats**

| (Million ECU)        | 1980   | 1981   | 1982   | 1983   | 1984   | 1985   |
|----------------------|--------|--------|--------|--------|--------|--------|
| Apparent consumption | 11 886 | 13 171 | 14 230 | 15 017 | 16 676 | 16 635 |
| Total production     | 9 398  | 10 187 | 10 792 | 11 172 | 12 508 | 13 166 |
| Employment           | 49 689 | 47 501 | 46 259 | 44 733 | 43 958 | 42 955 |

EC 10 Excluding Spain and Greece.

**Table I**  
**Activities of the Oilseed Crushing Industry by Type of Oilseed**

| (Thousand tonnes)        | Oilseeds | % Share | Raw oils and fats | % Share | Oil cake | % Share |
|--------------------------|----------|---------|-------------------|---------|----------|---------|
| Groundnut                | 28       | 0.1     | 13                | 0.2     | 14       | 0.1     |
| Soya bean                | 13 747   | 59.8    | 2 434             | 38.9    | 10 915   | 66.9    |
| Colza/rape               | 4 661    | 20.3    | 1 879             | 30.1    | 2 720    | 16.7    |
| Sunflower                | 3 415    | 14.9    | 1 466             | 23.5    | 1 787    | 10.9    |
| Others (1)               | 492      | 2.2     | 195               | 3.1     | 556      | 3.4     |
| Coconut                  | 95       | 0.4     | 57                | 0.9     | 33       | 0.2     |
| Palm nut & other laurics | 96       | 0.4     | 45                | 0.7     | 42       | 0.3     |
| Linseed                  | 391      | 1.7     | 138               | 2.2     | 252      | 1.5     |
| Castor                   | 50       | 0.2     | 23                | 0.4     | -        | -       |
| TOTAL                    | 22 975   | 100.0   | 6 250             | 100.0   | 16 319   | 100.0   |

(1) Excluding olives, maize seed, grapeseed, tomato seed, etc.

palm oil, as well as the biggest share of coconut and palm kernel oil are imported from third countries, mainly from Malaysia, Indonesia, the Philippines and New Guinea. Depending on the type of raw material used, the added value ranges from 50 to 200 ECU/1000 kg of crude oils or fats.

The share of industrially produced crude oil and protein meal for internal EC consumption was:

- for crude oils and fats : roughly 75 %
- for protein meal : 50 %

Regarding the processing of oils and fats, the share is close to 100 %.

In terms of oilseed crushing or crude oils/fats processing, the EC oils and fats industry has a relatively small workforce. This can be explained partly by the nature of the technical operations involved but also by the fact of reducing processing costs.

The industry is capital intensive and requires considerable investment.

### *Factors behind Production Trends*

The EC oils and fats industry is one of the most important outlets for the EC agricultural sector.

It represents practically the entire oilseed production. In 1987/1988, this amounted to approximately 11 500 000 tonnes, of which :

- 5 900 000 tonnes of rapeseeds;
- 3 850 000 tonnes of sunflowerseeds;
- 1 880 000 tonnes of soybeans.

It is the major outlet for crude fish oils from EC fisheries. It processes the majority of land animal fat production, i.e. lard and tallow. It fulfills the requirements of the breeding sector in protein meal.

Due to the variety of raw materials processed and the geographic location of the industrial facilities, the industry can maintain regular supplies in the required quantities and qualities and can cope with sharp rises or falls in demand, for oil as well as for protein meal.

In order to meet a fluctuating demand, the oils and fats industry has large production capacities which can exceed the average yearly demand.

The same is true for the take-over of domestic oilseed production.

Production of oil and protein meal is complementary : the latter cannot be produced without the former. Meeting

**Table II**  
**Activities of the Oilseed Crushing Industry by Country**

| (Thousand tonnes) | Oilseed process | % Share | Crude oils and fats | % Share | Protein meal | % Share |
|-------------------|-----------------|---------|---------------------|---------|--------------|---------|
| BLEU              | 2 112           | 9.2     | 567                 | 9.1     | 1 564        | 9.6     |
| Denmark           | 250             | 1.1     | 83                  | 1.3     | 162          | 1.0     |
| Germany           | 6 071           | 26.4    | 1 750               | 28.0    | 4 257        | 26.1    |
| Greece            | 619             | 2.7     | 110                 | 1.8     | 471          | 2.9     |
| Spain             | 3 446           | 15.0    | 816                 | 13.2    | 2 463        | 15.1    |
| France            | 2 118           | 9.2     | 763                 | 12.2    | 1 294        | 7.9     |
| Ireland           | -               | -       | -                   | -       | -            | -       |
| Italy             | 2 262           | 9.8     | 516                 | 8.3     | 1 793        | 11.0    |
| Netherlands       | 3 572           | 15.6    | 826                 | 13.2    | 2 633        | 16.1    |
| Portugal          | 1 022           | 4.5     | 258                 | 4.1     | 759          | 4.6     |
| United Kingdom    | 1 503           | 6.5     | 561                 | 9.0     | 923          | 5.7     |
| TOTAL EC          | 22 975          | 100.0   | 6 250               | 100.0   | 16 319       | 100.0   |

**Table III**  
**Overall Results of the European Oils Industry in 1986**

| (1 000 tonnes)                    | Industrial Production of Oils and Fats | Imports extra-EC | Exports extra-EC | Apparent consumption |
|-----------------------------------|--|------------------|------------------|----------------------|
| Vegetable Oils and fats           |  |                  |                  |                      |
| Fluid oils                        | 5 987                                  | 437              | 2 036            | 4 388                |
| Lauric oils (coconut palm kernel) | 102                                    | 803              | 28               | 887                  |
| Linseed oil                       | 138                                    | 8                | 40               | 106                  |
| Castor oil                        | 23                                     | 72               | 4                | 91                   |
| Palm oil                          | N/A                                    | 915              | 14               | 901                  |
| <b>TOTAL</b>                      | <b>6 250</b>                           | <b>2 235</b>     | <b>2 122</b>     | <b>6 363</b>         |
| Protein meal                      | 16 316                                 | 17 963           | 2 410            | 31 872               |
| Marine Products                   |  |                  |                  |                      |
| Fish Oil                          | 132                                    | 559              | 28               | 663                  |
| Fish meal                         | 450                                    | 923              | 284              | 1 089                |

Source: FEDIOL

demands for oils and fats can result in a protein meal surplus ; conversely, meeting demand for protein meal can give rise to an oil surplus

During recent years, a greater increase in demand for protein meal rather than oil and fat consumption has resulted in exports of soyabean oil and rapeseed oil, despite increasing obstacles encountered on the international market, stemming either from importing countries or from unfair competition of other exporting countries.

### *Trends in Member States*

Despite its high level of efficiency and competitiveness, the EC oils and fats industry has to face increasing hardships, which are both of an internal as well as an external nature.

The industry is highly competitive and efficient regarding the supply of raw materials and the disposal of processed products.

It is characterized by efficient technology and considerable know how, as well as by dynamic trade and quality policies which are focussed on domestic and external markets.

Difficulties are not caused by any drop in EC consumption of oil and/or meal. Their origins lie in unfair trade practices. They are essentially due to obtaining raw material supplies in sufficient quantity and at prices compatible with prices of the resulting products, oil and protein meal. They are heightened due to the fact that competing oil and protein meal are imported and sold on the domestic market at world market price levels.

Custom duties for oils and fats range from 0 to 15 %.For protein meal, there are nihil.

Highly subsidized dairy products, such as butter and skimmed milk powder, have, for several years unbalanced the market for vegetable oil mainly, but sometimes also for protein. Also to blame are discriminatory national tax rates levied on various vegetable oils and fats, mainly margarine.

The major difficulties for the industry are to be found outside the EC. They are mainly due to the problem of obtaining a satisfactory supply of raw material, both quantity-wise as well as at prices which are compatible with the prices of the resulting processed products, the latter being imported and sold on the domestic market at world market price levels.

EC oilseed production represents only 50 % of the volume of seeds processed within the EC. Consequently, the EC oilseed industry must turn to external markets for its supplies, either to industrialized nations for soyabeans, sunflowerseeds, linseeds and occasionally rapeseeds,... or to developing countries for groundnuts, copra, palm, palm kernel, castor beans,...

In addition to its domestic oil and fat production, the industry also uses imported crude oils and fats, mainly palm oil, coconut oil, palm kernel oil, fish oil,...

Industrialized countries such as the USA, Canada, Sweden or Poland, export raw material - oilseeds - as well as the manufactured products - oil and protein meal -.

Developing countries however, favour exports of processed products rather than raw materials. They are unable to provide the EC industry with the quantities of oilseeds it requires at prices compatible with those of processed products. This phenomenon is illustrated by the development of the share of oilseed imports from tropical countries. From 33.2 % in 1956, it fell to 3.3 % in 1987. Conversely, the share of imports from tropical and subtropical regions (including olive oil from Mediterranean areas), represents 96 % of EC imports of vegetable oils and fats.

As a result, EC industries which used to specialize in groundnut coconut, palm kernel and castor processing, have had to either cut back their activities considerably in these sectors or else stop them altogether.

Only the processing of oilseeds from industrialized countries (soyabeans, rape and sunflower seeds) has followed the evolution of internal demand.

Trends of developing countries to push exports of processed product not only affects oilseeds in relation to crude oil and meal, but also crude oil in relation to processed oils. For instance, this is the case for Malaysia which practically stopped all exports of crude palm and palm kernel oils. These practices are not without a negative impact on the refining, hydrogenation and fractionation of palm oil in the EC.

In the light of these difficulties, those involved in the EC industry are aware of the need for continuing dialogue between

all parties and for increased mutual respect of present and future agreements and commitments under the relevant international rules (cf. current situation).

### **Forecast and Outlook**

Long-term production forecasts are tricky to establish but it is quite a different matter for the consumption of oils and of protein meal.

Production levels in the EC oils and fats industry are directly affected by policies carried out in the different geographic oilseed production and processing areas. Four major geographical areas set their own policies:

- the EC;
- countries with a planned economy;
- liberal countries with occasional impacts on markets;
- more or less developing countries such as Argentina, Brazil, Malaysia, Indonesia, the Philippines,... which have well-defined production targets and changing export policies.

EC consumption of oils and protein meal shows great stability.

Edible oil demand seems to have reached a balance point, at least per capita; the drop in household consumption is compensated by an increase intermediate consumption in the food industries. Overall consumption of edible oils evolves according to population growth. In other words, consumption per capita by volume is at present stable.

For technical purposes, the demand could increase if research and technology progress.

In animal feedingstuffs, no increase is foreseeable regarding the consumption of oils and fats. The same is true for the demand of protein meal. Animal feed consumption depends on the demand for meat and dairy products, eggs, ... Furthermore, oil and meal consumption also depends on the extent it is employed in compound feedingstuffs, in relation to other products like cereals, green fodder, etc...

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# OLIVE OIL

(NACE 411.2)

Olive oil production is a complex activity. Two qualities of olive oil are produced, virgin and refined, depending on the quality of the olive. Olive pomace oil is manufactured from olive pomace obtained from crushed olives.

## Current Situation

Olive oil is produced in two ways according to the quality of the raw material.

The first production technique consists of simply crushing the fruit, known as olive pressing, then filtering the product obtained. High quality olives are necessary for this technique and the olive oil obtained, virgin olive oil, is of very high quality; with low acidity and a pleasant flavour, it is biologically the best vegetable oil. The ultimate by-product after the crushing operation is reprocessed later to produce olive pomace oil, and still contains a little oil. This is extracted using the solvent hexane. The resulting raw oil is then refined to produce neutral olive pomace oil which, blended with virgin oil, yields olive pomace oil.

As it is difficult to obtain high quality raw material, a second production technique is used (see the following).

It is difficult to obtain supplies of high quality olives mainly because olive plantations are scattered. There are alternatives:

**Table I**  
**Olive Oils and Edible Olive Marc Oils: 1986-1987**  
**Results**

| (Thousand tonnes) | Virgin and refined olive oil | Edible olive marc oil | Total |
|-------------------|------------------------------|-----------------------|-------|
| Stocks 1.11.86    | 577                          | 89                    | 666   |
| Production        | 1 190                        | 96                    | 1 286 |
| Imports (1)       | 20                           | 0                     | 20    |
| Total supply      | 1 787                        | 185                   | 1 972 |
| Consumption       | 1 326                        | 100                   | 1 426 |
| Exports (1)       | 92                           | 54                    | 146   |
| Stocks 31.10.87   | 369                          | 31                    | 400   |

(1) Extra-EC imports and exports.

Source: FEDOLIVE.

- delay delivery of olives to the few large factories, (in this case the quality of the oil decreases in relation to storage time)
- increase the number of small installations close to olive plantations (in this case competitiveness drops sharply and oil production costs soar).

One possible solution could be the construction of warehouses adapted specially to olives. Current techniques are not entirely satisfactory in that they do not eliminate parasite attacks.

The second production technique is industrial. It consists of crushing, refining and if necessary blending oils of different origins. Refining is the traditional processing for fluid oils and involves neutralization, decolourization, deodorization and demargarination. This process yields neutral oil as well as

## Main Indicators

### Olive Oil

| (Thousand tonnes)     | EC 12   |         | Third countries |         | World |
|-----------------------|---------|---------|-----------------|---------|-------|
|                       | 1986-87 | 1987-88 | 1986-87         | 1987-88 |       |
| Production (1)        |         |         |                 |         |       |
| Olive Oil             | 1 190   | 1 428   | 424             | 270     | 1 614 |
| Edible Olive Marc Oil | 96      | 114     | 5               | 6       | 101   |
| Total                 | 1 286   | 1 542   | 429             | 276     | 1 715 |
| Consumption (1)       |         |         |                 |         |       |
| Olive Oil             | 1 326   | 1 335   | 435             | 438     | 1 761 |
| Edible Olive Marc Oil | 100     | 101     | 51              | 23      | 151   |
| Total                 | 1 426   | 1 436   | 486             | 461     | 1 912 |

(1) 1987-1988 Forecasts.

fatty acids. Neutral oil has the same biological qualities as virgin oil except the flavour and is thus blended with a greater or lesser percentage of virgin oil before being put on the market.

These two production techniques explain the differences in price between virgin and non-virgin oils.

### *Community Regulations*

Community regulations are designed to:

- give producers a guaranteed income (production subsidies)
- underpin the Community market (intervention price)
- facilitate the marketing of the product within the EC (consumption grants)
- assist exports (export compensation).

### *Production Structures*

5.3 million hectares of olives are under cultivation in the Community, corresponding to 544 million olive trees (4% of the surface of the Community). Over 2 million farmers rely on olive cultivation for at least part of their income:

approximately 900 000 in Italy, 550 000 in Spain, 350 000 in Greece, 200 000 in Portugal and 45 000 in France.

Production structures differ widely between countries. In Italy and Greece, olives are usually cultivated in regions where no other crops are possible and where the disappearance of olive cultivation would mean not only social but also ecological deterioration. The situation in Spain is quite different. Olives are cultivated over vast areas: they are harvested in bulk, and crushed in large-scale oil mills which usually belong to cooperatives. The oil obtained is generally refined there. The Spanish olive oil industry, over 70% of which is situated in the south of the country, has recently undergone far-reaching restructuring; considerable efforts have been made to improve profitability. Portugal and France face much less problems.

### *Consumption*

Spanish consumers are accustomed to blends of refined and virgin oil. The Greeks and the French consume mainly virgin olive oil. Italian consumers are divided equally between virgin oils and oils blended either with refined olive oil or olive pomace oil.

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# MARGARINE

(NACE 411.5)

*The margarine industry forms an important part of the EC oils and fats industry. It is composed of some 109 companies employing approximately 25 000 people and produces almost 25% of the world margarine output. A substantial part of the oils used for manufacturing margarine is obtained from Community-grown oilseeds. The largest producers are Germany, the UK and the Netherlands. The highest consumption per capita is in Denmark, the Netherlands and Belgium. Besides margarines, the industry is also engaged in the production of minarines. During the last few years, the industry has gone through an important period of restructuring, during which the numbers of both companies and employees were reduced.*

The principal product of the industry is margarine for consumers and professional use. Even though the definition of margarine varies from country to country, margarine can in general be defined as an emulsion of oil in water containing at least 80% fat of which not more than 3% is butter fat. However, these percentages may vary: in the UK and France, margarine can contain up to 10% butter fat, in Spain up to 50%. The second most important product is minarine, which differs from margarine in its fat content: it contains between 39% and 41% fat. Production of minarine is not allowed in all EC countries, for example Italy. In some EC countries, principally the UK and Ireland, the industry is also involved in the production of spreads and products which are mixtures of butter fat and non-butter fat in varying percentages.

## Current Situation

In 1987 the industry produced 1.76 million tonnes of margarine, including minarine and spreads. This represents

almost 25% of total world margarine production. The highest production was in Germany (470 000 tonnes), followed by the UK, the Netherlands, Belgium and France. Total EC margarine production increased from 1.7 million tonnes in 1978 to 1.8 million in 1982 but subsequently fell to 1.7 million in 1987. Most individual Member States have shown a similar pattern with the exception of Germany, where margarine production fell steadily from 518 700 tonnes in 1978 to 470 000 tonnes in 1987.

## Consumption Trends

The average consumption of margarine per capita in the EC was some 6.1 kg in 1987. For the EC as a whole, per capita consumption increased from 5.9 kg in 1979 to 6.3 kg in 1982. Since 1985 it has fallen to 6.1 kg per capita. Denmark has the highest per capita consumption (15.0 kg in 1987) followed by Belgium (13.8 kg) and the Netherlands (10.3 kg). Consumption of so-called solid fats is traditionally very low in the Mediterranean countries: margarine consumption in Italy was 1.2 kg per capita in 1987 and 1.3 in Spain.

## Export Trends

At present trade in margarine within the Community covers less than 15% of total production. The principal exporting countries are Belgium (66 000 tonnes in 1987), and the Netherlands (85 100 tonnes). The principal importing countries are the United Kingdom and France. Exports outside the EC are very low. Intra-Community trade in margarines and minarines has been gradually increasing in recent years; from well below 10% at the end of the 1970s, it has now risen to almost 15% of total production.

## Main Indicators Margarine

|                                     | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  | 1987  |
|-------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Production<br>(1 000 tonnes)        | 1 739 | 1 774 | 1 798 | 1 774 | 1 773 | 1 774 | 1 770 | 1 764 |
| Index                               | 100.0 | 102.0 | 103.4 | 102.0 | 102.0 | 102.0 | 101.8 | 101.4 |
| Consumption per capita<br>(kg/year) | 6.0   | 6.1   | 6.3   | 6.2   | 6.3   | 6.3   | 6.1   | 6.1   |

**Table I**  
**Margarine and Minarine Production**

| (Thousand tonnes) | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  | 1987  |
|-------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| BLEU              | 158   | 150   | 161   | 159   | 169   | 172   | 171   | 184   |
| Denmark           | 98    | 103   | 110   | 103   | 110   | 107   | 99    | 99    |
| Germany           | 511   | 518   | 516   | 500   | 483   | 466   | 470   | 470   |
| Greece            | 13    | 13    | 13    | 24    | 24    | 24    | 27    | 27    |
| Spain             | 46    | 47    | 47    | 54    | 57    | 59    | 64    | 67    |
| France            | 165   | 165   | 166   | 162   | 154   | 154   | 153   | 153   |
| Ireland           | 16    | 18    | 18    | 16    | 16    | 17    | 17    | 18    |
| Italy             | 69    | 72    | 72    | 68    | 64    | 65    | 65    | 68    |
| Netherlands       | 243   | 247   | 254   | 254   | 265   | 282   | 264   | 232   |
| Portugal          | 38    | 43    | 42    | 47    | 50    | 51    | 52    | 55    |
| United Kingdom    | 383   | 398   | 399   | 387   | 381   | 377   | 384   | 391   |
| Total             | 1 740 | 1 774 | 1 798 | 1 774 | 1 773 | 1 774 | 1 766 | 1 764 |

Source: IMACE.

**Table II**  
**Per Capita Consumption of Margarine**

| (Kilogrammes)  | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 |
|----------------|------|------|------|------|------|------|------|------|
| Belgium        | 11.8 | 11.8 | 12.6 | 12.9 | 13.6 | 13.8 | 13.7 | 13.8 |
| Denmark        | 16.8 | 17.2 | 18.3 | 16.9 | 16.8 | 16.3 | 15.0 | 15.0 |
| Germany        | 8.4  | 8.4  | 8.4  | 8.3  | 7.9  | 7.6  | 7.7  | 7.7  |
| Greece (1)     | 2.3  | 2.3  | 2.4  | 2.5  | 2.6  | 2.6  | 2.8  | 2.9  |
| Spain          | 1.0  | 1.1  | 1.1  | 1.2  | 1.2  | 1.2  | 1.3  | 1.3  |
| France         | 3.7  | 3.7  | 3.8  | 3.8  | 3.8  | 3.7  | 3.7  | 3.7  |
| Ireland        | 3.7  | 3.7  | 3.7  | 3.7  | 3.7  | 3.7  | 3.9  | 4.1  |
| Italy          | 1.2  | 1.3  | 1.3  | 1.3  | 1.2  | 1.2  | 1.2  | 1.2  |
| Netherlands    | 12.6 | 12.3 | 12.0 | 12.0 | 11.8 | 12.5 | 11.7 | 10.3 |
| Portugal       | 4.6  | 4.9  | 5.2  | 5.4  | 5.7  | 5.8  | 5.9  | 6.2  |
| United Kingdom | 7.0  | 7.4  | 7.5  | 7.4  | 7.4  | 7.3  | 7.4  | 7.5  |
| Total          | 6.0  | 6.1  | 6.3  | 6.2  | 6.3  | 6.3  | 6.1  | 6.1  |

(1) Estimate.

Source: IMACE.

### *Legislation*

Despite several attempts during the last 15 years, national legislation concerning margarine has still not been harmonized at EC level. In terms of advertising and taxation, margarine is still discriminated against in a number of EC countries compared with competing products. There are different VAT rates for margarine and butter in Belgium (19% and 6% respectively), France (18.6% and 5.5%) and Luxembourg. In some countries (Belgium and France) margarines must be clearly separated in displays and in others (Italy, Greece) there are limitations affecting distribution channels.

### *Industry Structure*

There were 109 companies in the European margarine industry on January 1986: 7 in Belgium, 14 in Denmark, 19 in Germany, 11 in Spain, 7 in France, 1 in Greece, 4 in Ireland, 19 in Italy, 15 in the Netherlands, 4 in Portugal and 8 in the United Kingdom.

IMACE: Association des Industries Margarinières des Pays de la CEE  
(Association of the Margarine Industry of EC Countries)

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# SLAUGHTERING, PREPARING AND PRESERVING OF MEAT

(NACE 412)

The European slaughtering, preparing and preserving of meat industry is highly developed and includes five major categories of activity:

- Slaughterhouses (NACE 412.1)
- Preserving and processing of meat (except poultry) (NACE 412.2)
- Killing, preparing and preserving of poultry (NACE 412.3)
- Manufacture of dripping, suet, tallow and other terrestrial animal fats and greases (NACE 412.4)
- Production of animal guts and meat offals (NACE 412.5)

Separate information is provided on the two sub-sectors, slaughterhouses and killing, preparing and preserving poultry. However, although the poultry sub-sector is clearly defined, the same is not true of the other sub-sectors. They can often overlap within the same establishment and are thus difficult to classify.

The main indicators given below concern the whole of the slaughtering, preparing and preserving of meat industries.  
UEEA: Union Européenne des Exploitants d'Abattoirs (EUROPEAN abattoir's Union)  
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**Main Indicators**  
**Slaughtering, Preparing and Preserving of Meat (except butchery)**

| (Million ECU)                  | 1980   | 1981   | 1982   | 1983   | 1984   | 1985   | 1986 |
|--------------------------------|--------|--------|--------|--------|--------|--------|------|
| Apparent consumption (1)       | 30 379 | 33 154 | 37 524 | 39 344 | 42 368 | 44 884 | N/A  |
| Net export earnings (1)        | -902   | -523   | -1 345 | -833   | -488   | -598   | -153 |
| Total Community production (1) | 29 477 | 32 631 | 36 179 | 38 511 | 41 880 | 44 286 | N/A  |
| Employment (1 000)             | 318    | 309    | 309    | 309    | 304    | 301    | 277  |

(1) EC 10: excluding Spain and Portugal.

**Table 1**  
**Slaughtering, Preparing and Preserving of Meat**

| (Million ECU)        | 1980   | 1981   | 1982   | 1983   | 1984   | 1985   | 1986  |
|----------------------|--------|--------|--------|--------|--------|--------|-------|
| Production (1)       |        |        |        |        |        |        |       |
| Current value        | 29 477 | 32 631 | 36 179 | 38 511 | 41 880 | 44 296 | N/A   |
| Index                | 100    | 110.7  | 122.7  | 130.6  | 142.1  | 150.2  | N/A   |
| Constant value       | 29 477 | 29 730 | 30 514 | 30 877 | 28 431 | 32 167 | N/A   |
| Index                | 100    | 100.8  | 103.5  | 104.7  | 96.5   | 109.1  | N/A   |
| Imports extra-EC (1) | 2 717  | 3 002  | 3 516  | 3 334  | 3 682  | 3 921  | 3 172 |
| Index                | 100    | 110.5  | 129.4  | 122.7  | 135.5  | 144.3  | 116.7 |
| Exports extra-EC (1) | 1 815  | 2 479  | 2 171  | 2 501  | 3 194  | 3 323  | 3 019 |
| Index                | 100    | 136.6  | 119.6  | 137.8  | 176.0  | 183.1  | 166.3 |
| Investment(1)        | 628    | 628    | 659    | 761    | 1 021  | 529    | N/A   |
| Index                | 100    | 100    | 104.9  | 121.2  | 162.6  | 84.2   | N/A   |

(1) Excluding Spain and Portugal.

Source: OSCE.



# SLAUGHTERHOUSES

(NACE 412.1)

The attempt to conduct a study of the European slaughterhouse industry was fraught with difficulties. There are no criteria which are valid for all Member States, due to the very great differences which exist in the rearing of animals for slaughter, marketing processes and the structures of individual companies involved, as well as in the legal basis of the industry itself.

## Current Situation

World meat production in 1987 was down compared to the previous year. Growth rates remained sluggish in the two major producers, the EC and the USA, and China stopped its rapid expansion. However, the growth rate in the USSR was 10% higher than in 1986. Slow growth in the EC and the USA was due to declining demand in world markets. China had difficulties with animal feedstuff supply. The rapid increase in output in the USSR was due to improved productivity.

The situation in Brazil continued to improve and production increased in Japan, Canada and Poland; it fell in Argentina and Uruguay and was stagnant in Australia and Oceania. Pork continued to dominate, although total output did not exceed the previous year. 36% of meat in the world came from ruminants, while the share of poultry rose to 22%, indicative of a worldwide trend in demand.

Demand for lean pork is growing, affecting slaughter weight. There was however a cyclical improvement in North America due to reasonable animal feedstuff prices over the last two years. Pork production increased in the EC, particularly in the Netherlands. The latest improvements in productivity in the USSR (+5%) can be attributed to greater motivation among producers, particularly in the private sector, as well as to higher protein feedstuffs.

Sheep farming was stimulated above all by steady wool prices in Australia and Uruguay. In New Zealand, which produces mostly lamb, the number of flocks decreased. Mutton and lamb production rose again in the EC, after a sharp drop in 1986 following the Chernobyl disaster.

World exports of beef fell in 1987, while exports of mutton and lamb rose slightly due to larger shipments from Australia and New Zealand. The EC, Japan, the Near East and North Africa remained the largest importers. The USA remained in first position but exported a large proportion to Japan.

The EC, which is the major wholesale exporter of beef, reduced shipments to the USSR and Eastern Europe but remained the chief supplier to the Near East and North Africa. Reduced exports and weak internal demand combined with strong production led to another increase in intervention stocks and a further decrease in domestic prices, not only for beef but also for poultry and pork.

There was also an increase in the quantities of pork periodically withdrawn from the market with the aid of the private storage system. Nominal support prices remained unchanged although the intervention authorities lowered their purchase prices as part of the Community effort to reduce budget expenditure on agriculture.

## Trends in Member States

### Germany

The slaughterhouse sector in Germany, as in the other countries of the Community, is characterized by considerable overcapacity, leading to stiffer competition and a growing tendency towards concentration. According to estimates, the three largest slaughtering firms account for some 50% of the sector's total revenue of 3.7 billion ECU. Revenue in the sector fell by 6% in 1987 as a result of continued pressure on

**Table I**  
**Number of Abbatoirs 1987**

|                    | Total number | Of which approved under G4/433 |
|--------------------|--------------|--------------------------------|
| Belgium            | 175          | 102                            |
| Luxembourg         | 6            | 6                              |
| Denmark            | 273          | 51                             |
| Germany (1)        | 350          | 299                            |
| Greece             | 430          | 7                              |
| Spain              | 476          | 46                             |
| France (2)         | 60           | 250                            |
| Ireland            | 854          | 45                             |
| Italy (3)          | 3 688        | 153                            |
| Netherlands (2)    | 221          | 1                              |
| United Kingdom (4) | 869          | 58                             |
| EC Countries       | 8 155        | 1 123                          |

(1) Total number - approximate.

(2) Approved - approximate.

(3) Approved - December 1986.

(4) England and Wales.

Source: UEEA.

**Table II**  
**Livestock Numbers**

| (Million head)                      | 1982-1984 average | 1985      | 1986      | 1987      |
|-------------------------------------|-------------------|-----------|-----------|-----------|
| <b>Bovine animals: World total</b>  | 1 381             | 1 400     | 1 410     | 1 429     |
| Developing countries                | 954               | 977       | 992       | 1 010     |
| Argentina                           | 54                | 54        | 53        | 53        |
| Brazil                              | 126               | 127       | 130       | 132       |
| China                               | 76                | 82        | 87        | 92        |
| India                               | 264               | 271       | 275       | 274       |
| Mexico                              | 30                | 31        | 32        | 33        |
| Developed countries                 | 427               | 423       | 418       | 415       |
| EC                                  | 85                | 85        | 84        | 82        |
| United States                       | 115               | 110       | 105       | 102       |
| USSR                                | 118               | 121       | 121       | 122       |
| Oceania                             | 31                | 31        | 31        | 32        |
| <b>Sheep and goats: World total</b> | 1 615             | 1 615     | 1 638     | 1 655     |
| Developing countries                | 1 061             | 1 049     | 1 064     | 1 075     |
| Argentina                           | 36                | 32        | 32        | 32        |
| China                               | 177               | 158       | 156       | 166       |
| Turkey                              | 67                | 62        | 58        | 54        |
| Developed countries                 | 554               | 566       | 574       | 580       |
| EC                                  |                   | 9093      | 95        | 95        |
| USSR                                | 152               | 149       | 147       | 146       |
| Oceania                             | 207               | 218       | 228       | 233       |
| <b>Pigs: World total</b>            | 778               | 795       | 823       | 838       |
| Developing countries                | 443               | 457       | 487       | 498       |
| Brazil                              | 32                | 32        | 33        | 34        |
| China                               | 301               | 307       | 331       | 337       |
| Developed countries                 | 335               | 338       | 336       | 340       |
| EC                                  | 94                | 95        | 96        | 98        |
| United States                       | 56                | 54        | 52        | 51        |
| <b>USSR</b>                         | <b>76</b>         | <b>78</b> | <b>78</b> | <b>80</b> |

**Meat Production**

| (Million tonnes)     |       |       |       |       |
|----------------------|-------|-------|-------|-------|
| <b>World total</b>   | 141.4 | 150.7 | 154.5 | 156.5 |
| Bovine meat          | 46.0  | 47.9  | 48.7  | 48.7  |
| Sheep and goat meat  | 8.0   | 8.3   | 8.4   | 8.5   |
| Pig meat             | 54.8  | 59.3  | 60.6  | 60.5  |
| Poultry meat         | 29.0  | 31.5  | 33.0  | 35.0  |
| Other meat           | 3.6   | 3.7   | 3.8   | 3.8   |
| Developing countries | 49.4  | 55.2  | 57.2  | 57.3  |
| Bovine meat          | 13.7  | 14.4  | 14.5  | 14.6  |
| Sheep and goat meat  | 4.4   | 4.6   | 4.7   | 4.8   |
| Pig meat             | 20.1  | 23.7  | 24.9  | 24.3  |
| Poultry meat         | 9.3   | 10.5  | 11.0  | 11.5  |
| Other meat           | 1.9   | 2.0   | 2.1   | 2.1   |
| Developed countries  | 92.0  | 95.5  | 97.3  | 99.2  |
| Bovine meat          | 32.3  | 33.5  | 34.2  | 34.1  |
| Sheep and goat meat  | 3.6   | 3.7   | 3.7   | 3.7   |
| Pig meat             | 34.7  | 35.6  | 35.7  | 36.2  |
| Poultry meat         | 19.7  | 21.0  | 22.0  | 23.5  |
| Other meat           | 1.7   | 1.7   | 1.7   | 1.7   |

Census data generally refers to the beginning of the year indicated. Weight given is carcass weight, excluding slaughter fats and offals. Source: FAO, Rome.

prices combined with an insignificant quantitative decrease in gross domestic meat production.

Overall meat consumption as well as consumption of different types of meat should hardly change in 1988. Despite lower production, price levels are unlikely to rise much. However,

concentration among buyers and overcapacity in slaughtering will increase price undercutting.

In purchasing, overcapacity leads to live weight prices which do not match slaughtering costs and possible sale prices. If cattle stocks are reduced as a result of political decisions concerning agricultural policy, undercutting will increase.

In sales, concentration in the food retailing sector, the meat processing industry and in external markets will also lead to increased competition. As meat is in general a relatively uniform product, factors such as price, conditions and modes of payment become more and more important as a means of gaining a competitive edge in a climate of increasing competition. Commercial firms end up by becoming finance houses. This situation is also brought about by industrial groups which have a market strength corresponding to their turnover potential and whose commercial policies are not oriented so much towards profit as a priority, but rather towards extending their market share. Given that industrial groups can also benefit from improved refinancing possibilities, they are able to last out a period of undercutting until the market shares they win match available slaughtering capacity.

In an emerging buyer's market, buyers are also tending to increase their quality demands. The industry is trying to avoid food retailers' demands for extended expiry dates and the danger of recalls by transferring the risk to the slaughterhouses. Consumers are also demanding ever higher quality. However, all purchasers are agreed that higher quality must not mean higher prices.

These general market developments are encouraging the trend towards increasingly larger production units, both for maximum rationalization (e.g. the optimum exploitation of slaughtering by-products) and for deliveries to an increasingly risky market.

In this situation, two solutions to the problems of small and medium-sized private export slaughterhouses are possible:

- several slaughterhouses joining together to form a single unit in order to counterbalance the market power of large-scale slaughtering concerns. (This form of collaboration could be applied to individual sectors, the purchase of cattle for example)
- exploiting market niches.

The slaughterhouse tries to produce a quality product by using the most efficient technology, hygiene procedures, etc. so as to break away from discussions concerning prices and conditions and to obtain reasonable profits despite a relatively small revenue volume. In this way, the slaughterhouse attempts to give mass-produced meat added value from the purchasers' point of view.

**Table III**  
**Foreign Trade in Live Animals and Meat**

| (Thousand tonnes)       | Imports            |       |       |       | Exports           |       |       |       |
|-------------------------|--------------------|-------|-------|-------|-------------------|-------|-------|-------|
|                         | 1982--1984 average | 1985  | 1986  | 1987  | 1982-1984 average | 1985  | 1986  | 1987  |
| World total (1)         | 8 854              | 9 062 | 9 547 | 9 650 | 9 492             | 9 571 | 9 908 | 9 950 |
| Bovine meat             | 3 995              | 4 095 | 4 601 | 4 300 | 4 274             | 4 210 | 4 620 | 4 200 |
| Sheep and goat meat     | 1 030              | 1 006 | 1 005 | 1 050 | 1 060             | 970   | 987   | 1 050 |
| Pig meat                | 1 413              | 1 630 | 1 549 | 1 700 | 1 647             | 1 977 | 1 826 | 2 050 |
| Poultry meat            | 1 332              | 1 185 | 1 271 | 1 450 | 1 392             | 1 266 | 1 328 | 1 500 |
| Other meat (2)          | 1 084              | 1 146 | 1 121 | 1 150 | 1 119             | 1 148 | 1 147 | 1 150 |
| Developing countries    | 3 562              | 3 550 | 3 859 | 3 620 | 2 959             | 2 796 | 2 807 | 2 650 |
| Bovine meat             | 1 411              | 1 413 | 1 634 | 1 250 | 1 633             | 1 454 | 1 438 | 1 250 |
| Sheep and goat meat     | 553                | 567   | 598   | 600   | 227               | 192   | 217   | 200   |
| Pig meat                | 403                | 406   | 412   | 450   | 480               | 547   | 562   | 600   |
| Poultry meat            | 862                | 769   | 832   | 950   | 382               | 380   | 384   | 400   |
| Other meat (2)          | 333                | 395   | 383   | 370   | 237               | 223   | 206   | 200   |
| Developed countries (1) | 5 292              | 5 512 | 5 688 | 6 030 | 6 533             | 6 775 | 7 101 | 7 300 |
| Bovine meat             | 2 584              | 2 682 | 2 967 | 3 050 | 2 641             | 2 756 | 3 182 | 2 950 |
| Sheep and goat meat     | 477                | 439   | 407   | 450   | 833               | 778   | 770   | 850   |
| Pig meat                | 1 010              | 1 224 | 1 137 | 1 250 | 1 167             | 1 430 | 1 264 | 1 450 |
| Poultry meat            | 470                | 416   | 439   | 500   | 1 010             | 886   | 944   | 1 100 |
| Other meat (2)          | 751                | 751   | 738   | 780   | 882               | 925   | 941   | 950   |

Import and export values include live animals and meat (fresh chilled, frozen, prepared and canned) in carcass weight equivalent. Differences between figures given for total exports and total imports may be due to: the time lag between the dispatch of goods from the exporting country and their arrival in the importing country; the use of a different classification of the same product by different countries; or the fact that some countries supply trade data on general trade while others give data on special trade, etc.

(1) Excluding intra-EC trade.

(2) Includes edible offal.

**Table IV**  
**Meat Prices of International Significance**

| (Per kilogramme) | National currency | 1982-1984 average | 1985 | 1986 | 1987 | 1987<br>\$US (1) |
|------------------|-------------------|-------------------|------|------|------|------------------|
| <b>Cattle:</b>   |                   |                   |      |      |      |                  |
| EC               | ECU               | 1.59              | 1.57 | 1.47 | 1.41 | 3.10             |
| USA              | USD               | 1.41              | 1.29 | 1.27 | 1.40 | 2.68             |
| Australia        | USD               | 1.43              | 1.69 | 1.83 | 1.94 | 1.36             |
| <b>Beef:</b>     |                   |                   |      |      |      |                  |
| USA              | USD               | 2.22              | 2.03 | 1.93 | 2.21 | -                |
| Argentina        | USD               | 1.19              | 1.11 | 1.34 | 1.51 | -                |
| <b>Pig:</b>      |                   |                   |      |      |      |                  |
| EC               | ECU               | 1.58              | 1.58 | 1.46 | 1.30 | 1.48             |
| USA              | USD               | 1.13              | 1.00 | 1.15 | 1.21 | 1.51             |
| <b>Lamb:</b>     |                   |                   |      |      |      |                  |
| UK               | UKL               | 1.34              | 1.45 | 1.47 | 1.46 | 2.34             |
| <b>Poultry:</b>  |                   |                   |      |      |      |                  |
| USA              | USD               | 0.66              | 0.66 | 0.77 | 0.65 | 0.93             |
| USA              | USD               | 0.90              | 1.06 | 0.97 | 0.78 | 1.11             |
| FR of Germany    | DM                | 2.03              | 2.05 | 1.88 | 1.74 | 1.36             |

Price specifications:

**Cattle:** EC- Adult cattle, weighted average, live weight. USA- Slaughter steers, choice, Omaha, live weight. Australia- Oxen and/or heifers, first and second quality, slaughter weight.

**Beef:** USA Boneless cow beef, Australian manufacturing, c.i.f.. Argentina- All beef, average unit value of exports, f.o.b., carcass weight equivalent.

**Lamb:** USA New Zealand PLS, carcasses, Smithfield.

**Pig:** EC- Weighted average, slaughter weight. USA- Barrows and gilts, weighted average, Omaha, live weight.

**Poultry (live weight):** USA- Average producer price for broilers. USA- Average producer price for turkeys. FR of Germany Average producer price for broilers.

(1) Live weight prices converted into slaughter weight using standard conversion factors.

Source: FAO.

**Table V**  
**Industry Structure in Germany**

|      | Number of firms | Revenue in million ECU | Share of x largest firms as a % of total turnover |      |      |      |      |
|------|-----------------|------------------------|---|------|------|------|------|
|      |                 |                        | 3   | 6    | 10   | 25   | 50   |
| 1981 | 100             | 2 900                  | 39.9  | 52.2 | 60.3 | 79.2 | (1)  |
| 1982 | 101             | 3 200                  | 40.5  | 53.7 | 62.6 | 79.7 | 93.5 |
| 1983 | 104             | 3 400                  | (1)   | 53.2 | 62.7 | 79.7 | 93.4 |
| 1984 | 101             | 3 500                  | (1)   | 53.9 | 63.7 | 81.1 | 94.1 |
| 1985 | 101             | 3 700                  | (1)   | 51.4 | 62.6 | 81.5 | 94.7 |
| 1986 | 102             | 4 000                  | (1)   | (2)  | (2)  | (2)  | (2)  |
| 1987 | (2)             | 7.9                    | (1)   | (2)  | (2)  | (2)  | (2)  |

(1) Not published because confidential.

(2) Not yet available.

Source: Statistics Bundesamt, Wiesbaden.

In conclusion, the slaughterhouse industry is the fourth most important branch of the food and drink industry.

There are some 400 authorized exporting firms, about 100 of which are of a significant size. Three firms represent some 50% of annual revenue.

#### France

Some 36 million animals were slaughtered by 602 firms in France in 1986, 22 firms and 11 500 animals less than in 1985. This corresponds to a total of 3.473 million tonnes compared to 3.461 million tonnes in 1985, a rise of 0.3%.

Total tonnage has been growing by 1.87% annually since 1969, whereas the number of firms has dropped from 1 393 to 602.

Slaughtering is divided between the private and the public sector, which are developing in completely different directions, both in the number of slaughterhouses and the volume processed. The number of public sector slaughterhouses is falling (from 745 in 1975 to 452 in 1986), while the number in the private sector rose continually until 1985 (from 135 in 1975 to 151 in 1985, then 150 in 1986).

The same trend is true of volume processed, which has been falling in the public sector since 1975. Approximately one-third of all slaughtering was being done in the private sector in 1985; in 1986 this had already risen to a half, accounting

for 1.716 million tonnes of meat (49.4%) as against 1.757 million tonnes (50.6%) in public slaughterhouses.

The breakdown of total volume slaughtered is as follows:

- 43.8% beef (62% public, 38% private)
- 41.3% pork (32% public, 68% private)
- 9.8% veal (66% public, 43% private)
- 4.5% sheep and goats (80% public, 20% private)
- 0.6% solid-hoofed animals (79% public, 21% private).

The public sector is dominant except in the pork sector.

The beef and veal sector is the most significant, representing 53.6% of total volume.

369 (61%) of the 602 slaughterhouses have export licences, processing 3.225 million tonnes (93% of total volume). 248 (41%) are in the public sector, processing 1.612 million tonnes, and 121 (20%) in the private sector, processing 1.614 million tonnes. Thus 223 firms, processing 247 645 tonnes (7% of total volume), do not have export licences; of these, 204 are public sector (145 916 tonnes) and 29 private sector (101 738 tonnes).

In the period 1970-1985, average annual tonnage rose from 2 033 tonnes per year to 5 769 tonnes per year, an annual growth of +6.7%. Figures for individual firms are:

**Table VI**  
**Meat Slaughtering and Processing in Germany**

|                              | 1980    | 1981    | 1982    | 1983    | 1984    | 1985    | 1986    | 1987    |
|------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|
| Revenue (million ECU) ex-tax | 2 701   | 2 846   | 3 202   | 3 267   | 3 525   | 4 001   | 3 978   | 3 808   |
| Employees                    | 11 396  | 10 995  | 10 913  | 10 725  | 11 052  | 12 091  | 12 219  | 12 579  |
| Labour hours (1000/yr)       | 18 026  | 16 216  | 16 930  | 16 785  | 18 061  | 19 522  | 19 451  | 19 743  |
| Wages (1 000 ECU)            | 100 281 | 102 554 | 108 314 | 114 296 | 125 267 | 140 375 | 153 942 | 167 382 |
| as % of revenue              | 3.7     | 3.6     | 3.4     | 3.5     | 3.5     | 3.5     | 3.5     | 4.4     |

Source: BDV, Bonn.

**Table VII**  
**Concentration of Activity**

| <b>(Class)</b>    |     | 40 000 T | 20 000 T  | 15 000 T  | 10 000 T  | 5 000 T   | Total     |
|-------------------|-----|----------|-----------|-----------|-----------|-----------|-----------|
| All abattoirs     | No. | 13       | 36        | 49        | 93        | 186       | 602       |
|                   | %   | 2.15     | 5.98      | 8.13      | 15.44     | 30.89     | 100       |
|                   | T   | 774 028  | 1 373 542 | 1 593 907 | 2 136 571 | 2 792 743 | 3 472 920 |
| Public abattoirs  | %   | 22.28    | 39.55     | 45.89     | 61.52     | 80.41     | 100       |
|                   | No. | 0        | 12        | 22        | 47        | 110       | 452       |
|                   | %   | 0        | 2.65      | 4.86      | 10.39     | 24.3      | 100       |
| Private abattoirs | T   | 0        | 292 094   | 459 268   | 778 972   | 1 229 717 | 1 757 366 |
|                   | %   | 0        | 16.62     | 26.13     | 44.32     | 69.97     | 100       |
|                   | No. | 13       | 24        | 27        | 46        | 76        | 150       |
|                   | %   | 8.66     | 16.00     | 18.00     | 30.66     | 50.66     | 100       |
|                   | T   | 774 028  | 1 081 448 | 1 134 638 | 1 357 599 | 1 563 025 | 1 715 553 |
|                   | %   | 45.11    | 63.03     | 66.13     | 79.13     | 91.10     | 100       |

Class given in equivalent carcass tonnes.  
Source: OFIVAL, Paris.

- from 1837 to 3888 tonnes for public sector slaughterhouses (+ 4.8% per year); the figure for 1985 was 3 815 tonnes
- from 3 729 to 11 437 tonnes for private firms (+ 7.2% per year); the figure for 1985 was 10 970 tonnes.

The trend towards concentration is continuing as a result of various modernization measures on the one hand and increasing capacity in certain firms on the other, leading to the closure of many - mostly small - firms.

Only one public sector slaughterhouse slaughtered more than 30 000 tonnes in 1986 (in 1985 there were none), whereas the largest private firm slaughters over 80 000 tonnes per year.

It should be pointed out that an increasing number of public sector slaughterhouses are managed by private firms, meaning that almost the entire tonnage is in effect accounted for by the private sector.

### Italy

According to the latest ISTAT figures, there are some 2 700 active slaughterhouses. 1 900 public sector slaughterhouses process 20%-25% of national production, 770 private firms and cooperatives process 65%-70%. The remainder is processed by local firms.

The continuing fall in the number of slaughterhouses is indicative of the difficult situation in Italy. According to a royal decree of 1901, every community with over 6 000 inhabitants is obliged to maintain a public slaughterhouse; this explains the high, though declining, number of public sector firms.

For technical reasons it was not possible to obtain sufficient official information to give an exact picture of the industry structure in Italy.

**Table VIII**  
**Meat Slaughtering and Processing in France**

|  | 1980   | 1981   | 1982   | 1983   | 1984   | 1985   | 1986   |
|--|--------|--------|--------|--------|--------|--------|--------|
| <b>Enterprises with more than 10 employees</b> |        |        |        |        |        |        |        |
| Revenue (million ECU)                          | 4 805  | 5 426  | 5 738  | 6 562  | 7 749  | 8 217  | 8 970  |
| Employees                                      | 24 357 | 24 240 | 23 732 | 25 564 | 29 195 | 29 871 | 31 655 |
| Labour hours (1 000/yr)                        | 53 585 | 53 328 | 52 210 | 55 970 | 52 551 | 53 767 | 56 979 |
| Wages (million ECU)                            | 220.4  | 238.1  | 248.0  | 283.4  | 338.5  | 380.6  | 417.5  |
| as % of revenue                                | 4.6    | 4.4    | 4.3    | 4.3    | 4.4    | 4.6    | 4.7    |
| <b>Enterprises with less than 10 employees</b> |        |        |        |        |        |        |        |
| Revenue (million ECU)                          | 516    | N/A    | N/A    | N/A    | N/A    | N/A    | 687    |
| Employees                                      | 1 667  | N/A    | N/A    | N/A    | N/A    | N/A    | 1 478  |
| Labour hours (1 000/yr)                        | 1 714  | N/A    | N/A    | N/A    | N/A    | N/A    | 1 777  |
| Wages (million ECU)                            | 14.6   | N/A    | N/A    | N/A    | N/A    | N/A    | 21.3   |
| as % of revenue                                | 2.8    | N/A    | N/A    | N/A    | N/A    | N/A    | 3.1    |

Source: OFIVAL, Paris.

**Table IX**  
**Slaughterhouse Industry Indicators in the UK**

| (Million Ecu)                                       | 1984    | 1985    | 1986   |
|---|---------|---------|--------|
| Enterprises (number)                                | 817     | 755     | 727    |
| Establishments (number)                             | 861     | 785     | 749    |
| Employment (1000)                                   | 15.8    | 17.0    | 16.0   |
| Wages and salaries                                  | 176.4   | 206.4   | 178.1  |
| Total sales and work done                           | 4 284   | 4 454   | 3 657  |
| Gross output  | 4 335.7 | 4 452.5 | 3 659  |
| Net output  | 627.8   | 588     | 465.9  |
| Gross value added, factor cost                      | 515.2   | 456.2   | 363.2  |
| Net capital expenditure                             | 32.7    | 51.8    | 28     |
| Operating ratios                                    |         |         |        |
| Ratio of gross output to stocks                     | 62.1    | 57.9    | 55.0   |
| Gross output (ECU/head)                             | 274.1   | 262.4   | 228.8  |
| Net output (ECU/head)                               | 39 693  | 34 653  | 29 137 |
| Gross value added (ECU/head)                        | 32 579  | 26 886  | 22 703 |
| Wages and salaries (ECU/head)                       | 11 109  | 12 070  | 11 142 |
| Net capital expenditure (ECU/head)                  | 2 089   | 3 053   | 2 646  |
| Gross value added as a % of gross output            |         |         |        |
| Wages and salaries as a % of gross value added      | 35      | 45      | 49     |
| Net capital expenditure as a % of gross value added | 6       | 11      | 8      |

Source: Business Statistics Office, PA 412.

## United Kingdom

Because of national disparities it has not been possible to obtain fully-detailed information this year. Comprehensive statistical information is expected to be available next year.

In 1985, 13 plants representing 8% of the national slaughtering total took part in a national exercise and declared a combined turnover equivalent to 426 million ECU. On this basis, the national turnover for 1985 would be 5.4 billion ECU and might be assessed as 5.0 billion ECU for 1987.

It is estimated that there are some 20 000 people employed in the slaughtering industry, including both production workers and general staff.

Working hours vary according to the time of year and of course according to the livestock available: there are times when employees are on a very short working week and others when they could be very busy. After allowing for both holidays and overtime, a figure of 2 000 hours per employee per year is reasonably accurate.

There are varying salary levels within the abattoir and a wide range according to type of job. We estimate that the average for slaughtermen would be around 19 000 ECU per year, 14 000 ECU to 16 000 ECU per year for meat cutters, etc., and 9 000 ECU per year for ancillary workers.

**Table X**  
**Classification of Business by Employment Size in the UK**

| Employment size<br>(Number of units) | Slaughterhouses |                 |                              | Bacon Curing/Meat Processing |                    |                 |
|--------------------------------------|-----------------|-----------------|------------------------------|------------------------------|--------------------|-----------------|
|                                      | 1985            | 1986            | 1987                         | 1985                         | 1986               | 1987            |
| 1-9                                  | 525             | 531             | 498                          | 397                          | 385                | 401             |
| 10-19                                | 109             | 115             | 109                          | 125                          | 146                | 155             |
| 20-49                                | 109             | 90              | 69                           | 142                          | 128                | 139             |
| 50-99                                | 55              | 44              | 50                           | 60                           | 60                 | 54              |
| 100-199                              | 27              | 25              | 32                           | 57                           | 59                 | 49              |
| 200-499                              | 12              | 12              | 60                           | 48                           | 52                 |                 |
| 500-999                              | -               | -               | -                            | 16                           | 22                 | 22              |
| 1000 +                               | -               | -               | -                            | 7                            | 6                  | 6               |
| Total<br>(number of employees)       | 832<br>(15 772) | 817<br>(16 077) | 770<br>(16 896)              | 864<br>(61 136)              | 854<br>(58 627)    | 878<br>(59 364) |
| <hr/>                                |                 |                 |                              |                              |                    |                 |
|                                      |                 |                 | Poultry Slaughter/Processing |                              | Animal By-products |                 |
| (Number of units)                    | 1985            | 1986            | 1987                         | 1985                         | 1986               | 1987            |
| 1-9                                  | 75              | 74              | 84                           | 73                           | 70                 | 67              |
| 10-19                                | 17              | 23              | 14                           | 26                           | 22                 | 18              |
| 20-49                                | 20              | 16              | 18                           | 32                           | 33                 | 27              |
| 5-99                                 | 14              | 12              | 10                           | 13                           | (2)                | 14              |
| 100-199                              | 15              | 18              | 13                           | (2)                          | (2)                | (2)             |
| 200-499                              | 31              | 34              | 36                           | -                            | -                  | -               |
| 500-999                              | 5               | 8               | 9                            | -                            | -                  | -               |
| 1000 +                               | 4               | 3               | 4                            | -                            | -                  | -               |
| Total<br>(no. of employees)          | 181<br>(22 526) | 188<br>(25 445) | 188<br>(27 567)              | 148<br>(3 783)               | 143<br>(3 522)     | 130<br>(3 382)  |

(1) Employment size figures are based on VAT returns and the totals therefore will therefore not necessarily be the same as the corresponding figures in Table IX which are based on the Census of Production.

(2) Figures not shown in order to protect confidentiality.

Source: Business Statistics Office, PA 1003.

The latest MLC figures showed that in 1985, salaries for production staff represented 3.5% of turnover and for general staff 0.9% of turnover.

### Greece

In Greece the main problem is the under-use of capacity. At present only 50% of the existing available infrastructure is used for slaughtering. Due to the poor financial situation there are practically no production figures for existing firms, which survive principally on State subsidies.

Some 2 000-2 500 people are employed in the slaughtering industry though this figure is declining due to increasing rationalization. Attempts are being made to close the majority of small and mostly unprofitable firms and to construct a few new large installations. (The government's planned rationalization programme is aiming to reduce the number of slaughterhouses from 400 to 40 over a maximum period of 10 years. Under this programme, community and publicly-owned installations will be taken over by cooperatives or private firms.) This solution does not however solve the problem of the small islands. It is expected that home slaughtering, essentially for individual needs, will continue for the foreseeable future.

Working hours are 2 days per week in large slaughterhouses and 1 day per week in smaller ones. On the basis of 8 working hours per day and 46 working weeks per year, annual average working hours is 736.

### Ireland

Cattle production and related industries represent the leading activity in the agricultural sector in Ireland, accounting for 37.5% of total agricultural output.

Exports of meat and livestock represent 1.4 billion ECU annually. The sector is thus relatively significant in the Irish economy.

Production of goat meat, mutton and lamb has risen over the last ten years, and cattle rearing has also increased.

EC agricultural policies (lower milk quotas) have not however been without effect: recently beef production has fallen considerably.

Until the mid-1960's, livestock was the largest category of this type of export. Meat exports have been increasing steadily since then, and the slaughtering industry has become correspondingly more significant.

This is linked to an increased production of goods with higher value added content than was the case in the past.

It is difficult to make a precise distinction between the slaughtering industry and the processing industry. These sectors are dominated by small private firms which are often not prepared to provide figures concerning investment and profit.

The figures in the table below illustrate the development of the slaughterhouse and processing sectors. 90% of turnover is accounted for by slaughtering and boning installations, the remaining 10% by processing firms.

50% of employees are employed in slaughterhouses, the other 50% in processing firms.

**Table XI**  
**Meat Slaughtering and Processing Industry**  
**in Ireland**

| (Million Ecu)   | 1980    | 1981    | 1982    | 1983    | 1984    |
|-----------------|---------|---------|---------|---------|---------|
| Revenue         | 1 343.6 | 1 312.7 | 1 481.3 | 1 575.6 | 1 851.4 |
| Employees       | 11 426  | 10 546  | 10 346  | 9 954   | 10 402  |
| Wages           | 88.8    | 90.0    | 101.6   | 103.1   | 106.3   |
| as % of revenue | (6.6)   | (6.9)   | (6.9)   | (6.5)   | (5.7)   |

Source: IMPA, Dublin.

Information and statistics on other Member States is not currently available, although it is to be hoped that these failings will be remedied by next year and that in coming years a more complete report on the situation in the slaughtering industry in the EC will be available in the future.

UEEA: Union Européenne des Exploitants d'Abattoirs (European Abattoir's Union)

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# POULTRY

(NACE 412.3)

*Since the establishment of the European Community, the structures of the poultrymeat sector have changed considerably like those of other agricultural and industrial sectors. The trend has been towards an increasing volume of production, differentiation of products and concentration of production, both geographically and in structural terms. The outlook for growth in the world market in general and the European market in particular is very favourable. There are two reasons for this; the first is due to the price difference from other meats, and the second stems from a growing consumer preference for poultry due to its taste and nutritional value.*

## Current Situation

The EC is the second largest producer of poultrymeat after the USA. In 1987, the EC produced 5.7 million tonnes of poultrymeat and exported 377 000 tonnes. The rate of self-sufficiency is 105.3%. Broiler chickens represent about 75% of total production.

Turkeymeat is the second most important poultry product. The figures show that in 1987 the EC produced 894 000 tonnes of turkeymeat, which represents an increase of 5.5% compared with 1986. The per capita consumption of turkeymeat in the EC is about 2.7 kg per annum.

By comparison with other agricultural sectors, the poultrymeat sector of the EC is subject to very liberal market organization. There are no guaranteed prices or intervention systems, nor does the poultrymeat sector have any system providing aid to private stocks. In principle, poultrymeat can therefore move freely from one Member State to another. As far as trade relations with third countries are concerned, the

present market organization for poultrymeat includes a system of export restitutions to compensate for the difference in cereal prices at world market level and within the European Community, as well as a system of sluiceway prices and import levies to prevent products from third countries being imported at unfair prices.

The poultrymeat sector in the EC also differs in other respects from other agricultural sectors. For instance, there is no possibility of obtaining aid for the establishment of poultry farms, except in cases where environmental protection is involved. Aid from public funds may be granted for modernization of slaughtering plants, but not for an increase in productive capacity. In its administration of the market organization, the EC Commission makes every effort to ensure that products can move as freely as possible from one market to another.

In 1971, the EC Commission presented a proposal for a Council Regulation on marketing standards for poultrymeat. That proposal was never adopted, but its main principles were later adopted by the United Nations' Economic Commission for Europe and have now been tested in practice for two and a half years with good results. The UN/EC marketing standards are subject to current revisions made on the basis of practical experience.

Common EC standards for the water content of frozen poultrymeat are laid down in a Council Regulation. These standards determine the maximum water content in poultrymeat, but certain misunderstandings have arisen due to different testing methods, and the EC Commission has now taken steps to carry out experiments in several Member States to decide whether it will be necessary to amend the Council Regulation of 1976 on water content. The main object is to

## Main Indicators Poultry

| (Thousand tonnes)              | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  | 1986  | 1987  |
|--------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Apparent consumption (1)       | 3 752 | 3 786 | 3 937 | 4 003 | 4 048 | 4 141 | 4 308 | 5 223 | 5 453 |
| Net exports (1)                | + 257 | + 416 | + 361 | + 380 | + 291 | + 238 | + 258 | + 260 | + 289 |
| Change in stocks (1)           | + 11  | - 5   | + 99  | - 72  | - 8   | - 4   | - 36  | - 36  | 0     |
| Total Community production (1) | 4 020 | 4 197 | 4 397 | 4 311 | 4 331 | 4 375 | 4 530 | 5 447 | 5 742 |

(1) 1980-1986: EC 10 (excluding Spain and Portugal), 1986-1987: EC 12.

**Table I**  
**Production and Foreign Trade**

| (Thousand tonnes)    | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  | 1986  | 1987  |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Production (1)       | 4 020 | 4 197 | 4 397 | 4 311 | 4 331 | 4 375 | 4 530 | 5 447 | 5 742 |
| Index                | 100   | 104   | 109   | 107   | 108   | 109   | 113   | N/A   | N/A   |
| Imports extra-EC (1) | 78    | 48    | 65    | 61    | 75    | 85    | 77    | 78    | 88    |
| Index                | 100   | 62    | 83    | 78    | 96    | 109   | 99    | N/A   | N/A   |
| Exports extra-EC (1) | 335   | 464   | 426   | 441   | 366   | 323   | 335   | 338   | 377   |
| Index                | 100   | 139   | 127   | 132   | 109   | 96    | 100   | N/A   | N/A   |
| X/M                  | 4.3   | 9.7   | 6.6   | 7.2   | 4.9   | 3.8   | 4.4   | 4.3   | 4.3   |

(1) 1980-1986: EC 10 (excluding Spain and Portugal), 1986-1987: EC 12.  
Source: Eurostat.

remove any obstacles to intra-Community trade that may be due to different testing methods.

The rules on health inspection of poultrymeat are laid down in a Council Directive on health problems affecting trade in fresh poultrymeat. However, the interpretation of the provisions of this Directive differs considerably from one member country to another, and so do the inspection charges paid by the processing plants in the various member countries. In order to harmonize these charges, the EC Commission has presented a proposal for a Council Directive laying down a minimum fee to be collected for health inspection in all member countries.

It has sometimes been suggested that there should be better intervention in the market for poultrymeat. However, this might prove to be a disadvantage in view of the short production period. In some fields, however, certain intervention measures have been carried out successfully, for instance in member countries where egg-laying hens have been slaughtered to prevent overproduction of eggs. But in order to obtain the desired result, it is advisable to ensure that such measures are carried out at EC level.

### *Consumption Trends*

Since the last critical period in 1982-83, the poultrymeat sector has made great efforts to keep production in step with the market demand. Although consumption has increased from 3.9 million tonnes in 1982 to 5 million tonnes in 1987, the threat of over-production has had the effect of depressing the

price for poultrymeat. This should also be seen in the light of the situation on export markets. The keen competition in the world market, especially from the USA, has made it very difficult for European exporters to dispose of production surpluses in third country markets. In 1985, the USA included poultrymeat in their Export Enhancement Program, and since then, the substantial subsidies granted to American poultrymeat exporters have made it possible for them to gain access to traditional European export markets. In 1986, American broiler exports increased by 30%, and the same happened in 1987. The consequences of the American export policy could have been disastrous for the European poultrymeat industry, if the EC Commission had not granted an increase of the EC export restitutions.

### **Forecast and Outlook**

As far as the demand for poultrymeat is concerned, per capita consumption in the EC has increased from 10.6 kg in 1976 to 16.9 in 1987. A further increase may be expected; in the USA, the per capita consumption has now reached a level of no less than 33.9 kg. Poultrymeat is gaining an increasing share of total per capita consumption of meat in all important parts of the world, and this development is expected to continue. In several important markets, poultrymeat is even expected to be the most common kind of meat, and consumption of poultrymeat continues to increase even in periods when prices go up.

At the same time, however, international trade in poultrymeat continues to decrease. One of the reasons for this

**Table II**  
**Turkey Meat**  
**1987**

|                                 | BLEU | DK  | D   | GR  | E   | F   | IRL | I   | NL  | P   | UK  | EC  |
|---------------------------------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Production (1 000 tonnes) (1)   | 4    | 2   | 79  | 3   | 19  | 308 | 17  | 242 | 25  | 26  | 167 | 89  |
| Consumption per capita (kg) (1) | 1.2  | 0.3 | 2.1 | 0.3 | 0.6 | 4.5 | 4.2 | 4.2 | 1.4 | 2.9 | 2.8 | 2.7 |

(1) Estimated figures.  
Source: AVEC.

decline is increasing home production in traditional export markets, for instance in a number of Middle Eastern countries, where a considerable increase in poultry production is expected. Recent consumer inquiries seem to indicate that future generations will have a preference for poultrymeat because of its special culinary and nutritional qualities. The rapid evolution in the field of further processed poultry products also predicts a fairly bright future for the poultry sector. Competition is certain to intensify, however, and the European poultrymeat sector must be prepared for an

uncertain situation, both at national and international level, and plan its future production very carefully according to the market trend. In the long run, however, there is no doubt that poultrymeat will gain an increasing share of the total meat market.

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# DAIRY PRODUCTS

(NACE 413)

The principal dairy products manufactured in the EC are liquid milk, butter (and butteroil), cheese (natural and processed), fresh products (cream, fermented milk, desserts, fresh cheese) and preserved milk (principally skimmed and whole milk powder, sweetened condensed and evaporated milk); others such as casein and whey products are less significant in certain EC Member States, but are growing in importance as the use of ultrafiltration spreads, allowing dairies greater manufacturing flexibility by breaking milk down into higher value-added components.

## Current Situation

Cheese consumption continues to grow slowly, although consumption of fresh cheese, cream and fermented milks (particularly yoghurt) is expanding at a slightly faster rate. Overall, butter consumption has fallen slightly as mixed fat products develop a niche for themselves in an increasing number of Member States. Liquid milk consumption is stagnating, although this masks a trend toward increased consumption of low fat milks to the detriment of full cream milk. Production of low fat milk powder has fallen since the introduction of milk quotas and since 1987, when the EC intervention system was modified to restrict access according to time and price criteria.

## Major Structural and Geographical Features

The main milk producing areas by Member State are in the west in Denmark (Jutland and Fuenen) and the UK (West Country, Shropshire, Cheshire, Lancashire), and in France (Basse Normandie, Bretagne, Pays de la Loire), in the north in Spain (Santander, Galicia, etc.), in Greece (Macedonia, Thrakis), in Portugal (North of the Douro river), and in Italy. In Germany and Ireland, milk production is concentrated in the southern part of the country (Bavaria and Baden-Württemberg; Munster and Leinster); it is fairly evenly spread throughout Belgium and the Netherlands.

From the last study published by the Commission ("Structure of the Dairy Industry in the Community in 1985 and changes since 1982", EC Commission DG VI) there was a clear trend showing decline in the number of dairies collecting less than 20 000 tonnes of milk and an increase in those collecting over 50 000 tonnes.

## Production Costs

Over 1987 production costs of butter (national costs weighted by production expressed in ECU - converted at green rates) increased slightly (+0.56%) in the EC as a whole; costs of skimmed milk powder fell a little (-0.72%) whilst those of collection fell slightly more (-2.55%).

The cost of industrial fuels in national currencies fell some 11% on average in the EC; electricity costs fell 8.3% while gas oil fell almost 25%. (The inclusion of Dutch costs - about 25% lower than other EC countries - reduces the EC average considerably.)

Packaging prices for sulphurized paper rose slightly, but were offset by a fall in the price of cardboard, so that butter packaging costs overall fell slightly (-1.6%). Bulk powder packaging costs increased 3.3% on average.

Personnel costs per hour, expressed in national currencies as cost to employers, rose on average 4.63% for a pasteurizer operator, 8.25% for a butter maker, 7.66% for a milk powder plant operator and 7.68% for a milk collection driver.

## Retail Prices

The EC Commission's successful efforts to reduce considerably EC intervention stocks of butter and skimmed milk powder (smp) in 1986 and 1987, together with the tightening up of milk supplies owing to the application of quotas, have caused prices to stabilize in a number of dairy product sectors, notably those sectors competing for milk proteins: milk

## Main Indicators Dairy Products

| (Million ECU)                  | 1980   | 1981   | 1982   | 1983   | 1984   | 1985   | 1986   |
|--------------------------------|--------|--------|--------|--------|--------|--------|--------|
| Apparent consumption (1)       | 33 411 | 36 208 | 39 715 | 43 076 | 45 309 | 48 114 | N/A    |
| Net exports (1)                | +2 589 | +3 310 | +3 531 | +3 188 | +3 664 | +3 516 | +3 045 |
| Total Community production (1) | 36 000 | 39 518 | 43 246 | 46 264 | 48 973 | 51 630 | N/A    |

(1) EC 10 (excluding Spain and Portugal).

**Table I**  
**Production**

| (Million ECU)   | 1980   | 1981   | 1982   | 1983   | 1984   | 1985   | 1986   | 1987   |
|-----------------|--------|--------|--------|--------|--------|--------|--------|--------|
| BLEU            | 1 387  | 1 505  | 1 681  | 1 836  | 2 024  | 2 217  | 2 217  | 2 273  |
| Denmark         | 1 531  | 1 713  | 1 927  | 2 294  | 2 461  | 2 447  | 2 447  | 2 489  |
| Germany         | 8 372  | 8 782  | 10 053 | 11 367 | 11 939 | 12 236 | 12 236 | 12 764 |
| Greece          | 201    | 256    | 252    | 250    | 267    | 268    | 267    | N/A    |
| France          | 9 704  | 11 033 | 11 967 | 12 712 | 13 670 | 14 629 | 14 629 | 14 345 |
| Ireland         | 1 284  | 1 447  | 1 714  | 1 830  | 2 119  | 2 292  | 2 292  | 2 240  |
| Italy           | 2 629  | 3 128  | 3 619  | 3 917  | 4 333  | 4 513  | 4 513  | 4 555  |
| Netherlands (1) | 5 183  | 5 296  | 5 139  | 5 139  | 4 598  | 4 873  | 4 598  | 4 768  |
| United Kingdom  | 5 709  | 6 358  | 6 894  | 6 919  | 7 562  | 8 155  | 8 155  | 7 225  |
| Total EC 10 (2) | 36 000 | 39 518 | 43 246 | 46 264 | 48 973 | 51 630 | 45 891 | 50 659 |

(1) 1986 Netherlands estimated - Eurostrategies.

(2) Excluding Spain and Portugal.

Source: Eurostat.

**Table II**  
**Fresh Products Production**

| (Thousand tonnes) | 1980 | 1981 | 1982 | 1983 | 1984 | 1985  | 1986  | 1987  |
|-------------------|------|------|------|------|------|-------|-------|-------|
| Belgium           | 167  | 173  | 168  | 172  | 179  | 199   | 200   | 201   |
| Denmark           | 133  | 131  | 134  | 142  | 147  | 140   | 143   | 148   |
| Germany (1)       | N/A  | N/A  | N/A  | N/A  | N/A  | 1 712 | 1 804 | 1 907 |
| Spain (1)         | N/A  | N/A  | N/A  | N/A  | N/A  | 344   | 373   | 399   |
| France (1)        | N/A  | N/A  | N/A  | N/A  | N/A  | 1 438 | 1 502 | 1 608 |
| Ireland           | 11   | 18   | 22   | 24   | 23   | 25    | 25    | 26    |
| Netherlands (1)   | N/A  | N/A  | N/A  | N/A  | N/A  | 636   | 650   | 660   |
| United Kingdom    | 270  | 282  | 294  | 307  | 330  | 335   | 395   | 436   |
| Total EC 8        | 581  | 604  | 618  | 645  | 679  | 4 829 | 5 092 | 5 385 |

(1) ASSILEC estimates.

Source: ASSILEC.

powder, casein and cheese. Retail prices in the fresh dairy product sector fell slightly in 1987 in all countries except Belgium and the UK. In the two largest product markets, Germany and France, where inflation was about + 1.5% and 3% respectively, prices fell by 1% in Germany and more in France. This was thought to reflect the growing concentration and power of large retail chains. Cheese prices firmed up in 1987 as increased competition for raw material, especially milk protein, caused raw milk prices to rise. Whilst most cheese prices were flattening out earlier in 1988, those for speciality cheeses and Emmental continued to rise which

meant that raw material prices for processed cheese increased.

Meaningful up-to-date milk producer price information is not available in many EC Member States; partly because many dairies, private and cooperative alike, operate "on account" payment systems with a 13th month or bonus payment being made after the financial year end, and partly because many companies keep such information confidential.

#### Butter

The substantial reduction in EC intervention stocks has helped relieve pressure on market prices, although these are not rising at the same rate as those in the skim sector where demand is high in a number of product areas.

The EC Commission earmarked some 1988 co-responsibility funds for the subsidized disposal of butter in schemes for the manufacture in ice-cream (54 million ECU) and pastries (110 million ECU). Food aid and short-term social butter actions also reduced stocks.

EC butter consumption is expected to fall slightly in 1988, mainly due to expansion of the mixed fat product market as more Member States open their markets to such products. Germany may again be the notable exception to this trend, due to a prudent butter pricing policy (keeping prices below

**Table III**  
**Processing Costs - End 1987**

| (%)                         | Butter | Skimmed milk powder | General milk handling |
|-----------------------------|--------|---------------------|-----------------------|
| Machinery                   | 13.4   | 16.1                | 34.6                  |
| Personnel                   | 14.9   | 9.4                 | 20.4                  |
| Energy & materials          | 16.4   | 30.8                | 36.2                  |
| Various                     | 6.3    | 21.0                | 8.8                   |
| Overheads                   | 21.1   | 6.1                 |                       |
| Transport                   | 5.2    | 3.1                 |                       |
| Interest on working capital | 22.7   | 13.5                |                       |
| Total                       | 100%   | 100%                | 100%                  |

Source: ASSILEC.

**Table IV**  
**Butter and Butteroil Production**

| (Thousand tonnes) | 1980 | 1981 | 1982 | 1983 | 1984 | 1985  | 1986  | 1987  | 1988  |
|-------------------|------|------|------|------|------|-------|-------|-------|-------|
| Belgium           | 71   | 75   | 76   | 88   | 86   | 83    | 86    | 84    | 80    |
| Denmark           | 113  | 109  | 121  | 131  | 104  | 110   | 112   | 96    | 89    |
| Germany (1)       | N/A  | N/A  | N/A  | N/A  | N/A  | 515   | 553   | 448   | 370   |
| Spain (1)         | N/A  | N/A  | N/A  | N/A  | N/A  | 16    | 29    | 28    | 23    |
| France (1)        | N/A  | N/A  | N/A  | N/A  | N/A  | 586   | 556   | 480   | 455   |
| Ireland           | 112  | 113  | 137  | 159  | 166  | 162   | 153   | 134   | 119   |
| Netherlands       | 179  | 183  | 216  | 271  | 241  | 229   | 264   | 199   | 160   |
| United Kingdom    | 169  | 173  | 216  | 241  | 206  | 202   | 222   | 176   | 144   |
| Total EC          | 644  | 653  | 766  | 890  | 803  | 1 903 | 1 975 | 1 645 | 1 440 |

(1) ASSILEC estimates.

Source: ASSILEC.

2 DM for a 250 gram pack), keen nutritional information campaigns targeted at the paramedical corps and their refusal to allow the sale of mixed fat products in their country.

On the export market, prices have firmed up only slightly, despite the EC's action of disposing of public stock, since butterfat is in surplus worldwide.

### Cheese

Overall consumption continues to grow slowly, although this masks a variety of different trends within the market: semi-hard cheese sales continue to be buoyant whilst hard and blue vein cheese sales are now slipping slightly. Soft cheese sales continue to be stable. Processed cheese sales, whilst holding up well in the Community, suffered greatly in third countries buying in American dollars and especially in Middle Eastern oil producing nations. Other cheese exports held up well and prices firmed up. Although a number of cheeses are now available in "lower fat" form, such products are marginal to mainstream business. Cheese substitutes similarly remain peripheral to this sector. However, the EC Commission's decision in 1988 to fund, from co-responsibility funds, a feasibility study concerning the use of a European "real dairy" symbol (at the request of the EC dairy industry) shows that the industry is alert to the need to consider whether and how dairy

product identity can be safeguarded and enhanced in a world of rapidly improving food processing techniques.

### Liquid milk

EC wide consumption of liquid milk continues to fall slightly, although individual markets within the EC, such as France, where the liquid milk consumption level was traditionally low, and Germany are increasing steadily. Nevertheless, sales continue to reflect a shift to lower fat milks with semi-skimmed milks (1.5-1.8% fat) growing more rapidly than skimmed (0.3% fat). The EC school milk programme currently applies only to whole and semi-skimmed milks; uptake remains constant.

Packaging remains primarily in cartons and plastic bottles in most Member States, although the UK pint delivered on the doorstep is still in glass bottles. In certain regions of Germany a test launch of full cream (unstandardized) milk in glass bottles sold in shops over 1986-87 has proven popular on a modest scale.

### Preserved milk products

Production of skimmed milk powder fell as a result of the tightening up of quotas in 1987 and the reduction in use of

**Table V**  
**Natural and Processed Cheese Production**

| (Thousand tonnes) | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  | 1987  |
|-------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Belgium           | 47    | 50    | 53    | 45    | 47    | 55    | 51    | 57    |
| Denmark           | 213   | 234   | 236   | 242   | 283   | 244   | 242   | 256   |
| Germany (1)       | N/A   | N/A   | N/A   | N/A   | N/A   | 440   | 425   | 441   |
| Spain (1)         | N/A   | N/A   | N/A   | N/A   | N/A   | 104   | 99    | 95    |
| France (1)        | N/A   | N/A   | N/A   | N/A   | N/A   | 903   | 896   | 892   |
| Ireland           | 49    | 61    | 63    | 58    | 62    | 84    | 72    | 75    |
| Netherlands       | 435   | 457   | 473   | 477   | 507   | 514   | 526   | 541   |
| United Kingdom    | 257   | 264   | 266   | 269   | 272   | 281   | 278   | 264   |
| Total EC          | 1 001 | 1 066 | 1 091 | 1 091 | 1 171 | 2 625 | 2 589 | 2 621 |

(1) ASSILEC estimates.

Source: ASSILEC.

**Table VI**  
**Liquid Milk (Drinking Milk) Production**

| (Thousand tonnes) | 1980   | 1981   | 1982   | 1983   | 1984   | 1985   | 1986   | 1987   |
|-------------------|--------|--------|--------|--------|--------|--------|--------|--------|
| Belgium           | 740    | 768    | 767    | 763    | 754    | 784    | 779    | 750    |
| Denmark           | 667    | 672    | 684    | 679    | 667    | 644    | 633    | 622    |
| Ireland           | 473    | 515    | 555    | 548    | 534    | 531    | 527    | 510    |
| Italy             | 4 369  | 4 360  | 4 369  | 4 379  | 4 320  | 4 405  | 4 303  | 4 267  |
| Netherlands       | 962    | 943    | 942    | 953    | 957    | 962    | 959    | 949    |
| United Kingdom    | 7 410  | 7 292  | 7 124  | 7 120  | 7 063  | 7 077  | 7 023  | 7 056  |
| Total EC 6        | 14 621 | 14 550 | 14 441 | 14 442 | 14 295 | 14 403 | 14 224 | 14 154 |

Source: ASSILEC.

calf milk replacers. Production of whole milk powder increased to meet export demand, although prices especially of small packs fell below those of bulk orders for the first time ever, owing to increased competition in this sector. Production of concentrated milks has continued to fall over a number of years, as customers, especially in third countries, switched to powdered milk.

#### Fresh products

This sector has consistently grown throughout most of the 1980s. In 1987, EC markets strengthened by 5% in volume for fermented milks and fresh cheese, by over 7% for cream and 10% for dairy desserts. Whilst low-fat fermented milk product sales continue well, the German market is seeing strong growth of its fat enriched yoghurt sector. The development of specialist sectors, e.g. products for children, is boosting growth in the yoghurt sector as is the increasing popularity of multipacks.

#### Employment Trends

Employment in the dairy industries is decreasing in each of the Member States. There are many reasons for this. The main ones can be summarized as follows:

- fewer dairies and concentration on production of specific products coupled with the development of mechanization and automation of production lines;

**Table VII**  
**Employment**

| (Persons)      | 1983   | 1984    | 1985    | 1986    | 1987   |
|----------------|--------|---------|---------|---------|--------|
| Belgium        | N/A    | 8 444   | 8 169   | 7 622   | N/A    |
| Denmark        | N/A    | 10 020  | 9 560   | 9 554   | 9 400  |
| France         | N/A    | 55 737  | 52 662  | 50 271  | N/A    |
| Germany        | 46 022 | 44 894  | 42 979  | 41 620  | 41 486 |
| Ireland        | 9 000  | 8 900   | 8 000   | 7 600   | 7 300  |
| Italy          | N/A    | 43 800  | 43 900  | 43 600  | N/A    |
| Netherlands    | 20 900 | 20 400  | 19 900  | 19 600  | 19 100 |
| Spain (1)      | N/A    | 25 913  | 25 894  | 25 635  | 25 500 |
| United Kingdom | N/A    | 41 700  | 41 000  | 39 400  | N/A    |
| EC 8 (2)       | N/A    | 259 808 | 252 064 | 244 902 | N/A    |
| (% change)     |        |         | -3.4%   | -2.4%   |        |

(1) 1986 and 1987 estimated.

(2) Excluding Portugal, Greece and Luxembourg.

Source: ASSILEC.

- limits on milk production because of the introduction of milk quotas since 1984.

#### Exports

The northern Member States are climatically better suited to dairying, indeed most of them - particularly the Netherlands, Belgium, France, Denmark and Germany - have a long tradition in dairy exports developed over many years.

In 1987, exports of butter and skimmed milk powder (smp) increased significantly as the EC disposed of its intervention surpluses in sales to the USSR (butter) and food aid schemes. By early 1988, this release of pressure began to find its way through to commercial markets and prices began to rise. Reports of smp prices exceeding even those of whole milk powder are not uncommon, although this is also a result of relatively new activity on the part of New Zealand in the whole milk powder retail market.

Cheese prices also firmed and volumes remained consistent with those of 1985 and 1986, although the trend for processed cheese has differed: exports fell sharply as dollar-reliant clients especially in the Middle and Far East were affected by the depreciation in the US dollar. The situation was then aggravated by the tightening up of EC milk quotas which reduced milk supplies and, owing to demand from competing dairy product sectors, placed milk protein for cheese at a premium.

Butter prices have not firmed up anywhere near as much as those of other products. The world market is oversupplied with butter and, as there is little prospect of demand

**Table VIII**  
**Extra-EC Exports by Product**

| (Thousand tonnes)   | 1984 | 1985 | 1986 | 1987 |
|---------------------|------|------|------|------|
| Butter              | 221  | 201  | 187  | 442  |
| Butteroil           | 131  | 153  | 120  | 145  |
| Natural cheese      | 372  | 317  | 303  | 304  |
| Processed cheese    | 91   | 86   | 66   | 61   |
| Skimmed milk powder | 312  | 307  | 268  | 388  |
| Other powders       | 495  | 476  | 476  | 568  |
| Condensed milk      | 519  | 544  | 428  | 368  |

Source: ASSILEC.

**Table IX**  
**Production and Foreign Trade**

| (Million ECU)        | 1980   | 1981   | 1982   | 1983   | 1984   | 1985   | 1986   |
|----------------------|--------|--------|--------|--------|--------|--------|--------|
| Production (1)       |        |        |        |        |        |        |        |
| Current value        | 36 000 | 39 518 | 43 246 | 43 264 | 48 973 | 51 630 | 50 659 |
| Index                | 100.0  | 109.8  | 120.1  | 128.5  | 136.0  | 143.4  | 140.7  |
| Constant value       | 36 000 | 36 004 | 36 474 | 37 093 | 33 247 | 37 501 | 35 650 |
| Index                | 100.0  | 100.0  | 101.3  | 103.0  | 92.4   | 104.2  | 99.0   |
| Imports extra-EC (2) | 485    | 623    | 680    | 687    | 643    | 683    | 675    |
| Index                | 100.0  | 127.9  | 140.2  | 141.6  | 132.6  | 140.8  | 139.2  |
| Exports extra-EC (2) | 3 074  | 3 993  | 4 211  | 3 875  | 4 307  | 4 199  | 3 720  |
| Index                | 100.0  | 127.9  | 137.0  | 126.1  | 140.1  | 136.6  | 121.0  |
| X/M                  | 6.4    | 6.3    | 6.2    | 5.7    | 6.7    | 6.2    | 5.5    |

(1) EC 10 (excluding Spain and Portugal).. 1986 Netherlands estimated - Eurostrategies.

Source: Eurostat.

increasing significantly in the near future, the remedy lies in the hands of world butter producers.

### Forecast and Outlook

The Council of Ministers' decision in December 1986 to reduce milk production quotas by a further 9.5% in 1987-88 and 1988-89 caused immediate shortages of milk protein in certain regions of some Member States in the trough production period. Whilst 5.5% of this was to be a temporary reduction, 3% was to be a definitive reduction; the further 1% to be achieved by the tightening up of the existing system (e.g. supplementary levy for both Formula A and Formula B set at 100%; more active encouragement of voluntary cessation of milk production) as laid down in COM (86) 648. In any

case, quotas will apply until 1992 and very likely thereafter, albeit possibly in an amended, more flexible form.

Domestic consumption of cheese, fresh products and liquid milk will probably increase consistently to 1992. However, great uncertainty is cast on the level of the EC's future export performance, where, since dairy products are very closely linked to the CAP mechanism, much depends on the Community policy and not just on market competition. This makes forecasting of EC dairy exports and production by product almost impossible.

ASSILEC: EC Dairy Trade Association

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# DEEP-FROZEN PRODUCTS

(NACE 414.1 and 421.3)

*The market for deep-frozen products is growing rapidly, helped by increasing storage possibilities in the home. Germany leads the field in this respect, with sales of frozen foods (including ice-cream) totalling more than 5.1 billion ECU compared with 2.8 billion ECU in the U.K. and 1.6 billion ECU in France.*

## Current Situation

### Consumption Trends

The attitudes of consumers towards frozen products are very positive, as shown by the steady increase in consumption. Qualitative studies have demonstrated that for housewives the nutritional value of frozen foods is very close to that of fresh produce. The same studies show that frozen foods are popular because they are quick, easy to prepare and non-seasonal. Other factors, such as the absence of waste and the time saved by home storage, are favourable to a growth in demand for frozen products and indicate that the potential market is much larger than its current size.

### Products

Fruit and vegetables are the leading frozen products, accounting for a quarter of total sales. These are followed by

potato-based products, representing one-fifth of the total. Value-added products, such as breaded products or products with cream are growing fast: prepared meals, desserts and bakery products are likely to have the highest rates of growth.

If quality is the major advantage of prepared dishes, novelty is almost as important. One of the basic reasons why people buy prepared dishes is to vary their menus, to have a break from the daily routine and to experience new sensations. New products are thus a key element in increasing sales.

Frozen products are highly standardized in appearance (presentation, packaging, colour) and by the fact that they are quick and easy to use. They thus correspond to the agro-industrial production models favoured by the multinational food giants which hold the largest share of the market (Iglo-Ola for Unilever and Findus for Nestle).

### Factors behind Production Trends

The production and distribution of frozen products requires very high investment in plant. Only large firms are able to establish and maintain national distribution networks, hence the small number of producers. Small producers distribute their products by using the refrigeration capacities of large-scale ice-makers.

Large supermarkets are devoting more and more space to frozen products, emphasizing their practicality and quality.

Table I  
Frozen Food Sales - 1986

| (Thousand tonnes)       | Denmark | France | Germany | UK    | Italy | Netherlands |
|-------------------------|---------|--------|---------|-------|-------|-------------|
| Vegetables              | 31      | 231    | 216     | 335   | 157   | 47          |
| Potato products         | 10      | 207    | 246     | 181   | 29    | 64          |
| Fruit, fruit juices     | 1       | 7      | 16      | 2     | 1     | 1           |
| Fish, seafood, mollusc  | 9       | 113    | 94      | 161   | 44    | 11          |
| Meat                    | 16      | 122    | 64      | 77    | 11    | 4           |
| Venison                 | 0       | 1      | 0       | 0     | 0     | 0           |
| Bakery products         | 21      | 101    | 96      | 52    | 20    | 14          |
| Milk products           | 1       | 2      | 2       | 35    | 7     | 1           |
| Ready meals             | 0       | 72     | 100     | 0     | 14    | 72          |
| Miscellaneous           | 0       | 0      | 0       | 0     | 5     | 0           |
| Poultry                 | 42      | 28     | 375     | 220   | 12    | 0           |
| Total                   | 161     | 884    | 1 209   | 1 063 | 300   | 214         |
| Consumption (kg/capita) |         |        |         |       |       |             |
| Including poultry       | 31.4    | 15.9   | 19.7    | 14.9  | 5.3   | 2.1         |
| Excluding poultry       | 21.4    | 15.4   | 13.6    | 18.8  | 5.1   | 2.5         |

Source: Swiss Frozen Food Institute, Zurich.

**Table II**  
**Ice Cream Consumption - 1986**

|                        | Denmark | France | Germany | UK  | Netherlands |
|------------------------|---------|--------|---------|-----|-------------|
| Total (1000 litres)    | 42      | 233    | 353     | 405 | 66          |
| Per capita (in litres) | 8.1     | 4.2    | 5.8     | 7.2 | 4.5         |

Source: Swiss Frozen Food Institute, Zurich.

Special departments (freezer banks) now exist in all large supermarkets.

### **Forecast and Outlook**

After a period of stagnation in the late 1970s and early 1980s, current prospects seem to be very promising. Consumption of these products is increasing at such a rate that in 1990 sales should be a third higher than in 1985. Europeans consume over 5 million tonnes of frozen products annually,

representing almost 9 billion ECU (with the exception of ice cream). Demand would appear to be increasing rapidly in France, and in Germany, and at a more moderate pace in the UK. It is estimated that some 6.3 million tonnes will be marketed in 1990 compared with 5.2 million tonnes in 1986, with a total value of 10 to 11 billion ECU for EC 8

FAFPAS: Fédération des Associations des Fabricants de Produits Alimentaires Surgelés de la CE.  
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# BREAD

(NACE 419.1)

*The industrial manufacture of bread and baked goods has grown in importance due to the increasing urbanization of the population, new distribution systems and changes in shopping habits. The bread industry is an important supplier of bread and baked goods, the market share of bread supply varying between 18% and 70% depending on the country.*

## Current Situation

The Community bread industry is expanding and there is a continuing trend towards concentration. It has been able to match changing market conditions, eating habits and consumer tastes through a wide range of high quality goods and the development of new products. The fast food sector represents good prospects for increased sales and growth for industrial bread producers. The same is true for the production and marketing of deep-frozen baked goods.

The bread industry is in competition not only with small-scale bakeries but also with manufacturers of substitute products. The increasing power of retailers on the demand side is a source of concern, as concentration continues to increase. Under these circumstances, the overall revenue level and the capitalization of firms is not considered satisfactory.

## Consumption Trends

Bread consumption, which had been falling in all countries, has stabilized or even increased slightly since the early 1980s, following various kinds of Community publicity and public relations campaigns, including explanations of the nutritional value of bread.

Ideas concerning nutrition have altered over the last 10 years, and changes in the economic environment have

affected eating and shopping habits. Consumer information has become a high priority and their creativity and innovation have enabled industrial bread producers to take advantage of this development.

## Factors behind Production Trends

The bread industry, as a significant processor of agricultural produce, depends on high-quality raw material supply. This is particularly true of cereals for bread but is also valid for other raw materials involved in processing.

The planned dismantling of structural surplus in the framework of EC agricultural policy reforms will be welcomed, as will a market-oriented policy on agricultural prices.

New technologies have made their appearance in the bread industry. New processes such as analysis methods and extrusion have been integrated. Areas of progress in the future are fermentation technology, the development of freezing techniques, new preservation methods, computerization and data processing.

The bread industry in all countries is characterized by regular increases in personnel costs. Cost-intensive manpower and technological progress are forcing firms in the industry to increase the degree of automation of their production, necessitating considerable investment.

## Forecast and Outlook

Larger production units can be expected in the traditional bread industry. Demand for special breads and breads which can be preserved is stable and the trend towards fresh goods will be maintained. Half-processed and deep-frozen baked goods will increase in importance as a result of fermentation

Table I  
Employment in EC Bread Factories

| (1000)         | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 |
|----------------|------|------|------|------|------|------|------|------|
| Belgium        | N/A  | N/A  | 4.3  | 4.2  | 4.2  | 3.8  | 3.8  | 3.8  |
| Germany        | 50.2 | 52.7 | 52.7 | 53.4 | 55.0 | 57.2 | 59.5 | 62.5 |
| France         | 10.3 | 11.3 | 11.8 | 12.3 | 13.0 | 13.9 | 14.4 | 14.8 |
| Ireland        | N/A  | N/A  | N/A  | N/A  | N/A  | N/A  | 9.6  | N/A  |
| Netherlands    | 39.7 | N/A  | N/A  | N/A  | 38.8 | N/A  | 38.4 | N/A  |
| United Kingdom | 66.0 | 65.0 | 62.5 | 60.0 | 55.0 | 50.0 | 48.0 | 46.0 |

Source: AIBI.



technology and freezing techniques. Future prospects for the bread industry are good in this segment.

Take-overs and shareholdings in bread industry firms from other countries will lead to increased interconnections at an international level. Collaboration with other firms, domestic and foreign, create new opportunities for cooperation. The creation of the single European market in 1992 will have an

effect throughout the food and drink sector, including the bread industry, which is looking forward to free trade in its products and the dismantling of existing trade barriers.

AIBI: Association Internationale de la Boulangerie Industrielle  
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# BISCUITS

(NACE 419.4 to 419.5)

The biscuits sector includes both crispbread making (NACE 419.4) and biscuit making (NACE 419.5). There are some 1 000 firms in the biscuits sector in the EC, employing almost 125 000 people.

Total turnover amounted to 9 billion ECU in 1986, representing an average of 2 750 ECU per tonne. Sales increased steadily until 1985 but dropped slightly in 1986 from the 1985 figure.

## Current Situation

For the cocoa, chocolate and sugar confectionery sector, the number of agricultural raw materials is high. Flour consumption in 1986 amounted to 1.9 million tonnes.

Production figures have risen steadily over the period 1980-1986.

Table II shows that, in general per capita consumption of biscuit products is rising, although consumption is much lower in southern European countries.

In 1980 intra-Community trade accounted for 10% of total production. This figure rose gradually to reach 13% in 1986.

In 1986, exports to third countries represented 6% of total production; the percentage of exports to these countries has remained at between 5% and 6% since 1980.

Trade barriers with third countries are the same as for the cocoa, chocolate and sugar confectionery sector, namely high customs duties, blanket import restrictions or obstacles due to very restrictive legislation concerning food products.

CAOBISCO: Association des Industries de la Chocolaterie, Biscuiterie, Biscotterie et Confiserie de la CEE

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## Main Indicators Biscuits

| (Thousand tonnes)          | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  |
|----------------------------|-------|-------|-------|-------|-------|-------|-------|
| Turnover (million ECU) (1) | 5 381 | 6 022 | 6 586 | 7 221 | 8 159 | 9 068 | 8 983 |
| Production (1)             | 2 638 | 2 715 | 2 775 | 2 876 | 2 970 | 3 240 | 3 266 |
| Net exports (1) (2)        | 274   | 297   | 309   | 325   | 362   | 391   | 427   |
| Extra-EC imports (1) (2)   | 27    | 22    | 24    | 25    | 28    | 31    | 38    |
| Extra-EC exports (1) (2)   | 121   | 140   | 159   | 159   | 176   | 202   | 198   |

(1) 1980 EC 9 (excluding Greece, Spain and Portugal), 1981-1984 EC 10.

(2) 1986 is the first year that Spain and Portugal were not considered as third countries.

Table I  
Biscuit Production by Country

| (Tonnes)       | 1980    | 1981    | 1982    | 1983    | 1984    | 1985      | 1986      |
|----------------|---------|---------|---------|---------|---------|-----------|-----------|
| Belgium        | 129 220 | 134 980 | 139 475 | 149 715 | 154 100 | 148 362   | 161 891   |
| Denmark        | 73 665  | 81 285  | 88 610  | 97 700  | 109 700 | 113 874   | 112 509   |
| Germany        | 320 080 | 327 720 | 339 150 | 365 895 | 393 100 | 403 046   | 412 965   |
| Greece (1)     | 40 775  | 40 580  | 40 985  | 41 000  | 41 000  | 41 000    | 41 000    |
| Spain          | N/A     | N/A     | N/A     | N/A     | N/A     | 150 000   | 158 500   |
| France         | 584 400 | 584 330 | 581 185 | 601 870 | 604 650 | 604 255   | 611 500   |
| Ireland (1)    | 23 295  | 24 380  | 23 730  | 24 000  | 24 000  | 22 000    | 24 000    |
| Italy          | 457 700 | 483 900 | 526 800 | 558 000 | 594 400 | 613 800   | 588 600   |
| Netherlands    | 281 400 | 287 000 | 286 000 | 285 575 | 292 100 | 318 300   | 318 900   |
| Portugal       | N/A     | N/A     | N/A     | 35 180  | 35 180  | 31 090    | 29 264    |
| United Kingdom | 768 205 | 750 700 | 748 800 | 752 300 | 756 500 | 793 975   | 807 040   |
| Total EC       | N/A     | N/A     | N/A     | N/A     | N/A     | 3 239 702 | 3 266 169 |

(1) 1983-1986 estimated.

Source: CAOBISCO.

**Table II**  
**Per Capita Consumption Trends**

| <b>(Kilogrammes/year)</b> | <b>1980</b> | <b>1981</b> | <b>1982</b> | <b>1983</b> | <b>1984</b> | <b>1985</b> | <b>1986</b> |
|---------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Belgium                   | 9.8         | 10.2        | 10.5        | 10.5        | 10.3        | 10.1        | 11.3        |
| Denmark                   | 8.7         | 8.4         | 9.0         | 9.6         | 9.7         | 8.8         | 8.7         |
| Germany                   | 5.8         | 5.7         | 5.7         | 6.1         | 6.4         | 6.3         | 6.3         |
| Greece                    | N/A         | N/A         | 4.5         | N/A         | 4.5         | 4.5         | 4           |
| France                    | 9.8         | 9.8         | 10.0        | 11.3        | 11.8        | 12.0        | 12.5        |
| Ireland                   | 11.6        | 11.0        | 10.6        | 10.4        | 10.4        | 10.4        | 10.4        |
| Italy                     | 8.1         | 8.5         | 9.3         | 9.7         | 10.3        | 10.7        | 10.1        |
| Netherlands               | 15.3        | 15.6        | 15.4        | 15.5        | 15.4        | 16.7        | 16.5        |
| Portugal                  | N/A         | N/A         | N/A         | 3.5         | 3.3         | 2.9         | 2.7         |
| United Kingdom            | 13.0        | 13.1        | 13.1        | 13.3        | 13.0        | 13.0        | 13.3        |
| <b>EC 10 average</b>      | <b>9.12</b> | <b>9.14</b> | <b>8.81</b> | <b>10.0</b> | <b>8.6</b>  | <b>8.7</b>  | <b>8.7</b>  |

Source: CAOBISCO.

# SUGAR

(NACE 420)

*Sugar plays an important part in the common agricultural policy, employing 65 000 people directly and with almost 400 000 growers delivering beet to 204 factories throughout the Community. The EC sugar sector has had a market organization since 1967. It is the world's largest producer and second largest consumer and exports considerable quantities of sugar to third countries. These exports are achieved within a strict policy framework of self-finance and budgetary neutrality.*

## Current Situation

All the EC countries with the exception of Luxembourg and Portugal produce sugar beet, as is shown in the table below. The total surface under cultivation increased considerably in the 1970s, reaching a peak of 2.2 million hectares in 1981-1982 but has since decreased, due to saturation of the world market, to a stable level of approximately 1.9 ha, or 3% of the total surface of usable agricultural land in the Community.

## Consumption Trends

Although sugar consumption has been growing strongly it has been levelling out over the last few years because demand has been fully met and because new sweeteners have been marketed (isoglucose, synthetic products). Per capita consumption varies according to national eating habits (from 26kg in Spain to 40kg in the United Kingdom). In general, there has been a significant transfer year by year from domestic use (table sugars) to industrial use (processed sweetened products, organic chemicals), the latter now representing over 60% of total sugar consumption in the EC.

## Foreign Trade

According to the terms of Protocol III of the Lomé Convention, the EC is committed to importing 1.3 million tonnes of sugar annually from African, Caribbean and Pacific countries for an unlimited period with prices paid to the producers based on current Community prices. As the EC is more than self-sufficient in sugar, these tonnages increase the quantities available for export. In a period of depressed world prices the results are:

- a significant increase in the export receipts of the countries concerned
- a specific cost to the EC assimilated by the Community budget.

The breakdown of exports by geographical zone for 1986 was 38% for Africa, 35% for the Near and Middle East, 14% for Asia and 10% for non-EC European countries. Community exports (from which the tonnages imported from ACP countries should be deducted) have fallen regularly since 1982-1983 as a contribution to the regularization of the world sugar market.

## Factors behind Production Trends

The sugar contained in the 90-95 million tonnes of sugar beet produced is extracted, stored and packaged in a small number of high-capacity factories (44 in Germany, 14 in Belgium, 6 in Denmark, 54 in France, 39 in Italy, 10 in the Netherlands, 13 in the United Kingdom, etc.), working 24 hours a day at peak times. As the manufacturing period only lasts a few weeks (from approximately 60 days in Italy to 120 days in the United Kingdom), the Community sugar industry is able to receive and process over 1.3 million tonnes of beet per day.

## Main Indicators Sugar Manufacturing and Refining

| (Thousand tonnes)                  | 1980/81 | 1981/82 | 1982/83 | 1983/84 | 1984/85 | 1985/86 | 1986/87 | 1987/88 |
|------------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|
| Apparent consumption (1)           | 10 723  | 10 995  | 10 855  | 10 686  | 10 890  | 10 836  | 10 909  | N/A     |
| Net exports (1)                    | 3 234   | 3 772   | 3 912   | 2 791   | 2 546   | 2 828   | 3 112   | 2 554   |
| Total Community production (1) (2) | 13 166  | 16 061  | 15 126  | 12 280  | 13 614  | 13 679  | 14 156  | 13 246  |
| Employment (1 000)                 | N/A     | 65      |

(1) October 1 to September 30.

(2) White sugar.

**Table I**  
**Areas Under Beet**

| (Thousand hectares) | 1980/81 | 1981/82 | 1982/83 | 1983/84 | 1984/85 | 1985/86 | 1986/87 | 1987/88 |
|---------------------|---------|---------|---------|---------|---------|---------|---------|---------|
| Belgium             | 126     | 135     | 130     | 120     | 123     | 125     | 118     | 111     |
| Denmark             | 75      | 76      | 76      | 72      | 74      | 73      | 69      | 67      |
| Germany             | 414     | 464     | 429     | 403     | 423     | 415     | 399     | 384     |
| Greece              | 28      | 42      | 41      | 38      | 28      | 43      | 44      | 28      |
| Spain               | 183     | 220     | 260     | 249     | 209     | 178     | 195     | 182     |
| France              | 521     | 610     | 533     | 462     | 501     | 464     | 421     | 420     |
| Ireland             | 33      | 35      | 34      | 36      | 36      | 35      | 38      | 37      |
| Italy               | 282     | 320     | 257     | 222     | 217     | 225     | 277     | 283     |
| Netherlands         | 121     | 133     | 137     | 117     | 129     | 131     | 137     | 128     |
| United Kingdom      | 210     | 207     | 201     | 186     | 196     | 197     | 201     | 200     |
| EC 10               | 1 993   | 2 242   | 2 098   | 1 905   | 1 936   | 1 886   | 1 899   | 1 840   |

Source: CEFS.

As sugar beet is an agricultural raw material, production depends on climatic conditions as well as on the surface under cultivation, although their effect has been greatly lessened by progress in seed quality. Yields (in tonnes of sugar per hectare) can however vary by as much as 30% in the same country from one year to another. After reaching a peak of 16 million tonnes in 1981-1982, production has stabilized at around 13 million tonnes in the last five years. These volumes make the EC the world's largest producer, well ahead of the USSR (9 million tonnes), Brazil (7.8 million tonnes) and Cuba (6.9 million tonnes), these figures being expressed in white sugar values for comparison with Community statistics.

### *Organization of the Sugar Market in the Community*

This is based essentially on a quota system together with a mechanism for financing exports. Each EC country has an A quota and a B quota called the specialization segment.

Both the A and the B quotas benefit from intervention prices, in contrast with C sugar produced over and above these tonnages for which there are no price or disposal guarantees and which must necessarily be exported to third countries.

### *Export Financing*

The sugar sector is regulated by a self-financing system in which producers are responsible for all costs involved in the export of Community sugar. Nevertheless, as it was said earlier, reexporting costs of the equivalent imported tonnage from ACP countries are handled by the FEOGA. The cost to the Community of exports corresponds generally to the difference between the internal Community price and the world rate. Eventhough the world market experienced a slight amelioration, the cost of sugar exports amounted to 811 million ECU in 1986-1987.

The cost is financed through production contributions from growers (60%) and manufacturers (40%):

**Table II**  
**White Sugar Production**

| (Thousand tonnes)             | 1980/81 | 1981/82 | 1982/3 | 1983/84 | 1984/85 | 1985/86 | 1986/87 | 1987/88 |
|-------------------------------|---------|---------|--------|---------|---------|---------|---------|---------|
| Belgium                       | 799     | 1 030   | 1 105  | 782     | 837     | 943     | 938     | 804     |
| Denmark                       | 427     | 480     | 537    | 346     | 547     | 530     | 499     | 388     |
| Germany                       | 2 749   | 3 392   | 3 304  | 2 507   | 2 894   | 3 155   | 3 192   | 2 726   |
| Germany from molasses         | -       | 2       | 9      | 19      | 19      | 19      | 19      | 19      |
| Greece                        | 174     | 323     | 296    | 298     | 218     | 317     | 287     | 182     |
| Spain                         | 904     | 1 026   | 1 144  | 1 240   | 1 074   | 903     | 1 020   | 1 001   |
| D.O.M. cane sugar (1)         | 0       | 0       | 16     | 8       | 9       | 15      | 14      | 15      |
| France metropolis             | 4 205   | 5 130   | 4 446  | 3 562   | 3 957   | 3 953   | 3 410   | 3 655   |
| France D.O.M. (1)             | -       | 317     | 309    | 263     | 300     | 296     | 305     | 305     |
| Ireland                       | 148     | 168     | 222    | 197     | 222     | 174     | 186     | 223     |
| Italy                         | 1 779   | 2 048   | 1 180  | 1 244   | 1 275   | 1 244   | 1 719   | 1 719   |
| Netherlands                   | 875     | 1 044   | 1 130  | 743     | 934     | 915     | 1 239   | 979     |
| Portugal                      | 0       | 9       | 9      | 9       | 5       | 4       | 5       | 2       |
| United Kingdom                | 1 106   | 1 092   | 1 419  | 1 062   | 1 323   | 1 211   | 1 323   | 1 228   |
| EC countries                  | 13 166  | 16 061  | 15 126 | 12 280  | 13 614  | 13 679  | 14 156  | 13 246  |
| Share of world production (%) | 14.9    | 15.9    | 15.0   | 12.6    | 13.6    | 13.8    | 13.6    | 12.7    |

(1) D.O.M. Départements d'Outre Mer: Guyana, Guadeloupe, Martinique, Reunion.

**Table III**  
**Per capita consumption Trends**

| (Kilogramme/year) | 1980/81 | 1981/82 | 1982/83 | 1983/84 | 1984/85 | 1985/86 | 1986/87 | 1987/88 |
|-------------------|---------|---------|---------|---------|---------|---------|---------|---------|
| Belgium           | 35.0    | 36.1    | 37.1    | 38.5    | 37.9    | 38.3    | 38.1    | 38.0    |
| Denmark           | 40.0    | 41.2    | 39.7    | 39.0    | 39.0    | 39.8    | 38.8    | 39.3    |
| Germany           | 35.8    | 35.2    | 35.6    | 34.7    | 36.1    | 35.2    | 35.0    | 35.3    |
| Greece            | 34.3    | 29.3    | 29.5    | 30.6    | 31.4    | 31.8    | 31.1    | 30.9    |
| Spain             | 29.8    | 27.0    | 27.1    | 26.2    | 23.9    | 25.7    | 26.0    | 25.8    |
| France            | 35.4    | 36.0    | 34.9    | 34.1    | 33.9    | 33.4    | 35.6    | 34.4    |
| Ireland           | 40.6    | 40.5    | 39.8    | 39.7    | 38.8    | 38.3    | 37.9    | 38.9    |
| Italy             | 28.7    | 27.8    | 26.7    | 25.7    | 28.9    | 26.8    | 26.6    | 26.9    |
| Netherlands       | 39.7    | 39.4    | 38.3    | 38.3    | 38.5    | 39.1    | 39.2    | 38.7    |
| Portugal          | N/A     | 27.1    | 29.1    | 30.3    | 26.5    | 29.7    | 29.7    | 29.7    |
| United Kingdom    | 39.2    | 40.8    | 41.0    | 40.2    | 40.1    | 40.5    | 39.9    | 40.4    |
| EC                | N/A     | 34.0    | 33.7    | 33.1    | 33.5    | 33.4    | 33.6    | 33.5    |

Source: CEFS.

**Table IV**  
**Total Consumption**

| (Thousand tonnes)             | 1980/81 | 1981/82 | 1982/83 | 1983/84 | 1984/85 | 1985/86 | 1986/87 |
|-------------------------------|---------|---------|---------|---------|---------|---------|---------|
| Belgium                       | 358     | 370     | 379     | 394     | 387     | 392     | 390     |
| Denmark                       | 205     | 211     | 203     | 200     | 199     | 204     | 199     |
| Germany                       | 2 212   | 2 277   | 2 193   | 2 127   | 2 203   | 2 148   | 2 135   |
| Greece                        | 332     | 284     | 289     | 301     | 310     | 316     | 310     |
| Spain                         | 1 135   | 1 041   | 1 043   | 1 009   | 925     | 1 002   | 1 020   |
| France                        | 1 947   | 1 990   | 1 938   | 1 915   | 1 907   | 1 892   | 2 020   |
| Ireland                       | 140     | 141     | 140     | 140     | 138     | 136     | 134     |
| Italy                         | 1 640   | 1 561   | 1 519   | 1 465   | 1 649   | 1 534   | 1 521   |
| Netherlands                   | 561     | 564     | 549     | 551     | 556     | 569     | 571     |
| Portugal                      | N/A     | 273     | 294     | 306     | 345     | 350     | 350     |
| United Kingdom                | 2 194   | 2 283   | 2 308   | 2 278   | 2 271   | 2 293   | 2 259   |
| EC                            | N/A     | 10 995  | 10 855  | 10 686  | 10 890  | 10 836  | 10 909  |
| Share of world production (%) | 12.0    | 11.9    | 11.5    | 11.1    | 11.1    | 10.8    | 10.6    |

Source: CEFS.

**Table V**  
**Production and Foreign Trade**

| (Thousand tonnes)    | 1980/81 | 1981/82 | 1982/83 | 1983/4 | 1984/85 | 1985/86 | 1986/87 | 1987/88 |
|----------------------|---------|---------|---------|--------|---------|---------|---------|---------|
| Production (1)       | 13 166  | 16 061  | 15 126  | 12 280 | 13 614  | 13 679  | 14 156  | 13 246  |
| Index                | 100.    | 122.0   | 114.9   | 93.3   | 103.4   | 103.9   | 107.5   | 100.6   |
| Imports extra-EC (1) | 1 133   | 1 345   | 1 295   | 1 277  | 1 302   | 1 305   | 1 322   | 1 305   |
| Index                | 100.    | 118.7   | 114.3   | 112.7  | 114.9   | 115.2   | 116.7   | 115.3   |
| Exports extra-EC (1) | 4 367   | 5 117   | 5 207   | 4 068  | 3 848   | 4 133   | 4 434   | 3 859   |
| Index                | 100.    | 117.2   | 119.2   | 93.2   | 88.1    | 94.6    | 101.5   | 88.4    |

(1) October 1 to September 30.  
Source: CEFS.

**Table VI**  
**Production Quotas by Country**

| (Thousand tonnes) | Quota A | Quota B | Quota B/Quota C (%) |
|-------------------|---------|---------|---------------------|
| Belgium           | 680     | 146.0   | 21.5                |
| Denmark           | 328     | 96.6    | 29.5                |
| Germany           | 1 990   | 612.3   | 30.8                |
| Greece            | 290     | 29.0    | 10.0                |
| Spain             | 960     | 40.0    | 4.2                 |
| France            | 2 560   | 759.2   | 29.7                |
| D.O.M. (1)        | 436     | 43.6    | 10.0                |
| Ireland           | 182     | 18.2    | 10.0                |
| Italy             | 1 320   | 248.3   | 18.8                |
| Netherlands       | 690     | 182.0   | 26.4                |
| Portugal          | 55      | 5.5     | 10.0                |
| Port/Azores       | 9       | 0.9     | 10.0                |
| United Kingdom    | 1 040   | 104.0   | 10.0                |
| Total EC          | 10 540  | 2 285.6 | 21.7                |

(1) D.O.M. Departements d'Outre Mer: Guyana, Guadeloupe, Martinique, Reunion.

- a contribution of 2% of the operation price for quota A sugar;
- a contribution of 39.5% of the operation price for quota B sugar.

To this is added a special contribution to balance export accounts at the end of the year. For 1986-1987 this special contribution had for effect to increase the two contributions mentioned above by 38.8%, bringing them respectively to 2.77%, for sugar A and to 54.85% for sugar B. In this way, at the end of a complex process, the cost of exports subject to production quotas is met entirely by the sector itself. The manufacture of sugar outside quotas (C sugar) is free and not subject to any other quotas, but producers assume all export

costs. Total exports for 1987-1988 (3 859 000 tonnes) were 3 028 000 tonnes for sugars subject to quotas and 821 000 tonnes for sugars not subject to quotas.

### *Major Structural Features*

The European sugar industry, which requires heavy investment, is concentrated in a very small number of firms (93 for the whole Community compared with 203 in 1960). Sugar manufacturing is complemented by considerable refining activity, particularly in the United Kingdom and France.

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# ANIMAL AND POULTRY FOODS

(NACE 422)

The EC animal food industry consists of two distinct industries which are completely different both in size and development. The first is the farm animal feed industry and the second is the pet food industry.

expanding in other areas, such as sheep, goats, horses, rabbits, fish and game.

Cooperatives and private industry share 34% and 66% respectively of the compound feed market.

## COMPOUND FEED

### Main Indicators

#### Animal Feed Industry - 1986

|                             | Compound feed industry | Pet food industry | Total  |
|-----------------------------|------------------------|-------------------|--------|
| Production (million tonnes) | 96.9                   | 2.8               | 99.7   |
| Turnover (million ECU)      | 26 451                 | 3 188             | 29 639 |
| Direct employment (1 000)   | 80                     | 18                | 98     |

Source: FEFAC/FEDIAF

Table I

#### Manufacture of Compound Animal Feed

|                             | Compound feed industry | Pet food industry |
|-----------------------------|------------------------|-------------------|
| Production (tonnes)         | 97.2%                  | 2.8%              |
| Turnover (ECU)              | 89.2%                  | 10.8%             |
| Direct employment (persons) | 81.6%                  | 18.4%             |

Source: FEFAC.

*The farm animal compound feed industry is very developed in Europe by comparison with other countries in the world. Nevertheless, there are still large potential markets to develop. The market penetration rate varies from 30% to 80% of livestock according to the animal categories. However, growth in this industry is limited for the time being by the current surplus animal production in the EC and by the manufacture of feed by farms themselves.*

Compound feed mainly covers three large areas of livestock farming: cattle, with three specific production lines (beef, veal and milk); poultry, with two different production lines (broilers and eggs); and pigs. The use of compounds is

## Current Situation

### Consumption Trends

Since the beginning of the European Community, the industrial production of compound feed has grown from 12.5 million tonnes in 1960 in the EC 6 to 58.5 million tonnes in 1973 in the EC 9. At the end of 1986, it totalled 97 million tonnes in the Community. It has become the barometer of productivity in livestock husbandry and highly significant for the modern pattern of consumption and the standard of living. At current prices, the share of compound feed makes up 30% of animal production value and 36% of farmers' intermediate consumption.

### Major Structural Features

With a turnover value of 26 billion ECU, the Community Compound Feed Industry ranks amongst the leaders in the agri-food business. It employs about 80 000 workers, but the number of labour units is decreasing as a result of progressive mechanization and automation. Nowadays, 90% to 95% of compounders use computer formulation.

In the Community, there are around 5 000 mills. Mergers, rationalizations and concentrations have accelerated over the last five years. While the number of small - and medium sized - undertakings is still predominant, the size of mills is substantially increasing. There are now about 175 production units with an annual output capacity of more than 100 000 tonnes. A few have an annual capacity exceeding 200 000 tonnes. Total mill capacity when working two shifts is estimated at 130 million tonnes. This can be compared with the current output of 97 million tonnes which represents capacity utilization of roughly 75%.

**Table II**  
**Compound Feed**

|                                    | 1980   | 1981   | 1982   | 1983   | 1984   | 1985   | 1986   | 1986   | 1987 |
|------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|------|
| Production<br>(million tonnes) (1) | 79.1   | 80.9   | 81.4   | 83.4   | 81.0   | 79.9   | 82.6   | 96.9   | 96.6 |
| Index                              | 100    | 102    | 103    | 105    | 102    | 101    | 104    |        |      |
| Turnover<br>(million ECU) (1)      | 16 635 | 17 686 | 21 157 | 23 311 | 24 537 | 22 846 | 22 680 | 26 451 |      |
| Index                              | 100    | 106    | 127    | 140    | 148    | 137    | 136    |        |      |

(1) 1980-1986: EC 9 (excluding Spain and Portugal), 1986-1987: EC 11, 1987 provisional figures.

Greek industrial compound production included at an estimated 1 million tonnes per year.

Excluding Luxembourg - production is less than 100 000 tonnes.

Source: FEFAC.

**Table III**  
**Compound Output per Livestock Class - 1986**

| (Million tonnes) | B    | DK   | D     | E     | F     | IRL  | I     | NL    | P    | UK    | EC 10 |
|------------------|------|------|-------|-------|-------|------|-------|-------|------|-------|-------|
| Cattle feed      | 1.35 | 1.79 | 6.94  | 2.36  | 3.74  | 1.56 | 4.01  | 5.76  | 0.74 | 4.90  | 33.15 |
| Pig feed         | 2.66 | 2.10 | 5.80  | 4.13  | 4.48  | 0.45 | 2.43  | 7.24  | 1.13 | 2.20  | 32.62 |
| Poultry feed     | 0.95 | 0.50 | 3.25  | 3.86  | 5.74  | 0.31 | 4.14  | 3.19  | 0.95 | 3.46  | 26.35 |
| Others           | 0.14 | 0.11 | 0.51  | 1.05  | 1.44  | 0.08 | 0.42  | 0.31  | 0.08 | 0.64  | 4.78  |
| Total (1)        | 5.10 | 4.50 | 16.50 | 11.40 | 15.40 | 2.40 | 11.00 | 16.50 | 2.90 | 11.20 | 96.90 |

(1) Luxembourg production is less than 100 000 tonnes.

Source: FEFAC.

### *Factors behind Production Trends*

The average composition of modern, industrially produced compound feed is as follows: cereals: 35%, manioc: 6%, by-products of the food industries: 23%, oilcakes and meals: 24%, animal proteins, oils and fats: 4%, dried forage: 2%, milk products: 3%, minerals and additives: 2% and other products: 1%. The average composition of a milk replacer, which is a special type of feed for young animals and veal calves in particular is: skimmed milk powder: 60%, whey products: 15%, animal and vegetable fats: 20%, starch: 2%, minerals, vitamins and other additives: 3%.

Compound feed is more than the sum of its ingredients. It is offered to the farmer either as a complete diet with an exactly balanced starch and protein equilibrium, and all the essential nutrients and additives adapted to the species, age and the economic performance of the animal, or as a complementary feed containing all the necessary nutrients and additives to upgrade the livestock farmer's own feed resources.

The compound feed industry upgrades numerous by-products from the food and beverage industries such as milling offals (bran, feed meals), brewers grains, distillers waste, oil cakes and meals, fruit waste, animal meals, fats, molasses, vinnasses. Many of them have no other outlets; without their use in animal feeding, foodstuffs like flour, sugar, canned fruit would have to be higher-priced, to the detriment of the consumer.

### *Export Trends*

For several years, the compound feed industry has bought 60% to 65% of its raw materials from Community origin and 35% to 40% from abroad. The raw materials from abroad essentially comprise oilcakes and meals, fishmeal, so-called substitutes, cereals and molasses.

The total compound feed production is fed to the Community livestock population. Whilst import of raw materials is of great importance, no ready-made compounds are entering the Community. Exports are less than 500 000 tonnes a year. Nevertheless exports to third countries are important to a certain number of firms for which, individually, it represents an appreciable part of their market.

### **Forecast and Outlook**

Theoretically, there is still a large potential market for compound feed in Europe. Animal feed come from three different sources: industrial compound feed, farm-produced feed and agricultural production consumed as such. Present market penetration rates are estimated at 64% for pigs, 80% for poultry and 30% for cattle.

The downward trend is likely to continue as long as the milk quota exists. The cereals co-responsibility levy, in its discriminatory application, favours grain consumption on the farm and home-mixing.

Social factors may also put a brake on expansion: slow population increase and eating habits supporting lower meat consumption. Finally, quality replaces quantity. The increasingly improved feeds produced by the compound feed industry have substantially reduced the feed intake per animal. Pig feed conversion rates have improved by 20% since the 1950-1970 period, and broiler feed conversion by more than 30%.

The coherent development of Europe's compound feed industry will depend on solutions being found to several problems which mainly concern the following:

- access to raw materials
- health regulations for humans and animals
- relations between industrially produced compound feeds and farm-mixed feeds
- composition of the feeds and the technical know-how of manufacturers
- harmonization and legislative reform within the Community.

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## PET FOOD (NACE 422.2)

*Industrial production of pet food began in Europe in the late 1950s. In a quarter of a century, the prepared pet food industry has made its mark as a new and important sector of the food processing industry; its unique characteristics and rapid growth have made it one of the most dynamic processors of agricultural materials. Coming between the food industry on the one hand and the feedingstuffs industry on the other, the prepared pet food industry has proved to be an additional and valuable outlet for agricultural produce. Its prime merit lies in its potential to give added value to materials and surpluses not taken up by food and foodstuffs industries. A strong growth rate of around 7% per year, which is very high for the food industry, is expected over the medium term.*

The EC pet food industry covers three major product categories:

- dog food
- cat food
- food for other pets, such as birds, fish, etc.

## Current Situation

One of the dominant characteristics of this industry is investment in technology and high performance equipment enabling it to develop quality foods from materials (meat, poultry and fish by-products, cereals and vegetables) not used for human consumption or surplus to requirements. In giving added value to these agricultural by-products and materials which were otherwise often wasted, the activity of the Community pet food industry has a positive impact on the income and profit margins of farmers and fishermen. It also lowers the cost of other parts of the carcass, which decreases meat prices to the consumer, and reprocesses substances such as blood, which were in the past inevitable sources of pollution. Prepared pet food significantly reduces the quantities of fresh meat taken from the human food chain to be fed to pets.

### Consumption Trends

From a very modest level in 1950, the increase in sales of prepared pet food has been rapid as may be seen from the turnover figures over the last decade.

**Table I  
Pet Food Sales**

| (Million ECU) | 1974 | 1978  | 1981  | 1983  | 1986  |
|---------------|------|-------|-------|-------|-------|
| Production    | 653  | 1 298 | 2 179 | 2 552 | 3 188 |

Source: FEDIAF.

The number of companies involved in the manufacture and marketing of prepared pet food has risen in line with the growth in the market. In 1986, there were 248 production units, of varying sizes, located in all regions of the Community.

### Factors behind Production Trends

None of the FEDIAF member companies representing 94% of EC production utilize meat or by-products from whales, kangaroos or other endangered species in the manufacture of pet food.

**Table II  
Consumption of Raw Materials - 1986**

| (Thousand tonnes)    |       |
|----------------------|-------|
| Meat by-products     | 1 126 |
| fish by products     | 107   |
| Cereals & vegetables | 910   |

Source: FEDIAF

Today, over half of the 44 million pet-owning households corresponding to 170 million animals in the European Community use prepared pet food on a regular basis and this trend is increasing.

Products are prepared scientifically according to nutritional requirements recommended by the National Research Council (NRC) of the National Academy of Sciences of the USA. The industry manufactures (under biochemical, bacteriological and organoleptic control) a very wide range of products and recipes that provide variety, are nutritionally sound and convenient to use. Pet foods for cats and dogs may be categorized according to the manufacturing process or method of use:

- products sterilized in metal containers
- intermediate moisture products with moisture levels ranging from 15% to 50%
- dry products with a maximum moisture level of 14%.

In each of these categories:

- complete products offering the animal in good health all the nutritive elements it needs
- complementary products which need to be fed together with other foods to assure a balanced diet.

Other pet foods include food for birds, aquarium fish and small animals (hamsters, etc.) which exists in a range of forms, such as biscuits, flakes or pellets. In each case, the products can be complete or complementary.

### External Trade

In the absence, up to 1987, of specific sub-headings for pet food in the Nimex, there are no figures available on imports of raw materials and exports or imports of prepared pet food. However, the majority of the materials used by the pet food industry originate from the European Community. Imports from non-EC countries consist mainly of primary offal (liver, lungs) of which the quantities available in the EC are insufficient. These imports subsequently enable the industry to use greater quantities of secondary European Community by-products whilst maintaining the overall quality of the products and keeping production costs and price increases below those for foodstuffs and manufactured goods as a whole.

Intra-Community trade in pet food is highly developed. However, the Community market is self-sufficient, and the import of finished products from non-EC countries is minimal.

On the other hand, efforts to expand into foreign markets are beginning to bear fruit. According to data collected among FEDIAF members, the sale of prepared pet food to non-EC countries may be estimated at 180 000 tonnes. This is already

quite an achievement and an obvious indication of the international competitiveness of the industry considering the impact of transport costs of these weighty products in relation to low unit prices. Foreign markets are promising and should lead to an increased trade surplus.

### Employment

The prepared pet food industry provides direct employment for some 18 000 people.

**Table III**  
**Breakdown of Sales - 1986**

| (Thousand tonnes)                      |         |
|--|---------|
| Dog food                               |         |
| - Metal containers                     | 1 057.7 |
| - Others                               | 582.5   |
| Cat food                               |         |
| - Metal containers                     | 915.0   |
| - Others                               | 156.2   |
| Food for birds,<br>fish and other pets | 52.1    |
| Total                                  | 2 763.5 |

Source: FEDIAF.

### Forecast and Outlook

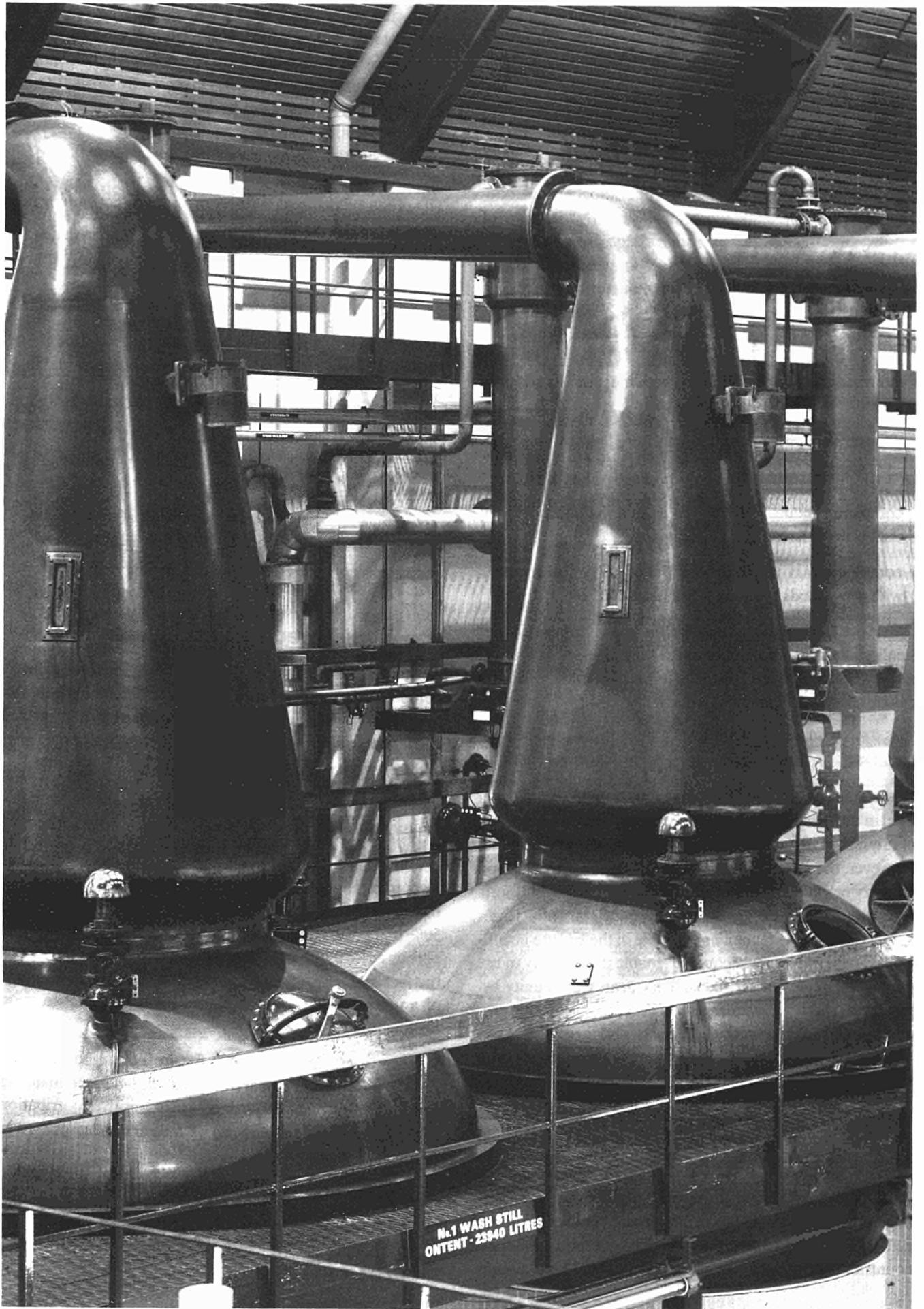
The rapid growth rate of the European pet food industry demonstrates that it meets a real need by providing pets and their owners with the assurance that prepared pet food is of consistently high quality allowing nutritionally balanced feeding.

However, there is still potential for further development. Increasing numbers of pet-owners are realizing that to use prepared pet food is the best formula to keep their pets healthy.

According to a survey by Frost & Sullivan, over 1984 to 1990, the growth trend in prepared pet food sales will be close to 50% in the European Community. This may be explained in part by a rise in the pet population, but to a greater extent by the fact that pet-owners increasingly realize the importance of a nutritionally balanced diet to keep their pets in good health.

Hence, strong motivation exists for the industry to intensify further its efforts in research and development, to maintain its rate of investment and to increase its positive contribution to the Community economy as a whole and to agriculture in particular.

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# ALCOHOL AND SPIRITS

(NACE 424)

The EC is the world's leading exporter of spirits and a major producer of alcohol. Consumption of alcohol within the EC, on a per capita basis generally peaked over the first half of the 1980s.

This sector includes two major categories of products: spirits and ethyl alcohol from agricultural produce. Ethyl alcohol of agricultural origin is used in many different ways, including in food processing, as solvents and as chemical reagents. There are also many different kinds of spirits for drinking and here national tastes play a considerable part, which explains the importance of schnapps in Germany, pastis in France, ouzo in Greece, jenever in the Netherlands and Belgium, aquavit in Denmark and brandy made according to national recipes in many countries (France, Italy, Germany, Spain, Greece). However, there are some products such as whisky, brandy, gin, vodka and rum, which are consumed everywhere.

## Current Situation

### Consumption Trends

Figures concerning alcohol consumption by country are published annually by Produktschap voor Gedistilleerde Dranken (Schiedam). Alcoholic drinks covered include spirits, wine and beer. Consumption is provided per capita for the whole population living within national borders irrespective of age, sex, nationality, etc.

Table I shows the changes in total consumption of pure alcohol per inhabitant in the various countries of the EC over the period, 1960-1986.

The figures show the peaks in the period and these figures clearly contradict general opinion that alcohol consumption is increasing regularly and that it is currently at a peak. Two important phenomena can be identified: on the one hand a drop in consumption in all countries but from different dates (1960 in France, 1984 in Denmark and Greece); and on the other hand a reduction in the differences in consumption levels between different countries. In 1960 the extremes ranged between 2.5 litres in the Netherlands and 18.2 litres in France; now they range between 6.2 litres in Greece and 13.2 litres in France.

Table II shows consumption per inhabitant and per country by type of drink:

- spirits, expressed in litres of pure alcohol
- wine, expressed in litres
- beer, expressed in litres.

Consumption for all EC countries is expressed in litres of pure alcohol for each of these three categories, showing that spirits represent 20% of consumption of pure alcohol, wine represents 50% and beer the remaining 30%.

There are four principal environmental factors which affect the alcohol and spirits sector by limiting the production or consumption of alcohol.

Table I  
Consumption Trends - Pure Alcohol

| (Litres per capita) | 1960 | 1970 | 1975 | 1980 | 1984 | 1985 | 1986 |
|---------------------|------|------|------|------|------|------|------|
| Belgium             | 6.4  | 8.9  | 10.1 | 10.8 | 10.6 | 10.5 | 10.3 |
| Germany             | 6.8  | 10.3 | 11.3 | 11.5 | 10.7 | 10.8 | 10.5 |
| Denmark             | 4.6  | 6.8  | 8.9  | 9.2  | 10.2 | 9.9  | 10.0 |
| France              | 18.2 | 17.3 | 17.0 | 14.4 | 13.5 | 13.3 | 13.2 |
| Greece              | 5.3  | 4.7  | 5.4  | 6.7  | 6.8  | 6.2  | 6.2  |
| Ireland             | 3.9  | 4.5  | 6.7  | 7.3  | 6.2  | 6.2  | 5.3  |
| Italy               | 13.8 | 13.8 | 13.4 | 11.5 | 12.1 | 11.6 | 10.2 |
| Luxembourg          | 11.1 | 10.1 | 12.3 | 18.4 | 13.6 | 13.0 | 12.7 |
| Netherlands         | 2.5  | 5.6  | 8.7  | 8.8  | 8.6  | 8.5  | 8.6  |
| Spain               | 8.6  | 12.1 | 14.1 | 14.1 | 11.5 | 11.8 | 11.5 |
| Portugal            | 10.4 | 15.6 | 16.9 | 11.0 | 12.8 | 13.1 | 11.2 |
| United Kingdom      | 5.1  | 6.4  | 8.1  | 7.1  | 6.9  | 7.1  | 7.1  |

Source: Produktschap.

**Table II**  
**Alcohol Consumption by Country - 1986**

| (Litres per capita) | Spirits | Wines | Beer  | Total |
|---------------------|---------|-------|-------|-------|
| Belgium             | 1.98    | 21.7  | 119.9 | 10.3  |
| Denmark             | 1.58    | 19.8  | 125.8 | 10.0  |
| Germany             | 2.30    | 23.3  | 146.6 | 10.5  |
| Greece              | N/A     | 37.0  | 34.4  | 6.2   |
| Spain               | 3.00    | 45.0  | 62.0  | 11.5  |
| France              | 2.34    | 78.4  | 40.4  | 13.2  |
| Italy               | 1.20    | 73.3  | 19.5  | 10.2  |
| Ireland             | 1.68    | 3.5   | 80.0  | 5.3   |
| Luxembourg          | 2.50    | 55.4  | 119.3 | 12.7  |
| Netherlands         | 2.21    | 14.9  | 86.0  | 8.6   |
| Portugal            | 0.80    | 70.8  | 38.8  | 11.2  |
| United Kingdom      | 1.71    | 10.4  | 108.1 | 7.1   |
| EC                  | 2       | 45    | 80    | 10    |

Litres per capita of spirits and the total are given as litres of pure alcohol (253 = 10).

Wine and beer are given as litres in state.

Source: Produktschap.

### Social considerations

The deleterious effects of alcohol abuse are well known and their importance for the populations concerned is recognized. They stem from alcohol consumption in any form.

### Taxation

Tax levels on alcoholic beverages can vary enormously for the same product from one country to another within the Community. Within individual countries, tax levels can be very different for different types of alcoholic beverage (beer, wine, spirits). On the basis of pure alcohol, spirits are the most highly taxed.

### Advertising

Many countries restrict or even forbid the advertising of spirits. Whether such measures have any effect on levels of alcoholism is a subject of fierce debate between those in favour and those against advertising in this area.

### Commercial handicaps

EC production of spirits is currently running at an average 9 to 10 million hectolitres of pure alcohol a year. A large proportion of this is exported to third countries and consequently Community exports encounter protectionist policies in certain countries seeking to defend national products against imports. Alcoholic beverages are among those products included in retaliatory measures against the EC on the part of third countries.

### Factors behind Production Trends

The alcohol and spirits sectors use many agricultural raw materials. The estimates for the Community are:

- over 1.2 million tonnes of cereals
- over 15 million hl of wine (including quantities bought up by intervention authorities)
- 900 000 tonnes of sugarbeet molasses
- over 600 000 hl of cane juice and syrup
- approximately 500 000 tonnes of potatoes
- 400 000 to 750 000 tonnes of apples, pears, peaches and apricots.

Table III shows that in 1986 the EC produced more than 12 million hectolitres of ethyl alcohol of agricultural origin expressed as pure alcohol, compared with 8.6 million hl for EC 10 in 1980.

The value per year of this production was some 600 million ECU excluding taxes and duties. This alcohol is for so-called conventional uses - food, as solvents (perfumery, cosmetics, pharmaceutical, industrial) - and reactional uses in the chemical industry.

In most Member States ethyl alcohol of agricultural origin is in competition for non-food uses with ethyl alcohol of petroleum origin produced in three Member States (Germany, the United Kingdom, France) at the rate of 5 million hl per year with a market value of 200 million ECU.

Alcohol from molasses is produced in all countries except Luxembourg and represents a little under a third of total agricultural alcohol production.

Grape alcohol is even more important - 4 to 5 million hl per year - and is produced in four countries (Italy, France, Spain and Greece) benefiting from Community intervention on the wine industry markets.

Only France produces alcohol directly from sugar beet. The other categories are insignificant, each representing less than 1 million hl per year.

### Major Structural and Geographical Features

There are considerable degrees of industrial concentration in the sector. Even if ethyl alcohol of agricultural origin is considered to be agricultural produce under the Treaty of Rome, a large part of the manufacture of spirits also remains linked to agriculture, such as grain spirits in Germany. If only those firms employing 10 people or more are counted, two-thirds of grain spirits production would not be taken into consideration.

There are also the home distillers and many occasional distillers of fruit spirits in the Black Forest, of wine spirits in southern European countries, etc. Small businesses still play an important part in the industry.

**Table III**  
**Production of Ethyl Alcohol by Agricultural Origin**

|                | (Thousand hectolitres) |       | Beets |       | Cereals |      | Wine  |       | Fruit |      | Potatoes |      | Other |      | Total |        |       |
|----------------|------------------------|-------|-------|-------|---------|------|-------|-------|-------|------|----------|------|-------|------|-------|--------|-------|
|                | Molasses               |       | 1980  | 1986  | 1980    | 1986 | 1980  | 1986  | 1980  | 1986 | 1980     | 1986 | 1980  | 1986 | 1980  | 1986   |       |
| Belgium        | 114                    | 78    | -     | -     | 2       | 8    | -     | -     | -     | -    | -        | -    | -     | -    | -     | 116    | 86    |
| Denmark        | 82                     | 104   | -     | -     | 19      | 12   | -     | -     | -     | -    | 19       | 19   | -     | -    | -     | 120    | 135   |
| Germany        | 242                    | 125   | -     | -     | 83      | 48   | -     | -     | 54    | 41   | 561      | 470  | -     | -    | -     | 940    | 684   |
| Greece         | 206                    | 147   | -     | -     | -       | -    | 84    | 56    | 77    | 83   | -        | -    | -     | 31   | -     | 367    | 317   |
| Spain          | -                      | 641   | -     | -     | -       | 85   | -     | 1 269 | -     | -    | -        | -    | -     | 59   | -     | -      | 2 054 |
| France         | 569                    | 840   | 1 648 | 1 664 | -       | -    | 1 432 | 1 464 | 3     | 112  | -        | -    | 44    | 57   | 3 696 | 4 137  |       |
| Italy          | 858                    | 837   | -     | -     | -       | 229  | 1 000 | 2 073 | 259   | 78   | 25       | 18   | -     | 122  | 2 142 | 3 357  |       |
| Ireland        | 62                     | 60    | -     | -     | 15      | 15   | -     | -     | -     | -    | -        | -    | 30    | 30   | 107   | 105    |       |
| Luxembourg     | -                      | -     | -     | -     | -       | -    | -     | -     | -     | -    | -        | -    | -     | 2    | -     | -      | 2     |
| Netherlands    | 569                    | 621   | -     | -     | 45      | 25   | -     | -     | -     | -    | -        | -    | -     | -    | 614   | 646    |       |
| Portugal       | -                      | 16    | -     | -     | -       | -    | -     | 8     | -     | 43   | -        | -    | -     | -    | -     | 67     |       |
| United Kingdom | 176                    | 201   | -     | -     | 327     | 309  | -     | -     | -     | -    | -        | -    | -     | -    | 504   | 5      |       |
| EC             | 2 878                  | 3 670 | 1 648 | 1 664 | 491     | 731  | 2 516 | 4 870 | 393   | 357  | 605      | 507  | 74    | 301  | 8 605 | 12 100 |       |

Sources: National associations and UEAES.

Industrial statistics thus represent only a part of the spirits sector, since they are based on firms with a minimum of 10 employees.

The leading producer of spirits is the United Kingdom with over a third of Community production. Slower economic growth has had a negative effect on consumption. In the Scotch whisky sector, production fell by almost half over the period 1974-1985, though in general all spirits have suffered because of the crisis.

Table IV shows estimated average annual production of spirits over the period 1982-1985 in 1000s hl/per year:

### Trade Trends

The EC is the world's leading exporter of spirits. The four main categories of EC exports are, in order of importance:

- whisky (Scotch, Irish)
- brandy (Cognac, Armagnac, Weinbrand, and French, Italian, Spanish, Greek and Portuguese brandies)
- gin, vodka and other distilled products (including aniseed)
- liqueurs.

Over 80% of Scotch whiskies, Cognac and Armagnac are consumed outside their country of origin. The same is true of Irish whiskey, but the production level is considerably lower.

Ten countries represent over 85% of international trade in spirits, five of them belonging to the EC (Germany, France, Britain, Italy and Belgium/Luxembourg). The five leading third country importers in 1982, in relation to the world total, were:

- the United States - 46.0%
- Canada - 4.4%
- Australia - 3.2%
- Japan - 2.9%
- South Africa - 1.9%.

Some 40% of exports from EC Member States are to other countries within the Community, and 60% to third countries. The immense importance to the Community of the American market is apparent.

Intra-Community trade represents a major share of each Member State's imports and also a considerable share of domestic consumption. The free movement of goods within the EC will provide excellent opportunities in this sector, as shown in table V.

**Table IV**  
**Estimated Annual Production of Spirits**

| (Thousand hectolitres) | 1982-1985 average | %      |
|------------------------|-------------------|--------|
| Belgium                | 74                | 0.8    |
| Denmark                | 85                | 0.9    |
| Germany                | 1 025             | 10.9   |
| Spain                  | 070               | 11.65  |
| Greece                 | 005               | 1.1    |
| France                 | 2 139             | 22.65  |
| Ireland                | 129               | 1.4    |
| Italy                  | 990               | 10.5   |
| Luxembourg             | 2                 | 0.02   |
| Netherlands            | 358               | 3.8    |
| Portugal               | 88                | 0.9    |
| United Kingdom         | 3 375             | 35.75  |
| EC                     | 9 440             | 100.00 |

Excluding flavoured wines; hectolitre of pure alcohol.

Sources: National associations and UEAES.

**Table V**  
**1984 Exports**

| (Million hectolitres/year) | Intra-EC | USA |
|----------------------------|----------|-----|
| Scotch whisky              | 673      | 681 |
| Cognac                     | 116      | 83  |
| Armagnac                   | 6        | 1   |
| Dutch jenever              | 9        | 0.1 |
| British gin                | 48       | 108 |
| Vodka                      | 8        | 1   |
| Danish aquavit             | 6        | 0.5 |
| Danish liqueurs            | 2        | 0.4 |

Source: UEAES.

Certain countries are very large importers. Belgium, for example, imports more than three-quarters of total spirits consumed.

Imported products accounted for a quarter of consumption in the German market (1 million hectolitres of 4 million).

Britain is the main EC market for cognac (42 322 hl/p.a.).

UEAES: Union Européenne des Alcools, Eaux-de-vie et Spiritueux  
Address: Avenue de Tervueren 192, Boite 6, B-1150 Brussels  
Tel: (32 2) 771 77 35; Telex: 63954 UNALCO B

## COGNAC

*With exports valued at FF 27.4 billion in 1987 and a positive balance of FF 24.2 billion, wines and spirits account for more than three-quarters of France's agro-trade surplus. Sales of Cognac represent more than three-quarters of the total value of all French spirit exports, contributing in 1987 FF 6.2 billion worth of exports to France's balance of payments. With 90% of their sales volume made abroad, Cognac firms have long confirmed their vocation as exporters.*

### Current Situation

In 1987, sales of Cognac as such, in France and abroad, totalled 142 million bottles, an increase of 10% over 1986. Exports alone - 130 million bottles - rose by 11%, due mainly to progress in the United States and the Far Eastern markets. Total sales, that is including the amount of cognac used in the preparation of Pineau des Charentes (a local liqueur wine), liqueurs and "vins vinés", amount to 161.8 million bottles, a rise of 9% compared with 1986. Production of Cognac from the 1987 harvest represents the equivalent of 166 million bottles, half of which is processed by the vine-growers themselves, often in their own stills ("bouilleurs de cru"), but also by distilling cooperatives and independent distillers ("bouilleurs de profession"). Stocks are considerable, with inventories (ageing solely in casks made from the oak of the

Limousin and Tronçais forests) amounting to a billion bottles, i.e. more than five years' sales at the present rate of transactions. Lastly, evaporation (poetically called the "angels' share") can be evaluated at around 22 million bottles, in other words, more than the volume shipped to Hong Kong and Germany together, two of Cognac's foremost markets. However, evaporation is the counterpart of the natural ageing process and the indispensable condition for perfecting a quality renowned for centuries.

### French Market

Despite a slight recovery in 1987, the pattern of sales in France is one of slow decline since 1980. At 11.8 million bottles, the home market represents only 7.3% of world sales (in 1980 its share was 11.6%).

### Export Markets

The decline in the home market is more than made up for by the performance of the export trade: +11% in volume in 1987, to 130 million bottles, and +16% as regards turnover (FF 6.2 billion), with a continuing trend towards the older Cognacs. A decade ago, the Three Star or VS qualities of cognac accounted for as much as 85% of all shipments. Today, that percentage has fallen to 54%, while the VSOP category represents 27%, with the extra old Cognacs (Napoleon, XO, Extra Vieux, etc.) taking a 19% share. In volume terms, the latter increased by a third in 1987, the VSOP qualities by 13% and the Three Star/VS category by 6%.

The three main zones for Cognac exports are Europe, the American continent and Asia. The volume and value breakdown between these areas is significant. Europe is the most important in volume terms (41%) with 53 million bottles, but representing only 34% in the value of deliveries. The EC countries (France excluded) account for a little over 43 million bottles and, as a whole, are slowly recovering after a decline between 1980 and 1983. The American continent (mainly the USA and Canada) accounts for 27% in value terms and 29% as regards volume, with 37.4 million bottles - an increase of 14% over 1986. This improvement is mainly due to the USA deliveries to the Canadian provincial Liquor Boards falling regularly (-19% in 1987), in line with the general decline of the spirit market there. Asia - the Far East principally - continues to progress regularly: +7% in 1986, +30% in 1987, deliveries reaching 37 million bottles, i.e. 29% of export volume. The market leaders are Hong Kong and Japan which together represent over 70% of all exports to this zone and 19% of world deliveries. The predilection of the Japanese and Chinese for the older Cognacs - almost all those sold in Asian countries are VSOP and extra old qualities - explains why this zone accounts for 37% of export value.

## Forecast and Outlook

On today's competitive markets the concepts of prestige and high quality are increasingly decisive factors in creating and maintaining consumer preferences and are of prime importance for the future of Cognac. Progress is today centred mainly on the United States and the Far East, whilst elsewhere deliveries are, on the whole, relatively stable with downward trends here and there that are often in line with the general situation for spirits in the countries concerned.

Fluctuations reflect the influence of economic and financial difficulties on import policies and consumer purchases. In addition, Cognac faces on several of its traditional markets a decline in the consumption of spirits in general, spurred on

by the growing anti-alcohol campaign and the increasing preoccupation of the man-in-the-street with a healthier life style. Thanks, however, to its image as a high quality, natural product (of the vine) at the top end of the overall spirit market, Cognac has shown in many cases that it is able to preserve its clientele and market shares. The backing of a firmly structured distribution network and a pricing policy in line with its prestige are, more than ever, essential conditions for Cognac's continuing progress.

BNIC: Bureau National Interprofessionnel du Cognac  
Address: 5, rue Georges Briand; BP 18; F-16101 Cognac Cedex;  
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# BREWING AND MALT

(NACE 427.1)

## Brewing

Brewing is the third largest food industry branch after dairy and meat products and is the largest of the secondary processing industries. Within the individual Member States, it is the largest food industry in Germany, Belgium and Luxembourg and the second largest in the United Kingdom and Denmark. In 1986, there were 1 400 independent brewing companies in the Community (excluding Spain and Greece plus Ireland for employment only), employing some 157 000 persons to produce 235 million hectolitres of beer, 10 million hl of which were exported to non-Community countries. Within the Community, the average annual per capita consumption of beer is 82.3 litres. The industry uses 5 million tonnes of malting barley each year.

### Current Situation

Table I shows the number of active breweries, the number of independent brewing companies and the number of persons employed in 1986 in the Member States. Table II shows the division of brewing plants by production. There is a strong trend towards concentration in the industry.

### Consumption Trends

Table IV shows total beer production 1980-1986 and Table V total beer consumption. The recession and consequent increased pressure on disposable incomes have compounded changing trends in beverage consumption and lifestyle leading to a rather stagnant market in the Community. Table VI,

consumption of beer per head, shows where some changes have occurred within the overall trend.

**Table I**  
**Industry Structure - 1986**

| Country        | Number of active breweries (plants) | Number of independent brewing companies | Number of persons employed |
|----------------|-------------------------------------|---|----------------------------|
| BLEU           | 130                                 | 109                                     | 12 832                     |
| Denmark        | 23                                  | 18                                      | 7 200                      |
| Germany        | 1 190                               | 1 140                                   | 59 500                     |
| France         | 37                                  | 26                                      | 8 809                      |
| Ireland        | 7                                   | 5                                       | N/A                        |
| Italy          | 24                                  | 12                                      | 5 020                      |
| Netherlands    | 20                                  | 14                                      | 9 625                      |
| Portugal       | 8                                   | 4                                       | 4 504                      |
| United Kingdom | 117                                 | 68                                      | 50 000                     |
| EC (1)         | 1 556                               | 1 396                                   | 157 490                    |

EC 9 for persons employed; refers to office staff and workers involved on site and/or in production.

(1) EC 10.

Source: CBMC.

### Export Trends

Exports to third countries have grown although they represent a very small share of total production. The internal consumption of the EC member States is stagnating.

### Raw Materials

At a time when the Community is producing surplus cereals it is paradoxical that the brewing industry is short of its own raw material: malting barley. Between 1979 and 1984 the areas given over to growing malting barley in the Community dropped by almost 50% leading to prices above threshold levels and imports of barley from third countries.

### Main Indicators Brewing

| (Hundred thousand hl)    | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  |
|--------------------------|-------|-------|-------|-------|-------|-------|-------|
| Apparent consumption (1) | 231.4 | 229.7 | 228.7 | 231.1 | 225.4 | 226.6 | 227.7 |
| Net exports (1) (2)      | +4.8  | +5.4  | +6.2  | +6.3  | +7.2  | +6.7  | +8.0  |
| Total production (1)     | 235.9 | 235.1 | 234.9 | 237.4 | 232.1 | 233.3 | 235.7 |
| Employment (1 000) (3)   | N/A   | N/A   | N/A   | N/A   | N/A   | N/A   | 157.5 |

(1) Excluding Spain and Greece.

(2) Excluding the supply for ships.

(3) EC 9 (excluding Spain, Greece and Ireland).

**Table II**  
**Division of Brewing Plants by Annual Production**

| (Thousand hl)   | 0-10   |        | 10-60  |        | 60-120 |        | 120-500 |        | 500-1 000 |        | 1 000 + |        |
|-----------------|--------|--------|--------|--------|--------|--------|---------|--------|-----------|--------|---------|--------|
|                 | Plants | Output | Plants | Output | Plants | Output | Plants  | Output | Plants    | Output | Plants  | Output |
| Belgium (1)     | 55     | 152    | 18     | 475    | 30     | 4 500  | 22      | 8 799  |           |        |         |        |
| Denmark         | 2      | N/A    | 12     | N/A    | N/A    | N/A    | 5       | N/A    | 1         | N/A    | 3       | N/A    |
| Germany         | 623    | 2 040  | 343    | 8 951  | 81     | 7 200  | 96      | 23 130 | 27        | 19 659 | 20      | 33 079 |
| Spain           | N/A     | N/A    | N/A       | N/A    | N/A     | N/A    |
| France (2)      | 7      | 18     | 4      | 47     | 5      | 439    | 8       | 1 584  | 2         | 1 615  | 2       | 16 951 |
| Greece          | N/A     | N/A    | N/A       | N/A    | N/A     | N/A    |
| Ireland         | N/A    | N/A    | N/A    | N/A    | N/A    | N/A    | 4       | N/A    | 2         | N/A    | 1       | N/A    |
| Italy           | N/A    | N/A    | 2      | 52     | 1      | 120    | 10      | 3 131  | 10        | 6 662  | 1       | 1 117  |
| Luxembourg      | 1      | 10     | 1      | 19     | N/A    | N/A    | 3       | 703    | N/A       | N/A    | N/A     | N/A    |
| Netherlands (3) | N/A    | N/A    | 6      | 125    | 2      | 200    | 2       | 994    | N/A       | N/A    | 10      | 16 669 |
| Portugal        | N/A    | 1      | 48     | 1      | 80     | 4      | 1 045   | N/A    | N/A       | N/A    | 2       | 2 912  |
| United Kingdom  | N/A     | N/A    | N/A       | N/A    | N/A     | N/A    |
| EC              |        |        |        |        |        |        |         |        |           |        |         |        |

(1) The Belgian categories for plants differ slightly. They are: 0-11, 11-64, 64-265, 265.

(2) Brewing companies.

(3) Medium plants are 120-1 000.

Source: CBMC.

**Table III**  
**Production and Foreign Trade**  
**Brewing Industry**

| (Hundred thousand hl)    | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  |
|--------------------------|-------|-------|-------|-------|-------|-------|-------|
| Production (1)           | 235.9 | 235.1 | 234.9 | 237.4 | 232.1 | 233.3 | 235.7 |
| Index                    | 100.0 | 99.7  | 94.6  | 100.6 | 98.4  | 98.9  | 99.9  |
| Imports extra-EC (1)     | 0.8   | 0.6   | 0.8   | 0.9   | 0.6   | 1.4   | 0.9   |
| Index                    | 100.0 | 120.0 | 160.0 | 180.0 | 120.0 | 280.0 | 180.0 |
| Exports extra-EC (1) (2) | 5.3   | 6.0   | 7.0   | 7.2   | 7.8   | 8.1   | 8.9   |
| Index                    | 100.0 | 113.2 | 132.1 | 135.8 | 147.2 | 152.8 | 167.9 |
| X/M                      | 6.6   | 10.0  | 8.8   | 8.0   | 13.0  | 5.8   | 9.9   |

(1) Excluding Spain and Greece.

(2) Excluding the supply for ships.

Source: CBMC.

**Table IV**  
**Total Beer Production**

| (Hundred thousand hl) | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  |
|-----------------------|-------|-------|-------|-------|-------|-------|-------|
| BLEU                  | 15.0  | 14.6  | 15.4  | 14.9  | 14.9  | 14.7  | 14.4  |
| Denmark               | 8.2   | 8.2   | 8.5   | 8.7   | 8.5   | 7.9   | 8.5   |
| Germany               | 92.3  | 93.7  | 94.6  | 95.0  | 92.6  | 93.3  | 94.1  |
| France                | 21.7  | 21.7  | 22.3  | 21.8  | 20.7  | 20.3  | 20.7  |
| Ireland               | 6.0   | 5.8   | 5.6   | 5.5   | 5.4   | 5.5   | 5.4   |
| Italy                 | 8.6   | 9.0   | 10.2  | 10.1  | 9.1   | 10.3  | 11.1  |
| Netherlands           | 15.7  | 16.6  | 16.2  | 17.3  | 17.1  | 17.5  | 18.0  |
| Portugal              | 3.6   | 3.8   | 3.9   | 3.8   | 3.7   | 3.8   | 4.1   |
| United Kingdom        | 64.8  | 61.7  | 58.2  | 60.3  | 60.1  | 60.0  | 59.4  |
| EC (1)                | 235.9 | 235.1 | 234.9 | 237.4 | 232.1 | 233.3 | 235.7 |

(1) Excluding Spain and Greece.

Source: CBMC.

## Outlook

Probably the most serious problem facing the European brewing industry is the stagnation of domestic beer consumption. Consumption in 1986 was at a similar level to that in 1975. The recession coupled with the national governments' tendencies to tax beer consumption have brought about this

stagnation. As a result, third country markets are becoming increasingly important to European beer producers.

Communauté de Travail des Brasseurs du Marché Commun. CBMC  
Address: Boulevard du Souverou 191-197, Box 10, B-1160 Brussels  
Tel: (32 2) 672 2392; Telex: 62148 BRACOM; Fax: 660 94 02

**Table V**  
**Total Beer Consumption**

| (Hundred thousand hl) | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  |
|-----------------------|-------|-------|-------|-------|-------|-------|-------|
| BLEU                  | 13.4  | 12.6  | 13.5  | 13.1  | 12.8  | 12.4  | 12.5  |
| Denmark               | 6.7   | 6.7   | 6.8   | 7.1   | 6.9   | 6.6   | 6.7   |
| Germany               | 89.7  | 90.6  | 91.1  | 91.1  | 88.4  | 88.9  | 89.4  |
| France                | 23.7  | 23.7  | 24.3  | 23.8  | 22.6  | 22.1  | 22.4  |
| Ireland               | 4.2   | 4.0   | 4.0   | 3.8   | 3.8   | 3.9   | 3.7   |
| Italy                 | 9.5   | 10.1  | 11.6  | 11.8  | 10.8  | 12.4  | 13.2  |
| Netherlands           | 12.2  | 12.8  | 11.7  | 12.6  | 12.0  | 12.2  | 12.5  |
| Portugal              | 3.5   | 3.7   | 3.7   | 3.7   | 3.5   | 3.7   | 4.0   |
| United Kingdom        | 65.5  | 62.3  | 60.4  | 62.2  | 62.1  | 61.5  | 61.2  |
| EC (1)                | 228.4 | 226.5 | 227.1 | 229.2 | 222.9 | 223.7 | 225.6 |

(1) Excluding Spain and Greece.

Source: CBMC.

**Table VI**  
**Per Capita Consumption of Beer**

| (Litres)       | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  |
|----------------|-------|-------|-------|-------|-------|-------|-------|
| BLEU           | 130.8 | 124.0 | 131.9 | 128.0 | 125.2 | 120.9 | 122.1 |
| Denmark        | 130.7 | 131.0 | 133.7 | 138.8 | 134.0 | 129.2 | 130.0 |
| Germany        | 145.7 | 147.0 | 147.9 | 148.3 | 144.8 | 145.8 | 146.5 |
| France         | 44.3  | 44.0  | 44.8  | 43.7  | 41.2  | 40.1  | 40.4  |
| Ireland        | 121.7 | 116.4 | 115.0 | 108.0 | 108.4 | 109.0 | 104.5 |
| Italy          | 16.7  | 17.9  | 20.6  | 20.7  | 18.9  | 21.7  | 23.0  |
| Netherlands    | 86.4  | 89.6  | 82.0  | 87.5  | 83.4  | 84.4  | 86.0  |
| Portugal       | 35.0  | 37.0  | 37.4  | 37.0  | 35.5  | 36.9  | 39.5  |
| United Kingdom | 117.1 | 111.5 | 107.3 | 110.5 | 110.1 | 108.9 | 107.8 |
| EC average (1) | 84.3  | 83.5  | 83.6  | 84.1  | 81.7  | 81.9  | 82.3  |

(1) Excluding Spain and Greece.

Source: CBMC.

### Malt (NACE 427.2)

*The European Community's malt industry annually processes approximately 4.7 million tonnes of malt, representing 1/3 of world malt production. The main EC malt producing countries are Belgium, France, Germany and the United Kingdom. Other malt producing Member States of significance are Denmark, Ireland, Italy and the Netherlands. Two categories of malt are produced: brewing malt which accounts for 98.5% of the tonnage produced, and whisky malt.*

### Current Situation

About two-thirds of the EC maltings operate independently, while one-third of them are associated with other industries, predominantly breweries. In 1985, there were about 200 EC maltings, more than half of which were situated in Germany.

### Factors behind Production Trends

The value-added content of malting is low. In the Community the raw material (barley) represents between 75% and 80% of the ex-factory sales price, which is a much higher ratio than that for the Australian or North American maltings (50-60%, depending on the type of malt). To remain competitive on the world market the European malters therefore have to manage their supply of the raw material barley as rationally

### Main Indicators

#### Malt

| (Thousand tonnes)        | 1980  | 1981   | 1982   | 1983   | 1984   | 1985   | 1986   | 1987   |
|--------------------------|-------|--------|--------|--------|--------|--------|--------|--------|
| Apparent consumption (1) | 4 017 | 3 649  | 3 898  | 3 758  | 3 769  | 3 711  | 3 632  | 3 727  |
| Net exports (1)          | +963  | +1 219 | +1 122 | +1 268 | +1 020 | +1 089 | +1 118 | +1 233 |
| Production (1) (2)       | 4 980 | 4 868  | 5 020  | 5 026  | 4 789  | 4 800  | 4 750  | 4 960  |

(1) Excluding Spain, Portugal and Greece.

(2) U.K. malt for whisky estimated 1985, 1986 and 1987. Estimates for Denmark in 1987 and for Ireland in 1986 and 1987.

**Table I**  
**Maltings - 1985**

|                              | B  | DK | D   | F  | IRL | I | NL | UK | TOTAL |
|------------------------------|----|----|-----|----|-----|---|----|----|-------|
| Independent                  | 9  | 4  | 71  | 25 | 4   | 3 | 4  | 10 | 130   |
| Associated to breweries      | 2  | 4  | 37  | 1  | 2   | 1 | 1  | 17 | 65    |
| Associated to other industr. | 0  | 0  | 0   | 0  | 1   | 1 | 0  | 4  | 6     |
| Total                        | 11 | 8  | 108 | 26 | 7   | 5 | 5  | 31 | 201   |

**Table II**  
**Number, Total Capacity and Coefficient of Utilization of Maltings (Plants) in 1985**

| Capacity size<br>1 000 tonnes malt | Belgium |           | Denmark |           | Germany |           |
|------------------------------------|---------|-----------|---------|-----------|---------|-----------|
|                                    | No.     | Tot. cap. | No.     | Tot. cap. | No.     | Tot. cap. |
| 0 - 10                             | 1       | 6 000     | 4       | 21 800    | 64      | 220 000   |
| 10 - 20                            | 3       | 47 000    |         |           | 17      | 220 000   |
| 20 - 30                            | 1       | 30 000    | 3       | 75 600    | 10      | 220 000   |
| 30 - 40                            |         |           |         |           | 8       | 250 000   |
| 40 - 50                            | 1       |           | 1       | 46 200    | 3       | 120 000   |
| 50 - 100                           | 5       | 392 000   |         |           | 5       | 330 000   |
| 100 - 200                          | 1       | 120 000   |         |           | 1       | 175 000   |
| Total                              | 11      | 595 000   | 8       | 143 600   | 108     | 1 535 000 |
| % of EC 8                          | 5.5     | 10.7      | 4.0     | 2.6       | 53.7    | 27.7      |

| Capacity size<br>1 000 tonnes malt | France |           | Ireland |           | Italy |           |
|------------------------------------|--------|-----------|---------|-----------|-------|-----------|
|                                    | No.    | Tot. cap. | No.     | Tot. cap. | No.   | Tot. cap. |
| 0 - 10                             | 1      | 6 938     | 1       | 3 000     | 1     | 2 000     |
| 10 - 20                            | 4      | 60 698    | 2       | 22 000    | 2     | 26 000    |
| 20 - 30                            | 1      | 20 144    | 3       | 61 000    |       |           |
| 30 - 40                            | 3      | 97 133    |         |           |       |           |
| 40 - 50                            | 5      | 224 897   | 1       | 50 000    | 2     | 95 000    |
| 50 - 100                           | 10     | 661 659   |         |           |       |           |
| 100 - 200                          | 2      | 238 305   |         |           |       |           |
| Total                              | 26     | 1 309 774 | 7       | 136 000   | 5     | 123 000   |
| % of EC 8                          | 12.9   | 23.7      | 3.4     | 2.5       | 2.5   | 2.2       |

| Capacity size<br>1 000 tonnes malt | Netherlands |           | United Kingdom |           | TOTAL |           | % Tot. |
|------------------------------------|-------------|-----------|----------------|-----------|-------|-----------|--------|
|                                    | No.         | Tot. cap. | No.            | Tot. cap. | No.   | Tot. cap. |        |
| 0 - 10                             | 1           | 2 800     | 13             | 48 155    | 86    | 308 693   | 5.6    |
| 10 - 20                            |             |           | 4              | 59 555    | 32    | 435 253   | 7.9    |
| 20 - 30                            |             |           | 1              | 30 000    | 19    | 436 744   | 7.9    |
| 30 - 40                            | 3           | 113 600   | 2              | 73 500    | 16    | 534 233   | 9.7    |
| 40 - 50                            |             |           | 1              | 47 535    | 13    | 583 632   | 10.5   |
| 50 - 100                           | 1           | 64 000    | 6              | 513 000   | 27    | 1 960 659 | 35.4   |
| 100 - 200                          |             |           | 4              | 740 000   | 8     | 1 273 305 | 23.0   |
| Total                              | 5           | 180 400   | 31             | 1 509 745 | 201   | 5 532 519 | 100    |
| % of EC 8                          | 2.5         | 3.3       | 15.4           | 27.3      | 100   | 100       |        |

All malters whether independent or associated with the brewing, distilling or other industries are included.

Source: BIOS.

**Table III**  
**Production and Foreign Trade**

| 1 000 tonnes         | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  | 1987  |
|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Production (1) (2)   | 4 980 | 4 868 | 5 020 | 5 026 | 4 789 | 4 800 | 4 750 | 4 960 |
| Index                | 100   | 97.8  | 100.8 | 100.9 | 96.2  | 96.4  | 95.4  | 99.6  |
| Imports extra-EC     | 55    | 46    | 40    | 47    | 56    | 60    | 57    | 61    |
| Index                | 100   | 83.6  | 72.7  | 85.5  | 101.8 | 109.1 | 103.6 | 110.9 |
| Exports extra-EC (2) | 1 018 | 1 265 | 1 162 | 1 315 | 1 076 | 1 149 | 1 175 | 1 294 |
| Index                | 100   | 124.3 | 114.1 | 129.2 | 105.6 | 112.9 | 115.4 | 127.1 |
| X/M                  | 18.5  | 27.5  | 29.1  | 28.0  | 19.2  | 19.2  | 20.6  | 21.2  |

(1) Excluding Spain, Portugal and Greece.

(2) U.K. malt for whisky estimated 1985, 1986 and 1987. Estimates for Denmark in 1987 and for Ireland in 1986 and 1987.

Source: BIOS.

as possible. The barley has to meet stringent quality criteria in terms of germination capacity, protein content and diastatic capacity.

As malt is the raw material for beer, the trends in malt exports follow the evolution of beer production. World beer production currently stands at around 1 billion hl/year and increases annually by about 2.3%. Production is concentrated in the northern hemisphere (800 million hl) where consumption is stagnating. The past 15 years have seen a remarkable development of beer production and consumption in South and Central America (+6%/year), Asia (+11%/year) and Africa (+6%/year). As barley growing is difficult in these parts of the world, market opportunities for malt exporting countries to these areas are substantial.

### *Exports Trends*

According to FAO statistics, the total world malt trade amounts to 2.73 million tonnes of malt, representing a countervalue (import basis) of 702 million ECU, i.e. about 260 ECU/tonne. This trade represents 18% of world malt production which is estimated at 14 million tonnes. EC exports to third countries amounted to 1.28 million tonnes in 1987, which makes the EC by far the most important malt exporter in the world. In 1987, the EC exports to third countries were geographically divided as follows: European third countries: (100 000 tonnes), Africa: (460 000 tonnes), Central and South America (440 000 tonnes), Asia (280 000 tonnes).

In 1986, the EC's main competitors on the world market were in order of importance: Australia (1986 exports: 258 000 tonnes), Canada (1986: 140 000 tonnes), South America (1986: 68 000 tonnes), USA (1986: 39 000 tonnes).

Buyers in third countries have high technical demands. To maintain consistency in the quality of their products, they cannot frequently change their supplies, nor can they change their selling prices repeatedly. For these reasons, buyers try to protect themselves for periods of at least one year and are reluctant to suddenly change suppliers. However, they gradually adapt their buying policy to price, quality, reliability of supply and to the possibilities on the market.

Intra-Community trade amounted to 722 000 tonnes or about 25% of world trade. Therefore, with extra and intra-Community trade, the EC realizes 72% of the total world malt trade.

### **Forecast and Outlook**

The medium-term outlook for the Community malt industry is good. The consumption of beer has stabilized in Europe while it has increased in third countries which do not produce barley.

#### **EUROMALT**

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# SOFT DRINKS

(NACE 428.2)

The terminology concerning soft drinks within the EC has not been harmonized. In the present context, soft drinks are defined as non-alcoholic beverages consisting of water, flavouring substances, sugars or intensive sweeteners. These drinks are usually carbonated. Waters (mineral waters and other categories) sharing item 428 of the NACE Classification with soft drinks are not included in this report. Fruit juices and nectars are also excluded.

## Current Situation

The EC soft drinks industry can best be described by a few 1986 figures: the total production of ready-to-drink soft drinks represents nearly 15 billion litres. Concentrates in equivalent ready-to-drink beverages account for another 4 billion litres. There are more than 5 000 production units in the EC.

However, the differences are very marked from one country to another. While in Germany, the consumption per capita was 77.5 litres, in Portugal, it was only 23.6 litres. Soft drinks containing fruit juice represent only 7.6% of the total consumption in Belgium, but 38.9% in France. Cola drinks account for 42% of total consumption in Holland and for only 24% in Ireland. These differences are explained by widely varying traditions and economic and sociological situations. Despite the diversity of the European scene, it is possible to make some general comments about the present situation.

## Consumption

Since the end of the Second World War, the soft drinks industry has developed considerably, although the last few years have seen a slackening of growth; in some countries, there is even stagnation.

The factors that have influenced the volume increase are the public's preference for non-alcoholic drinks, the increase in purchasing power making possible a greater sophistication and diversification of drinks and the development of new packaging systems. In some countries (e.g. Denmark) development has been slower or production has stagnated over the last few years. This is largely due to excessive taxation of soft drinks under completely irrational excise duties combined with high VAT rates. There have also been obstacles to the introduction of new packaging systems. Other negative factors include the less favourable economic situation and the stagnation and aging of the population.

## Trade

Exports and imports do not appear to have developed much, except in the Benelux countries. This is undoubtedly due, to a large extent, to the fact that the Benelux countries have harmonized their legislation on soft drinks while the regulations of other countries differ, sometimes widely.

## Factors behind Production Trends

In all countries, there is a trend towards concentration and the number of producers is gradually decreasing. The modernization of production methods, equipment, transport, etc., increases the need for concentration. So does the vital necessity to maintain a sufficient profit margin in the face of stiff competition.

Soft drinks made with extracts of fruits or plants are the largest category. The market share of fruit-flavoured drinks varies from one country to another. Cola is the predominant flavour, followed by orange, lemon and other fruit, with some

## Main Indicators Ready-to-drink Soft Drinks

| (Million litres)                 | 1980   | 1981   | 1982   | 1983   | 1984   | 1985   | 1986   |
|----------------------------------|--------|--------|--------|--------|--------|--------|--------|
| Production (1)<br>Ready-to-drink | 10 124 | 10 058 | 10 509 | 10 759 | 10 594 | 11 254 | 12 359 |
| Employment (1 000) (2)           | 64.7   | 63.6   | 60.3   | 54.8   | 55.0   | 52.3   | 51.5   |

(1) EC 8 Belgium, Denmark, Germany, Ireland, Italy, Portugal, the Netherlands and the United Kingdom. Portugal 1980 estimated.

(2) EC 7 Denmark, Germany, Ireland, Italy, Portugal, the Netherlands and the United Kingdom.

**Table I**  
**Breakdown by Country in 1986**

| (Million litres)            | B    | DK   | D     | GR   | E     | F     | IRL  | I     | NL   | P    | UK    |
|-----------------------------|------|------|-------|------|-------|-------|------|-------|------|------|-------|
| Apparent consumption        | 668  | 210  | 4 826 | N/A  | 2 062 | N/A   | 170  | N/A   | 860  | N/A  | N/A   |
| Total exports               | 222  | 12   | 144   | N/A  | 98    | N/A   | 30   | N/A   | 270  | N/A  | N/A   |
| Total imports               | 125  | N/A  | 115   | N/A  | 19    | N/A   | 17   | N/A   | 131  | N/A  | N/A   |
| Production for home market  | 542  | 210  | 4 711 | 350  | 2 042 | 1 450 | 152  | 1 430 | 728  | 235  | 2 750 |
| Consumption capita (litres) | 68.2 | 41.2 | 77.5  | 37.5 | 53.0  | 27.0  | 48.6 | 25.5  | 59.1 | 23.6 | 49.6  |

Source: UNESDA.

**Table II**  
**Consumption by Category in 1986**

| (%)                | B    | DK   | D    | GR   | E    | F    | IRL  | I    | NL   | P    | UK   |
|--------------------|------|------|------|------|------|------|------|------|------|------|------|
| Fruit juice drinks | 7.6  | 44.1 | 12.8 | 19.0 | 22.1 | 38.9 | 8.5  | 42.1 | 28.0 | 49.3 | 2.5  |
| Comminuted drinks  | N/A  | N/A  | N/A  | N/A  | 3.0  | N/A  | N/A  | N/A  | N/A  | N/A  | 5.8  |
| Colas              | 48.5 | 30.5 | 40.2 | 57.0 | 29.5 | 22.4 | 24.0 | 27.1 | 42.0 | 15.6 | 36.2 |
| Others             | 43.9 | 25.4 | 47.0 | 24.0 | 45.4 | 38.7 | 67.5 | 30.8 | 30.0 | 35.1 | 55.5 |

Source: UNESDA.

**Table III**  
**Packaging Used in 1986**

| (%)                  | B    | DK   | D    | GR   | E    | F    | IRL  | I    | NL   | P    | UK   |
|----------------------|------|------|------|------|------|------|------|------|------|------|------|
| Return glass         | 48.3 | 98.0 | 68.8 | 53.0 | 77.0 | 40.0 | 23.0 | 23.0 | 90.0 | 88.4 | 17.6 |
| Plastic              | 38.2 | 0.0  | 1.6  | 21.0 | 8.5  | 20.5 | 45.0 | 35.0 | N/A  | 5.1  | 37.7 |
| Metal                | 7.9  | 0.0  | 14.0 | 22.0 | 9.5  | 6.0  | 18.0 | 24.0 | N/A  | 2.9  | 24.5 |
| Cardboard            | 1.1  | 0.0  | 0.0  | 0.0  | 0.0  | 1.5  | 0.0  | 1.0  | N/A  | 0.7  | 0.0  |
| Non-refillable glass | 2.0  | 0.0  | 7.0  | 0.0  | 1.4  | 29.0 | 10.0 | 13.0 | N/A  | 2.5  | 7.3  |
| Postmix and premix   | 2.5  | 2.0  | 8.6  | 4.0  | 3.6  | 3.0  | 4.0  | 4.0  | 0.8  | 0.4  | 12.9 |

Source: UNESDA.

of the more recent products using exotic fruit flavours. In some countries, e.g. the UK, Ireland and to a certain degree France, concentrates represent a very sizeable volume in comparison with ready-to-drink beverages. Low-calorie soft drinks, in which sugar is replaced by intensive sweeteners, are new products with a relatively small share of the market but which are growing fast. This is particularly noticeable in Germany and in the UK.

The development of lighter, non-refillable containers, such as cans, plastic (P.E.T.) and disposable glass, has been very

different from one country to another. While the percentage of refillable glass used for soft drinks is 100% in Denmark and about 90% in the Netherlands and Portugal, the situation is quite different in most other countries where other types of packaging have developed in various degrees. In the UK, refillable glass now represents less than 18% of soft drink packaging.

UNESDA: Union of EC Soft Drinks Associations  
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## TEXTILE PROCESSING

(NACE 43)

*The textile industry is generally considered to be a mature industry which is confronted with increasing competition from newly industrialized and developing countries. The health of this sector is closely interlinked with demand from the clothing industry, the main outlet for its goods; recently this demand has been relatively weak. In 1987 apparent consumption grew by 1.4% in real terms while imports increased by 22% in tonnage.*

Because of the competition from these countries which export at low prices, the EC industry has been forced to turn more and more towards high-value-added products and to diversify. Compared with its US and Japanese competitors, the EC textile industry still occupies a leading position in the following sectors: wool (63% of the triad's production in 1983), silk (44%), linen (89%) and knitwear (39%). The market position in carpets is also very strong (36%).

Textile processing consists of the preparation of natural (especially cotton and wool) and man-made fibres, the spinning, the weaving or knitting and the finishing of these fibres, yarns and fabrics. The combination of different fibres and different stages of processing adds to the complexity of this industry. Performances can vary widely between different materials and processes.

### Current Situation

The Community industry remains one of the largest textile industries in the world. However, its share of world production expressed in terms of industrial fibre consumption has been constantly declining for several decades.

In 1986 the EC's share in world fibre consumption was 12.5%, which represented a 10-point setback as compared with the end of the 1960s. The American share was slightly more than 16% - a 5-point setback - and that of Japan was 6.5% - a 3.5-point setback. During this period, textile production had been expanding very quickly in the developing countries and in State-trading countries.

**Table I**  
**Total Value of Production in 1983**

| (Million ECU)          | NACE | EC 10  | USA    | Japan  |
|------------------------|------|--------|--------|--------|
| Total textile industry | 43   | 54 800 | 57 300 | 37 300 |
| Of which:              |      |        |        |        |
| wool industry          | 431  | 9 300  | 1 200  | 4 300  |
| cotton industry        | 432  | 13 200 | 24 600 | 6 300  |
| silk industry          | 433  | 5 200  | -      | 6 700  |
| linen industry         | 434  | 800    | -      | 100    |
| knitwear               | 436  | 11 700 | 9 800  | 8 500  |
| finishing (1)          | 437  | 4 700  | 7 000  | 6 400  |
| carpets and other      |      |        |        |        |
| floor coverings        | 438  | 5 000  | 10 100 | 1 700  |
| other textiles         | 439  | 4 500  | 4 600  | 3 300  |

(1) Independent finishers only.  
Source: Eurostat.

The EC textile industry is the largest textile exporter in the world. In 1986 it represented 62% of the combined exports of the US, Japan and Europe as is shown in Table II. On the other hand, the EC imports almost as much as the US. But whereas the bulk of its exports are directed to industrialized countries, its imports originate largely from low-cost countries such as developing countries or State-trading countries as is shown in Table IV.

### Main Indicators Textile Processing

| (Million ECU)              | 1980    | 1981    | 1982    | 1983    | 1984    | 1985    | 1986    | 1987    |
|----------------------------|---------|---------|---------|---------|---------|---------|---------|---------|
| Apparent consumption (1)   | 54 049  | 55 800  | 58 411  | 69 986  | 68 073  | 71 271  | 73 643  | 76 652  |
| Net export earnings (1)    | -1 591  | -700    | -792    | -959    | -701    | 123     | -612    | -2 032  |
| Total Community production | 59 593  | 61 395  | 64 460  | 68 701  | 74 710  | 79 031  | 81 963  | 84 035  |
| Employment (1 000)         | 1 820.5 | 1 703.3 | 1 641.1 | 1 595.5 | 1 565.1 | 1 497.4 | 1 533.0 | 1 502.2 |

(1) EC 10 (excluding Spain and Portugal).  
(2) EC 12

**Table II**  
**External Trade in 1986**

| (Million ECU) | Imports                        |               |        | Exports                        |               |        |
|---------------|--------------------------------|---------------|--------|--------------------------------|---------------|--------|
|               | Yarns, fabrics, other textiles | Knitted goods | Total  | Yarns, fabrics, other textiles | Knitted goods | Total  |
| EC            | 8 463                          | 3 936         | 12 399 | 10 735                         | 2 806         | 13 541 |
| USA           | 6 849                          | 5 747         | 12 596 | 2 528                          | 308           | 2 836  |
| Japan         | 1 245                          | 2 226         | 3 471  | 5 399                          | 159           | 5 558  |

Source: OECD - Foreign Trade by commodities.

### *Consumption Trends*

Apparent consumption increased in current value terms at an annual average rate of 5% over the period 1980-1987. However, in real terms this represented a 0.5% decrease per year. Most of this decline was registered during the world recession (1980-1982). Since then demand has constantly improved (1.1% per year).

The penetration of extra-EC imports has been steadily increasing with respect to both consumption and production. A 3% increase was observed in the import penetration ratio over the 1980-1987 period.

The interpenetration of Community markets is also growing steadily. For a firm located in a specific Member State, deliveries from another Member State have always been considered as imports. Now, on average 50% of the national markets are supplied by the domestic industry and 50% are supplied by imports (intra- and extra-EC).

### *Foreign Trade*

The increase in the value of imports does not reflect the disruptive impact of imports on the EC industry. Imports are

lower-priced than domestic goods. In 1987 import prices from developing countries and Comecon were between 20% to 50% below those charged in intra-Community trade according to the type of products. In 1987 the comparison between the average prices of imports from developing country and State-trading country members of the MFA (Multi-fibre Arrangement) and the prices charged in intra-Community trade is as follows: spun yarns 78%, fabrics 53% and knitted or crocheted garments 57%. (Source: COMITEX-TIL/CITH.)

The comparative advantages enjoyed by some of those countries because of the differences in wage costs may not be sufficient to explain the price differences at the import stage. As was noted in the case of man-made fibres, they may be the result of unfair competition or of subsidies. This justifies the existence of a system for the regulation of trade within the framework of the Multi-Fibre Arrangement in circumstances when the general GATT provisions do not ensure conditions of fair competition.

When the two elements of exchange rate movements and import price are combined, it induces a "surge of imports" which in 1987 led to a stabilization of production in the EC industry and fears for 1988 onwards. For instance, EC imports

**Table III**  
**Production and Foreign Trade**

| (Million ECU)        | 1980   | 1981   | 1982   | 1983   | 1984   | 1985   | 1986   | 1987   |
|----------------------|--------|--------|--------|--------|--------|--------|--------|--------|
| Production           |        |        |        |        |        |        |        |        |
| Current value        | 59 593 | 61 395 | 64 460 | 68 791 | 74 710 | 79 031 | 81 963 | 84 035 |
| Index                | 100    | 103.0  | 108.2  | 115.4  | 125.4  | 132.6  | 137.5  | 141.0  |
| Constant value       | 59 593 | 55 836 | 54 367 | 55 155 | 56 829 | 57 404 | 57 680 | 57 813 |
| Index                | 100    | 93.7   | 91.2   | 92.6   | 95.4   | 96.3   | 96.8   | 97.0   |
| Imports extra-EC (1) | 8 824  | 9 012  | 9 582  | 10 510 | 12 292 | 12 565 | 12 945 | 14 594 |
| Index                | 100    | 102.1  | 108.6  | 119.1  | 139.3  | 142.4  | 146.7  | 165.4  |
| Exports extra-EC (1) | 7 234  | 8 313  | 8 791  | 9 551  | 11 590 | 12 688 | 12 333 | 12 562 |
| Index                | 100    | 114.9  | 121.5  | 132.0  | 160.2  | 175.4  | 170.5  | 173.7  |
| X/M (1)              | 0.82   | 0.92   | 0.92   | 0.91   | 0.94   | 1.01   | 0.95   | 0.86   |

(1) EC 10 (excluding Spain and Portugal).  
Source: COMITEX-TIL

increased by 14% in terms of value between 1986 and 1987; in terms of volume (tonnes) they grew by 22%, with considerable increases from some supplier countries.

**Table IV**  
**Structure of Imports and Exports in 1986**

|                                | Imports                                       |                           | Exports                                       |                           |
|--------------------------------|---|---------------------------|---|---------------------------|
|                                | Yarns, fabrics, other text. and knitted goods | For knitted goods alone % | Yarns, fabrics, other text. and knitted goods | For knitted goods alone % |
|                                | USD million                                   | %                         | USD million                                   | %                         |
| Extra-EC                       | 12 605  | 100                       | 100   | 100                       |
| EFTA                           | 2 727   | 22                        | 10  | 35                        |
| USA                            | 781   | 6                         | 2   | 20                        |
| Japan                          | 705   | 6                         | N/A   | 5                         |
| Other industrialized countries | 65  | 1                         | N/A   | 4                         |
| Total industrialized countries | 4 278   | 34                        | 12  | 82                        |
| Comecon                        | 694   | 6                         | 7   | 3                         |
| Turkey                         | 839   | 7                         | 8   | 1                         |
| China                          | 743   | 6                         | 3   | N/A                       |
| South Korea                    | 576   | 5                         | 8   | 1                         |
| Taiwan                         | 505   | 4                         | 6   | N/A                       |
| Hong Kong                      | 909   | 7                         | 19  | 2                         |
| Others                         | 4 061   | 32                        | 36  | 13                        |

Source: OECD - Foreign Trade by commodities.

Exports appear to be one of the most dynamic elements of the textile industry. Although production fell during the world recession at the beginning of the 1980s, exports were still experiencing double-digit growth in nominal terms (almost 12% p.a. between 1980 and 1985) partly due to the strength of the US dollar. This strong export performance has also limited the growth of the trade deficit in value terms within acceptable limits. A small surplus was even experienced in 1985. Unfortunately, this situation changed in 1986 and 1987. The drop in the dollar's value has reduced the competitiveness of European exports and production, inducing a boom in imports.

### Employment Trends

The number of enterprises employing more than 20 people is steadily declining; on the other hand, the total number of enterprises is steadily increasing, thus demonstrating the growing fragmentation of production, especially in the knitwear sector. The average size of the small units tends to diminish further whereas that of other enterprises is stabilizing. As far as employment is concerned, trends are still negative, including those in Greece, Spain and Portugal. In a relatively stable period, the textile industry has lost about 3% of its jobs per year.

### Major Structural and Geographical Factors

During the 1980-1987 period, the EC was enlarged initially by the accession of Greece and then by that of Spain and Portugal. These three countries have large textile industries; their accession reinforced the social and economic importance of the sector at Community level. Before their accession, Spain and Portugal had important trade relations with the other EC countries which were representing a growing outlet for their exports. Since their accession, the extra-EC trade trend has been reversed and the deficit of the Twelve has been appreciably diminished.

### Factors behind Production Trends

With regard to investment, after the setback that followed the 1980 peak, investment has been steadily growing as the textile industry increasingly develops into a capital-intensive industry. The International Exhibition of Textile Machinery (ITMA), held every four years, plays a major role in the development of investment. Following the 1967 ITMA where open-end spinning technology was presented for the first time, the textile industry experienced a period of intense modernization. At the last ITMA, new prospects were opened thanks to the strong breakthrough of microelectronics which should promote both an improvement in productivity and shorter response times, which are decisive factors in competitive markets. Although in 1987 investment accounted for an average of 5% of production value, there are often firms which invest over 10% of their turnover. In fact, the overall figure is influenced by smaller firms whose investment is less significant.

**Table V**  
**Imports (1987/1986 Variation)**

|                | Yarns, fabrics and misc. | Knitwear articles | Total textiles |
|----------------|--------------------------|-------------------|----------------|
| Extra-EC       | +21.5%                   | +24.7%            | +22.1%         |
| Ind. countries | +7.7%                    | +9.6%             | +7.9%          |
| China          | +22.2%                   | 82.3%             | +30.6          |
| Turkey         | +19.7%                   | +54.8%            | +25.9%         |
| South Korea    | +10.9%                   | +7.6%             | +9.6%          |
| Others         | +34.8%                   | +24.9%            | +33.0%         |

Source: COMITEXTIL.

### Sectorial Performance in 1987

1987 proved to be a year of zero growth for textiles in the EC although imports into the Community grew rapidly. However, some differentiation must be made according to the textile sector involved.

#### Wool (NACE 431)

The slump in activity that had already characterized the European wool industry in 1986 continued in 1987. The general

**Table VI**  
**Industry Structure**

|   | 1980    | 1981    | 1982     | 1983    | 1984    | 1985    | 1986    | 1987    |
|---|---------|---------|----------|---------|---------|---------|---------|---------|
| Total number of enterprises                                 | 75 235  | 75 443  | 75 443   | 77 797  | 77 176  | 77 512  | 78 161  | 78 305  |
| Number of enterprises (more than 20 people)                 | 17 759  | 16 699  | 16 074   | 15 967  | 15 556  | 15 369  | 14 974  | 14 919  |
| Total employment (1000)                                     | 1 820.5 | 1 703.3 | 1 641.01 | 1 595.5 | 1 565.1 | 1 497.4 | 1 533.0 | 1 502.2 |
| Employment (enterprises with more than 20 employees) (1000) | 1 437.7 | 1 367.9 | 1 321.8  | 1 299.7 | 1 271.4 | 1 222.1 | 1 195.0 | 1 188.6 |

Source: COMITEXIL.

index of production which in 1986 decreased by 3.6% further declined by 2.8% in 1987 with all production stages being hit by this negative trend. Production in the combing sector which had increased by 3.4% in 1986, decreased by 2% in 1987; this setback can be attributed to the contraction of internal demand, as the growth of exports has largely offset the increase of imports. Worsted spinning production, which had decreased by 1% in 1986, experienced a 2.5% setback in 1987; to a large extent this decline was due to a severe crisis in the hand-knitting yarns sector where production fell by 10.3% in 1986 and by 16.6% in 1987. Carded spinning registered a further decline in output (4.4% in 1987 and 6.4% in 1986).

In woven fabrics for the clothing sector, production, which had experienced a 5.4% setback in 1986, declined by 2.4% in 1987 due to the 8% fall in exports (14% in 1986).

#### **Cotton (NACE 432)**

In 1987, activity in the spinning sector was good, especially combed and open-end cotton yarns which showed a 4.2% growth in output in tonnes: +7.2% for cotton spun yarns and -1.5% for cellulosic and synthetic spun yarns. However, activity slowed greatly during the last quarter. Activity throughout the first nine months was favourable in the cotton yarns sector due to the influence of the denim fashion trend, a slightly improved situation for household linen, and sustained demand for knitwear articles; from October onwards there was a clear shift in favour of man-made fibre yarns (polyester/cotton and viscose). Prices fell by 6% due to competitive pressure exerted by extra-EC imports (which rose by 34%) and to the reversal of the situation, especially in the clothing sector.

In the weaving sector, output decreased by 1.7% in 1987 compared with 1986 (-1.5% for cotton fabrics and -2% for polyester and cotton fabrics). Strong imports of fabrics and simple made-up articles led to higher stock levels.

However, activity by production breakdown presented a more confused picture. Due to booming external demand, activity in the denim sector grew strongly during the first

quarter of 1987. However, this situation had been greatly deteriorating since the previous autumn so that for the whole year the final result is a slight setback in production and deliveries. Velvet deliveries deteriorated badly in 1987, both on the internal market and on export markets. Terry towelling registered a small increase in production, especially over the first quarter. After the all-time low of 1986, there was a slight improvement in production in the bed-linen sector but deliveries were lower than those of the preceding year.

#### **Silk (NACE 433)**

The silk industry is going through rough times; the Community is being flooded with silk made-up articles sold at very low prices and originating for the most part from China. In the fabrics made of continuous man-made fibres sector, the situation is no better; although the production of fabrics made of cellulosic filament yarns increased by 2%, that of synthetic fabrics which, in terms of volume, is more important, decreased by 2%. In addition, the acute competition initiated in mid-1986 by the large capacity surpluses in Asia and by the trend of the dollar resulted in a serious lowering of polyester prices and a fall in profitability.

#### **Linen (NACE 434)**

During 1987, the linen industry recorded mixed results; in dry spinning, there was a 5.5% set-back of production while in wet spinning production increased by 23% as compared to the preceding year. In the weaving sector, the general situation is stagnant. However, an upswing in imports and exports was recorded in 1987.

#### **Jute (NACE 435)**

This industry has practically disappeared from the industrial scene in Europe. However, there are still a limited number of enterprises producing specialities. The EC industry effected a reconversion by making use of polyolefins.

#### **Knitting Mills (NACE 436)**

This is the sector where the number of small enterprises is the largest; furthermore with almost 500 000 people

employed, it is one of the main elements of the European textile sector. The situation varied widely in 1987 according to the type of activity involved. The production of knitted and crocheted fabrics increased strongly (+12%). This holds true for socks and other hosiery (ladies' stockings +15%, pantihose +3% and other socks and the like +1%) as well as for other typical knitted or crocheted articles: jerseys (+2%), track suits (+4%) and swimwear (+3%). However, there was an obvious decline in the production of a number of made-up articles. This is more particularly the case for underwear where the decline varies between 2% and 7% across all articles. With a few exceptions a similar trend has developed for outerwear. This situation can be attributed to a strong growth of imports at a time when fashion trends were very favourable to the knitting sector.

#### **Finishing of textiles (NACE 437)**

Growth in this sector was quite varied according to the countries and types of activity concerned. Overall, output was less than a year ago. The activity of this sector is in fact largely determined by that of the other sectors (cotton industry, wool industry and production of knitted fabrics). On the whole, and for reasons ascribed to fashion trends, printing performed better than dyeing. In spite of a set-back in activity in volume, on the whole turnover maintained its level or even increased significantly in several countries, as the industry increasingly concentrated on small lots to meet the needs of the making-up industry and of consumers in general.

#### **Carpets (NACE 438)**

There was a 5% increase in EC carpet production in 1987 following the recovery in the building sector both for residential houses and offices. This had favourable repercussions on various types of carpets: the production of woven carpets increased by 2.5% and that of tufted carpets by 3.5%. But it is in the needle carpets sector that the increase was the strongest: +8.5%.

#### **Miscellaneous textiles (NACE 439)**

1987 was a bad year for twines, ropes and cordage: the output of sisal-made products fell by 13%. A massive offensive is presently being directed to this sector by East European countries selling at prices often inferior to that of the raw material in Europe. The Community industry of heavy cordage is presently utilizing only 35% of its production capacity and is undergoing a structural decline which is endangering its future.

Demand for curtains recovered and activity improved markedly last year. Pronounced improvement for the embroidery

industry has been experienced. The situation was less favourable in the lace business where a downward trend was recorded.

## **Forecasts and Outlook**

### *Short-term Forecasts*

After a year of zero growth in 1987, the EC textile industry will probably see its activity decline in 1988 by 1%-2%. The large quantities imported in 1987 are a burden for the market, particularly in the cotton sector where not only did production follow a downward trend during the first quarter, but where there is also a risk that the pressure exerted on prices might affect profitability. The wool sector has not so far experienced any significant improvement. Internal demand will remain relatively stable or increase slightly (probably less than 1% per year). On the export side, development prospects remain limited. The penetration of products from EC countries on the EFTA markets is already high and can hardly increase. The US market outlet will mainly depend on the economic situation in that country and on the value of the dollar. Middle East markets may remain depressed. Even if some Asian markets open up progressively, export possibilities will remain poor.

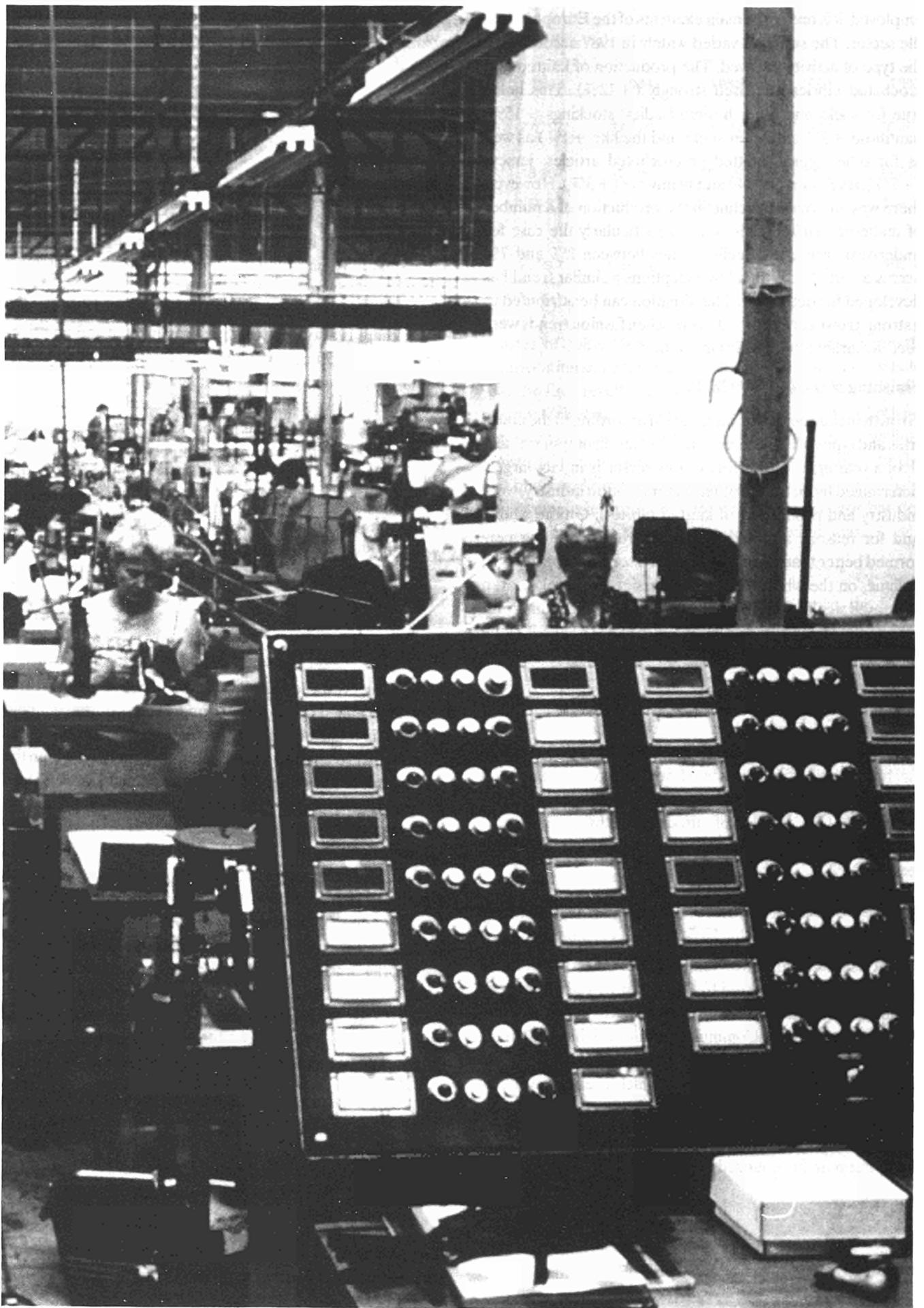
### *Medium-term Forecasts*

In the longer run, the situation of the sector will thus continue to be determined by the trend of imports, as internal demand will remain relatively stable or increase slightly (probably less than 1% per year). Imports are presently regulated within the framework of the Multi-Fibre Arrangement. But this does not preclude strong short-term variations, as was the case in 1986 and 1987. In the medium term, the trend will still be oriented upward and the bilateral agreements concluded within the framework of this Arrangement will remain in force until 31 December, 1991. On the other hand, due to the huge investment and productivity efforts that have been undertaken, it should be possible to increase the competitiveness of the industry provided exchange rates do not become more unfavourable. For the sector as a whole, medium-term prospects are not very favourable, but this does not preclude the possibility of certain individual firms experiencing interesting developments in the years to come.

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## CLOTHING (NACE 453)

The clothing industry in this report refers to the industry engaged in the manufacture of clothing and clothing accessories of various flexible materials, mainly of woven but also of knitted fabrics. The clothing sector, like the knitting sector, designs and produces all types of clothing.

The industry buys its basic material from the textile industry for whom it is thus the main customer since it buys 49% of the production of the cotton industry, 69% of that of the wool industry, and 39% of that of the silk industry (see flow chart in the textile industry's report).

The major structural characteristics of the clothing industry are as follows:

- the industry is labour intensive and more than 80% of its employees are women
- most companies are small- or medium-sized enterprise;
- the clothing industry is concentrated in very specific geographical regions.

### Current Situation

The European clothing industry produces a wide range of articles adapted to the consumers' needs and tastes. Due to weak demand and strong competition from developing countries (especially South-East Asia), the industry has moved upmarket to develop high-quality and fashionable articles. The industry has also responded to consumer demand for leisure and sports (casual) wear.

Efforts have concentrated on reducing the time necessary for the conception, production and marketing of goods by greater coordination with up-stream and down-stream sectors. The quick response to consumer demand is one of the primary goals of the whole textile-clothing process.

In terms of value, production within the Community has increased even though it fell almost everywhere during 1981-1982 and has continued to fall steadily in some Member States. In volume terms, production still remains below the 1980 level, except for the years 1985 and 1986 due to the addition of the Spanish and Portuguese figures.

The output of the EC industry is considerably larger than that of the US and Japan; the value of US production in 1986 totalled 34.6 billion ECU and the Japanese total stood at 19.9 billion ECU.

### Export Trends

Over the 1981-1986 period, extra-EC exports have expanded at a much faster rate than imports: 23.5% compared with 12.2% between 1981 and 1982 for EC 9 and 19% compared with 14.9% between 1984 and 1986 for EC 12.

The trade balance, which has been negative both in value and in volume for many years, has worsened for EC 9; however, with the addition of the figures for Spain and in particular with those of Portugal, it has slightly improved for EC 12.

Particular attention should be paid to the trends underlying these developments rather than to absolute figures since they

### Main Indicators Clothing Industry

| (Million ECU)              | 1980   | 1981   | 1982   | 1983   | 1984   | 1985   | 1986   |
|----------------------------|--------|--------|--------|--------|--------|--------|--------|
| Apparent consumption (1)   | 29 232 | 31 081 | 32 973 | 33 765 | 41 273 | 43 467 | 44 350 |
| Net export earnings (1)    | -2 349 | -2 235 | -2 482 | -2 246 | -2 070 | -1 623 | -2 219 |
| Total Community production | 31 306 | 32 368 | 34 351 | 34 769 | 39 203 | 41 844 | 42 139 |
| Employment (1 000)         | 1 275  | 1 200  | 1 165  | 1 144  | 1 105  | 1 095  | 1 101  |

(1) 1980: EC 9 (excluding Greece, Spain and Portugal). 1981-1983: EC 10 (excluding Spain and Portugal). 1984-1986: EC 12

**Table I**  
**Production by Member State - 1986**

| (Million ECU)  | BLEU  | DK  | D      | GR    | E     | F      | IRL | I     | NL  | P   | UK    | Total EC |
|----------------|-------|-----|--------|-------|-------|--------|-----|-------|-----|-----|-------|----------|
| Production (1) | 1 318 | 872 | 10 619 | 1 076 | 3 696 | 8 361* | 309 | 8 961 | 417 | 612 | 5 898 | 42 139   |

(1) BLEU, Greece and France estimated figures.

Source: AEIH.

have been largely influenced by inflation and exchange rate fluctuations.

### *Employment Trends*

Despite a continuation of the trend towards a reduction in employment (-14% between 1980 and 1986), the European clothing industry still employs over one million persons. In addition, a substantial proportion of jobs in the small- and medium-sized companies (employing less than 10 - 20 persons) are not registered in the statistics.

The clothing industry ranks among the 10 largest industries in the Community, representing 2.5% of the workforce in the industrial sector. Combined with the textile and knitting industry, this total is as much as 5.5% of total industrial employment.

By comparison, the American and Japanese clothing industries employ 1 115 000 and 399 000 persons respectively (1986 figures).

Hourly wage costs in the Community vary considerably among the Member States partly due to different social insurance and taxation systems. The weighted average is around 7 ECU per hour (1986).

### *Major Structural and Geographical Features*

The number of companies in the industry stands at 28 000 in EC 12; this compares with the 1980 figure of 33 700 and indicates substantial closures over the period.

This industry is composed of many small- and medium-sized enterprises and industry concentration remains comparatively low. In general, 75% of companies employ between 20 and 99 persons. Companies employing more than 500 persons are in the larger countries (Germany, France, Italy, the UK); they represent around 2% of the total.

The US and Japanese industries are more highly concentrated; the number of American companies is estimated at 10 300 while in Japan there are 7 747 (1986 figures).

The clothing industry is concentrated in specific geographical regions:

- France - Ile de France, Loire region, Nord-Pas-de-Calais, Rhône-Alpes, the Centre
- Belgium - West and East Flanders, Brabant
- Netherlands - south Netherlands
- Germany - Bavaria, Westphalia, Baden- Württemberg
- Italy - Lombardy, the Centre, the North East

**Table II**  
**Production and Foreign Trade**

| (Million ECU)               | 1980   | 1981   | 1982   | 1983   | 1984   | 1985   | 1986   |
|-----------------------------|--------|--------|--------|--------|--------|--------|--------|
| <b>Production</b>           |        |        |        |        |        |        |        |
| Current value               | 31 306 | 32 368 | 34 351 | 34 769 | 39 203 | 41 844 | 42 139 |
| Index                       | 100.0  | 103.3  | 109.7  | 111.0  | 125.2  | 133.6  | 134.6  |
| Constant value              | 31 306 | 29 502 | 28 966 | 27 893 | 26 641 | 30 396 | 29 681 |
| Index                       | 100.0  | 94.2   | 92.5   | 89.1   | 85.1   | 97.1   | 95.0   |
| <b>Imports extra-EC (1)</b> |        |        |        |        |        |        |        |
| Current value               | 4 252  | 4 628  | 5 084  | 5 192  | 5 955  | 6 271  | 6 841  |
| Index                       | 100.0  | 108.0  | 119.6  | 122.1  | 140.1  | 147.5  | 160.9  |
| <b>Exports extra-EC (1)</b> |        |        |        |        |        |        |        |
| Current value               | 1 903  | 2 393  | 2 601  | 2 945  | 3 885  | 4 648  | 4 622  |
| Index                       | 100.0  | 125.7  | 136.7  | 154.8  | 204.2  | 244.2  | 242.9  |
| X/M                         | 0.45   | 0.52   | 0.51   | 0.57   | 0.65   | 0.74   | 0.67   |

(1) 1980: EC 9 (excluding Greece.) 1981-1983: EC 10 (excluding Spain and Portugal.) 1984-1986: EC 12

- U.K. - West Yorkshire, the North West, East Midlands, Scotland
- Denmark - Jutland
- Ireland - Dublin
- Greece - Attica, Macedonia
- Portugal - the northern part: Oporto-Braga
- Spain - Catalonia, the Madrid region, Valencia, Andalusia, Aragon, Galicia, Castille-La Mancha.

### *Factors behind Production Trends*

While the manufacture of clothing remains a labour-intensive process (65% of the time is taken up by handling operations) in which automation, to date, has played a limited role, technological progress has begun to produce major changes in the industry. Computer and graphic systems (CAD) have been introduced to assist in the drawing, designing, grading and cutting operations. Sewing machines with extended capabilities now permit small operations to be carried out automatically (i.e. button-holing). New conveyor systems (overhead conveyors) facilitate the transport of piece goods throughout the whole manufacturing process. So far, however, the assembly stage has been resistant to a high degree of automation.

Research is now being undertaken in this area, aimed at improving integration of the successive sewing stages, fully automated sewing operations being the final step.

Technological developments are geared towards increasing the competitiveness of clothing companies by lowering unit costs and increasing the speed of the manufacturing process while at the same time maintaining flexibility, which is a key factor in this industry.

### **Forecast and Outlook**

The clothing industry experienced a major setback last year. The fall in the value of the US dollar has affected the competitiveness of the EC industry leading to a new surge in imports.

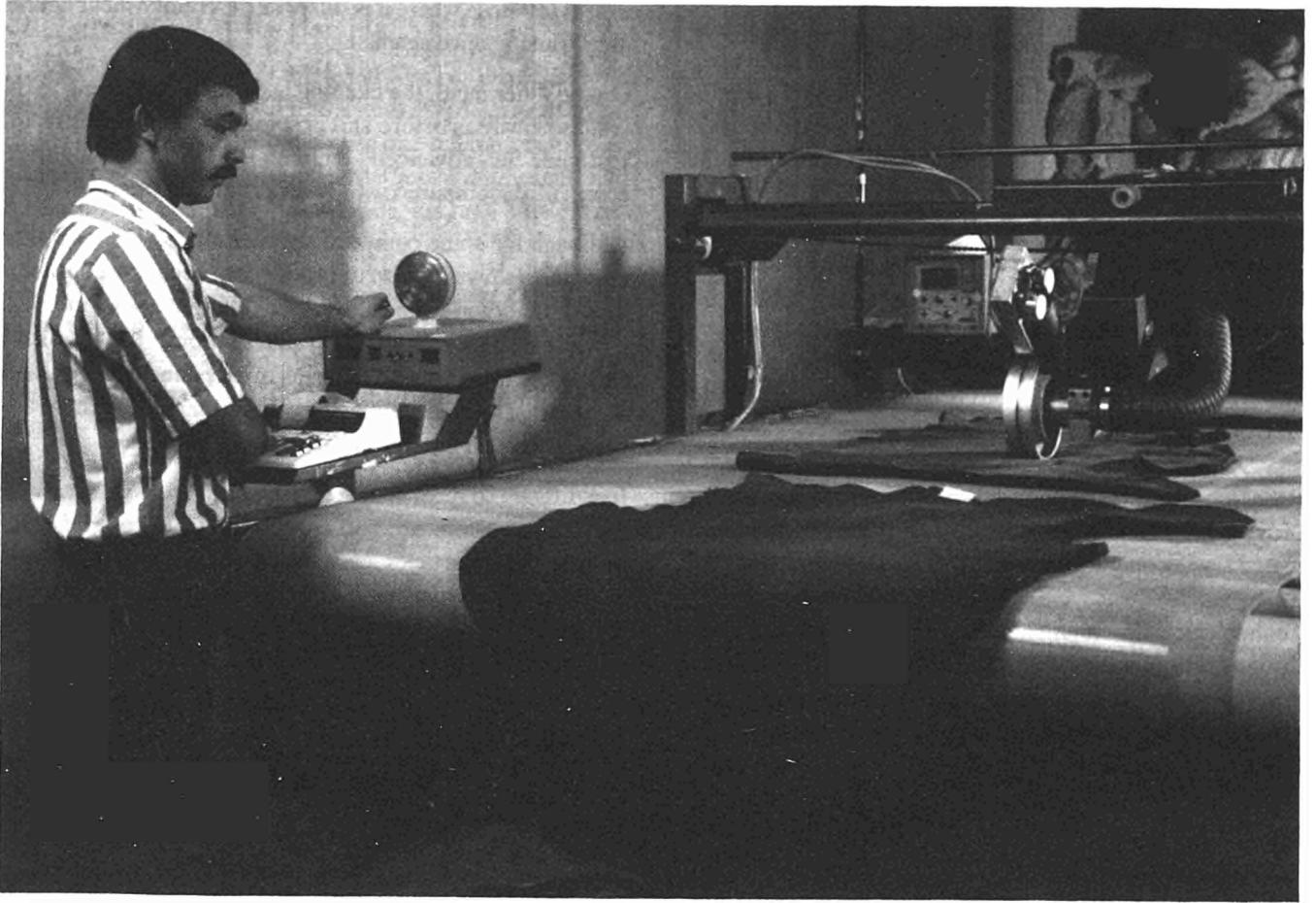
Internal demand which had improved for some time was met not only by local production but also by imports. Demand suffered from adverse weather conditions and the fact that consumer spending went to other durable goods (cars, electrical household appliances, etc). On the whole, exports went down during 1987, even those from traditional exporting countries. The trade balance is continuing its downward trend both for the countries where it is already negative as well as for those where it is still positive. Employment figures are shrinking once again.

On the other hand, the clothing industry is continuing to invest as heavily as before and in some cases increasing its investment in advanced technology to make it more competitive compared with other producer countries.

Although for some countries the outlook for 1988 is rather uncertain (slowing down of production, declining consumer demand), other countries started off quite well in 1988. Nevertheless, exchange rate fluctuations, the pressure exerted by imports both in terms of price and quantity, and the fact that there is no opening of third markets will have adverse effects on the clothing industry as a whole.

It is difficult to draw specific conclusions from general considerations. There are and will always be successful companies and/or articles even when the general economic environment is unfavourable. Given the strong level of international competitiveness in the clothing industry, company dynamism and response to change are key factors in the performance of the sector.

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## LEATHER TANNING AND FINISHING

(NACE 441)

*Over the 1980s, the leather tanning and finishing sector has undergone substantial restructuring leading to a reduction in both the number of tanneries and the size of the workforce. One reason for this contraction has been the partial relocation of leather product industries, such as shoe manufacturing, to lower labour cost countries. This trend is anticipated to continue, resulting in a forecast decline in production and consumption of leather in the Community. Exports to the rest of the world have grown relatively strongly over the past seven years although the value of exports represents only around 15% of total production. Further restructuring in the industry is expected in the face of strong competition from the developing countries; however, European producers, at present, retain their leading place in terms of product quality and technical innovation.*

The EC tanning industry has successfully combined long-standing traditional skills with technological progress, which together have converted the sector into a highly sophisticated industry, mobilizing large financial resources and exploiting a high degree of design and fashion.

Leather tanning and finishing consists of establishments engaged in tanning, currying, dyeing and finishing of raw hides and skins. The industry is therefore based on the use of an agricultural by-product linked to the production of meat, milk and wool. The fur industry, where the animal's body hair is preserved after tanning, is considered as a separate and distinct sector. However, woollen sheepskins (double-face) are included in the tanning sector.

The NACE definition is very general, since it covers related industries such as imitation leather (441.2). This cannot be considered leather, as synthetic substitutes do not possess the inherent qualities of leather as defined by the International Council of Tanners. Substantial efforts have been

made to harmonize descriptions and agree on common definitions of leather.

### Current Situation

In 1987 the value (turnover) of EC leather tanning production increased by 2.6% from 7 028 million ECU to an estimated 7 212 million ECU. As Europe's biggest tanner, Italy contributed 54% to the total with 3 345 million ECU; this was followed by Spain with some 1 350 million ECU and 19% of EC production. The EC is a relatively large producer compared with the USA, whose tanning output is valued at 1 767.9 million ECU. Measured in constant ECU, output rose by 0.3% in 1987. EC leather production reached its maximum output in terms of surface area in 1985 with about 324.7 million m<sup>2</sup> (up 22% from 1980) and has since decreased steadily. Total leather production fell by about 1% from 313.8 million m<sup>2</sup> in 1986 to 311.3 million m<sup>2</sup> in 1987. This decrease is somewhat less than the previous year when it dropped by 3.3%.

However, the situation differs within the EC, as Italy, Spain, Portugal, Greece and the UK have registered an increase in their production since 1980 while France, Germany, Belgium, Denmark and Ireland, all registered a decrease over the same period. The new EC Member States, namely Spain and Portugal, are enjoying a phase of relative expansion; Spain has increased its production in value terms by 83% (63% in quantity) since 1980, Portugal by 11.4% (23% in quantity).

### Major Geographical and Structural Features

The geographical location of the tanning and leather production industries has registered considerable changes in recent years. The shoe industry has followed a global trend to

**Main Indicators**  
**Leather Tanning and Finishing (1)**

| (Million ECU)           | 1980  | 1981  | 1982  | 1983  | 1984   | 1985   | 1986   | 1987   | 1988   | 1989   | 1990   |
|-------------------------|-------|-------|-------|-------|--------|--------|--------|--------|--------|--------|--------|
| Apparent consumption    | 4 311 | 4 696 | 5 181 | 5 562 | 6 468  | 7 041  | 6 790  | 6 949  | 6 837  | 6 771  | 6 740  |
| Net export earnings (2) | -30.9 | +81.6 | + 8.8 | +91.0 | +191.2 | +300.7 | +237.7 | +263.1 | +236.2 | +232.2 | +226.3 |
| Production              | 4 280 | 4 778 | 5 190 | 5 653 | 6 659  | 7 341  | 7 028  | 7 212  | 7 073  | 7 002  | 6 966  |
| Employment (1 000)      | 83.2  | 82.8  | 80.8  | 80.8  | 79.5   | 77.8   | 77.0   | 75.2   | 73.1   | 72.6   | 70.7   |

(1) Forecasts 1988-90: Cotance.

(2) Excluding Portugal.

relocate its activities in low labour cost countries, often abandoning the developed ones in the process. The EC is no exception; its shoe industry has suffered a decline for several years. This has led some tanneries, having lost one of their markets, to move with their clients to countries offering cost advantages and fewer environmental constraints. Spain and Portugal have benefited in part from this trend, but their accession to the Community has brought with it strong competition.

European tanneries are highly concentrated geographically; the southern European countries account for 90% of the EC's tanneries. Italy alone represents 77% of them with over 3 000. Spain follows a long way behind with some 8% and 342 establishments. In both these countries the tanneries are mainly located along the Mediterranean coast (Valencia, Catalonia, Tuscany, Campania and Veneto). Other important European centres are located in Lombardy, Mazamet, Pirmasens, the Stuttgart area and Northamptonshire.

As hides and skins make up the raw material for the industry, tanneries have tended to locate close to the suppliers in agricultural regions. However, other aspects such as proximity to the buyer, joint use of effluent treatment plants and links to fashion centres have become leading factors in the choice of geographical location. A recent trend is to locate wet-blue production close to slaughterhouses in order to treat fresh instead of salted hides and skins, and thereby to improve quality. When concentrated geographically, the industry also enjoys better access to availability of qualified personnel and economies of scale for suppliers to the tanneries.

Europe's tanning companies vary in size from small enterprises employing less than 20 people to larger plants such as Cogolo in Italy with a workforce of over a thousand employees. The EC average is about 20 workers per tannery but figures vary considerably from one Member State to the next. The average in Benelux, the UK and Germany ranges from 50 to 90 workers. France, Spain and Portugal, register a rough average of 30 workers per tannery. The biggest European tanner, Italy, employs on average 11 workers per plant, having developed the concept of micro-tanneries. This phenomenon partly explains Italy's success in the sector since the small size of Italy's tanneries makes them flexible and adaptable to the market.

European tanneries are mainly family-owned and family-run. This large identification between management and capital imposes several constraints on individual tanneries, including the lack of financial strength or a modern approach to management. To improve this situation, some tanneries form consortia to take advantage of collective buying of raw materials and chemicals, market analysis and strategies, to improve their financial strength and to benefit from economies of scale.

In some Member States tanning activities can account for a small part of larger holdings dedicated to related industries,

such as chemicals and plastics. In countries facing severe decline of the tanning and leather manufacturing sectors, diversification and market orientation play important roles.

### *Trends in Member States*

Due to the changing structure of the shoe and leather goods industry, since 1980 the EC tanning sector has undergone considerable contraction and restructuring in most Member States, with a consequent drop in the number of tanneries and the size of the workforce. In the early 1980s the sector accounted for 4 181 tanneries but by 1987 the number had fallen to 3 878, representing a decrease of 7.2%. Northern European countries experienced a bigger decrease in the number of establishments compared with southern Member States; these declines were as follows, France -25%, Germany -23% and the UK -13%. This crucial decrease was accompanied by a strong concentration and modernization of the industry in the UK, where the largest and third largest tanning groups merged in 1987, giving them added financial strength. German tanners have survived the most difficult restructuring period; their structural framework and market orientation now seem to have stabilized. The strong contraction of the sector was accompanied by heavy investment and rationalization. In France, the drop in both the workforce and the number of tanneries has not coincided with important technological progress. Until recently, France invested in large production units, the rigidity of which do not meet the present need for flexibility and market orientation.

The countries that make up the EC's southern flank have not suffered to the same extent as their northern counterparts, since the tanners' clients have largely remained. Modern technology, management and market orientation could enable some tanneries in southern Member States to face the future with relative optimism.

The entry of Spain and Portugal into the EC added some 500 factories to the EC's tanning sector (of which 342 were in Spain). Portugal is in a unique position benefiting from low labour costs compared to other EC Member States, thereby attracting, for example, the shoe industry. Portugal's tanning sector is enjoying relative expansion. Italy, hosting the bulk of Europe's tanning industry, has used the concept of micro-tanneries enabling the leather sector to increase the number of production units and improve flexibility. However, today, with 3 000 tanning companies, Italy is facing the same structural problems as the other Member States.

### *Employment Trends*

Employment in the EC's tanning sector is polarized between the heavy concentration in the southern Member States such as Italy (34 000 production workers and 45% of the EC total) and Spain (13 000 people and 17% of the total), and the

northern European countries with some 29% of the total. France, the Germany and the UK together employ 18 961 tannery workers accounting for 25% of the total. The Benelux countries and Denmark and Ireland have very low employment in the industry with less than five production units in each country.

In the EC, the tanning sector has lost over 40% of its workforce since 1960. This drop is a direct consequence both of internal structural changes and of cheap imports of leather and leather products from LDCs and NICs. Since 1980, the 12 Member States which today make up the EC, registered a decrease of 10% in employment in this sector; in 1987, 75 236 people worked in tanneries compared to 83 242 in 1980. Over the same period the US registered a reduction of 38% of production workers in the tanning and finishing area. By 1987 only 10 000 production workers were employed. Japan's workforce in the tanning sector is estimated to be around 7 000.

It is clear that the same trend has swept through all industrialized countries, due to the development of large tanning capacities in developing countries and the relocation of the leather product industries to low labour cost countries. Nevertheless, the southern European countries have stood their ground as important leather producers, Italy being the second largest producer in the world. Employment in this sector has remained relatively stable in Italy, Greece and Spain since 1980. In Italy, employment increased until 1984 when it peaked at a total of 36 200 workers, although today the figure has fallen to 34 000. The state of Portugal's tanning industry differs in many ways from other EC countries. Portugal is stepping up its investment to meet the rise in domestic demand due to an influx of leather goods and shoe producers attracted by low labour costs. Portuguese tanneries registered an increase of 4% from 1986 to 1987, and has now some 5 000 production workers. France, the UK and Germany lost 7 536 production workers from 1980 to 1987, a reduction of 38%, 28% and 17% respectively. Other than in Portugal, this trend does not seem to be slowing down in the EC. Member States will have to brace themselves for average annual reductions of 5% until the end of the decade.

## Consumption

The footwear sector remains the tanning industry's largest market, consuming 40% of the EC's leather production by surface area. Nevertheless, this market and its importance has been steadily reduced due to the competition from NICs and LDCs in the lower end of the market. In 1983, footwear uppers and linings consumed 46.4% of production as against 49% in 1980. Production of heavy tanned leather (used for soles) has decreased by about 23% from 1980 to 1985 when EC countries produced 61 700 tonnes compared to 80 000 tonnes in 1980. The developing countries are progressively increasing their slice of the heavy leather market, at the expense of the industrialized world. As developing countries improve their leather quality, the remaining shoe industry in Europe and other industrialized countries will face stronger competition even in high-quality products. However, the latter countries still have the lead in fashion, punctual delivery and technical innovation, at least for the time being.

Production of leather goods, such as wallets, handbags and luggage, has also decreased since 1980. Their share in total EC leather production dropped from 16% at the beginning of this decade to 9.9% in 1986, losing their rank as the second largest market. Production of leather clothing and gloves has overtaken them to become the second largest market for EC leather after footwear. Some 21.2% of Europe's leather now goes to the garment industry.

The most impressive rise has occurred in the upholstery market. Consuming only 9.3% of the European leather production in 1980, upholstery is now the third largest client with 13.6%.

Italy and Germany and to a lesser extent the UK, are the main European producers of upholstery leather.

## Factors Behind Production Trends

Hides and skins are by-products of stock breeding. The hides are ultimately treated in industrial processes but none are specifically produced for that purpose. Supply is thus independent of demand, although increasing prices may encour-

**Table I**  
**Community Production by Type of Hides and Skins (1)**

| (Million m <sup>2</sup> ) | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  | 1987  | 1988  | 1989  | 1990  |
|---------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Cattle and calf           | 159.2 | 162.8 | 169.3 | 176.4 | 186.2 | 181.0 | 187.4 | 191.1 | 188.2 | 186.2 | 184.8 |
| Sheep and goat            | 100.6 | 106.1 | 116.6 | 115.7 | 128.9 | 135.4 | 120.5 | 115.4 | 109.7 | 106.6 | 103.5 |
| Others (2)                | 6.5   | 5.5   | 6.2   | 5.5   | 6.5   | 8.3   | 6.0   | 4.9   | 4.9   | 4.9   | 4.4   |

(1) Forecasts 1988-90: Cotance.

(2) Excluding Germany.

Source: Cotance.

age more effective techniques in the preservation of hides during and after slaughtering. The European leather sector depends on the EC's common agricultural policy for supplies, but also on the world market.

As a group, developing countries emerged as net importers of raw hides and skins, increasing at an average annual rate of 8.8% for raw hides, and 4.5% for goatskins in the period 1980/84. By 1984, developing countries accounted for almost half of the world production of bovine hides and sheepskins. They also make up 22.9% and 25% of world imports of bovine hides and sheepskins, respectively.

Industrialized countries produce slightly more than half of the global production of bovine hides, exporting over 90% of them. However, these countries are net importers of sheep and goatskins, representing more than 75% of world imports.

The availability of raw materials is constantly under pressure as more developing countries enforce export restrictions in order to build up domestic industry or implement macro-economic policies.

Half the world's supply of raw material (bovine) is subject to protectionism: 24% of total supply in developing countries and 18% in the Communist countries. Some of the developing countries with an already highly developed leather industry also continue to benefit from the EC's Generalized System of Preferences, the result being that EC tanners compete against low-priced imported leather.

As the price of raw materials makes up about 50% of production costs, the tanneries are vulnerable to price movements; prices fluctuate considerably, usually in cycles of four year periods. Except for a modest rise in 1984, the last major price rise was in 1979 when several tanners experienced severe liquidity problems and this consequently caused a contraction of the industry. At present, both prices and availability of raw materials are decreasing. The future prospects

are therefore that prices will rise soon and may well reach the 1979 level unless considerable concessions are made by developing countries to open their domestic supply to international markets.

Several attempts have been made to improve hide quality on a voluntary basis through cooperation with farmers' associations, IHATIS and others, with mixed results. Some of the problems relating to the quality of raw material are as follows:

- cleanliness of the animal and brushes used
- transportation to slaughtering
- slaughtering
- barbed wire
- diseases and parasites
- hygiene laws and regulations and their implementation
- how animals are marked/numbered
- warble fly.

### *Export Trends*

The leather industry on a global basis is considered an international and trade-active sector, with a yearly international total trade figure of 16 500 million ECU. This is due to the extensive trade in raw materials, tanned leather and manufactured end products. The leather industry is therefore potentially strongly affected by international economic and financial developments.

Industrialized countries account for the largest share of world trade of finished leather with about 80% of world imports. However, developing countries are emerging as the leather product industries are relocating their activities in these countries.

**Table II**  
**Production and Foreign Trade (1)**

| (Million ECU)        | 1980  | 1981  | 1982  | 1983  | 1984  | 1985    | 1986  | 1987    | 1988    | 1989    | 1990    |
|----------------------|-------|-------|-------|-------|-------|---------|-------|---------|---------|---------|---------|
| Production           |       |       |       |       |       |         |       |         |         |         |         |
| Current value        | 4 280 | 4 778 | 5 190 | 5 653 | 6 659 | 7 341   | 7 028 | 7 212   | 7 073   | 7 002   | 6 966   |
| Index                | 100   | 112   | 121   | 132   | 156   | 172     | 164   | 168     | 165     | 164     | 163     |
| Constant value       | 4 280 | 4 353 | 4 377 | 4 532 | 5 065 | 5 332   | 4 946 | 4 961   | 4 866   | 4 817   | 4 793   |
| Index                | 100   | 102   | 102   | 106   | 118   | 125     | 116   | 116     | 114     | 113     | 112     |
| Imports Extra-EC (2) | 441.9 | 389.7 | 521.7 | 548.0 | 705.1 | 786.7   | 698.5 | 793.6   | 807.8   | 818.4   | 830.8   |
| Index                | 100   | 88    | 118   | 124   | 160   | 178     | 158   | 180     | 183     | 185     | 188     |
| Exports Extra-EC (2) | 411.1 | 471.3 | 530.5 | 639.1 | 896.3 | 1 087.3 | 936.2 | 1 056.6 | 1 044.0 | 1 050.5 | 1 057.1 |
| Index                | 100   | 115   | 129   | 155   | 218   | 265     | 228   | 257     | 254     | 256     | 257     |
| X/M                  | 0.93  | 1.21  | 1.02  | 1.17  | 1.27  | 1.38    | 1.34  | 1.33    | 1.29    | 1.28    | 1.27    |

(1) Forecast: Cotance.  
(2) Excluding Portugal.  
Source: Cotance.

Several EC countries which have a highly integrated production cycle of tanned products are being forced to channel their energy into export as the downstream industries face a decline. Hence, imports of leather will eventually slow down as apparent consumption is declining. Apparent consumption has already decreased 1.3% since 1985 while imports are still increasing albeit at a slower rate. Extra-EC leather imports have increased steadily during the 1980s reaching 793.5 million ECU in 1987, up 13.6% from 1986 (or 17% in quantity). However, the EC import penetration rate has stayed stable since 1980 at around the 10% mark. These imports are mainly accounted for by the Germany and Italy, each with 32% of the total. Other Member States can be divided into two groups according to their importance, with the UK and France representing 10% and 12% respectively and others with around 3% of the total.

Extra-EC exports more than doubled over the same period from 411 million ECU in 1980 to 1 056 million ECU in 1987. Europe's main exporters are Italy and Germany followed by the UK and France. The Benelux countries are relatively large leather traders compared with their production.

Intra-EC trade has increased in value since 1980 but at a declining rate. The progressive increase occurred in the early 1980s levelling down in 1984/85 to some 1 250 million ECU. The bulk of intra-EC trade is accounted for by Germany, France, Belgium, the UK and Italy, respectively. Spain and Portugal have experienced a considerable rise in trade with other EC Member States since their accession to the Community (e.g. Spain doubled its EC imports from 1986 to 1987).

An open market for this sector is essential. Protectionism and quantitative restrictions in some countries restrict trade considerably and cause serious harm to EC tanners. There are many trade restrictions affecting the EC leather industry specifically, tariff and non-tariff barriers and restrictions on raw materials or semi-finished leather, practised by developing countries such as Turkey, India and Argentina.

Japan stands out as the only industrialized country exercising higher tariffs for leather than most developing countries. At present, an agreement exists between the EC Member States and Japan to cover the period 1986-91, which allows the import into Japan of 342 000 m<sup>2</sup> of finished bovine leather from all sources subject to duty at 20%. This represents less than 1% of Japanese domestic production and less than a day's production in the EC. Imports above the quota are subject to duty at 60%. Quotas run for a limited period and the number of applicants ensures that the quotas are fully taken up on the first day they become available. (Their size can be as low as 64 m<sup>2</sup> per importer.) As a result quotas are traded at a premium - generally 15% - and speculators are left with unused quotas at the end of the time limit. These and other obstacles such as MITI's (Ministry of International Trade and Industry) refusal to publish the size of quotas and the

name of the quota-holders preclude normal business practices and increase unit sales costs.

In addition to trade-related problems, EC tanners currently face strong competition from countries whose currencies are linked to the US dollar. As many countries see the growing US debt and the US competitive climate for importers becoming increasingly difficult, they view the EC as an alternative future export market. The current strength of EC currencies against the dollar, and the fact that imports of leather and leather products are lower than those to the US, together benefit overseas producers when exporting to the EC.

### *Environmental Constraints*

National laws for environmental protection differ throughout the EC, as does their implementation. This causes short-term competition problems for those tanners who face stronger environmental constraints than their competitors and therefore have to invest in costly waste treatment plants. This also creates uncertainty, such that tanners are afraid that legislation will force them out of business.

Conforming to ecological standards is expensive; tanners in Italy, for example, spend 3% of total turnover on these requirements. Importing semi-finished leather such as wet-blue shifts the pollution problem to countries with less or no environmental protection. But even the use of wet-blue can cause ecological problems as it is difficult to predict the concentration of the chemicals used. It is thus very easy to exceed the limits established in some EC Member States.

With regard to pollution and environmental problems, harmonization of national legislation so as to ensure fair competition would be welcomed by the industry. In addition a reasonable solution would be to support development of technology through financial incentives, leading to, for example, the building of sewerage works or plants to separate out chromium, and research programmes aimed at identifying pollution-free processes.

Sludge presents similar problems in most EC countries. This is normally disposed of in public discharges, but these are few and far between and long distances contribute to increase transportation costs. In addition, sludge is often refused at the public discharges, leaving it up to the tanner to dispose of it himself.

### **Forecast and Outlook**

The consumption of processed leather in the EC will probably decrease further as the leather product industries continue to emigrate to developing countries. Export ability, market orientation and the ability of EC tanners to adjust to

these changing structures will therefore decide the industry's future.

A quicker response to changing market needs should lead to smaller, more flexible production units.

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# FOOTWEAR

(NACE 451 and 452)

*The EC footwear industry, which produced 1 139 million pairs of shoes in 1987, found itself confronted by stiff competition from the South-east Asian countries in the lower- and medium-priced segments of the markets. This situation led to a growing external deficit, especially in recent years. In future, the Community industry could capitalize more on its strongpoints, especially in the upper and medium ranges. The EC industry's strength is based on creativity, where CAD will play a dominant role, and on improved distribution. Some large firms have already taken steps in these directions to reinforce their presence in the market.*

The footwear sector manufactures the following products:

- outdoor footwear (dress and sports shoes as well as shoes for leisure, walking, hunting and work);
- indoor footwear (slippers);
- orthopaedic shoes;
- special types: dance shoes, military shoes ...

The footwear industry is a very heterogeneous sector. Traditionally it is divided into the following sub-sectors: leather, synthetics, rubber, textile, slippers and others. In the following discussion the sub-sectors are not covered in detail. Nevertheless, where it is important for an understanding of developments in the sector as a whole, some product-linked information is provided.

## Current Situation

The Community footwear industry provides about a quarter of the total world production of 4.7 billion outdoor and indoor shoes. 1986 production in the EC 10 was estimated at 14.8 billion ECU (1.2 billion shoes) compared to the 1982

figure of 12.8 billion ECU. Between 1982 and 1987, the number of pairs produced fell by 1.6% a year partly due to strong pressure from imports.

## Major Structural and Geographical Features

The EC footwear industry numbered 16 000 firms in 1986 compared with 15 600 firms in 1982 and approximately 17 500 firms in 1980.

Restructuring in the industry produced a 1.5% per year decrease in the number of production units between 1980 and 1986. However, some large groups have developed strong positions in the world production over the last few years.

A breakdown according to the countries in the EC shows that in 1986 Italy accounted for 9 531 firms while Denmark has only 18 firms. The Southern European countries (Greece, Spain and Portugal) together account for 4 900 firms, or 31% of the total European companies registered.

Behind this general picture, wide variations exist between Member States. Particularly in the smaller countries, production in the footwear industry is decreasing systematically: the 1987 indices are 71.8 for Denmark (turnover for EC 10 was evaluated at 14.8 billion ECU according to the CEC), 74.5 for Belgium-Luxembourg and 78.8 for the Netherlands.

However, in the United Kingdom production levels were higher than in 1982, the 1987 index reaching 105.4. Special attention should also be given to the situation in Ireland: in 1985 production was cut to 46.0% of the 1982 level. Since then, however, production has recovered with the 1987 index hitting 76.0. In Spain the production index was consistently above 100.0 with a maximum value of 120.9 in 1985 and a lower value in 1986 and 1987.

Italy is by far the largest producer, with an average annual share in total production of 51.9%. Other important countries are France (20.7%), the United Kingdom (13.0%) and

## Main Indicators Footwear Industry

| (Million pairs)                | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  | 1987  |
|--------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Apparent consumption (1)       | 1 090 | 1 068 | 1 103 | 1 120 | 1 146 | 1 144 | 1 184 | 1 283 |
| Net exports                    | -155  | -141  | -128  | -161  | -181  | -154  | -228  | -391  |
| Total Community production (1) | 935   | 927   | 975   | 959   | 965   | 990   | 956   | 892   |
| Employment(1 000) (1)          | 346.5 | 342.7 | 328.1 | 311.4 | 294.6 | 291.1 | 295.7 | 279.0 |

(1) EC 10 (excluding Spain and Portugal).



**Table I**  
**Production and Foreign Trade**

| (Million pairs)      | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 |
|----------------------|------|------|------|------|------|------|------|------|
| Production (1)       | 935  | 927  | 975  | 959  | 965  | 990  | 956  | 892  |
| Imports extra-EC (1) | N/A  | N/A  | 314  | 349  | 384  | 380  | 434  | 576  |
| Exports extra-EC (1) | N/A  | N/A  | 186  | 188  | 203  | 226  | 206  | 195  |
| X/M                  | N/A  | N/A  | 0.6  | 0.5  | 0.5  | 0.6  | 0.5  | 0.3  |

(1) EC 10.

Sources: CEC; Estimates 1980-1981: Eurostrategies.

Germany (9.3%). Production in other countries has only a marginal significance within the EC as a whole. Over the 1980s no significant changes in the geographical distribution pattern have occurred.

The inclusion of data for Spain and Portugal changes the picture. In 1986 the footwear production in those two countries was almost 25% of total EC 10 production; in 1987 it amounted to 27.5%. Italy's 1987 share equals 52.0% for the EC 10 but only 40.8% for the total EC. The Southern European countries are key producers of footwear; in 1987, Italy, Greece, Spain and Portugal accounted for 64.5% of total Community footwear production.

Leather is the most commonly used material in the footwear manufactured by European firms, followed by synthetics (polyurethane) (See Table II).

### Consumption Trends

The Community has a large footwear market totalling about 16.5 billion ECU in 1986 and corresponding to consumption of 1.25 billion pairs of shoes of all types.

Overall consumption represented 4.0 pairs of shoes per capita in 1986 and 4.2 pairs in 1987, placing the EC between the United States with 5.1 pairs per capita and Japan with 3.7 pairs per capita.

The slow growth of the European population and of household purchasing power since the early 1980s accounts for overall stagnation in the European footwear market; in terms

of volume, consumption grew at an average annual rate of 2.2% between 1982 and 1987.

### Trade Trends

For the most part, the EC market is supplied by intra-Community production which satisfied 55% of the consumption in 1987 compared with 72% in 1982.

From 1982 to 1987 imports to Greece (250% growth) and Italy (180%) had the highest rate of growth. Extra-EC imports grew by 11% per year between 1982 and 1987. Growth was particularly strong at the end of the period (a 67% increase from 1986 to 1987).

In 1987, the top four suppliers are China (29%), Taiwan (22%), South Korea (16%) and Hong Kong (6%); more than two thirds of extra-EC imports come from the Far East. The most important European suppliers are Yugoslavia (3.6%) and Austria (2.3%).

The three largest importers of shoes are Germany (29.6%), France (22.7%) and the United Kingdom (19.8%); together they account for more than 72% of total imports. During the 1980s, 50.5% of total imports for the EC 10 came from outside the Community. However, there are sharp variations between the Member States. For Italy, more than 86% of total imports are from outside the Community. By contrast, for Ireland and Belgium-Luxembourg, extra-EC imports represent only 25.2% and 27.4% respectively of total imports; the

**Table II**  
**Comparative European Production Trends by Materials**

| (%)        | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 |
|------------|------|------|------|------|------|------|------|
| Leather    | 59   | 60   | 60   | 63   | 63   | 63   | 64   |
| Synthetics | 18   | 19   | 20   | 18   | 19   | 19   | 18   |
| Textile    | 8    | 7    | 6    | 7    | 5    | 4    | 3    |
| Rubber     | 1    | 1    | 2    | 2    | 1    | 1    | 1    |
| Others     | N/A  | N/A  | N/A  | 1    | 1    | N/A  | N/A  |
| Slippers   | 14   | 13   | 12   | 10   | 12   | 12   | 13   |
| Total      | 100  | 100  | 100  | 100  | 100  | 100  | 100  |

EC 10 (excluding Spain and Portugal).

Sources: CEC and BIPE.

United Kingdom and the Netherlands are important suppliers in these markets.

Between 1982 and 1986 total EC 10 exports increased by 1.6% per year in volume terms. Behind this general picture, however, there exist very strong variations between countries, especially between the smaller Member States where exports in absolute figures are quite small. The membership of Spain and Portugal has led to a fundamental change in the EC export trends.

Analysis of the structure of extra-EC exports reveals stagnation between 1982 and 1987. An annual average growth of 5.4% between 1982 and 1985 was followed by an average fall of 8.8% a year between 1985 and 1987. Exports suffered from quantitative barriers to trade in the Canadian, Japanese and Australian markets. Developments varied depending on the country: the strongest growth is in Belgium-Luxembourg (23.1% a year) while Ireland registered the most significant drop (29.4% a year). Italy accounts for about 50% of extra-EC exports followed by Spain (23%), France (8%) and Germany (7.5%).

Over the 1982-1986 period the average shares of the most important buyers outside the EC were as follows: USA (36.7%), Austria (11.2%), Switzerland (10.5%), Sweden (5.8%) and Canada (3.9%).

### *Employment Trends*

During the 1982-1986 period, the number of jobs in the footwear industry of the EC 10 fell by 2.6% a year, from 328 140 in 1982 to 295 683 in 1986. Employment continued to fall in 1987. The drop in the number of employees was particularly pronounced in Ireland, the Netherlands and Denmark. By contrast, employment in Greece grew by 7.7% a year over the same period.

Most of the EC footwear industry's employment is concentrated in Italy, which accounts for 44% of total jobs while Ireland, Denmark, Belgium-Luxembourg and the Netherlands together represent less than 3% of the total. In the Community as a whole the number of jobs in the footwear industry reached about 371 000 in 1986.

Another interesting indicator on labour market conditions is average gross hourly earnings (data is available only up to 1985). For the EC 10 as a whole average gross hourly earnings increased substantially: taking 1982 as the base year, the 1985 index stood at 146. Inter-country comparisons show wide variations in the growth of earnings. The two extreme values for the 1985 index are 109.9 for France and the Netherlands on the one hand and 198.8 for Italy on the other. The indicators of earnings levels show that the Netherlands

and Denmark are systematically above the EC 10 average; there is no country systematically under the average. The range of earnings is decreasing over time: for 1982 the extreme index values were 161.1 (Denmark) and 81.3 (Italy). For 1985 they are 127.1 (Denmark) and 81.8 (Ireland).

### *Investment Trends*

For the EC 8 - consisting of Italy, France, Germany, the United Kingdom, the Netherlands, Belgium, Denmark and Luxembourg - investment in the footwear industry increased from 301 million ECU in 1982 to 408 million ECU in 1986. This represents a growth in value of 7.9% a year. A nearly identical rate is observed in Italy, France and Germany; investment by UK firms increased 19% a year in value, although the starting level was markedly lower. UK investments have been mainly concentrated on new technology.

Looking at the distribution of investments in the different countries we find that 53% of total investment took place in Italy. France accounts for 19% and Germany 16%.

## **Forecasts and Outlook**

### *Short-term Forecast*

In 1988 EC footwear production could still register a decline of about 1% in constant value (at 1987 prices) as extra-EC imports continue to increase. The outlook for 1989 is for similar trends in supply and demand with weak growth in the EC market being met by imports rather than domestic production.

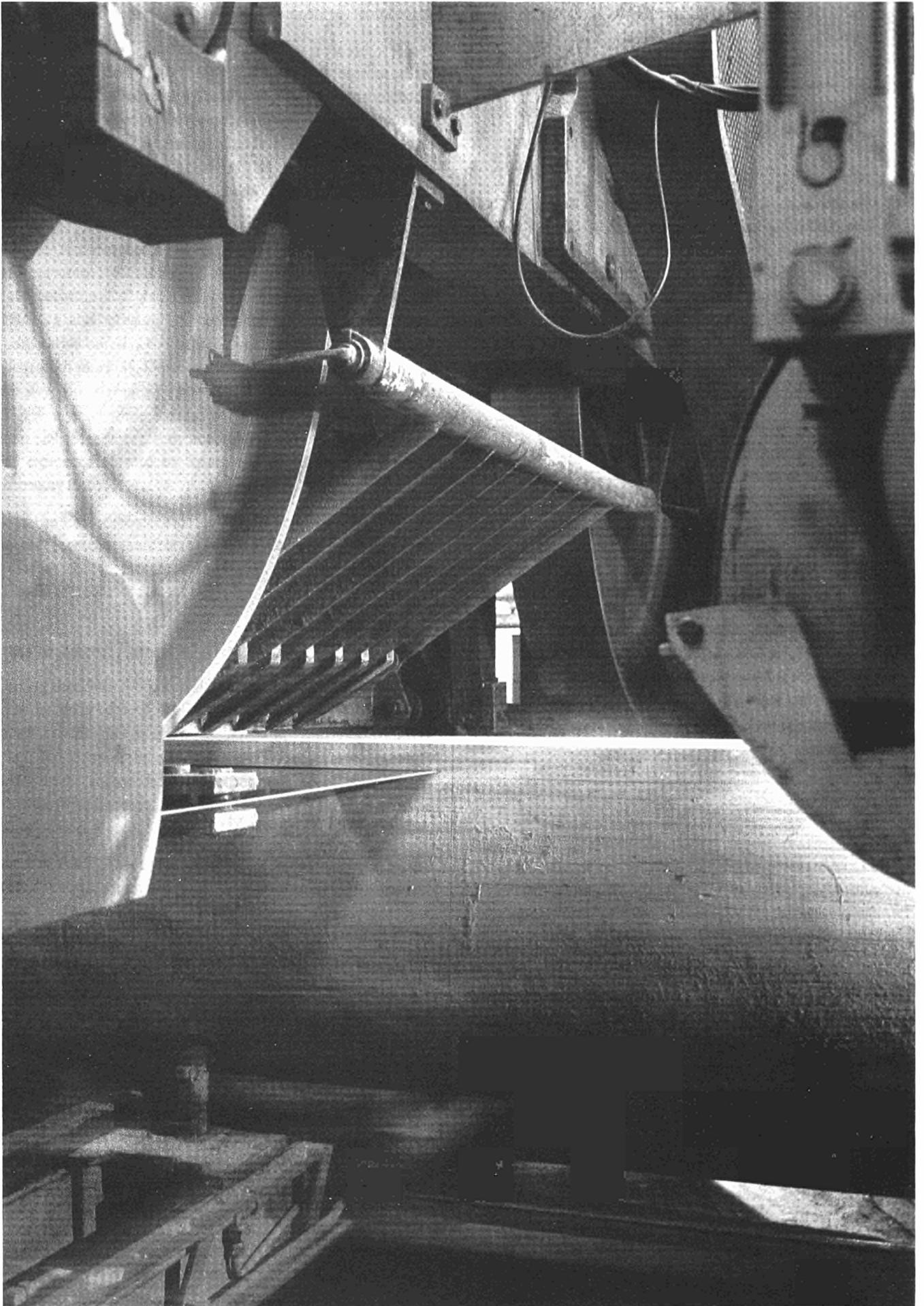
### *Medium-term Forecast*

In 1990 the EC footwear market should reach 16.1 billion ECU at 1987 prices, corresponding to a yearly increase of 1.3% in volume. This situation can be explained by stagnant EC population trends and especially by changing consumer practices unfavourable to this type of semi-durable product.

Faced with growing competition from the South-east Asian countries, the EC industry is specializing in upmarket and fashion product ranges. At the same time it is developing brand policies and trying to play a larger role in distribution. The industry is in the process of improving its competitiveness by the application of new technologies.

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Forecasts and Outlook: BIPE





## WOODWORKING

(NACE 462-466)

The EC woodworking industry, which was originally an artisan's activity, is still strongly characterized by family-owned companies. Some large firms exist alongside numerous small- and medium-sized enterprises. After a phase of rapid growth (between 1960 and 1974), the woodworking sector experienced a rapid decline during the late 1970s and early 1980s. Since then, the sector has undergone a progressive recovery which should continue until 1990.

### Current Situation

#### Consumption Trends

The Community internal market for processed wood products was valued at 19.4 billion ECU in 1987 (compared with 17.4 in 1980). This is less than that of the United States but higher than that of Japan.

In the 1980-1987 period the internal market dropped by about 4% a year in volume. There are several reasons for this negative development:

- weak demand from the construction and industrial sectors;
- competition from other materials which result in substitutions to the detriment of wood;
- the price of this type of product.

#### Export Trends

The EC woodworking market depends mainly on intra-Community production, which satisfied 87% of apparent consumption in 1987 as in 1980. This percentage remains high and is explained partly by the weight of processed products, which has a major effect on transportation costs and hence prices.

Nevertheless, the internal market of the European Community is affected by the penetration of products coming from other countries such as Finland, Sweden, the USSR, the United States and Canada. Extra-Community imports represented a total of 13% of the European market in 1987.

The following activities belong to the secondary wood processing sector:

- manufacture of semi-finished wood products;
- manufacture of carpentry and joinery components and parquet flooring;
- manufacture of wooden containers;
- other wood manufactures (including *inter alia*, the manufacture of wooden articles, wood flour, wood shavings and wood fibres as well as clog-making);
- manufacture of articles of cork and articles of straw; other plaiting materials;
- manufacture of brushes and brooms.

The timber industry, including the manufacture of wooden furniture, comes under NACE 46. If sawing and basic processing of wood (NACE 461) are disregarded, this group may be roughly divided into the furniture sector (NACE 467) and woodworking proper (NACE 462-466).

### Main Indicators Woodworking Industries

| (Million ECU)              | 1980   | 1981   | 1982   | 1983   | 1984   | 1985   | 1986   | 1987   |
|----------------------------|--------|--------|--------|--------|--------|--------|--------|--------|
| Apparent consumption       | 17 448 | 16 476 | 16 359 | 17 720 | 18 892 | 19 482 | 19 032 | 19 350 |
| Net export earnings        | -1 418 | -1 279 | -1 329 | -1 501 | -1 625 | -1 628 | -1 178 | -1 100 |
| Total Community production | 16 030 | 15 197 | 15 030 | 16 219 | 17 295 | 17 854 | 17 854 | 18 250 |
| Employment (1 000) (1)     | 331.5  | 301.2  | 281.8  | 272.9  | 266.4  | 260.8  | 250.0  | 250.0  |

(1) Enterprises with more than 20 employees.

On the other hand, the export capacity of the EC industry of finished and semi-finished wood products remains weak. Extra-EC exports represented only 8% of total production in 1987 (5% in 1980), but in the USA only 3.3% and in Japan a mere 1% of total production is exported. Thus the Community has run a trade deficit since 1980. However, some improvement can be seen in external trade as the export/import ratio went from 0.36 in 1980 to 0.58 in 1987.

The deficit in the extra-Community trade balance stems from:

- the dependence on tropical hardwood of a few important sub-sectors, such as exterior joinery;
- the large, inexpensive wood lands in other economic blocs such as North America and Scandinavia, countries which also have a great tradition in the field of woodworking;
- the overwhelming import of, for instance, plywood and hardwood from South-East Asia (first and foremost from Indonesia) and South America (chiefly Brazil);
- the import of wood products from the Eastern Bloc countries at low prices.

The EC dependence on a number of raw materials such as tropical hardwood will continue to exist in the future, if only because these raw materials are not found in Europe. This implies, therefore, that the EC woodworking industries must continue to have permanent access to these raw materials. A balance in trading relations can only be achieved through consolidation of the industrial system within the EC. The strength of the EC industry is in its technical processing knowledge.

The use of marginal (agricultural) land may further improve the favourable prospects with regard to the supply of wood. The Community forest Action Programme could be of help here, as it takes into account the possibilities and needs of the woodworking industries.

### *Factors behind Production Trends*

With production at about 18.3 billion ECU in 1987, the EC ranks among the five leading producers world-wide of

finished and semi-finished wood products. Between 1980 and 1987, EC production registered a decline of the order of 3.5% a year in volume.

In general, it can be stated that the woodworking industries went through a major crisis starting in the second half of the 1970s, which lasted until the beginning of the 1980s. As a result of substantial investment efforts from 1983 onwards, however, the EC woodworking industries are heading for positive growth over the second half of this decade. This economic growth will even result in a slight increase in employment in the EC woodworking sector towards 1990. One of the reasons for this success is the fact that wood is a raw material closely connected to the surge of renewed interest in natural materials in general. Moreover, wood is a raw material which can be renewed and which possesses both interesting aesthetic and technical characteristics.

According to the study by the Economic Commission for Europe (UNO) and the FAO "European Timber Trends and Prospects to the Year 2000 and Beyond", demand for wood products will be on the increase in coming years even taking the most unfavourable hypothesis. It appears that the economic basis of the EC woodworking industries is fundamentally healthy and that this sector, subject to the reservation of sudden disruptions of an external nature, has good prospects.

At present, the sector is still encountering a large number of technical barriers to intra-EC trade; nationally-oriented standards which have already long been in existence; major differences in the procedures for technical approval; various susceptibilities to specific aspects of use, such as the fumes from glue components and moisture-resistance, etc. In light of the integration of the EC market in 1992, the sector is therefore involved in discussions on the implementation - in the short term - of European standards and technical reference documents (directives on building products, certification, Eurocode 5, CEN standards, etc.). This technical integration should result in increased intra-EC trade.

Due to rapid development in production techniques, the sector is confronted with increasing difficulties in finding properly trained staff. Consideration needs to be given to higher education in this field, as qualified executives are needed as well as skilled workers. Furthermore, in most edu-

**Table I**  
**Trends in Community Production by Product**

| (Million ECU)                   | 1980     | 1981     | 1982     | 1983     | 1984     | 1985     | 1986     | 1987     |
|---------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|
| Semi-finished wood products     | 4 733.0  | 4 547.4  | 4 414.6  | 4 716.4  | 5 069.2  | 5 196.7  | 5 200.0  | 5 418.0  |
| Carpentry and joinery           |          |          |          |          |          |          |          |          |
| Components and parquet flooring | 8 061.5  | 7 579.0  | 7 292.0  | 7 959.6  | 8 387.8  | 8 628.0  | 8 721.8  | 9 000.0  |
| Wooden containers               | 1 947.1  | 1 844.6  | 1 784.3  | 1 780.4  | 1 936.5  | 2 038.0  | 2 035.1  | 2 129.4  |
| Others                          | 1 288.4  | 1 226.3  | 1 539.3  | 1 762.6  | 1 901.6  | 1 991.4  | 1 897.1  | 1 702.6  |
| Total                           | 16 030.0 | 15 197.3 | 15 030.2 | 16 219.0 | 17 295.1 | 17 854.1 | 17 854.0 | 18 250.0 |

Source: Eurostat.

**Table II**  
**Production and Foreign Trade**

| (Million ECU)    | 1980   | 1981   | 1982   | 1983   | 1984   | 1985   | 1986   | 1987   |
|------------------|--------|--------|--------|--------|--------|--------|--------|--------|
| Production       |        |        |        |        |        |        |        |        |
| Current value    | 16 030 | 15 197 | 15 030 | 16 219 | 17 295 | 17 854 | 17 854 | 18 250 |
| Index            | 100    | 94.8   | 93.8   | 101.2  | 107.9  | 111.4  | 111.4  | 113.8  |
| Constant value   | 16 030 | 13 836 | 12 542 | 12 737 | 12 933 | 12 762 | 12 500 | 12 600 |
| Index            | 100    | 86.3   | 78.3   | 79.5   | 80.4   | 79.6   | 78.0   | 78.6   |
| Imports extra-EC | 2 203  | 2 301  | 2 296  | 2 596  | 2 828  | 2 840  | 2 506  | 2 600  |
| Index            | 100.0  | 104.5  | 104.2  | 117.9  | 128.4  | 129.0  | 113.8  | 118.0  |
| Exports extra-EC | 785    | 1 022  | 967    | 1 095  | 1 203  | 1 212  | 1 328  | 1 500  |
| Index            | 100.0  | 130.1  | 123.2  | 139.5  | 153.2  | 154.4  | 169.2  | 191.1  |
| X/M              | 0.4    | 0.4    | 0.4    | 0.4    | 0.4    | 0.4    | 0.5    | 0.6    |

Source: Eurostat.

cation programmes for architects and engineers the absence of sound information concerning the material "wood" is a shortcoming with negative ramifications on the specifying behaviour in the building sector as far as timber is concerned.

In recent years some parts of the woodworking industry have been subject to severe constraints as far as health and environment are concerned. This is particularly the case in relation to the chemicals used in the production processes of the wood-based panels and wood preservation industry.

The woodworking industry is involved in the continuous adaptation of chemicals and production techniques incorporating the most recent developments in science and technology. In this context, the timber industry is essentially an environment-conscious industry. Although timber production might at first sight seem to be in contradiction with the conservation of forests, there is ample evidence from the history of humankind that good forest management goes together with timber utilization. Furthermore, wood is a renewable raw material with a low energy demand. This bears comparison with the use of other materials made from finite resources.

The remaining issues relating to the EC woodworking industries are too wide-ranging for it to be possible to deal with them under one heading. For this reason, the specific aspects of four of the most important dealt with in more detail below. These sub-sectors are as follows:

- wooden board material (NACE 462);
- veneer, plywood and blockboard (NACE 462.1);
- fibreboard and chipboard (NACE 462.2);
- wooden building components (NACE 463);
- wooden containers and pallets (NACE 464).

Brushes and brooms (NACE 466.3) are dealt with elsewhere and the other wood manufactures (465), as well as cork

(466.1) and baskets and wickerwork (466.2), are also excluded as they are too diffuse to be made the subjects of a brief summary. The above mentioned sectors together represent about 8% of the total output of the EC woodworking industries.

### **Manufacture of Semi-finished Wood Products**

This group mainly covers wooden board material, which in its turn is found as an intermediate product in the furniture industry or in building (the "inter-industry" circuit) or as a finished product (the "do-it-yourself" circuit).

This activity is carried out by 1 550 firms who are involved at present. These firms employed 58 500 people in 1987, thus bringing the average employment per firm to about 40 people, which can be termed as a relatively high number for the woodworking industries. The total value of production rose from 4.7 billion ECU in 1980 to 5.2 billion ECU in 1985 (+ 10%).

### **Veneer, Plywood and Blockboard**

These products are based on thin sheets of wood. Depending on how these woods are cut, thin sheets are obtained which are suitable for covering all kinds of surfaces (furniture panels, wainscoting, etc.) With an odd number of different (thicker) layers glued together, on the other hand, a very interesting board material is obtained. Depending on what is placed between the two surface sheets, a distinction can be drawn in the case of this product between two large groups: plywood and blockboard.

The use of these wooden boards occurs in building, packaging and the furniture industry, although a distinction is usually made between interior and exterior work. In the case of the latter, different glues are used.

To simplify, it can be stated that in the EC plywood industry, tropical wood is used nearly exclusively for its aesthetic qualities, whereas for mechanical performance other slow-growing types of wood are chiefly used.

According to the FAO publication "Yearbook of Forest Products", European production of plywood in 1985 - the last year for which figures are available - amounted to 1.5 million cubic metres, which is equivalent to a production value of 1 billion ECU. Total exports (intra- and extra-EC) in the same year were worth 639 000 cubic metres (364 million ECU). Imports on the other hand were considerable: 2.6 million cubic metres, equivalent to a value of 1.1 billion ECU.

Until recently, this industry sector was rather labour-intensive. However, technological development and computer applications in production control and the operation of machinery have lowered production costs by a substantial reduction in the percentage of wood waste. The sector holds considerable potential, especially in the direction of product diversification, certainly with production methods allowing small-scale custom-made orders.

With few exceptions, all enterprises in this sector are family-owned small- and medium-sized enterprises in rural locations. Their most important comparative advantage, in relation to the large single product producers in the USA and Indonesia, is that the European industry is specialized in the processing of very different types of wood.

## Chipboard

The basic raw material chipboard, contrary to plywood, consists of wood residues which are obtained from forestry or from woodworking, e.g. sawing, planing and veneer manufactures.

In contrast to plywood and veneer-covered wood, which are much older techniques, the production of chipboard has only been fully developed since the Second World War, although a patent was taken out as early as 1901 in the USA.

According to the FAO data, EC production of chipboard in 1985 - the last year for which figures are available - amounted to 13.5 million cubic metres and a value of 3.4 billion ECU. In the same year, total EC exports - both within and outside the EC - amounted to 3 million cubic metres (592 million ECU), which is offset by an import figure of 4.6 million cubic metres (812 million ECU). These imports mainly originate from the EFTA countries (Austria among others) and the Eastern Bloc countries. Between 1980 and 1985, the chipboard sector experienced an increase of 35% in the value of production, which is significantly more than the whole of the EC woodworking industries. It is expected that this trend will also continue over the medium term, both with regard to production and consumption.

The chipboard industry is one of the most capital-intensive of the EC woodworking industries. Production is almost fully automated and the level of initial investment, especially for the continuous production lines, is high. As a result the average chipboard firm exceeds the small- and medium-sized dimension of the sector and the value-added activity is lower than in the rest of the woodworking industries. The sector has gone through considerable restructuring and increased concentration has taken place.

Regarding raw materials, the sector is particularly dependent on the glue suppliers, who hold a monopoly position. Both glue prices on the one hand and the price of small roundwood and wood residues on the other are to a substantial extent determined by price fluctuation of energy products.

In the case of chipboard, significant R&D is taking place to further diversify the basic product. Resistance to moisture, fungus and fire are important areas of investigation which have already been touched on elsewhere. In addition, considerable efforts are being made in research to develop completely new boards on the basis of composite material consisting of a combination of wood, chemicals and/or cement.

Although the manufacturing process of chipboard is already fully automated, substantial investment is being put into computer-controlled processes and quality control. In view of the large contribution made by energy in the total cost price, the search for energy-saving improvements is a matter of serious concern. Finally, the development of non-destructive testing methods for the measurement of mechanical properties is an important area in which the EC chipboard industry is carrying out a substantial amount of research and development.

## Oriented Strand Board

From a production point of view, oriented strand board (OSB) can be loosely considered as a variant of chipboard but with significant differences in wafer or strand production and mat formation.

OSB derives its enhanced properties from the precise production of the wafers or strands, with thickness and length being critical. In order to increase the properties of strength in a specific direction, the strands are oriented in that direction. On the basis of its identifiable characteristics as a product, OSB can therefore be compared more with plywood than with chipboard.

OSB, which has only been produced in Europe since 1985, is grouped with waferboard. OSB and waferboard account for 40% of the plywood market in the construction industry in the USA. It is estimated that this will rise to 80% by the year 2000. Currently, high grades of OSB are being produced in the UK and France and the product has reached a high

standard of acceptability in these and several other European countries.

In the United Kingdom and France the product has been certified or is currently being tested for several principal construction uses. It is anticipated that OSB will become a major product of the European panel industry within the next decade.

### **Particleboards Bonded with Inorganic Binders**

These boards have either internal or external construction uses, according to type. Production is world-wide, and it is estimated that production capacity in Western Europe amounted to about 100 cubic metres per day in 1987.

#### **Fibreboard**

According to FAO data, in 1985 EC production of fibreboard amounted to 1.2 cubic metres with a value of 318 million ECU. Total exports (intra- and extra-Community) amounted to 453 000 cubic metres, which is offset by imports (intra- and extra-Community) of about 1 million cubic metres. Apparent consumption consequently amounted to 1.8 million cubic metres.

For nearly a decade, traditional hardboard and softboard have been outstripped by a new sort of fibreboard (medium density fibreboard, MDF), which has comparable characteristics (density among others) to solid wood, and in addition is a very homogeneous material, which can easily be processed. MDF is now used for lacquered furniture and for implements with sharp edges and/or contours; applications in the building sector have also recently arisen. MDF hence completes the range of available board material. The outlook of MDF is promising, first and foremost as a substitute material for more expensive types of solid wood.

#### **Wooden Building Components**

This subgroup relies heavily on trends in the building sector. Nevertheless, in the last decade, for wooden building components, a substantial opening has become available in the field of renovation work; this sub-sector is a little less dependent on new building per se, although in this area its market share continues to be preserved.

With regard to the construction of private housing, despite the achievement of the single market, well-defined regional markets will continue to exist within Europe. This has less to do with the standards laid down by the various authorities than with the specific climatic conditions and the local building traditions and styles. To meet this, the ideal form of enterprise is small-to-medium-sized which optimizes its size in accordance with clearly determined geographical limits and technical specialization.

The demand for wooden joinery and parquet flooring in private housing has clearly been on the increase in recent years.

In general, demand for wooden building components has focused on characteristics such as thermal and acoustic insulation as well as fire- and burglar-proofing properties, particularly for uses in the non-residential building sector. Even products such as fire-resistant wooden doors have been developed. The high degree of dimensional stability of wood provides these doors with a comparative advantage in relation to competing metal or synthetic products, which become distorted more quickly at high temperatures. The same characteristics regarding performance are to be found again in glued laminated rafters.

This sub-sector is not restricted to wooden doors, frames and rafters. It also includes wooden facade components, partitioning and other walls, wooden screens and staircases.

In practice, the "wood-protection" industry can to a large extent be considered part of the sectors relating to building. This branch of industry, which in the past was directed principally towards the impregnation of railway sleepers and poles for electricity distribution and telephone connections, has switched over to the delivery of protected wood for building and external uses. This switch-over incidentally also led to the use of other means of impregnation. Presently, in addition to the traditional creosote, increasing quantities of inorganic salts and products in organic solvents are used.

About 4.5 million cubic metres of wood are protected industrially per year in the European Community, of which about 3.5 million cubic metres are used in relatively new applications (agriculture, vineyards and horticulture, fruit-growing, enclosures, playgrounds, hydraulic engineering, but also as impregnated building components such as rafters). The surplus value from this impregnation amounts to about 200 million ECU per year.

The significance of wood-protection for the woodworking industries in general is expressed by the fact that through this, the use of wood has been made possible in applications where normally biological stresses are to be feared. This means that wood can develop market shares in these fields from competing building materials.

In magnitude, the wooden building components sub-sector is the most important of the whole woodworking industry (excluding saw-mills and furniture). In 1985, the value of production amounted to more than 8.6 billion ECU, accounting for around half of the total production of EC woodworking industries.

Apparent consumption in the EC reached 8.5 billion ECU in 1985 of which 313 million ECU (or 3.6%) was met by imports from outside the Community. Extra-EC exports on the

other hand are greater than imports; at 385 million ECU, they represent 4.4% of European production.

In contrast with most other sub-sectors of the woodworking industries, the wooden building components sub-sector therefore has a positive trade balance. The surplus value of 14% grew to 23% in 1985. In addition, output per employee, which was valued at 56 419 ECU per year in 1980, increased by 39% to 78 205 ECU in 1985.

### **Wooden Containers**

This sub-sector includes wooden containers of a temporary nature to contain products during their processing, transport, storage or display for sale for the purpose of promoting their manoeuvrability. Both light structures and containers which must be able to withstand rough handling are involved. The raw materials used are mostly local types of wood such as poplar and pine. The fact that wood is used as a raw material for containers and boxes makes these products very suitable for custom-made manufacturing.

The pallets have to a large extent been standardized with regard to their dimensions, which makes them highly suitable for use on multiple occasions or for being interchanged with one another. Some of the international trade in pallets is "invisible" moreover because consignments with empty pallets are included in the customs statistics, whereas loaded pallets are not.

The value of EC production amounts to 2 billion ECU, an average turnover of 1.3 million ECU per firm, which clearly underlines the small- and medium-sized nature of firms in this sector. Production is directed first and foremost towards the requirements of the local markets. Foreign trade in wooden containers (outside the EC) is consequently rather limited in scale. Both imports and exports (outside the EC) amount to only a fraction of consumption (1.7%) or production (2.2%) and this will, in all probability, not change in the future. Overall, the sub-sector of wooden containers is nevertheless worth 12% of the value of production of the EC woodworking industries, not including saw-mills and furniture.

Wood, paper, cardboard, glass and plastic are the most important packing materials. Cardboard in particular is

increasingly used as a substitute for wood in cheap packaging, whereas wood in its turn holds a better position in the upper end of exclusive packaging. Some saturation has been evident in recent years.

### *Employment Trends*

The EC woodworking industry comprises about 21 100 firms with more than 20 employees. The industry features the coexistence of large companies and numerous small- and medium-sized enterprises. This structure is in keeping with the nature of the products and technical production constraints (i.e. particleboard which requires major investments and wood packaging which needs flexible production methods to meet occasionally personalized demand).

Woodworking enterprises in the EC employed about 250 000 persons in 1987. If enterprises employing less than 20 persons are included the total number of employees would be close to 400 000.

## **Forecasts and Outlook**

### *Short-term Forecasts*

In 1988 Community wood industries production is expected to approach 18.8 billion ECU (+0.8%) after stagnating in 1987 and declining in 1986. At the same time the European market should see a slight recovery due to improved demand in user sectors.

### *Medium-term Forecasts*

Over the medium term (to 1990), EC production of wooden products should reach 20 billion ECU - an 11% increase in value between 1987 and 1990. This production level will still be around 20% less than the 1980 level.

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# BRUSHES AND BROOMS

(NACE 466.3)

Community output of brushes and brooms reached a value of almost 1 billion ECU in 1986 and the industry has a positive trade balance with third countries despite strong competition. Prospects for the immediate future are for comparative stagnation, both in production and in consumption.

## Current Situation

### Consumption Trends

Production in the brushware industry, which stood at 738 million ECU in 1980, increased steadily until 1985, when it reached 912 million ECU (+ 24% approximately between the two dates). Since then it has remained stable.

Consumption has developed in a similar manner. From 700 million ECU in 1980, it grew by 23% to 856 million ECU in 1985 and stabilized in 1986. The import penetration rate (imports from third countries/consumption) rose from 7.6% in 1980 to 10.9% in 1986.

### Import and Export Trends

Both intra-Community trade and trade with third countries by the EC 10 have grown over the period. Imports from third countries rose by 75% between 1980 and 1986, from 56 million ECU to 99 million ECU. Over the same period exports to third countries increased by 57%, from 98 million ECU to 153 million ECU. Extra-EC exports as a percentage of production went from 13.2% in 1980 to 16.8% in 1986.

The third country export/import ratio has remained positive although it decreased from 1.73 to 1.55 over the 1980-1986 period.

In 1986 EC imports represented some 100 million ECU and 16.8 tonnes.

Imports from EFTA countries amounted to 26 million ECU in 1986. Moreover, the ECU/kg price was 12.1, double the global average (6.6 ECU/kg). Nevertheless, EFTA imports into the Community in 1986 increased by 16% by value and 9% by volume.

Analysis of the brushware industry has been carried out using data supplied by the European Brushware Federation (Belgium, Germany, France, Italy, Spain, the Netherlands and the United Kingdom). Figures for Denmark and Ireland are based on the whole of sector 466, given that there is no significant production of cork and/or basketwork. The same does not apply to Portugal and Greece; overall figures are for EC 10.

The main categories of brushes are:

- domestic brushes (soft and hard brooms, washing-up brushes, scrubbing brushes, clothesbrushes)
- cosmetic brushes (toothbrushes, hairbrushes, nail brushes, bath brushes, shaving brushes)
- machine-mounted industrial brushes of different shapes (discs, cylinders, strips, etc.); they are not necessarily large brushes, such as car-wash brushes, as they also include tiny brushes for the electronics industry, etc.
- paint brushes, varnish brushes, radiator brushes, paint rollers
- fine paintbrushes, make-up brushes, water-colour brushes, etc.; most firms specialize in one branch only.

## Main Indicators Brushes and Brooms

| (Million ECU)                  | 1980   | 1981   | 1982   | 1983   | 1984   | 1985   | 1986   |
|--------------------------------|--------|--------|--------|--------|--------|--------|--------|
| Apparent consumption (1)       | 696.9  | 713.3  | 755.8  | 763.8  | 790.1  | 856.3  | 857.2  |
| Net export earnings (1)        | + 41.4 | + 44.1 | + 28.6 | + 38.8 | + 50.0 | + 56.3 | + 54.6 |
| Total Community production (1) | 738.3  | 757.4  | 784.4  | 802.6  | 840.1  | 912.6  | 911.8  |
| Employment (1 000) (2)         | 24.1   | 22.6   | 21.8   | 20.3   | 20.0   | 20.2   | 19.7   |

(1) EC 10 excluding Greece and Portugal.

(2) Total: Employees and workers.

The trend is different in trade with State-trading countries. Imports represent only a small part of total value, though this is larger in terms of tonnage. Very low prices (between 1.4 ECU and 2.1 ECU) explain the large increase in imports from these countries: +17% by value and +12% by volume in 1986 compared to 1985.

**Table I**  
**Production by Country - 1986**

| (Million ECU)  | Production |
|----------------|------------|
| Belgium        | 16.8       |
| Denmark        | 23.6       |
| Germany        | 298.8      |
| Spain          | 24.2       |
| France         | 174.7      |
| Ireland        | 11.9       |
| Italy          | 166.2      |
| Netherlands    | 14.2       |
| United Kingdom | 181.4      |
| Total EC 10    | 911.8      |

Source: FEIBP.

Imports from third countries are increasing rapidly, +19% in volume in 1986 compared with 1985. The value decreased by 5.6% however, following the fall in the ECU/kg price, (-20.5%) over 1986. A third of these imports are from China, with Taiwan and Hong Kong as other major suppliers. These three countries represent two-thirds of total imports by volume.

In 1986, EC exports to third countries represented 153 million ECU, or 23.2 tonnes of which around 100 million ECU represented exports to North America and the Middle East. Exports to EFTA countries stood at 47 million ECU (6.527 tonnes), growth was renewed in 1986 (+13% by value and +9.6% by weight). These exports are over 80% higher by

value than imports from EFTA countries. This indicator rises to 310% in terms of volume; the main characteristic of exports to Eastern bloc countries is their high unit price.

### *Factors behind Production Trends*

The brushware industry uses natural raw materials (animal and vegetable) as well as synthetic fibres and metal wires. For animal fibres, China is the major supplier of pig bristles. The categorization of bristles depends on their origin (Tientsin, Tsingtao, Chunking, Hankow, etc. for example), their dimensions (15mm to 38mm) and their colour (black, white, grey). Other suppliers are Germany, Yugoslavia, Poland and India. Pig bristles are cured and delivered in bales. These type of bristles are used in the manufacture of paint brushes, clothes and hair brushes and domestic brooms, etc. Boar bristles, which are harder, may also be used.

Another natural fibre is horsehair, for which South America and China are the principal suppliers. Horsehair is taken from the mane and the tail and the colours are black, grey and white. It is used for industrial and domestic brushes.

In the category of natural fibres, the most expensive are fine hairs used for making fine paintbrushes such as water-colour brushes, and make-up brushes. They are taken from marten, badger, squirrel, pony, ermine, etc. and come from China, the Soviet Union, Central Europe and Canada.

The second category of raw materials used in the brushware industry is vegetable fibres. The main fibres are:

- Mexican fibre (Tampico): this fibre, which is supplied by Mexico, is used for cosmetic, domestic and industrial brushware; when mixed with Palmyra, the mixture is called "Union"

**Table II**  
**Production and Foreign Trade**

| (Million ECU)        | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  |
|----------------------|-------|-------|-------|-------|-------|-------|-------|
| Production (1)       |       |       |       |       |       |       |       |
| Current value        | 738.3 | 757.4 | 784.4 | 802.6 | 840.1 | 912.6 | 911.8 |
| Index                | 100.0 | 102.6 | 106.2 | 108.7 | 113.8 | 123.6 | 123.5 |
| Constant value       | 738.3 | 672.1 | 631.6 | 595.4 | 580.2 | 593.8 | 572.8 |
| Index                | 100.0 | 91.0  | 85.5  | 80.6  | 78.6  | 80.4  | 77.6  |
| Imports extra-EC (1) | 56.4  | 67.1  | 80.6  | 83.1  | 89.3  | 97.8  | 98.9  |
| Index                | 100.0 | 119.0 | 142.9 | 147.4 | 158.4 | 173.6 | 175.4 |
| Exports extra-EC (1) | 97.7  | 111.2 | 109.1 | 121.9 | 139.4 | 154.1 | 153.5 |
| Index                | 100.0 | 113.8 | 111.7 | 124.8 | 142.6 | 157.8 | 157.1 |
| X/M                  | 1.73  | 1.66  | 1.35  | 1.47  | 1.56  | 1.58  | 1.55  |

(1) EC 10 Excluding Greece and Portugal.

Source: FEIBP and Eurostat.

- **Palmyra fibre:** India and Sri Lanka are the suppliers of this fibre which is used for domestic and industrial brushware; Sri Lanka practically has a monopoly on coconut fibre, which is used for the manufacture of brooms
- **Piassava:** this is a generic name given to vegetable Piassava fibres from northern and eastern Brazil, West Africa and Madagascar; they are used for the manufacture of brooms amongst others.

The third category of fibres used in the brushware industry is synthetic fibres, the most common of which are polyamide (nylon/perlon), polyvinylchloride (PVC), polypropylene and polyester. These fibres are produced in Europe, the United States and Japan and are used in almost all kinds of brushware.

Metal wires are generally steel, aluminium and copper wires of varying thickness, twist and composition. They are mainly used in the manufacture of industrial brushes.

### *Major Structural Features*

A distinction is drawn between paintbrushes and other brushes depending on how they are made. A brush has a number of tufts of bristles, either natural or synthetic, whereas a paintbrush only has one. Apart from these two types of brushes, other products such as scrapers, feather dusters, paint rollers, etc. are included in the sector.

As is the case in the woodworking industry in general, production and marketing units are small family businesses. In

some countries, official statistics only count businesses with 10 or even 20 employees. This means that certain figures are likely to be underestimated as many businesses employ between five and 10 people.

Large firms also exist in some countries, the result either of collaboration between several medium-sized firms, or of mergers with a view to horizontal integration.

The work-force in these businesses varies according to the type of product, the degree of mechanization or automation and so on. In general, the manufacture of paintbrushes is the most labour intensive with women continuing to make up a large share of the work-force.

### *Employment Trends*

The brushware industry (EC 10) employed just under 20 000 people in 1986. Employment in the sector decreased by 18% over the period 1980-1986.

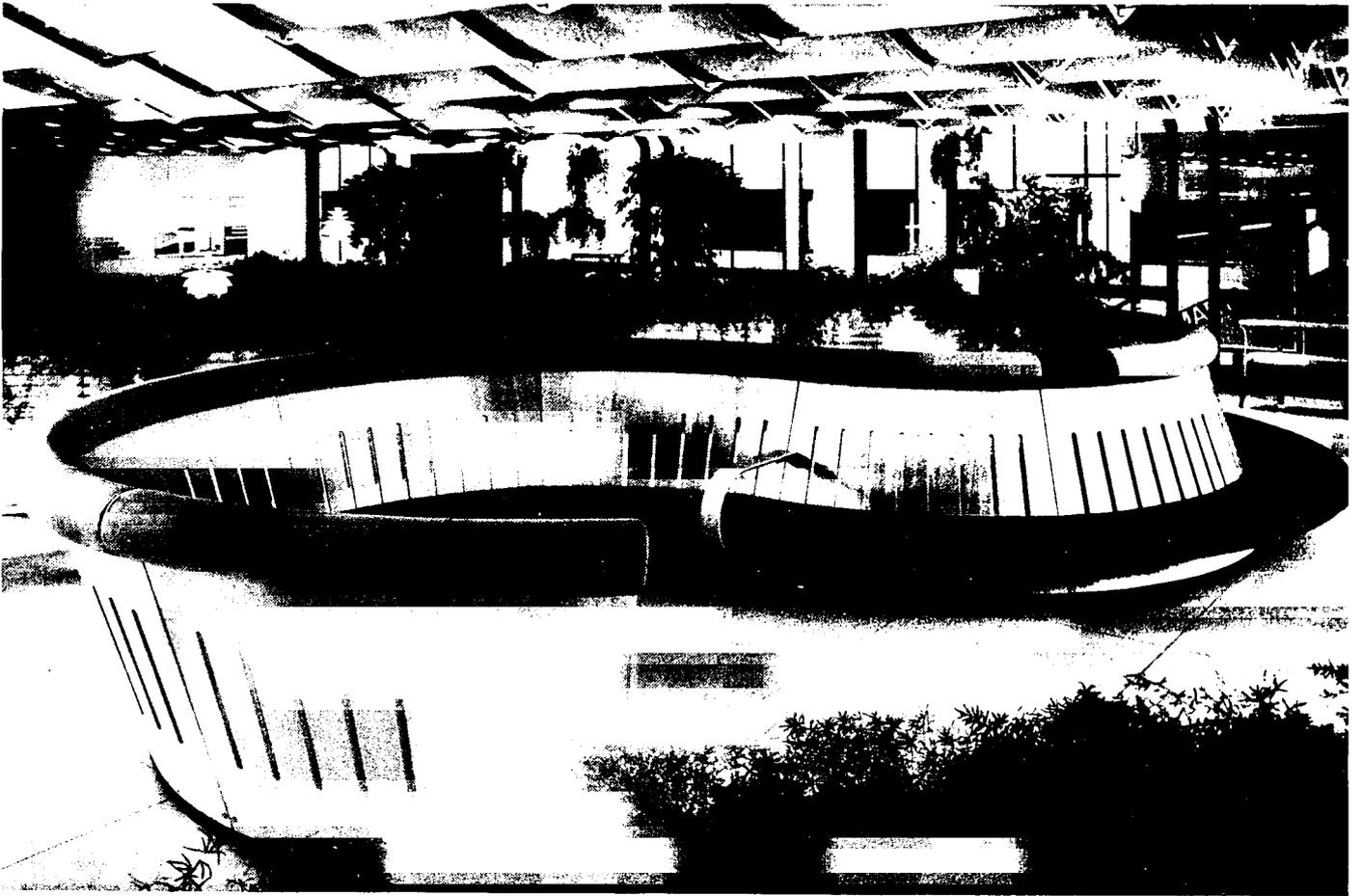
### **Forecast and Outlook**

The outlook for 1990, based on developments over several years, is for relative stability or at best moderate growth in both production and consumption.

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# FURNITURE

(NACE 316.6, 467)

*The European furniture industry is a comparatively large manufacturing sector employing over 600 000 people. Some structural changes in the industry have been evident over the last 10 years although industry concentration remains relatively low with a preponderance of medium-sized firms. Substantial intra-Community trade exists; however, exports to the rest of the world represent a small percentage of production capacity. The immediate outlook is moderately healthy assuming a steady increase in consumer purchasing power.*

Although furniture fabrication is one of the most ancient skills, furniture manufacture is one of the younger industries. With a few exceptions, industrialization of furniture manufacturing in most of the European countries only began around 1950: it first began in the Scandinavian countries, in the UK, Belgium, the Netherlands, Luxembourg and in Germany, followed by Italy in the early 1960s. The impetus behind industrialization was the relatively high mass purchasing power in these countries. At present, in most European countries, production structures are already industrialized; it is only in Greece, Spain and Portugal that smaller firms of a skilled/small industrial character predominate.

## Current Situation

### Major Structural and Geographical Features

In the furniture industry medium-sized enterprises still predominate; this applies both to domestic furniture in the narrow sense and to other furniture (fabrication of office furniture, laboratory furniture, furniture for public buildings such as airports, universities, schools, etc.). Typically, large-scale enterprises are rare but do exist in nearly every European country. The reasons for this are various. The technology of furniture production forces enterprises to specialize in certain products (for example upholstered furniture, kitchens, chairs and tables, office furniture). Other specialization occurs particularly in domestic furniture in view of design acti-

vities where the manufacturer produces modern or period-style furniture. At the same time, specialization in quality articles is the rule for market and technical reasons. Concerning marketing, in general, the furniture trade is also specialized in satisfying particular needs (for example the mass furniture market for the lower and medium income groups). Technical reasons are also important: to produce solid wood furniture, different equipment is needed than that required to construct veneered furniture or furniture with plastic surfaces.

In the field of furniture production, enterprises in Germany have reached the largest average size at around 100 employees. The primary reason for the fact that the largest average size of enterprise is found in Germany is that the domestic market is the largest in Europe.

Since 1950, the average size of enterprises has continuously increased in the other EC Member States as well, and the development of the industry will show a similar trend in Greece, Spain and Portugal. This increase is stimulated by the use of computer-controlled manufacturing installations - as a response to stronger national and international competition - which require a certain business size to be profitable. It is also stimulated by the fact that manufacturers who only sell on local markets are losing their position in comparison with manufacturers selling at the national level; furthermore, it is an obvious trend that manufacturers only selling at a national level will have smaller opportunities in comparison with their colleagues selling to an international market.

Above all, these developments will be strengthened by the implementation of the European single market. Consequently, it is expected that an average staff complement of 100 will be reached in many EC Member States by the mid-1990s; in the other Member States this number is likely to be approached. Yet, depending on product group and market sector, the optimal business size could lie between 50 and 300 employees; only about one enterprise in 20 might reach a staff complement between 300 and 1 000. More than 1 000 employees are to be expected in no more than 15 enterprises in Europe.

## Main Indicators Furniture

| (Million ECU)              | 1980   | 1981   | 1982   | 1983   | 1984   | 1985   | 1986   | 1987   |
|----------------------------|--------|--------|--------|--------|--------|--------|--------|--------|
| Apparent consumption       | 29 891 | 29 433 | 27 546 | 27 141 | 28 674 | 29 547 | 32 399 | N/A    |
| Net export earnings (1)    | + 929  | +1 266 | +1 568 | +1 745 | +2 132 | +2 668 | +2 481 | +2 274 |
| Total Community production | 30 820 | 30 699 | 29 115 | 28 886 | 30 806 | 32 215 | 34 880 | N/A    |
| Employment (1 000)         | 771.1  | 741.0  | 704.2  | 677.1  | 661.2  | 690.6  | 662.4  | N/A    |

(1) EC 12; 1980: excluding Greece.

In general, the degree of concentration in the furniture industry remains low; it will continue to be below the average degree of concentration in other industries.

**Table I**  
**Number of enterprises (1)**

|      |        |
|------|--------|
| 1980 | 68 794 |
| 1981 | 67 411 |
| 1982 | 64 307 |
| 1983 | 64 804 |
| 1984 | 61 969 |
| 1985 | 62 015 |
| 1986 | 53 402 |

(1) EC 12; 1986: excluding Greece and UK.  
Sources: UEA, Eurostat.

In many European countries, investment in the furniture industry has increased due to high rates of economic growth, enhanced mass purchasing power and substantial house building, and this has had an impact on the structure of the furniture industry. In this respect, southern European countries, in particular, are at a disadvantage, since they need to restructure their industries at a time when competition with other European countries - including Comecon countries - is very significant. It is a matter of concern that the furniture industries in countries such as Greece, Spain and Portugal may not be able to sustain their positions in domestic markets (and above all in the internal market), although the level of employee training in these countries is remarkably good, particularly in the field of furniture manufacturing.

### *Employment Trends*

In the 1960s, wage costs represented considerably more than 50% of production costs. Since then, this proportion has decreased due to increasing industrialization, and currently it is about 35% in the most technically advanced furniture industries in Europe. In a few factories mass-producing furniture on a large scale, the figure lies well below 20%, but such factories are, and will remain, exceptions.

During the first half of the 1980s, a considerable number of factory closures (reaching 20% in some European countries) resulted in a strong decrease in employment. This was due to declining economic activity in almost every European country which strongly affected demand for furniture. In addition, house-building activities in northern and central Europe decreased significantly with negative effects on furniture sales. As a result of the current moderate increase in furniture manufacturing in most EC countries, the reduction of staff has stopped; in some regions the number of employees is even increasing slightly.

Despite the introduction of computer-controlled manufacturing in many European furniture factories - particularly in Germany, but also in northern Italy, Scandinavia France and the UK - technical restructuring is not the cause of job cuts. Even in Germany, where enterprises are at present particularly well equipped in the technical sense, the proportion of production/staff complement remains constant. This is due to a number of factors. Firstly, in Europe, greater affluence has meant that a larger proportion of furniture purchases are replacements and additional items as opposed to first purchases; in this area demand has become more selective and quality conscious. Consequently, mass production is being dropped and smaller scale manufacturing is becoming increasingly important. This compensates for the effects of mechanization on staffing. Secondly, working time is gradually decreasing. Thirdly, the proportion of total staff comprising employees directly involved in the production process is decreasing.

This basic trend exists in the furniture industries of all EC Member States, except Spain and Greece which clearly have a lower per-capita sales ratio than the other EC countries (future development in Portugal is expected to be similar). For these countries, a similar pattern of development is expected to that which occurred in northern and central Europe during the first years of growth after the Second World War; the effects of mechanization on the labour force will be less important than increasing mass demand. However, this forecast will only prove to be correct if these furniture industries remain competitive and do not lose their market shares to international competitors.

Employees working in the wood and furniture industry, almost without exception, are skilled labour. Since natural resources (wood, leather, wool, stone) are being used, basic skilled training still is, and will remain, important. However, artisanal elements in training are not only predominant for skilled labour but also for the lower and middle technical management who lack the knowledge necessary for electronic manufacturing. This is partly due to a lack of training possibilities, a weak point in many industries in which small and medium-sized enterprises predominate. Pilot projects would be useful in the northern and central EC Member States, but especially in the southern countries, although the fundamental problem is the same across the Community.

### *Domestic Furniture*

European national statistics give different definitions of the term "domestic furniture". Here we use the term in the sense that it comprises all furniture used in private apartments, including the kitchen. This definition seems to be appropriate, since the kitchen is used both as a private workroom and also as a living space. Consequently, the much smaller volume of bathroom furniture is also classed with domestic furniture.

On the other hand, it seems to be less appropriate to consider upholstered furniture separately from other domestic furniture, because the definition of the term "upholstered furniture" can no longer be limited to armchairs and sofas. For a long time, most chairs have been upholstered; bedsteads and mattresses are combined into a new form of furniture, the upholstered bed.

The usual distinction by materials - wood, plastics or metal - also seems to be antiquated. The trend is in the direction of combining different materials; chairs and cupboards could be made of wood, plastics and metal combined. National statistics, which almost without exception distinguish between materials, might be misleading, since the classification depends on the information from individual enterprises. However, enterprises rather arbitrarily report furniture made of combined materials, the history of the enterprise (stemming from the domain of wood or metal) being in most cases the determining factor.

In the non-saturated markets which existed just after the Second World War, the most important determining factors for furniture sales were the number of marriages, population changes and house-building activity. These socio-demographic structures are no longer so important for saturated markets and furthermore, there have been significant changes in lifestyles. Particularly in northern and central Europe, the establishment of households has markedly increased. This is due to both non-married couples and single persons setting up homes and the increasing number of divorces, especially in northern Europe.

Nowadays, the most important determining factors for furniture sales are:

- the development of mass purchasing power as real incomes rise
- the development of the number of households
- the trend towards equipment of existing households with more furniture (except in Greece, Spain, Portugal and the southern parts of Italy).

In socio-demographic terms, the most important factor is the number of households since a basic provision of furniture is always needed. Percentage-wise, the number of households in Europe is increasing more rapidly than the number of people. Despite decreasing or stagnant birth rate, socio-demographic developments are promising for furniture sales.

Furniture sales depend to a high degree on the development of real purchasing power. In favourable economic circumstances (i.e. real available income increasing by about 2% annually), the proportion of first acquisitions compared with replacements and additional needs is about 1:2 in most EC countries; in the southern European countries, this ratio is about 1:1. This means that the EC furniture industry de-

pends very much on the state of the economy. In circumstances of declining or stagnant economic activity, the furniture industries fare badly: the high proportion of replacements and additional needs results in the consumer postponing his acquisitions since these purchases are flexible. In favourable economic circumstances furniture sales increase very rapidly, because the general increase in leisure creates a greater interest in standards of living. Interest in design increases and fashions assume a more important place in the media, which may result in a more rapid turnover for the furniture industry.

However, the medium-sized structure of this industry has one drawback: it is extremely difficult to establish trademarks of high prestige. The furniture industry competes for the consumer with large sectors such as the motor industry, communications and tourism which have a superior marketing know-how and high advertising budgets at their disposal. Especially in the field of marketing, the furniture industry has marked weak points; this applies particularly to the domestic furniture industry because management is primarily concerned with production rather than selling. Moreover, turnover and consequently the income of most enterprises in the furniture industries is too low to finance large advertising and public relations exercises. In this respect, cooperative PR and advertising are urgently required.

### *Office Furniture*

Some parts of the office furniture industry have developed from the domestic furniture industry and this is particularly true of the wood-manufacturing sectors of office furniture. However, the metal office furniture sector is particularly important and has developed independently. Nowadays, the office furniture industry is generally a separate, highly specialized sector. In general, its marketing knowledge is much more advanced than that of the domestic furniture industry.

While manufacturing employment is decreasing across the EC, employment in the service sector is increasing, resulting in a greater need for offices and work stations.

In all EC countries, the office furniture industry showed excellent development up to 1976. The optimal firm size should be higher than in the domestic furniture industry, but although the number of employees per enterprise is still increasing, to date only a few enterprises have reached this level. In general, the larger enterprises have achieved higher growth rates in terms of turnover. However, in all EC countries the office furniture industry passed through a period of stagnation, between 1976 and 1982. Subsequently, office furniture responded well before the domestic furniture industry to the economic upturn and has since shown high growth rates in a number of EC countries.

Electronic data processing requires essential changes in the typical office. Instead of using the term "office furniture", the term "Organisationsmöbel" is often applied. The fear that data processing and the high storage capacity of modern EDP-installations would replace the need for storage space has not materialized. Contrary to previous forecasts anticipating the replacement of files by EDP, the need for storage place in offices is still increasing since EDP-installations allow the creation of even more hard files. The forecast that files will be copied on microfilm, which would have had negative consequences for manufacturers of office cupboards and shelves, has also proved to be false. Investment per work place is also increasing and this has affected demand for both equipment and furniture.

In general, the economic situation of the office furniture industry is better than that of the domestic furniture industry. On the other hand, enterprises which cannot manage the "office revolution", requiring very innovative furniture, carry a high risk of failure. Although production is increasing, it is expected that a considerable number of enterprises will be eliminated from competition. In this respect, the smaller enterprises which also suffer from a lack of investment are particularly vulnerable. With the implementation of the internal market, extremely strong competitors - market leaders are Italy and Germany which have enterprises of international reputation - are likely to displace small and medium-sized enterprises.

### Other Furniture

The other furniture industries comprise primarily:

- manufacturers of school furniture
- manufacturers of laboratory furniture
- manufacturers of chairs for big projects (theatres, cinemas, airports etc.).

Some enterprises concerned with shop-fitting are also classed with the furniture industry. However, here they are

omitted since they are not concerned with furniture in a general sense but with special built-in installations.

The manufacturers in these sectors are highly specialized. Since the buyers are public bodies, the marketing channels for school furniture and chairs for big projects are completely different to those for other furniture. Manufacturers have generally failed to adjust capacity to changing levels of demand - over which they have little influence. Downturns in demand, have often led to price wars and the elimination (in most cases bankruptcy) of the weaker competitors. Diversification to other products is very rare.

Demand for school furniture depends on two factors: the capacity and willingness of public bodies (and similar establishments e.g. churches) to invest in the education sector; and the trend in the number of pupils and students. (At present, tenders for the equipment of education centres are advertised locally and nationally. With the implementation of a the internal market international tendering should follow.) In many countries - particularly in Germany and in Scandinavia - the number of pupils is decreasing due to smaller family size. In Catholic EC countries, particularly in southern Europe, the birthrate is higher. While the number of students at universities and similar establishments is still increasing, in countries with a declining number of pupils school population will reach a peak around 1990 and thereafter slowly decrease. In countries where the number of pupils is decreasing, the manufacture of school furniture, which has already decreased, will drop further.

In other furniture sub-sectors the situation varies considerably. The need for laboratory furniture has increased markedly. In future, there will be a need for more furniture in the technical sector also. For 15 years the manufacturers of chairs for cinemas, theatres etc. have seen a decreasing number of orders due to the electronic media (television and video). It is difficult to foresee whether this decrease has already stopped or whether production will be maintained at a lower level. For the EC countries in general, a further decline is more probable. On the other hand, developments in furni-

Table II  
Production and Foreign Trade

| (Million ECU)    | 1980   | 1981   | 1982   | 1983   | 1984   | 1985   | 1986   | 1987  |
|------------------|--------|--------|--------|--------|--------|--------|--------|-------|
| Production       |        |        |        |        |        |        |        |       |
| Current value    | 30 820 | 30 699 | 29 115 | 28 886 | 30 806 | 32 215 | 34 880 | N/A   |
| Index            | 100.0  | 99.6   | 94.5   | 93.7   | 100.0  | 104.5  | 113.2  |       |
| Constant value   | 30 820 | 28 232 | 24 910 | 23 972 | 24 455 | 24 475 | 25 818 | N/A   |
| Index            | 100.0  | 91.6   | 80.8   | 77.8   | 79.3   | 79.4   | 83.8   |       |
| Imports Extra-EC | 1 005  | 1 152  | 1 173  | 1 294  | 1 614  | 1 720  | 1 651  | 1 914 |
| Index            | 100.0  | 114.6  | 116.8  | 128.8  | 160.5  | 171.2  | 164.2  | 190.5 |
| Exports Extra-EC | 1 934  | 2 418  | 2 742  | 3 039  | 3 745  | 4 388  | 4 131  | 4 188 |
| Index            | 100.0  | 125.0  | 141.7  | 157.1  | 193.6  | 226.9  | 213.6  | 216.5 |
| X/M              | 1.92   | 2.11   | 2.34   | 2.35   | 2.32   | 2.55   | 2.50   | 2.19  |

Sources: UEA, Eurostat.

ture sales for other customers, in particular for big projects such as airports, banks and similar organizations, look very promising.

### *Export Trends*

For a long time, furniture in general, and domestic furniture in particular, was considered difficult to transport. Differences in national living habits (e.g. Japan) and in taste are also significant. Consequently, in the past, furniture for local markets has predominated, and this is still the case in parts of southern Europe. In the field of exports, the following EC countries have particularly strong points:

Italy - upholstered furniture, small furniture, chairs and tables

Denmark - seats, tables, light softwood furniture and teak furniture and, since the mid-1970s (in competition with Sweden, the leader in this sector), take-away furniture

Germany - built-in kitchens, office furniture and "Organisationsmöbel", in recent years more and more upholstered furniture and system furniture for living rooms and bedrooms

France - living-rooms and bedrooms, first of all period style, only recently modern furniture

Belgium - relatively heavy furniture, often made from oak, primarily in the Flemish and old German style

The Netherlands - designer furniture.

In international markets, inventive Italian design has a particularly good reputation. Danish furniture is considered to be functional and of pure form; this is true of Scandinavian furniture in general. The Germans have a reputation for technique, particularly for furniture which is produced in module systems.

International furniture fairs support the international exchange of goods. The following are the most important among the big international fairs in Europe:

- the annual international furniture fair in Cologne which takes place in January and has the most important worldwide participation
- the furniture fair in Milan, which takes place on a national and international level (alternating yearly) and is considered to be the trend indicator
- the international fair in Paris
- the Scandinavian furniture fair in Copenhagen which has considerable overseas influence.

Important fairs for office furniture take place in Cologne (Orgatechnik) and Milan and there are also special fairs for kitchens.

The most important competitors for the EC industry are the traditional European furniture manufacturers, Sweden (important in take-away furniture), Switzerland, Austria and also manufacturers in the State-trading countries. In future, some of the Asian countries will be important - first of all Taiwan, followed by Hong Kong and Singapore. From a technical point of view, the developing countries - even those with large wood resources - are far behind. It is not expected that they will compete with the EC furniture industry before the end of the century.

From a technological point of view, furniture manufacturers in the EC countries rank first in the world: during this century, innovations in furniture technology and design emanated without exception from the European furniture manufacturers. The leadership role of the EC countries is strengthened by their considerable superiority in the mechanical sector (notably Germany and Italy) and the fittings sector; this applies also to the materials sector (the paperboard technique and the development of MDF-boards are of European origin).

Significant furniture trade takes place within Europe and, in proportion to their production, Italy and Denmark have the largest shares of exports. Germany, also an important exporter, is the biggest importing country, followed by France.

In spite of its technical superiority, the industry in the EC countries has not found a particularly strong market position overseas. Taiwan is the main supplier to the USA and Japan, followed far behind by Italy, Denmark and Germany. Japan as a customer could be an important future market: European furniture is becoming more and more sought after as a result of the rapid change in living habits due to skyscraper construction. But Japanese non-tariff and bureaucratic obstacles act as a deterrent. Due to the fall in oil prices, the once significant demand from the OPEC countries has almost stopped.

Concerning imports, EC manufacturers complain about the cheap offers from the State-trading countries. One tonne of furniture from State-trading countries costs an average of 1 300-1 700 ECU; the average price/tonne in the EC lies between 4 000 and 5 000 ECU. In terms of design, quality and adaptability to the market, the State-trading countries are inferior to the EC furniture manufacturers. They have therefore limited their deliveries to simple furniture (chairs, tables, small furniture, compact cupboards) and have gained important market positions in most EC countries. These imports from the State-trading countries resulted in job cuts and closures in the EC. Although their importance is not clearly shown by statistics giving values, it becomes more apparent when measured in quantities (expressed in tonnes). In 1987, the volume of FRG imports from GDR and Romania equalled those from Italy; but in terms of value, these countries achieved only one quarter of Italian exports to the

Federal Republic. However, the decisive effect on jobs is caused by the quantities imported.

External trade in furniture will continue to increase in both directions. By the second half of the 1990s at the latest, Taiwan, which is preparing to penetrate the EC market backed by Japanese money and Japanese marketing strategies, will become an important competitor. The pressure from the Eastern Bloc countries will further increase; these countries have a large supply of wood, except for luxury varieties. However, fabrication of paperboards is improving in quality; the equipment (mainly from Germany and Italy) is up-to-date as are the scientific institutes (e.g. Dresden) and training.

Small and medium-sized enterprises in Europe have difficulties in penetrating overseas markets: in vast areas such as the USA and Canada, the setting-up of a sales system requires important investments. There are no European programmes for common participation in big overseas fairs. Since, in the USA, Trademarts (a sort of permanent purchase fair for specialized trades) play a significant role, special European fairs would be required to penetrate the market.

In spite of its superior products, the EC furniture industry, which should achieve export surpluses, risks failure in the face of international competition.

### *Trends in Each Member State*

The furniture industries of the new EC Member States can rely on the fact that their present domestic markets have a significant demand potential determined by the evolution of mass purchasing power. However, in the European single market, these industries will be confronted with superior

competitors. Local economic aid might help to overcome existing structural problems and, given the good level of employee training, such aid promises some success. With the implementation of the internal market, the balance inside the EC furniture industry will shift. Italy, Denmark and Germany seem to be the best prepared, particularly in terms of their specific strengths.

## **Forecast and Outlook**

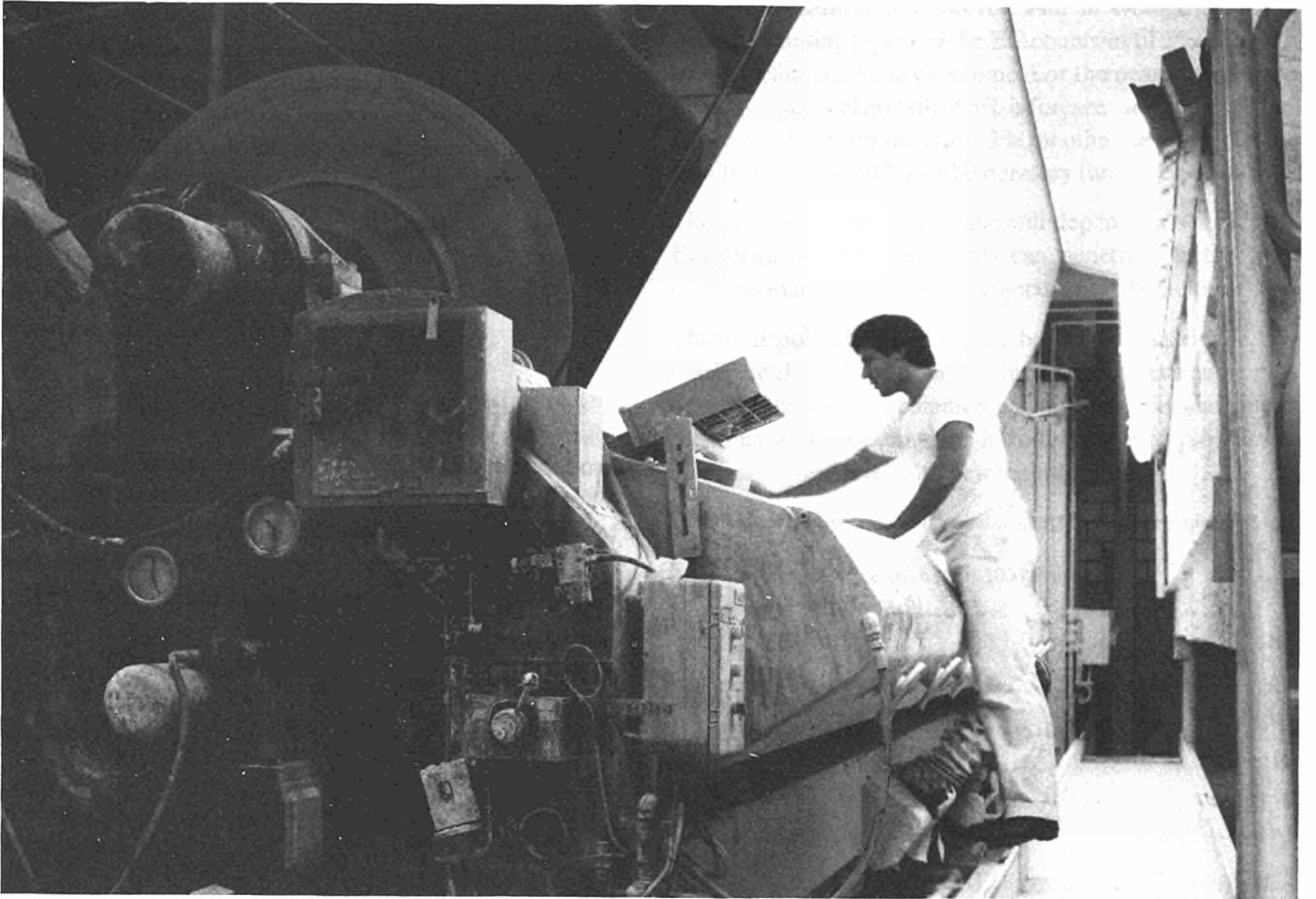
The period of very high growth rates in furniture sales in European countries has finished, since in most European countries, particularly the highly industrialized ones, the market is relatively saturated. However, with an average growth of mass purchasing power in the EC countries of 2%, the period of decline has been overcome. For the near and medium term, average real growth of 3% is foreseen for domestic furniture, 5% for office furniture, 2% for other furniture (school furniture), chairs (0%) and laboratory furniture (4%).

The evolution of external trade will depend on whether the European furniture industries can penetrate further into overseas markets. Common projects would be helpful.

The weak points in the European furniture industries lie, primarily, in the field of domestic furniture; in marketing, particularly the lack of common sales promotion and public relations; and in training, the introduction of employees - at all management levels - to new technologies.

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The pulp, paper and board industry is represented, at Community level, by two associations:

CEPAC, the European Confederation of Pulp, Paper and Board Industries, groups the manufacturers of these products which provide the input for the processing industries, i.e. those manufacturing the final products. The latter are represented by CITPA, the International Committee of Paper and Board Converters in the Common Market.

However, since many of the paper and board producers are large, integrated concerns combining manufacturing and processing, they are members of both associations, and the figures provided in the first of the following two monographs therefore frequently overlap with those in the second.

The combined turnover of the paper manufacturing and converting industries, together with that of the related printing sector (see Chapter 23), represent 4.6% of the total turnover of manufacturing industries.

## PULP, PAPER AND BOARD MANUFACTURE

(NACE 471)

*In 1987 the total value of paper and board production in the EC was 21.3 billion ECU, representing a 4.4% increase over 1986, on a record volume of 32.7 million tonnes. Market pulp output was valued at an additional 1.5 billion ECU. Generally stronger prices and healthy demand for the industry's products in 1988 indicate further increases in production, and moderate real growth in the industry. The industry's outlook is favourable through to the end of the decade.*

The EC's pulp and paper industry is a dynamic sector which has enjoyed steady growth at or slightly above the rate of increase in Community GDP. Rapid developments in publishing, information technology and food distribution have stimulated growth in the industry.

Paper and board is used for three broadly defined purposes:

- **Communications:** the press, education and culture, publicity, office and administration. These grades are called graphic papers

- **Packaging and protection:** for handling, storage, transport and presentation of products for sale. These are packaging papers and boards
- **Other functions or special applications:** hygienic and sanitary, fiduciary (money, cheques, securities); construction (wallpaper); technical (filters, insulation); cigarettes, etc.

In recent years, the industry has managed to successfully meet strong international competition, both by slowing the advance of import penetration of paper and board in internal EC markets and, in particular, by rapidly expanding its exports to non-EC countries.

### Current Situation

The combined production value of pulp, paper and board in the EC is estimated for 1987 at 22.9 billion ECU. This is slightly more than 1% of the total of all manufacturing industries and slightly less than 1% of the EC's total GDP.

### Main Indicators Pulp, Paper and Board

| (Million ECU)        | 1980   | 1981   | 1982   | 1983   | 1984   | 1985   | 1986   | 1987    | 1988   |
|----------------------|--------|--------|--------|--------|--------|--------|--------|---------|--------|
| Apparent consumption | 21 240 | 23 755 | 24 174 | 25 087 | 30 637 | 30 924 | 31 205 | 33 703  |        |
| Net export earnings  | -6 343 | -7 494 | -7 579 | -7 925 | -9 742 | -9 438 | -9 523 | -10 816 |        |
| Total EC production  | 14 897 | 16 261 | 16 595 | 17 162 | 20 894 | 21 486 | 21 682 | 22 888  | 24 989 |
| Employment (1 000)   | 225    | 212    | 204    | 193    | 186    | 179    | 179    | 176     |        |

**Table I**  
**Production, Foreign Trade and Investment - Paper and Board**

| (Million ECU)         | 1980        | 1981        | 1982        | 1983        | 1984        | 1985        | 1986        | 1987        | 1988        |             |             |
|-----------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Production            |             |             |             |             |             |             |             |             |             |             |             |
| Current value         | 14 192      | 15 350      | 15 680      | 16 190      | 19 596      | 20 184      | 20 406      | 21 346      | 23 306      |             |             |
| Index                 | 100         | 108         | 110         | 114         | 138         | 142         | 144         | 150         | 164         |             |             |
| Constant value        | 14 192      | 13 985      | 13 225      | 12 981      | 14 906      | 14 661      | 14 360      | 14 686      | 16 034      |             |             |
| Index                 | 100         | 99          | 93          | 91          | 105         | 103         | 101         | 103         | 113         |             |             |
| Imports Extra-EC      | 4 796       | 5 403       | 5 689       | 6 220       | 7 479       | 7 854       | 8 020       | 8 943       |             |             |             |
| Index                 | 100         | 113         | 119         | 130         | 156         | 164         | 167         | 186         |             |             |             |
| Exports Extra-EC      | 1 144       | 1 263       | 1 277       | 1 442       | 2 086       | 2 279       | 1 998       | 2 251       |             |             |             |
| Index                 | 100         | 110         | 112         | 126         | 182         | 199         | 175         | 197         |             |             |             |
| X/M                   | 0.24        | 0.23        | 0.22        | 0.23        | 0.28        | 0.29        | 0.25        | 0.25        |             |             |             |
| Gross investment      | 1 078       | 927         | 796         | 777         | 1 150       | 1 589       | 1 610       | 1 840       |             |             |             |
| <b>(1 000 tonnes)</b> | <b>1980</b> | <b>1981</b> | <b>1982</b> | <b>1983</b> | <b>1984</b> | <b>1985</b> | <b>1986</b> | <b>1987</b> | <b>1988</b> | <b>1989</b> | <b>1990</b> |
| Production quantities | 27 759      | 27 534      | 26 885      | 27 637      | 30 039      | 29 771      | 30 994      | 32 681      | 33 661      | 34 335      | 35 021      |
| Index                 | 100         | 99          | 97          | 100         | 108         | 107         | 112         | 118         | 121         | 124         | 126         |
| Imports Extra-EC      | 9 842       | 10 022      | 10 040      | 10 778      | 11 696      | 11 638      | 12 671      | 13 629      |             |             |             |
| Index                 | 100         | 102         | 102         | 110         | 119         | 118         | 129         | 138         |             |             |             |
| Exports Extra-EC      | 1 474       | 1 401       | 1 318       | 1 497       | 2 046       | 2 123       | 2 002       | 2 316       |             |             |             |
| Index                 | 100         | 95          | 89          | 102         | 139         | 144         | 136         | 157         |             |             |             |
| X/M                   | 0.15        | 0.14        | 0.13        | 0.14        | 0.18        | 0.18        | 0.16        | 0.17        |             |             |             |

Source: CEPAC.

The total world production of paper and board in 1987 was about 214 million tonnes.

The EC's 1987 production of 32.7 million tonnes is only about half that of the United States (65.9 million tonnes), but is 50% greater than Japan's output (21.1 million tonnes). With 15.4% of world production and 20.7% of world consumption, the EC is thus the world's second largest producer and consumer, after the USA.

Total 1987 production of woodpulp for papermaking was up 2% to 8.5 million tonnes. Included here is pulp directly integrated into paper and board production and "market pulp", i.e. pulp dried and sold to third parties.

Total international trade (excluding intra-EC trade) is estimated at about 40 million tonnes of paper and board plus another 22 million tonnes of pulp. Thus, the Community's 13.6 million tonnes of paper and board imports from third countries accounted for about 34% of world imports, while its exports of 2.3 million tonnes account for almost 6% of total world trade. Trade in market pulp resulted in a net external deficit of about 4.1 billion ECU in 1987. The balance of trade for the EC's entire pulp, paper and board sector remains even more heavily in deficit in 1987 at 10.7 billion ECU, close to half of total production value.

The EC paper industry benefits from practically no tariff protection. Almost 90% of all imports enter duty free, mainly from countries of EFTA, but also from Canada and other GATT and non-GATT countries, and from developing countries, notably Brazil.

### *The Paper and Board Sector*

Paper and board production has grown steadily since the recession of 1981-82, and is projected to continue to advance into the 1990s at an average annual rate of 2-3%.

Well over 90% of 1987 Community production of 32.7 million tonnes was sold on the internal EC markets. This internal volume of 30.4 million tonnes represents a domestic market share of 69.1% of EC consumption. The domestic market share of the EC industry has declined slightly from 72.8% at the beginning of the 1980s. This is due both to increased imports, often of grades not produced in volume within the EC, and to the fact that exports have grown at a significantly faster rate than imports during the past five years.

In 1987, internal EC trade in paper and board increased by over 11% to 7.7 million tonnes, meaning that about one out of every four tonnes produced within the Community is traded to another EC partner.

In the same year, exports outside the EC rose sharply to a new record 2.3 million tonnes, and this despite the fact that currency parities changed to the disadvantage of EC exporters in 1986-87. These exports now account for 7.1% of total production. The export ratio has grown gradually during the 1980s and should continue to advance.

Imports of paper and board from outside the Community have risen steadily and in 1987 accounted for about 31% of consumption, up from 27% in 1980. In 1987 the net external deficit in paper and board was 11.3 million tonnes, valued at 6.6 billion ECU.

**Table II**  
**Production, Foreign Trade and Investment - Market Pulp**

| (Million ECU)         | 1980        | 1981        | 1982        | 1983        | 1984        | 1985        | 1986        | 1987        | 1988        |             |             |
|-----------------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Production            |             |             |             |             |             |             |             |             |             |             |             |
| Current value         | 705         | 911         | 915         | 972         | 1 298       | 1 302       | 1 276       | 1 542       | 1 684       |             |             |
| Index                 | 100         | 129         | 130         | 138         | 184         | 185         | 181         | 219         | 239         |             |             |
| Constant value        | 705         | 830         | 772         | 779         | 987         | 946         | 898         | 1 061       | 1 158       |             |             |
| Index                 | 100         | 118         | 109         | 111         | 140         | 134         | 127         | 150         | 164         |             |             |
| Imports Extra-EC      | 2 769       | 3 466       | 3 268       | 3 266       | 4 521       | 4 055       | 3 657       | 4 333       |             |             |             |
| Index                 | 100         | 125         | 118         | 118         | 163         | 146         | 132         | 156         |             |             |             |
| Exports Extra-EC      | 78          | 112         | 101         | 119         | 172         | 192         | 156         | 209         |             |             |             |
| Index                 | 100         | 144         | 130         | 152         | 220         | 246         | 200         | 268         |             |             |             |
| X/M                   | 0.03        | 0.03        | 0.03        | 0.04        | 0.04        | 0.05        | 0.04        | 0.05        |             |             |             |
| Gross investment      | 118         | 104         | 92          | 106         | 82          | 93          | 85          | 85          |             |             |             |
| <b>(1 000 tonnes)</b> | <b>1980</b> | <b>1981</b> | <b>1982</b> | <b>1983</b> | <b>1984</b> | <b>1985</b> | <b>1986</b> | <b>1987</b> | <b>1988</b> | <b>1989</b> | <b>1990</b> |
| Production quantities | 2 190       | 2 240       | 2 241       | 2 528       | 2 535       | 2 917       | 3 124       | 3 375       | 3 476       | 3 546       | 3 617       |
| Index                 | 100         | 102         | 102         | 115         | 116         | 133         | 143         | 154         | 159         | 162         | 165         |
| Imports Extra-EC      | 7 776       | 7 522       | 6 874       | 7 366       | 7 675       | 7 701       | 8 034       | 8 460       |             |             |             |
| Index                 | 100         | 97          | 88          | 95          | 99          | 99          | 103         | 109         |             |             |             |
| Exports Extra-EC      | 237         | 275         | 250         | 336         | 323         | 472         | 379         | 447         |             |             |             |
| Index                 | 100         | 116         | 105         | 142         | 136         | 199         | 160         | 189         |             |             |             |
| X/M                   | 0.03        | 0.04        | 0.04        | 0.05        | 0.04        | 0.06        | 0.05        | 0.05        |             |             |             |

Source: CEPAC.

Imports are predominantly from the Nordic countries and North America, and are concentrated in lower value-added bulk or "commodity" grades of paper and board. This is easily confirmed by the large difference in average current value per tonne between intra-EC trade and imports; i.e. 849 ECU per tonne and 656 ECU per tonne, respectively, in 1987.

The import penetration rate is highest for kraftliner (77.2%) and newsprint (60.9%). These two "commodity" grade sectors alone account for almost 5.7 million tonnes or 41.5% of all EC imports from third countries.

Most EC exports are in high value-added grades such as coated graphic papers (a 12.8% export rate in 1987) and folding boxboard (11.4% export rate). These grades compete successfully on world markets, mainly on the basis of quality.

### *The Market Pulp Sector*

For market pulp, the EC represents by far the world's largest single market. The 8.5 million tonnes imported in 1987 was almost 39% of total world trade.

Net 1987 imports of market pulp rose 5% to 8 million tonnes. Thus total consumption of market pulp (all used to make paper and board or hygienic products) rose by 5.4% to 11.4 million tonnes, in line with paper and board production growth.

Dependence on imports of market pulp (a 74% import rate) constitutes one of the industry's principal weaknesses, as many mills are either non-integrated or only partly integrated

with pulp production. This dependence is, however, somewhat compensated by the excellent availability of wastepaper, due in large measure to the EC's high urban population, which facilitates collection.

**Table III**  
**Employment Levels**

|      | Total EC |
|------|----------|
| 1980 | 224 858  |
| 1981 | 212 142  |
| 1982 | 203 567  |
| 1983 | 192 641  |
| 1984 | 186 267  |
| 1985 | 178 968  |
| 1986 | 178 875  |
| 1987 | 175 735  |

**Table IV**  
**Hourly Labor Costs, 1987**

|             | (ECU) |
|-------------|-------|
| Belgium     | 16.95 |
| Germany     | 15.32 |
| France      | 10.10 |
| Italy       | 15.05 |
| Netherlands | 13.45 |

Source: CEPAC.

## Employment Trends

Total employment has dropped by 22% since 1980, while output has climbed almost 18%. Thus the industry's productivity per employee has risen by 50% since 1980: from 123 tonnes per year to 185 tonnes in 1987. This progress has been accomplished by high-performance equipment, operated by even more highly-qualified personnel, particularly in the areas of information technology, mechanical engineering and chemistry. This development is in line with developments in other major paper-producing countries. The data on hourly labour costs correspond well with known data for all manufacturing industries in the Community.

Today, total employment levels appear to have stabilized, as production continues to rise.

## Research & Development

The industry's record of technical innovation is particularly good in the areas of paper machine technology, paper coating, wastepaper recycling. Research and development expenditure by the paper industry itself is low compared with other industries. Much R&D work has traditionally been done by equipment and process supplier industries.

## Major Structural and Geographic Features

There were 830 companies active in the industry in 1987, operating a total of 1 032 pulp, paper or board mills.

While the number of small mills decreased by 4% to 274, the number of large mills (over 100 000 tonnes/year capacity) increased 5% to 81. These mills alone, representing only 8% of the EC's total operating units, account for an estimated 35 to 40% of total Community production.

Major differences exist between Member States, in the average size of mills and machines. For example, in 1987 the average annual capacity of paper and board mills was 68 000 tonnes in Belgium and the Netherlands; 56 000 tonnes in Ger-

many and Denmark; 45 000 tonnes in the United Kingdom; 42 000 tonnes in France; 21 000 tonnes in Italy; and less than 20 000 tonnes in Spain, Greece, Portugal.

The difference in average mill size between the EC industry and that of the Nordic countries and Canada (both much larger), may be explained by the following reasons:

- The EC's paper industry developed, historically, to supply all grades of paper and board to individual national markets, then progressively in recent years to supply the broader EC market
- In contrast, the paper industries of the Nordic countries and Canada, supported by vast forest resources, were conceived for and have concentrated on exports of mass consumption grades. Recently there has been some trend to diversification into higher value-added products, mainly destined for the EC market.

In wood resources, for example, Italy is disadvantaged, and the UK has just begun to reduce its heavy deficit.

Production of the various grades of pulp and paper is also unevenly distributed. Market pulp production is concentrated in Portugal, Spain, France and Belgium. Newsprint is made mostly in Germany and now the UK; coated graphic papers in Germany, France and Italy; kraftliner mostly in France; uncoated graphic papers in Germany, the UK, Italy and Spain, to give but a few examples.

This specialization of production is reflected as well in the structure of trade, both intra- and extra-EC.

The dependence on imports of paper and board from outside the EC varies greatly among Member States.

In exporting paper and board outside the EC, performance ranges (in % of production) from Denmark's high of 13.7%, followed by Belgium at 10.7%, the Netherlands at 9.7% and Germany at 9%, to Spain, the UK and Portugal, all under 5%.

**Table V**

### Number of Companies and Mills, EC 12

|      | Paper and board     |                 | Market pulp         |                 |
|------|---------------------|-----------------|---------------------|-----------------|
|      | Number of companies | Number of mills | Number of companies | Number of mills |
| 1980 | 961                 | 1 220           | 23                  | 29              |
| 1981 | 932                 | 1 179           | 22                  | 28              |
| 1982 | 909                 | 1 158           | 22                  | 28              |
| 1983 | 871                 | 1 098           | 23                  | 28              |
| 1984 | 848                 | 1 068           | 23                  | 29              |
| 1985 | 831                 | 1 037           | 23                  | 29              |
| 1986 | 818                 | 1 014           | 23                  | 29              |
| 1987 | 806                 | 1 003           | 24                  | 29              |

Source: CEPAC.

**Table VI**  
**Production by Member State, 1987**

| (Million ECU)      | Paper and board | Market Pulp  | Total         |
|--------------------|-----------------|--------------|---------------|
| Belgium/Luxembourg | 1 007           | 113          | 1 120         |
| Denmark            | 221             | 39           | 260           |
| Germany            | 6 273           | 74           | 6 347         |
| Greece             | 253             | -            | 253           |
| Spain              | 1 983           | 225          | 2 208         |
| France             | 3 854           | 357          | 4 211         |
| Ireland            | 19              | -            | 19            |
| Italy              | 3 537           | 107          | 3 644         |
| Netherlands        | 1 360           | -            | 1 360         |
| Portugal           | 399             | 627          | 966           |
| United Kingdom     | 2 500           | -            | 2 500         |
| <b>Total EC</b>    | <b>21 346</b>   | <b>1 542</b> | <b>22 888</b> |

Source: CEPAC.

## Raw Materials

Wood fibre, which includes both virgin fibre and wastepaper, is the dominant raw material for papermaking in the EC. It accounts for over 80% of the total raw material input for the industry's production. Thus pulp and paper manufacturing may be considered a forward integration of the forestry sector. As such it is directly influenced by forestry management and policy, both within the EC and in other major papermaking countries, which tend to either supply woodpulp as raw material to the EC or to compete with its paper and board products, or both.

Other cellulosic fibres are used to only a very small degree in the EC, generally for speciality grades such as filter papers or banknote and security papers. Pulp is made from annual plants - cotton, sugar cane bagasse, bamboo, abaca, sisal, rice and wheat straw, and reeds - but this production is concentrated in tropical countries and/or those lacking wood.

**Table VII**  
**Raw Material Input for Paper and Board Production, 1987**

|                              | (1 000 tonnes) | (%)   |
|------------------------------|----------------|-------|
| Woodfibre                    |                |       |
| as pulp                      | 16 544         | 44.2  |
| of which:                    |                |       |
| - integrated - EC production |                | 13.8  |
| - market - EC production     |                | 9.0   |
| - net imports                |                | 21.4  |
| as wastepaper                | 15 467         | 41.3  |
| Inorganic fillers            | 4 300          | 11.5  |
| Binders, other additives     | 1 100          | 2.9   |
| Total input                  | 37 411         | 100.0 |
| Total output                 | 32 681         | 87.4  |
| Ratio input/output           | 1.14           |       |

Source: CEPAC.

Inorganic filler materials (China clay, kaolin, talc, calcium carbonate) and binders (starch and latex) account for 12-15% of total raw material input tonnage.

Table VII shows the composition of raw material input for the EC in 1987. Woodpulp, both integrated and market, represent the largest single raw material with 44.2% of total input.

Total input normally exceeds total output by 12-14% in tonnage volume in the EC. This is due to normal process losses, augmented in the case of the EC industry by the high utilization of wastepaper which involves somewhat higher losses than virgin pulp.

## Wood

It takes roughly 5 steres of wood to produce one tonne of bleached chemical pulp, and about half this amount for a tonne of mechanical pulp.

The price of wood is the major cost factor in production of all pulps. The higher the degree of processing and value added, the smaller the share of the wood price in the total product cost. Thus wood cost is a major factor (30-40%) in the cost of newsprint, but much less in the case of coated graphic papers (15-20%).

The Community is largely self-sufficient (97%) in wood at the current level of pulp production, both integrated and market. However, substantial expansion of pulp capacity will be difficult without intensified silvicultural activity, both for higher utilization of existing forests and, particularly, for extension of fast-growing plantation forests in Spain and Portugal. The situation for 1986-87 is shown in Table VIII.

Some additional forest resources exist in the EC to permit further expansion of pulp production. The resources are mainly in France, Germany and the UK.

Coniferous species (spruce, pine) were traditionally the main raw materials for the industry, but in recent years deciduous or hardwood species (birch, eucalyptus) have found

**Table VIII**  
**Wood Consumption by EC Pulp Mills, 1986-87**

| (Million steres)         | Coniferous  |             | Hardwood    |             | Total        |              |
|--------------------------|-------------|-------------|-------------|-------------|--------------|--------------|
|                          | 1986        | 1987        | 1986        | 1987        | 1986         | 1987         |
| Roundwood                |             |             |             |             |              |              |
| - domestic               | 15.3        | 16.2        | 16.3        | 16.9        | 31.6         | 33.1         |
| - imports                | 0.9         | 1.0         | 0.3         | 0.6         | 1.2          | 2.2          |
| Sawmill chips, residuals |             |             |             |             |              |              |
| - domestic               | 7.7         | 8.5         | 1.0         | 1.1         | 8.7          | 9.6          |
| <b>Total</b>             | <b>24.0</b> | <b>25.7</b> | <b>17.6</b> | <b>18.6</b> | <b>41.6</b>  | <b>44.3</b>  |
| <b>% share</b>           | <b>57.7</b> | <b>58.0</b> | <b>42.3</b> | <b>42.0</b> | <b>100.0</b> | <b>100.0</b> |

Source: CEPAC.

greater application. In particular, fast-growing eucalyptus has become a preferred papermaking fibre. Its availability in Spain and Portugal, where it is grown in man-made plantations, is a major advantage for the EC industry.

Contrary to much popular belief, the pulp and paper industry does not contribute to the destruction of the forest, but rather to its healthy survival and good management. Small diameter thinnings generated in the course of forest maintenance make up the bulk of the coniferous roundwood consumed. Hardwood deliveries to the paper industry consist almost exclusively of wood unsuitable for sawmills. A significant share of the total wood received is waste from sawmills or other wood processing plants.

### **Pulp and Market Pulp**

To supply paper and board manufacture, the EC produced, in 1987, over 8.5 million tonnes of woodpulp, or 2% more than in 1986. This amount includes both pulp directly integrated into paper and board production and pulp which is dried and sold on the market, known as "market pulp".

For comparison, the United States leads the world with a total production of 52 million tonnes of woodpulp (1987), followed by Canada with 21.8 million tonnes, Sweden with 9.4 million and Japan with 9.2 million.

In the EC, integrated production of pulp (mechanical and chemical) amounted to 5.16 million tonnes (60% of the total), while EC-produced market pulp - almost all of it bleached chemical pulp - amounted to 3.37 million tonnes, 8% more than in 1986.

Total domestically produced pulp, however, accounts for only about half (52% in 1987) of the total pulp consumed for paper and board production. The rest is imported.

The Community is thus highly dependent on imports of market pulp; 74.3% of market pulp consumption and 48% of total pulp consumption was supplied from external sources in 1987. Dependence on imports has been, however, substantially reduced through the entry into the EC of Spain and, particularly, Portugal. The figures in this report have been corrected to reflect the effect of these two new EC members back to 1980. The increase in market pulp output in Portugal has helped reduce the Community's import dependence from almost 80% in 1980.

Market pulp is produced in seven Member States, but almost 90% of the total is accounted for by Portugal, Spain and France, in that order. It is in these countries where future expansion of market pulp capacity is likely to occur.

Developments in southern Europe notwithstanding, the EC will remain heavily dependent on pulp imports, with all the consequences this implies for the non-integrated mills (currency fluctuations, etc.). The main suppliers of market pulp

are Sweden, Finland, Canada, the USA, Brazil and Chile. North America and, particularly, South America have tended to become more important in recent years as Nordic producers have continued to integrate their pulp into paper and board. Announced expansion plans in Brazil and Chile indicate future increases in shipments to the EC.

All woodpulp is divided into two broad categories: mechanical and chemical.

Mechanical pulps are made by mechanically defibrating or grinding wood. Their production consumes less wood per tonne than chemical pulp, but requires large amounts of electrical energy, and hence is highly dependent on the cost of electricity. Recently, mechanical pulps have been further developed by processes involving elevated temperature and pressure, or the addition of chemicals, or both. The modern processes of pressurized groundwood (PGW), thermo-mechanical (TMP) or chemi-thermo mechanical (CTMP) pulp account for most new mechanical pulp capacity. The pulps produced have improved strength and printing characteristics. Mechanical pulps are normally integrated directly into paper and board production.

Mechanical pulps are used extensively in publication papers. In the EC, newsprint, for example, is made almost entirely with mechanical pulp and de-inked wastepaper. Uncoated and coated magazine and directory papers use high proportions of mechanical pulps. These pulps are also used in varying levels in the interior layers of folding boxboard (used for packaging), where they provide bulk and stiffness, and in certain hygienic and sanitary products.

Chemical pulp is made by treating wood in chemicals to dissolve the lignin bonding the fibres. Half the wood volume is removed in this process. This plus the very capital-intensive process system required make chemical pulps more expensive than mechanical pulps. They have, however, the advantage of superior strength properties and also can be bleached to the high brightness levels necessary for many graphic papers. Chemical pulps are produced today primarily by the sulphate or "kraft" process. Process technology dictates extremely large units to achieve economies of scale and competitive cost. The economic size of a sulphate pulp mill today is 300 000 to 400 000 tonnes/year, with a capital cost of between 350 and 450 million ECU.

Of the total pulp consumed in the EC, by far the most important grade is bleached sulphate pulp, accounting for 57% or 9.5 million tonnes in 1987. The share of bleached sulphate pulps (comprising both bleached softwood and bleached hardwood sulphate pulps) has increased during the 1980s and will probably continue to do so, though at a modest rate.

The other major grade of bleached chemical pulp is bleached sulphite, mostly made from coniferous trees. Although EC production has increased slightly during the

1980s, imports have decreased and total consumption of bleached sulphite pulp has stagnated; thus its share of consumption has declined.

Mechanical pulps (all sub-grades combined) accounted for 23% or 3.8 million tonnes of total pulp consumption in 1987. Production of mechanical pulps, particularly the newer types TMP and CTMP, is expected to grow at 2.3% per year. The share of mechanical pulps in total pulp consumption is expected to increase slightly during the coming years. This development is encouraged by the lower capital investment per unit of production required, and the smaller scale of economic installations (60 000-80 000 tonnes), but high electrical energy consumption is a disadvantage.

The pulp market is international and highly cyclical, with cycles of three to five years corresponding roughly to the investment cycle (the time required for producers to react, plan and start new capacity). For these reasons, the EC consumers of market pulp are subject to great fluctuations in price and sometimes in supply.

**Table IX**  
**Consumption of Main Pulp Grades, 1987**

|                        | Tonnage<br>(1 000 tonnes) | EC<br>production<br>(%) | Share of<br>total pulp<br>consumption<br>(%) |
|------------------------|---------------------------|-------------------------|--|
| Mechanical pulp        | 3 803                     | 86.5                    | 23.0   |
| Bleached sulphite pulp | 1 607                     | 62.3                    | 9.7  |
| Bleached sulphate pulp | 9 462                     | 26.0                    | 57.2   |
| <b>Total 3 grades</b>  | <b>14 872</b>             |                         | <b>89.9</b>                                  |

Source: CEPAC.

### Wastepaper

Wastepaper is the EC's most important domestic raw material for papermaking, and the EC is virtually 100% self-sufficient in wastepaper.

Apparent consumption rose by 6.7% in 1987 to about 15.4 million tonnes. Wastepaper accounts for over 41% of all papermaking raw materials and over 48% of all fibrous raw materials used in papermaking.

EC collections, at 15.3 million tonnes, represent a recovery rate of 34.8% measured against total EC consumption. More than one of every three tonnes of paper and board consumed in the EC is recycled - an impressive level and one of the highest in the world. The true rate is closer to 40%, as at least 15% of all paper and board is unrecoverable (hygienic papers, books, archive documents, paper and board mixed with household refuse, etc.).

Wastepaper is traded in four main categories:

- ordinary grades: mixed paper and board, mixed newspapers and magazines, unsold or sold
- improved grades: newspapers, once-read or unsold, magazines, books, bleached paperboard, white-top carton trimmings
- superior grades: white office waste (from shredders), printers' trimmings
- corrugating waste: corrugated boxes, containing mostly unbleached kraft pulp.

Wastepaper use is concentrated in four sectors of paper and board production.

**Table X**  
**Main Uses of Wastepaper**

| Grade sector                           | Share in total<br>fibre input (%) |
|--|-----------------------------------|
| Casemaking materials (testliner, etc.) | to 100                            |
| Greyboard                              | to 100                            |
| Newsprint                              | 20-100                            |
| Hygienic and sanitary                  | 20-100                            |

Source: CEPAC.

Wastepaper usage is obviously saturated in certain grades and is at a technical limit in others. There is potential, however, to extend utilization somewhat with more intensive treatment. The incentive to do this depends to a large extent on the price of pulp. The best prospects for using more wastepaper lie in greater substitution of waste-based casemaking materials for kraftliner and semi-chemical fluting. However, progress in the use of de-inked wastepaper in higher quality printing papers and tissues is likely to continue.

High quality grades of wastepaper are today fully utilized and few unused resources remain. There is potential for recovering substantial quantities of newspapers and magazines - mainly from households, where segregation at source is required - and lower grades from some other sources.

### Other Raw Materials

In addition to cellulose fibre, inorganic fillers and both natural and synthetic binders are used extensively in paper and board production. Together they account for 13-16% of total raw material output.

Inorganic fillers or pigments have two main functions: they improve the printing characteristics of the paper surface; and they reduce cost as they are less costly than fibre. Fillers may be added to the paper sheet internally - as is done with most writing papers, newsprint, uncoated magazine and directory papers - or the minerals can be applied externally as a coating in combination with natural and synthetic binders.

The consumption of all fillers is increasing at a faster rate than overall paper and board consumption. This is due mainly to the strong demand for coated publication papers. This trend is expected to continue for the next several years. Current consumption of fillers and pigments is estimated at 4.3-4.5 million tonnes. Over 65% of this is China clay from England. Calcium carbonate is also mainly from domestic sources. Increasing quantities of kaolin are being imported from the USA and Brazil.

Overall, EC self-sufficiency is estimated at between 80 and 85%. This will decline somewhat in future, as increased consumption will be met to a higher degree from imports.

The binders used mainly in the pigment coating of paper and board grades are starch and latex. The consumption of both is also expected to increase in line with that of coating pigments.

### *Main Grades of Paper and Board*

In this study eight major grade sectors are identified. They were selected as the most significant sectors in terms of both current volume and future growth. Each sector is comprised of at least several grades (in the case of newsprint and kraftliner) or dozens (coated and uncoated graphic papers).

Variation among individual grades can involve any one of many factors or a combination of several of them. Key factors of differentiation among individual grades are:

- basis weight or substance
- fibre composition (various pulps or wastepaper)
- surface treatment (coating)
- physical properties (stiffness, strength)
- optical properties (brightness, opacity, gloss).

The combined volume of the eight grade sectors selected accounts for 88% of total EC production and 87% of consumption.

Among the grade sectors not covered here are:

- semi-chemical fluting (used for corrugated board)
- sack paper
- other kraft packaging papers
- sulphite papers
- greaseproof, crystal, parchmented papers
- speciality and industrial papers.

### **Newsprint**

Newsprint is used mainly for printing newspapers. Made largely from mechanical pulp and/or wastepaper, sometimes

with small amounts of inorganic fillers, newsprint may be slightly calendered for improved gloss, white or slightly coloured. It is used for letterpress, offset and flexographic printing. It is sold mainly in reels. Standard base weights are now 40, 45, 48.8 and 52 g/m<sup>2</sup>.

Newsprint consumption - strongly affected by advertising expenditure - has recovered from the 1981-82 recession and grown at about 5%/year since 1984. The spread of offset and flexo-printing and the resulting increased use of colour in newspapers has encouraged higher advertising and hence higher consumption.

Production volume in the EC has grown even faster. After a sharp decline in the early 1980s, due mainly to the closure of several old mills in the UK, production has rebounded at 8%/year since 1984. Several entirely new mills have been built in the EC during the 1980s, and at least two more are planned. UK production has recovered from only 84 000 tonnes in 1982 to 500 000 tonnes today and should reach 800 000 by 1990. There are very few producers in this sector and the average unit size is fairly high.

With consumption growth expected to be modest, domestic market share should increase from about 39% in 1987 to around 42% by 1990. The export rate may increase as well. Imports are mainly from Sweden, Norway, Finland and Canada.

### **Coated Graphic Papers**

This is the fastest growing grade sector in the EC. Both production and consumption have soared at a compound rate over 8%/year since 1982; growth at close to 6%/year is expected to 1990.

This sector includes coated mechanical printing papers and coated woodfree papers. The former contain a blend of mechanical and chemical pulps and are used for printing catalogues, magazines and advertising material in gravure or offset. They contain fillers, are pigment-coated on both sides, and may be glossy or matte. Below 72 g/m<sup>2</sup> base weight, these papers are called LWC for "light-weight coated". The base weight includes that of the pigment coating.

Coated woodfree papers contain little or no mechanical pulps, are generally heavier weight than the coated mechanical pulps and are used for high-quality printed products, annual reports, etc.

External trade has grown much faster than production, and despite the sharp growth in output net imports have doubled since 1980 to almost 400 000 tonnes. Main supplier countries for these grades are Finland, Sweden and Austria. Though the import penetration rate has risen to 18%, it is still modest and EC producers are expected to maintain their domestic market share while, at the same time, increasing exports, which have risen almost threefold in the 1980s.

A typical new machine for these grades will have a capacity of around 200 000 tonnes/year. Thus this sector also favours concentration into large, internationally competitive units.

The expected sharp increase in new capacity may lead to temporary overcapacity in this sector, even assuming efforts at raising exports are successful.

### **Uncoated Graphic Papers**

This grade sector includes both mechanical and woodfree grades. The mechanical grades contain more than 10% of mechanical or thermo-mechanical pulp. Also known as groundwood or wood-containing paper, this grade includes directory papers and heavily filled supercalendered (SC) magazine papers. It is sold mostly in reels and is printed both rotogravure and offset.

Uncoated woodfree papers contain less than 10% mechanical pulp (the rest being chemical pulps) and may contain varying amounts of mineral fillers. This grade includes copier paper, most office papers such as computer forms, and book papers. It is sold in sheets and reels.

Performance is quite different between the mechanical and woodfree grades. For the mechanical grades, production growth has been very modest in the EC and is expected to continue at these levels (under 1%/year). Consumption growth has been supplied largely by imports from Finland and Austria, and even this has been small.

The woodfree sector is by far the larger of the two, however, and has seen growth in the 3-4%/year range. These grades are subject to increasing import pressure, mainly from Nordic countries which benefit from integration to chemical pulp, and also from Brazil.

The woodfree sector is characterized by a relatively large number of smaller producers, though a few large producers account for the majority of total output.

### **Kraftliner**

Kraftliner is used for the outer lining of corrugated board, which is made into boxes. Kraftliner is made largely from unbleached kraft pulp, though it may contain up to 20-30% wastepaper (corrugating waste normally). Kraftliner is also made with a top layer of bleached pulp (called "whiteline") for better printing and appearance. It is an internationally traded commodity with relatively low value-added, sold in reels in base weights ranging from 125 g/m<sup>2</sup> to over 200 g/m<sup>2</sup>.

EC production of kraftliner (630 000 tonnes in 1987) has not progressed since 1980. It is limited to very few mills in France, Portugal and Spain, with a small amount made in Italy. Consumption, which has increased slightly, is mainly supplied by imports from the USA, Sweden and Finland. The import

penetration rate (78%) is the highest for any grade, though it is relatively stable.

Production and consumption growth of kraftliner are expected to be modest. There is little potential for expansion within the EC, as both the large size of production units, the necessity for direct integration to kraft pulp and the low value-added argue against this product. Whiteline, however, is growing rapidly, replacing substantial amounts of regular kraftliner.

Kraftliner competes with the higher grades of testliner, which is produced in large quantities in the EC.

### **Casemaking Materials Based on Wastepaper**

This sector includes testliner (used for the outer lining of corrugated board) and "Wellenstoff" or waste-based fluting (used for the interior of the corrugated board). These grades are made in a wide range of qualities, using various grades of wastepaper. Testliner is the main substitute for imported kraftliner.

In terms of production volume, this is the largest sector in the EC industry, with a 1987 output of 6.7 million tonnes.

The EC is self-sufficient (97%) in this sector. Production and consumption have grown by slightly over 3%/year since 1980, and growth is expected to be slightly slower in the future.

All EC Member States produce these grades, with production distributed fairly evenly. There are a large number of small producers in this sector.

### **Folding Boxboard**

These are paperboards having good folding properties and stiffness, used for making folding cartons for consumer products. These are made from both virgin pulp and wastepaper and combinations of these. They are often pigment-coated for printability. These grades are sold in sheets and reels, in a wide range of base weights.

Import penetration has increased fairly rapidly in the sector during the 1980s. Most of the imports are of folding boxboard made with virgin pulp, mainly from Sweden, Finland and the USA. Among the grades with strong growth, and for which imports have increased strongly, is liquid packaging board used to make carton packs for milk, juices and other drinks. Virtually all the consumption of liquid packaging board is supplied by non-EC producers.

EC production is concentrated in those grades using at least some wastepaper.

EC production growth has been very modest (1.5%/year) during the 1980s. There is potential for increased capacity, integrated with chemical and mechanical pulps, in France, Portugal and Spain.

## Greyboards and Other Boards

Greyboard, as the name implies, is grey in colour, made generally from lower grades of wastepaper. This and similar products are used for shipping cases, shoe boxes, automotive panels, gypsum liner (on which gypsum is cast to make wall panels for housing construction). These boards are generally not coated, and are sold in sheets and reels in a wide range of base weights, mostly above 200 g/m<sup>2</sup>.

This sector, too, has seen only modest production and consumption growth (1.5%/year) and little change is expected.

The EC industry's domestic market share is high (87%) and stable.

## Hygienic and Sanitary

These papers for sanitary or household uses may be made from virgin fibre, generally bleached, and with varying amounts of secondary fibre ranging up to 100%. They are produced in weights from 15 g/m<sup>2</sup> upwards, in white and a variety of colours. Main products are toilet paper, kitchen towelling, handkerchiefs, napkins and industrial wipes.

This has been one of the most dynamic sectors of the EC industry during the 1980s. Production growth has been about 5%/year, reaching 2.3 million tonnes in 1987, with consumption growing at almost the same rate.

Virtually all production is converted at the mills directly into the consumer products.

Further growth is expected, though at slightly lower rates, into the 1990s. Substantial new capacity is being installed in France, Belgium, Italy and Spain. Consumption growth is expected to be stronger in southern EC countries.

The industry is dominated by a handful of very large producers, several of them owned by Nordic or American companies.

The EC is largely self-sufficient (91%) in these grades, and the import penetration rate has declined in recent years. Because they are bulky, these hygienic papers are not easily transported long distances. Imports are mainly from Austria, Sweden and Finland.

## Outlook

Paper and board production is projected to continue to advance into the 1990s at an average annual rate of around 2-3%.

Performance through the first quarter of 1988 shows the development of this trend; 1988 consumption is expected to grow at least another 3% to about 45.4 million tonnes, with production projected to reach 33.7 million tonnes.

**Table XI**  
**Forecast by Subsector**

| (1 000 tonnes)                                  | 1980         | 1987         | 1990         |
|---|--------------|--------------|--------------|
| <b>Newsprint</b>                                |              |              |              |
| Apparent consumption                            | 4 896        | 5 724        | 6 021        |
| Net export earnings                             | -3 009       | -3 417       | -3 595       |
| <b>Total EC production</b>                      | <b>1 887</b> | <b>2 307</b> | <b>2 426</b> |
| <b>Coated graphic papers</b>                    |              |              |              |
| Apparent consumption                            | 3 756        | 5 849        | 6 888        |
| Net export earnings                             | -191         | -397         | -468         |
| <b>Total EC production</b>                      | <b>3 565</b> | <b>5 452</b> | <b>6 420</b> |
| <b>Uncoated graphic papers</b>                  |              |              |              |
| Apparent consumption                            | 6 207        | 7 808        | 8 532        |
| Net export earnings                             | -949         | -1 883       | -2 057       |
| <b>Total EC production</b>                      | <b>5 258</b> | <b>5 925</b> | <b>6 475</b> |
| <b>Kraftliner</b>                               |              |              |              |
| Apparent consumption                            | 2 523        | 2 774        | 2 909        |
| Net export earnings                             | -1 902       | -2 143       | -2 247       |
| <b>Total EC production</b>                      | <b>621</b>   | <b>631</b>   | <b>662</b>   |
| <b>Casemaking materials based on wastepaper</b> |              |              |              |
| Apparent consumption                            | 5 429        | 6 809        | 7 225        |
| Net export earnings                             | -46          | -109         | -115         |
| <b>Total EC production</b>                      | <b>5 383</b> | <b>6 700</b> | <b>7 110</b> |
| <b>Folding boxboard</b>                         |              |              |              |
| Apparent consumption                            | 3 126        | 3 978        | 4 222        |
| Net export earnings                             | -658         | -1 225       | -1 301       |
| <b>Total EC production</b>                      | <b>2 468</b> | <b>2 753</b> | <b>2 921</b> |
| <b>Greyboards and other boards</b>              |              |              |              |
| Apparent consumption                            | 2 563        | 2 920        | 3 008        |
| Net export earnings                             | -162         | -212         | -218         |
| <b>Total EC production</b>                      | <b>2 401</b> | <b>2 708</b> | <b>2 790</b> |
| <b>Hygienic and sanitary</b>                    |              |              |              |
| Apparent consumption                            | 1 772        | 2 420        | 2 644        |
| Net export earnings                             | -147         | -140         | -144         |
| <b>Total EC production</b>                      | <b>1 625</b> | <b>2 280</b> | <b>2 500</b> |

Source: CEPAC.

The pace of recent investments in new papermaking facilities has accelerated throughout the Community, but particularly in the Federal Republic of Germany, the Netherlands, Belgium and the United Kingdom, confirming the industry's growth potential. Projects scheduled for completion through 1990 (most of them integrated into pulp production) involve more new capacity than those completed during the previous three years. Newsprint, graphic papers and hygienic and sanitary papers account for the majority of new investment.

The UK industry, which suffered a long-term decline into the 1980s, has now restructured and is enjoying one of the fastest growth rates.

These investments will continue to mean an increase in the average unit size and productivity of paper mills. Both have been rising steadily during the 1980s, as witnessed by the steady decline in number of operating mills coupled with growing production. This is also seen in the sharp increase in average unit capacities of the paper and board machines. The gap in productivity and unit size between the EC and Nordic and North American mills is rapidly closing for key grades. In certain key grade sectors, such as coated graphic papers, the EC's productivity and average mill size is on a par with international competitors.

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# PAPER AND BOARD CONVERTING

(NACE 472)

*The paper and board converting industry had a 1986 turnover in excess of 28 billion ECU. This level will probably be maintained, roughly corresponding to GNP growth. The sector has a large number of small and medium-sized companies. The majority of its products are sold on Community markets. Major growth areas are household and sanitary paper, followed by packaging materials for fluids and other foodstuffs.*

Together with paper and board manufacture and the printing industry, the paper and board converting industry makes up the paper industry. The sector relies heavily on the paper and board manufacturing industry for its raw materials, obtaining approximately 45% of its most important raw materials from within the Community and thereby using up a large proportion of the EC's paper and board production which, according to statistics of the paper and board manufacturers, exceeded 33 million tonnes in 1988.

## Current Situation

The paper and board converting industry in the European Communities employs approximately 380 000 people in about 5 000 companies, and in recent years reached an average turnover of more than ECU 28 billion.

This is an industry mainly consisting of small and medium-sized companies, with quite marked variations in the different Member States, as shown in Table I.

The economic backbone of the paper and board processing industry is the medium-sized operations, which account for about half of the total number of employees and which are responsible for about half of the industry's turnover.

Total employment in the sector is shown in Table III.

The spectrum of the paper and board processing industry's products is wide and heterogeneous. Table IV gives an indication of the most important product groups.

Further products of the paper and board processing industry are, among others: labels; paper bags; carrier bags; albums for samples or collections; calendars (diaries); tubes for winding flat materials or thread; cans made of paper and board and of composite materials; book-binding products; technical rolls such as cash register, bookkeeping and telex and telefax rolls; cigarette paper (cut); greeting cards; heliographic paper, etc. The largest proportion, both in quantity and in value, is represented by packaging materials of different kinds. The wide range of products offered, and sophisticated consumer demands regarding quality, safety and economic efficiency, require well-developed packaging.

With a share of 40%, paper, pulp and board packaging materials occupy a prominent place among all packaging goods. They meet consumer requirements well and at low cost, are no burden on the environment and are easy to recycle. In the last decades, folding cartons, corrugated board and corrugated board packaging products have experienced a particular boom whilst the remaining groups of paper and board packaging products have developed to a less significant degree.

With regards to demand, the market for paper and board products can be broken down into four important groups:

- paper and board packaging materials, where corrugated board and corrugated board products, folding cartons and transport cartons are major items, especially transport cartons of corrugated and full board and folding cartons for consumer goods such as foodstuffs, luxury foods, etc.
- stationery and office supplies as well as pocket or desk diaries, change-date calendars, envelopes, writing paper, index cards

**Main Indicators  
Paper and Board Conversion**

| (Million ECU)            | 1980     | 1981     | 1982     | 1983     | 1984     | 1985     | 1986     |
|--------------------------|----------|----------|----------|----------|----------|----------|----------|
| Apparent consumption (1) | 18 857.8 | 20 388.7 | 21 762.5 | 22 695.6 | 24 908.8 | 26 527.4 | 27 650.3 |
| Net export earnings (2)  | 220.1    | 210.7    | 352.3    | 504.7    | 598.4    | 732.4    | 582.4    |
| Total EC production (3)  | 20 790.2 | 22 096.6 | 23 566.8 | 24 646.4 | 27 007.2 | 28 759.8 | 28 232.7 |
| Employment (1 000) (4)   | 400 755  | 377 879  | 385 094  | 356 630  | 348 559  | 343 313  | 337 075  |

(1) 1980: EC 9, excluding Spain, Portugal and Greece; 1981-85: EC 10, excluding Spain and Portugal; 1986: EC 11, excluding Portugal.

(2) 1980: EC 9, excluding Spain, Portugal and Greece; 1981-85: EC 10, excluding Spain and Portugal; 1986: EC 12.

(3) 1980: EC 12; 1981-86: EC 11, excluding Portugal; 1984-85: Spain estimated - Eurostrategies; 1986: Spain, Netherlands, Greece estimated - Eurostrategies.

(4) EC 10: Excluding Spain and Portugal.

**Table I**  
Distribution of Employment by Size of Company,  
1981

| (%)     | 20-99<br>employees | 100-499<br>employees | Over 500<br>employees |
|---------|--------------------|----------------------|-----------------------|
| Denmark | 29.6               | 40.9                 | 29.5                  |
| Germany | 20.6               | 43.3                 | 36.1                  |
| France  | 25.6               | 49.6                 | 24.8                  |
| Italy   | 42.7               | 45.1                 | 12.2                  |
| UK      | 19.5               | 44.9                 | 35.6                  |

Source: Eurostat.

- sanitary paper products where both public and trade demand play a part; particular developments have been brought about by a steady increase in hygiene-consciousness among the general public
- wallpaper and other paper goods for interior decoration, where a sharp decline corresponds with the economic situation in the building industry.

### Industry Structure

The paper and board converting industry of the Community is made up of small and medium-sized companies. This indicates that product-oriented and regional differences in the markets for paper and board products are very pronounced. The flexibility of the smaller and medium-sized businesses enables them quickly to adapt to changes in the market. Closeness to the market, i.e. to the customer, is essential since it is uneconomical to transport paper and board products over long distances. Factories are mainly found close to the food processing industry, the capital-goods industry such as mechanical engineering, the chemical industry, the electrical engineering and electronics industry and the services sector.

**Table II**  
Distribution of Turnover by Size of Company,  
1981

| (%)     | 20-99<br>employees | 100-499<br>employees | Over 500<br>employees |
|---------|--------------------|----------------------|-----------------------|
| Denmark | 26.9               | N/A                  | N/A                   |
| Germany | 16.4               | 43.2                 | 40.4                  |
| France  | 23.0               | 50.0                 | 27.0                  |
| Italy   | 39.8               | 43.2                 | 17.0                  |
| UK      | 17.5               | 44.7                 | 37.8                  |

Source: SAEG.

### Investment Trends

In wide areas of the sector, traditional production processes are used which are, as a rule, inexpensive and have a low degree of automation. However, some sectors are more capital-intensive and more highly automated, e.g. the corrugated board and the sanitary paper goods sectors. Annual fixed investment in the paper and board converting industry is shown in Table VI.

Compared with other processing industries, the paper and board converting industry has seen above-average investment since 1980.

Investment has not taken place at the same time in all Member States. Investments were made with caution in the period 1977-80, after which they increased sharply. In 1984, investment amounted to as much as 5.5% of turnover. However, both the expansionary surge and euphoric expectations for growth are over, and investment is now expected to run along more moderate lines. In future, most investment will be directed towards rationalization and the maintenance of competitiveness. The replacement of existing plant will automatically lead to an expansion in capacity. Excess capacity

**Table III**  
Employment, 1980-86

|                    | 1980           | 1981           | 1982           | 1983           | 1984           | 1985           | 1986           |
|--------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| BLEU               | 10 536         | 9 808          | 9 454          | 9 168          | 9 159          | 8 956          | 8 835          |
| Denmark            | 5 183          | 5 143          | 5 984          | 6 049          | 6 371          | 6 992          | 6 832          |
| Germany            | 112 244        | 110 669        | 103 197        | 102 578        | 100 615        | 101 341        | 101 556        |
| Greece             | 4 386          | 4 893          | 4 766          | 6 307          | 6 388          | 4 662          | (1) 4 669      |
| France             | 73 467         | 69 922         | 69 629         | 67 006         | 65 595         | 64 335         | 63 189         |
| Ireland            | 4 821          | 4 408          | 3 745          | 3 446          | 3 217          | 3 056          | 3 148          |
| Italy              | 29 898         | 28 707         | 33 802         | 31 960         | 30 038         | 28 325         | 26 980         |
| Netherlands        | 14 916         | 13 923         | 13 137         | 12 767         | 12 707         | 12 900         | (1) 11 800     |
| United Kingdom     | 145 304        | 130 406        | 121 380        | 117 349        | 114 469        | 112 746        | 113 135        |
| <b>Total EC 10</b> | <b>400 755</b> | <b>377 879</b> | <b>365 094</b> | <b>356 630</b> | <b>348 559</b> | <b>343 313</b> | <b>337 075</b> |

(1) Estimated.

Sources: Eurostat, CITPA.

**Table IV**  
**NACE Groups and Subgroups of Paper and Board**  
**Converting/ Processing Industries**

|        |   |
|--------|---|
| 472    | Processing of Paper and Board   |
| 472.1  | Manufacture of paper products for use in interior decoration  |
| 472.11 | Manufacture of wallpaper  |
| 472.12 | Manufacture of other paper goods for interior decoration  |
| 472.2  | Manufacture of household and sanitary goods, toilet requisites and underwear of paper, board or pulp  |
| 472.3  | Manufacture of writing materials and of articles of paper or paperboard commonly used in offices, schools and the like (stationery and office supplies) |
| 472.4  | Manufacture of packaging products, including packaging  |
| 472.41 | Manufacture of large capacity paper sacks and other large paper bags  |
| 472.42 | Manufacture of corrugated paper and board and of articles thereof   |
| 472.43 | Manufacture of paper and board packaging products   |
| 472.44 | Manufacture of other packaging products   |
| 472.5  | Manufacture of bitumen-sized paper and paperboard for building industry   |
| 472.6  | Manufacture of impregnated, waxed, composite, adhesive and similar paper  |
| 472.7  | Manufacture of coated (other than machine-coated/and fancy paper) paper   |
| 472.8  | Manufacture of other articles of paper and board  |

Source: NACE.

and imports from low-wage Member States may adversely affect production activities in certain sectors. Other factors affecting future investment are the reduction of working hours and rising wages in some Member States. To offset these reductions, rationalization is taking place or has been implemented aimed at producing more economically and at the same time improving the quality of goods produced.

### *Research and Development*

Except for a few subsectors, R&D expenditure in the paper and board converting industry is relatively low and amounts to around 1% of turnover. Major efforts are being made in design and engineering, job planning, rationalization and in finding methods rapidly, cheaply and hygienically to package goods. Some R&D projects are carried out jointly with the manufacturers of paper and board converting machinery and with the packaging industry.

Harmonization of standards for processed products, machinery or types of paper and board is gaining in importance, since the customer increasingly refers to uniform, comprehensive testing procedures for paper and board product quality. However, small and medium-sized companies will be at a definite disadvantage in observing standardization norms or participating in standardization panels.

### *Trade Trends*

Until the early 1970s, paper and board products were not considered easily tradeable goods. Due to their unfavourable weight/volume ratio, it is virtually impossible economically to transport packaging materials over long distances. For corrugated board, a distance of between 250 and 500 km is considered an upper limit. Government and other protectionist influences play an important part, especially in the packaging sector, as do trade and customs regulations.

Small and medium-sized companies are often unable thoroughly to familiarize themselves with the various regulations of a potential third country customer. Intra-EC trade has therefore gained in importance in the past decade because of the absence of major trade barriers. Between 65 and 70%

**Table V**  
**Production by Member State**

| (Million ECU)      | 1980          | 1981          | 1982          | 1983          | 1984          | 1985          | 1986          |
|--------------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| BLEU               | 666           | 660           | 697           | 760           | 831           | 907           | 932           |
| Denmark            | 286           | 335           | 425           | 483           | 532           | 604           | 614           |
| Germany            | 5 500         | 5 825         | 6 149         | 6 704         | 7 514         | 8 002         | 8 342         |
| Greece (1)         | 199           | 314           | 250           | 247           | 264           | 266           | 270           |
| Spain (2)          | 1 513         | 1 497         | 1 452         | 1 446         | 1 500         | 1 520         | 1 600         |
| France             | 4 024         | 4 287         | 4 607         | 4 622         | 4 970         | 5 318         | 5 215         |
| Ireland            | 200           | 217           | 202           | 216           | 250           | 270           | 264           |
| Italy              | 1 857         | 1 793         | 2 289         | 2 477         | 2 740         | 2 854         | 2 880         |
| Netherlands (3)    | 1 011         | 1 153         | 1 240         | 1 308         | 1 430         | 1 516         | 1 610         |
| United Kingdom     | 5 535         | 6 016         | 6 257         | 6 383         | 6 976         | 7 523         | 6 665         |
| <b>Total EC 11</b> | <b>20 791</b> | <b>22 097</b> | <b>23 568</b> | <b>24 646</b> | <b>27 007</b> | <b>28 780</b> | <b>28 392</b> |

(1) 1986 estimated.

(2) 1984-86 estimated.

(3) 1986 estimated.

Sources: Eurostat, CITPA.

**Table VI**  
**Annual Fixed Investment, 1977-85 (1)**

| (Million ECU)  | 1977  | 1978  | 1979  | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  |
|----------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| BLEU           | 22.5  | 24.0  | 28.6  | 30.8  | 23.9  | 30.5  | 37.6  | 45.3  | 49.5  |
| Denmark        | 15.4  | 25.4  | 20.0  | 14.4  | 15.9  | 23.2  | 21.4  | 39.0  | 40.9  |
| Germany        | 216.7 | 232.7 | 271.0 | 306.6 | 351.4 | 288.1 | 348.5 | 318.5 | 375.7 |
| Greece         | N/A   | N/A   | N/A   | 6.5   | N/A   | N/A   | 16.5  | N/A   | N/A   |
| France         | 106.0 | 111.0 | 133.9 | 140.7 | 134.7 | 154.5 | 158.8 | 141.5 | 210.1 |
| Ireland        | N/A   | N/A   | N/A   | 8.1   | 6.9   | 6.4   | 5.7   | 8.1   | N/A   |
| Italy          | 69.2  | 58.1  | 62.3  | 92.7  | 92.7  | 114.3 | 93.8  | 165.3 | N/A   |
| Netherlands    | 44.8  | 37.8  | 48.7  | 58.8  | 52.4  | 54.0  | N/A   | N/A   | N/A   |
| United Kingdom | 142.8 | 184.2 | 240.3 | 275.2 | 259.6 | 268.6 | 268.5 | 364.6 | 357.5 |

(1) Machines, vehicles, plant and office construction.  
Sources: Eurostat, CITPA.

of the industry's foreign trade movements are intra-EC, and approximately 20% are with EFTA countries. Worldwide foreign trade volume, of which the EC now accounts for around 40%, has increased almost sixfold over the past decade.

### *Regulatory Trends*

The paper and board converting industry requires relatively few measures for the protection of the environment since it emits hardly any polluting substances. Investments are mainly directed towards purifying air emissions in coating and varnishing installations and reducing machine noise.

### *Labour Costs*

In contrast to the capital-intensive paper and board manufacturing industry, competitiveness in the paper and board converting industry is strongly influenced by labour produc-

tivity. However, there are considerable differences between Member States and from one company to another. Hourly labour costs are shown in Table VIII.

Between 1980 and 1983, total labour costs rose by 19.6% in Germany, 12.6% in France, 47.2% in Italy, 18.5% in the Netherlands, 12.3% in the UK, 6.6% in Ireland, and 51.3% in Denmark, whilst they fell by 6.2% in Belgium/Luxembourg because of plant closures and other factors.

### *Developments by Sector*

Corrugated board packaging materials are successfully used as sound and sturdy receptacles for transport and mailing purposes and have in many cases replaced the wooden boxes previously used for heavy goods. They have to a large extent benefited from growing trade in goods. Printed corrugated board boxes are also gaining in popularity as shop and sales packaging.

**Table VII**  
**Production and Foreign Trade**

| (Million ECU)        | 1980     | 1981     | 1982     | 1983     | 1984     | 1985     | 1986     |
|----------------------|----------|----------|----------|----------|----------|----------|----------|
| Production           |          |          |          |          |          |          |          |
| Current value (1)    | 20 790.2 | 22 096.6 | 23 566.8 | 24 646.4 | 27 007.2 | 28 759.8 | 28 232.7 |
| Index                | 100.0    | 106.3    | 113.4    | 118.5    | 129.9    | 138.8    | 135.8    |
| Constant value (2)   | 20 790.2 | 19 726.9 | 19 404.9 | 19 437.8 | 19 039.2 | 19 389.3 | 17 681.4 |
| Index                | 100.0    | 94.9     | 93.4     | 93.5     | 91.6     | 93.3     | 85.1     |
| Imports Extra-EC (3) | 902.0    | 1 042.3  | 1 076.2  | 1 172.7  | 1 424.8  | 1 552.0  | 1 563.8  |
| Index                | 100.0    | 115.6    | 119.3    | 130.0    | 158.0    | 172.1    | 173.4    |
| Exports Extra-EC (3) | 1 121.2  | 1 253.0  | 1 428.5  | 1 677.4  | 2 023.2  | 2 284.4  | 2 146.2  |
| Index                | 100.0    | 111.7    | 127.3    | 149.5    | 180.3    | 203.6    | 191.3    |
| X/M (3)              | 1.24     | 1.20     | 1.33     | 1.43     | 1.42     | 1.47     | 1.37     |

(1) 1980: EC 12; 1981-86: EC 11, excluding Portugal; 1984-85: Spain estimated - Eurostrategies; 1986: Spain, Netherlands, Greece estimated - Eurostrategies.

(2) 1980: EC 12; 1981-83: EC 11, excluding Portugal; 1984-1985: EC 10, excluding Spain and Portugal; 1986: EC 8, excluding Spain, Portugal, Greece and the Netherlands.

(3) 1980: EC 9, excluding Greece, Spain and Portugal; 1981-85: EC 10, excluding Spain and Portugal; 1986: EC 12.  
Source: Eurostat.

**Table VIII**  
**Hourly Labour Costs, 1984**

|                | (ECU) |
|----------------|-------|
| Belgium        | 12.2  |
| Denmark        | 12.0  |
| Germany        | 11.9  |
| Greece         | 4.1   |
| France         | 11.1  |
| Ireland        | 7.4   |
| Italy          | 9.8   |
| Netherlands    | 9.8   |
| Portugal       | 2.4   |
| United Kingdom | 8.9   |

Sources: Eurostat, CITPA.

Folding carton is mainly used for sales packaging owing to its excellent printability. Furthermore, carton packaging material is especially suited for automatic packaging of goods in high-speed packaging machines.

Carton packaging for fluids has secured an important market in recent years. The carton is sealed with plastic or metal foil to contain fluids, gaseous or greasy substances and is made into a packaging product which is inexpensive, lightweight and easy to handle. It is increasingly used for milk, fruit juices, wine, and more recently for other foodstuffs as well.

Cardboard boxes made of solid-fibre board are produced in the most diverse shapes, including the luxuriously designed gift box. Boxes made of heavy solid-fibre board have lost some market share but continue to be used for certain purposes. Their suitability for high-speed packaging systems is becoming increasingly important. New markets for solid-fibre board packaging are crates for yoghurt and other milk products, and in the fruit and vegetable sector.

Fine cardboard, which is often embossed and covered with other materials, is used for gift boxes. This product stresses

the nature of the often valuable contents such as chocolates, cosmetics, alcoholic drinks, etc.

Paper cornets, bags and carrier-bags as well as impregnated, coated and gummed paper have lost market share owing to the introduction of synthetic products. Competition, especially in the field of carrier-bags, is fierce. Both groups have adapted, or will have to adapt, to this shift in demand by including synthetic packaging in their range of products. Overall, however, paper cornets, bags, carrier-bags and other flexible paper packagings continue to play an important part in the packaging of consumer goods, where paper and cardboard appear to be particularly suitable base materials for compound packaging materials in combination with synthetics and metal foils.

Tubes can be used to wrap around flat materials like paper and/or board, foils of all kinds, textiles and also threads and fibres. They are also used as packaging material in transport or mailing. Cans (composite cans) made of paper and/or board, also in combination with other materials, are increasingly used as a substitute for glass, metal or plastic packaging. The market for composite cans is gaining in importance both in the food and the non-food sector for packing fluid, pasty and dry goods.

Household and sanitary paper goods made from cellulose cotton, tissue and crêpe paper represent the second largest sector in the production of paper and board goods. This product group has shown exceptionally high growth rates over the past 15 years and has increased its share both in quantity and in value.

Cellulose cotton products are used in nursing and baby care and in feminine hygiene. Major growth has come from the development of tissue paper, a smooth, soft and absorbent material which is used for handkerchiefs, facial tissues, travelling and kitchen towels and for napkins and lavatory paper, and which has replaced corresponding products made of other

**Table IX**  
**Production of Corrugated Board and Corrugated Board Packaging, 1980-86**

| (1 000 tonnes) | 1980         | 1981         | 1982         | 1983         | 1984         | 1985         | 1986          |
|----------------|--------------|--------------|--------------|--------------|--------------|--------------|---------------|
| BLEU           | 250          | 256          | 275          | 289          | 311          | 325          | 342           |
| Denmark        | 194          | 181          | 196          | 210          | 228          | 230          | 240           |
| Germany        | 2 008        | 2 006        | 1 952        | 2 056        | 2 134        | 2 184        | 2 296         |
| Spain          | 880          | 932          | 934          | 926          | 964          | 968          | 1 046         |
| France         | 1 785        | 1 764        | 1 829        | 1 846        | 1 900        | 1 910        | 1 952         |
| Ireland        | 88           | 86           | 87           | 89           | 91           | 100          | 106           |
| Italy          | 1 721        | 1 655        | 1 640        | 1 647        | 1 760        | 1 786        | 1 864         |
| Netherlands    | 400          | 402          | 392          | 406          | 409          | 415          | 427           |
| Portugal       | 106          | 111          | 134          | 158          | 169          | 149          | 154           |
| United Kingdom | 1 400        | 1 427        | 1 410        | 1 445        | 1 489        | 1 625        | 1 796         |
| <b>Total</b>   | <b>8 928</b> | <b>8 918</b> | <b>8 939</b> | <b>9 166</b> | <b>9 552</b> | <b>9 794</b> | <b>10 326</b> |

Sources: FEFCO, CITPA.

materials. The production of crêpe paper has also increased sharply. This product is mainly used for hand, kitchen, car and travelling towels.

The per capita consumption of sanitary paper goods in the EC is still considerably lower than, for instance, in the USA.

Stationery and office supplies are the third largest product group among paper and board products. In both quantity and value, production has increased at a below average rate in the past 15 years.

Account books, duplicating books and system bookkeeping products, are being replaced by electronic data processing systems. The production of envelopes has suffered from the increased use of telephone, telex and electronic data communication. The increase in direct mailing, i.e. the mailing of bulk printed matter in envelopes as a part of a marketing strategy has, however, provided some compensation.

The production of teaching aids has decreased owing to falling birthrates. The expansion of pre-school and adult education and the general increase in the standard of living have offset this to some extent.

The turnover of business planners and advertising items such as calendars, has recorded a positive development. The turnover of fancy paper and letter pads has fallen in recent years.

Since 1970, the share of wallpaper in the production of paper goods has fallen, both in quantity and in value, mainly due to

the introduction of wood-chip wallpaper categorized under paper manufacture. The latter can be painted over several times. In keeping with the do-it-yourself wave, user-oriented novelties such as wipe-clean plastic wallpaper, easily removeable vinyl wallpaper and self-adhesive wallpapers have breathed new life into the wallpaper business. Although to many prospective customers, grass fibre and cork wall coverings and wood panelling provide an alternative to wallpaper, their high price prevents them from seriously jeopardizing the latter's position.

## Forecast and Outlook

The industry's growth rate is expected to fall compared with earlier periods. However, the industry is offering a wide range of attractive products for which there is a constant demand, both domestically and abroad. Particularly threatened are mass products not requiring very sophisticated production techniques, whose only selling point is price and which are increasingly being supplied by non-EC competitors. On the other hand, resourcefulness in product development and diversification, coupled with leadership in quality and production techniques, will guarantee further growth.

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## PRINTING

(NACE 473)

*The printing industry is a major industrial sector in the Community with a massive production capacity. Comprising more than 60 000 establishments of all sizes, some three quarters of a million employees - most of them highly skilled - and handling a turnover in excess of 38 billion ECU, the Community's printing industry manufactures a variety of printed products for business and household consumption. It is a modern, high-technology industry in the vanguard of technical progress, and intensely competitive not only within national markets, but also across Community borders and outside the EC.*

### Current Situation

The printing industry has withstood the economic crisis better than industry overall, in terms of percentage decline in the numbers of firms (Germany shows an increase) and employees as well as trends in volume and turnover. On the whole, its growth has exceeded that of the Community's economy by about one percentage point per year. Rapidly rising production volumes, recently paralleled by a stabilization of employment levels, indicate sharp progress in productivity; past performance shows the vitality and capacity for renewal of this traditional but innovative industry.

In 1986, exports outside the EC reached 3.2 billion ECU. Paper and cardboard consumption by the industry itself was close to 20 million tonnes, half of this accounted for by newspapers, magazines and periodicals.

With publishing, the printing industry is essentially a provider of products which incorporate data, knowledge and enter-

tainment. Its central, strategic and political weight thus stems not so much from its economic size, but more importantly from its cultural, educational and intellectual role in communicating information and ideas in democratic societies.

### Consumption Trends

Since modern societies enhance the pursuit of knowledge, the need for information grows. Demand for printed products depends on a number of demographic and economic factors. Among the demographic elements are population growth, household formation, school, university and training course enrolment, and levels of education. Despite static or low growth of the population, the number of households continues to grow as well as the share of income available for information. The educational levels of the population and the number of managerial jobs are also going up, thus requiring more for information. All this will continue to stimulate the demand for newspapers, magazines, periodicals and probably also for books.

The main demand for print however comes from the activity of industries and services, including public authorities, with only a smaller part of the market directly dependent upon personal consumption. Thus, the main economic factors influencing the demand for printed products relate to levels of disposable income, growth in business activity, increases in the number of establishments and particularly the growth in advertising. Rapidly rising levels of advertising expenditure are a crucial element for the industry. In Germany for example, close to two thirds of print production is directly or indirectly related to advertising.

### Main Indicators Printing

| (Million ECU)                  | 1980   | 1981   | 1982   | 1983   | 1984   | 1985   | 1986   |
|--------------------------------|--------|--------|--------|--------|--------|--------|--------|
| Apparent consumption (1)       | 18 967 | 22 935 | 25 139 | 26 632 | 29 829 | 32 285 | 34 582 |
| Net export earnings (2)        | +942   | +1 163 | +1 128 | +1 254 | +1 428 | +1 713 | +1 783 |
| Total Community production (3) | 24 078 | 25 734 | 28 474 | 29 558 | 31 319 | 34 026 | 36 283 |
| Employment (1 000) (4)         | 515.8  | 506.4  | 588.2  | 479.6  | 559.2  | 557.1  | 550.6  |

(1) 1980: excluding Belgium, UK, Greece, Ireland, Spain, Luxembourg; 1981-86: excluding Luxembourg, Spain and Ireland; 1986: also excluding Portugal and Greece.

(2) 1980-85: excluding Belgium, Luxembourg, Portugal and Spain; 1980: also excluding Greece; 1986: excluding Belgium, Luxembourg.

(3) 1980-86: excluding Ireland and Luxembourg; 1980: also excluding Belgium; 1984 and 1985: also excluding Spain; 1986: also excluding Spain, Portugal and Greece.

(4) 1980-86: excluding Ireland, Luxembourg and Spain; 1980, 1981, 1983: also excluding UK; 1986: also excluding Greece and Portugal, UK figures are not comprehensive.

Although more books are being published than ever before, they only represent a small segment of the European printers' market. The commercial sector of printing is experiencing a boom in demand. Catalogues, brochures, tourist information, annual reports, and business forms are being printed in ever-increasing volumes. Also, new technologies have opened up new and growing markets for printed matter, e.g., computer manuals and a variety of teaching material.

This positive trend in overall demand has been stimulated by product development and more active consumer-oriented marketing, i.e., catering for special interests. Quality standards are rising visibly, particularly in creativity and design through electronic means and improved equipment for colour printing. Multicoloured pictorial information is moving ahead for advertisements, magazines and company reports but the majority of newspapers also make use of colour inserts and pre-prints by web-offset.

Specialization to cater for interest segmentation has been facilitated by a reduction of the cost penalty for shorter runs. The number of magazine titles and pages are moving up. In the UK for example there are now close to 3 000 consumer magazines, over 50% more than a decade ago. In France, where newspaper circulation is extremely low, periodicals of all kinds put out over 1 300 copies for every 1 000 citizens. In Italy, the circulation of newspaper magazines is booming and printed advertising is growing by 6 to 8% annually. However, in the business forms sector, professional printing has experienced some difficulty in keeping its place since these items are increasingly produced on in-house computers and laser printers of firms and public agencies.

### *Factors Behind Production Trends*

Information needs are being satisfied by a widening variety of electronic media and communication devices. Nevertheless, printing, characterized by permanence and high information content has retained its position as a convenient, widely accessible, and effective medium of communication. In general, the substitution of printing by electronic or "soft" media and indeed, the introduction of all the newer technologies although rapid, has been much slower than expected a decade ago. None the less, the necessity to process and exchange information efficiently in our societies will continue to increase.

Current developments in the industry indicate a close link between the printing sector and the global development in communication and information technology. Cross fertilization and mutual dependence is apparent in technology and in media usage. Research has shown that, in the past, competition between different market categories has been mainly directed towards increasing capacities. The resulting structural change remained manageable because at the same time the total market expanded greatly. Such an expansion will likely

continue into the future but the relationship between various communication areas will become more differentiated. The media researchers describe these sometimes overlapping effects as partial substitution and complementation. The effects have to be seen within the context of specific groups. However, it is important to realize that, in this respect, electronic communication should not be seen as something which does not concern the printing industry or which is *per se* directed against it. Apart from pure printing products and pure non-printing products, in certain parts of the information market there will be an increasing amount of "mixed information" i.e. purpose and user oriented mixed solutions consisting both of printed and electronic communication. This explains the efforts of the printing industry to open new markets in both areas by early participation in new information technologies and active diversification of business activities.

The printing industry has become a high technology operation with new equipment having a pervasive impact not only on type of work and volume but also on marketing, work flexibility and generally on management. Many aspects of the print production process are now automatic processes, calculated, measured and controlled by computer and microprocessors. Investments currently represent some 7% of turnover. The new machinery takes the following main forms:

- computerized typesetting, laser and photosetting, with photocomposition the predominant technology
- computerized automated equipment to control the machines, with microprocessors increasingly used in ancillary control functions such as ink regulation
- linking of printing and telecommunications in new systems of information retrieval
- use of new chemical and physical methods in the chain of activities from input to shipment.

There has been particularly fast change in the pre-press sector where, at least in the more economically advanced parts of the Community, even small printing and reproduction houses now resort to total electronic pre-press systems with word and image processors, electronic setting of colour images etc. Desk-top publishing by customers as well as printing houses makes it possible to take a floppy disk straight from the word processor and feed it directly into computerized typesetting systems. Such systems not only set text, but combined with scanners they handle layouts including image and diagrams. But customers own keying work leads to ever greater demand for photosetting and professional printing which the in-house desk-top equipment is not capable of producing effectively and economically.

In a parallel development, some major customers of the print sectors such as mail order catalogue houses have begun to typeset their own pages; this allows for last minute changes and greater security of data. In response, some printers have

installed complete electronic pre-press systems capable of handling various types of input from customers, finished or not, to convert them to high quality print. By moving typesetting in-house, only printing, binding, addressing and mailing are needed to reach the readership. In other areas, computers allow for new and cheaper creative print design and advertising. Elements in advertising can be changed quickly to see how they look on a page.

Further down the printing process, modern technology offers electronic whole-page transmission in colour, ink-jet, computer-controlled servo mechanisms, electronic automatic binding - notably for paperbacks - and polywrapping of magazines ready for dispatch. Highly automated, versatile machines allow shorter print runs to be handled economically through lower changeover and make ready times; customers now, often prefer to print a short first run and then obtain further reprints. All this also helps specialization of content, notably in advertising which requires message personalization in market media. The speed and automation of binding and finishing machines has also been continuously improving to unprecedented levels. In 1987, the first lines for largely automated book manufacturing from German equipment producers went into full production at book printers in different parts of the Community.

With varying pace and intensity between countries, all this equipment which reduces the non-labour unit cost of printing, has been gradually introduced in all Member States since the early 1970s. Non-labour unit costs as a proportion of overall costs may have risen, due to a relatively reduced use of labour. On the whole, the new technologies were not as rapidly adopted as originally foreseen and have thus not created the huge disruption which many expected. The reasons for this include the time it took to fully develop and improve the new equipment, and to reduce cost by incorporating cheaper electronic devices, better software and computer memories. Capital limitations and occasionally the requirement for labour retraining have also played a role, as well as the fact that

the new equipment often entails a jump in capacity levels with no immediate corresponding demand.

As there are only a few producers and worldwide suppliers of the major equipment, the modern technology is available everywhere. In 1985, Germany completed the largest industrial project hitherto of the 1980s with the start of a manufacturing complex producing the world's most advanced, automated printing machines. Particularly for sheet fed offset equipment as well as for other machinery, Germany continues to dominate the market for installations of all size ranges. However, Japanese manufacturers, in recent years, have gained some 60% of new installations in the world in the medium format range; for web offset presses, some Japanese companies have made inroads into the Community market. The relative position of other major equipment producing countries has declined with France, Italy and the United Kingdom among them, even though all these Member States still have some large and successful producers. In Italy, for example, the production of big rotogravure and flexographic presses has been growing rapidly. The major international printing machinery exhibitions take place in France (TPG), the United Kingdom (IPEX), Italy (GEC), Japan (IGAS) and the USA (Print-Chicago), but DRUPA in Dusseldorf outstrips them all and has been joined by IMPRINTA (also Dusseldorf) which concentrates exclusively on the pre-press sector.

The European printing industry buys significant numbers of American and Japanese presses, and an Israeli company is a strong competitor to British, German and Japanese producers of electronic image-processing equipment. Overall, international competition in the printing sector is fierce and in this respect, measures which encourage the harmonious development of the printing industry in the EC are vital.

### Research

The great advances in print technology have to be ascribed in very large part to the research carried out by the major suppliers to the printing industry - press and equipment manufacturers, paper and ink makers, and manufacturers of films, plates and other materials used in the printing process. Some of the larger printing and binding companies have developed equipment to meet their own production needs, but this is the exception rather than the rule.

Finance to maintain printing research institutes independently of any single commercial enterprise has tended to be a diminishing resource. The German printing research institute, FOGRA in Munich, maintains particularly good and close cooperation with the German printing industries' federation, jointly publishing a steady flow of research covering a wide area of practical printing problems. Another major institute is PIRA in the UK, which covers paper and packa-

**Table I**  
**Investment Trends (1)**

|      | (Million ECU) |
|------|---------------|
| 1980 | 1 171.4       |
| 1981 | 1 177.9       |
| 1982 | 1 195.9       |
| 1983 | 1 570.5       |
| 1984 | 2 545.6       |
| 1985 | 2 963.6       |
| 1986 | 2 102.6       |

(1) 1980-86: excluding Ireland, Spain and Luxembourg; 1980-84: also excluding Belgium, UK; 1981, 1982, 1983, 1985, 1986: also excluding UK and Portugal.

Source: Eurograf.

ging as well as printing; it still does practical, technical research but has more recently broadened its activity into technical-economic research, financed usually as multi-client studies. IGT in the Netherlands was also in the top rank of the printing research institutes in the Community but was recently closed due to lack of funds. Like the other two, IGT developed test and measuring apparatus which was successfully marketed in the printing industry for better control of the printing process. These three institutes have made a major contribution to the understanding and standardization of printing processes.

Printing research on a smaller scale is also done at the Graphic College of Denmark but, while paper research institutes have continued to exist for example in France and Italy, common printing research has lacked finance in most other Community countries. The British and German institutes excepted, printing research has probably enjoyed relatively greater resources and support in non-Community countries like Finland and Switzerland, where excellent institutes continue to serve the industry.

The cost of research and its increasing importance would seem to argue in favour of the development of specialized centres for high quality research, spread among the Member States, but working for the European Community as a whole.

### *Major Structural Features*

The structure of the printing industry in the Community today is one of a very few giant enterprises (1 000 or more employees), a modest number of medium plants (a few hundred employees) and a very large number (thousands in every large industrialized country) of small enterprises mostly family owned. Printing firms still number around 6 000 - 10 000 in Member States such as France, Germany and the United Kingdom, and in the region of 2 000 in the Netherlands and Belgium.

Print markets and print products are of great diversity. Also the customers of the printing industry range from small local businesses to large multinational concerns buying a wide range of products. Private consumption represents only an insignificant proportion of print orders, whereas advertising and general commercial printing constitute a very considerable part of the turnover. Demand for print is often for a very precise delivery date. The printer must be able to satisfy a variety of requirements within a very short time, whilst still offering irreproachable quality and personalized service. Publishers purchase less than half of the production of printers (newspapers, magazines, books). All other products such as printed packaging, advertising, forms, catalogues etc. are extremely important for printing firms. Less than 10% of the printing firms have special links with publishers: printing and publishing tend to take place within the same enterprise.

In the newspaper/magazine and book publishing sector, ownership used to be in the hands of families. However, in the last decade, the economies of size, implying huge capital expenditure and opportunities for full exploitation of related information markets, have entailed many mergers and takeovers. These have taken place not only between publishing firms (especially in newspaper publishing) but also between them and other media activities, with some becoming publicly owned global information businesses, trading information in a variety of electronic and printed forms. Most newspaper and some magazine publishers have their own printing equipment. In the Community, as well as in other developed regions, there is now increased competition among top printer/publishers in the major products markets. The printing industry proper, on the whole, has not gone through a similar merger wave.

Modern technology has favoured large scale operations catering for national and transnational markets with ever wider and faster presses and other expensive equipment which only financially powerful investors can afford. But there has also been a surprising vitality in the medium to smaller firms, partly stimulated by the reduction in cost of more versatile equipment which has helped many such firms to improve quality at moderate prices and exploit market niches for differentiated products and services. Usually, these smaller firms have initially computerized only their existing production processes. Most are catering to smaller and more local customers or have become specialized sub-contractors.

The investment boom seems to have peaked in most Member States around 1982 (1984 in the Netherlands), when printers, repro-houses and finishers invested heavily in the new equipment on offer. There is now some over-capacity in Europe, notably in the web offset sector. This is having an impact on price levels and profitability, making the printing market ever more competitive.

### *Employment Trends*

In the Community, employment in the printing industry numbers some 750 000 jobs and represents as much as 2% of the total labour force in some Member States. Some three-fifths of the employees are highly trained specialists, a much higher percentage than in other industries.

The EC printing industry experienced substantial overall job reduction in the second half of the 1970s and somewhat less in the early 1980s. This trend was partly due to a constant outflow of trained workers from the printing industry to publishers and in-house printing activities of public administrations and firms; in addition, the new technologies affected, particularly, the more manual types of job. However, in the Netherlands, employment rose until 1981, followed by a fall up to 1984. It was in the pre-press sector, and mainly in the

setting area involving changeover from hot metal to photo-setting, that typesetters, letterpress printers and platemakers had to find alternative occupations, mostly in lithography. Expansion of the market combined with overall dynamism of the printing industry, a network of social regulations and agreements as well as extensive retraining within the industry, helped to facilitate the adjustment which is now well advanced.

Skilled unemployment in the printing industry is now lower, in percentage terms, than for the skilled sector of the economy as a whole. This in itself is a remarkable achievement in view of the technical revolution which has swept the industry and boosted its productivity. In general, the number of less skilled production workers, as a percentage of total employment, may well continue to decline. But future employment can be expected to confirm an ongoing trend of slowly increasing numbers of well paid, highly trained workers with a greater participation of women. As in most other industrial sectors, job creation will be linked to overall economic growth, availability of the required type of skills and the necessary flexibility in labour and social legislation.

The printing industry is characterized by the high labour content of its cost structure. In Germany where labour costs are probably amongst the highest, they represent 36% of total costs as compared with 24% for industry overall. The ever greater resort to skilled workers and sharp rises in social charges have contributed to this situation. Overtime and shift work, notwithstanding their cost, are unavoidable in an industry characterized by time constraints, particularly at a time when working hours are going down. According to UNICE, harmonization of social conditions at European level would involve the risk of increases in wage costs on a scale which would cause very serious problems.

### *Training*

During the last two decades, the printing industry has been confronted with the necessity to dramatically alter, expand and diversify its technical skills in the production process in order to respond to changes in the printing processes described above. The ever-widening range of input sources and techniques has affected the whole chain of production: the suppliers of paper, chemicals, films and plates, printing inks; the computer-based front end typesetting and reproduction systems; the cameras and scanners for reproduction, and the printing and finishing equipment. The production management function has become immensely complicated and now requires mastery of technology and complex financial and marketing matters. It is therefore no surprise that experienced, multilingual and creative people are, more than ever, the key element for cost effectiveness, speed and quality.

With the present levels of technology, it is more difficult for the industry to rely on printing schools and colleges to carry

out training to the levels required by these new technologies. The manufacturers themselves have been taking over a greater educational role in bridging the gap between skills learned at school or in-house, and requirements of industry and have tried to collaborate with the schools to integrate their training in the basic curricula.

Traditionally, within the industry the moves of workers and other employees were chiefly horizontal, between different kinds of hardware and involving minimum retraining. Nowadays, job changes often consist of transition from secondary to tertiary jobs such as software-related qualitative changes in occupations with new skill requirements, language knowledge and work organization, including new patterns of working hours and mobility across the printing sector. It should therefore not be surprising that retraining in the new microelectronic technologies has all but been accomplished.

Apprentice and trainee numbers are now increasing again, reflecting renewed confidence in the industry's future. In Germany and the Netherlands for example, the annual requirement for skilled workers represents some 4 to 6% of the present workforce, with somewhat greater intake for the pre-press and finishing sectors and a reduction for less skilled workers. For young people, entry into the industry remains as before, i.e. in-house training of apprentices in printing companies or vocational courses held in colleges or schools (usually lasting around 3 years). The curricula show that specialization tends to diminish and to be replaced by broader based training in the new technologies. The schools have experienced increasing difficulties in acquiring advanced equipment; there is a need for cooperation between public authorities, educators and private entrepreneurs in order to better respond to training requirements. Printing employers federations in several countries, sometimes in close cooperation with the trade unions, have taken action to give the industry a proper, dynamic image to attract young people and the training itself has been adapted to meet contemporary needs. However, as in many other high-tech industries, there remains, at present a serious shortage of qualified specialist labour.

### *Environmental Issues*

Protection of the environment is an essential task of contemporary society. In relation to industry generally, the printing sector is not a major polluter, nevertheless for years it has actively participated to reduce pollution. Technical progress has enabled it to use techniques and materials which do not harm the environment and considerable progress has been made in the recycling of waste products. This was done before the tightening up of environmental legislation.

In some Community countries there is detailed discussion between industry and government before the introduction of new anti-pollution measures. In others it would appear that

**Table II**  
**Production and Foreign Trade**

| (Million ECU)            | 1980    | 1981    | 1982    | 1983    | 1984    | 1985    | 1986    |
|--------------------------|---------|---------|---------|---------|---------|---------|---------|
| Production (1)           |         |         |         |         |         |         |         |
| Current value            | 24 078  | 25 734  | 28 474  | 29 558  | 31 319  | 34 026  | 36 283  |
| Index                    | 100.0   | 106.9   | 118.3   | 122.8   | 130.1   | 141.3   | 150.7   |
| Constant value           | 24 078  | 24 626  | 24 151  | 23 818  | 23 981  | 24 985  | 25 487  |
| Index                    | 100.0   | 102.3   | 100.3   | 98.9    | 99.6    | 103.8   | 105.9   |
| Imports Extra-EC (2)     | 709.2   | 840.1   | 893.1   | 995.8   | 1 194.4 | 1 263.7 | 1 242.4 |
| Index                    | 100.0   | 118.5   | 125.9   | 140.4   | 168.4   | 178.2   | 175.2   |
| Exports Extra-EC (2) (3) | 1 651.2 | 2 003.1 | 2 021.4 | 2 249.6 | 2 621.9 | 2 976.5 | 3 025.3 |
| Index                    | 100.0   | 121.3   | 122.4   | 136.2   | 158.8   | 180.3   | 183.2   |
| X/M                      | 2.33    | 2.38    | 2.26    | 2.26    | 2.21    | 2.36    | 2.44    |

(1) 1980-86: excluding Ireland and Luxembourg; 1981: also excluding Belgium; 1984-86: also excluding Spain; 1986: also excluding Portugal and Greece.

(2) 1980-85: excluding Belgium, Luxembourg, Portugal, Spain; 1981: also excluding Greece; 1986: excluding Belgium, Luxembourg.

(3) The value of print exports is overstated due to definitional problems between printing and publishing matter.

Sources: Eurograf, Eurostat.

the legislator introduces measures to be applied to many industries and/or many types of equipment, for instance printing presses, without making any distinction between greatly varying levels of pollution or even whether all types of such equipment cause any pollution at all. The printing industry is ready to cooperate but insists that it should be consulted in advance.

Harmonization of environmental protection standards within the European Community will be welcomed; uniform application is as essential as the harmonization of the legislation. Stricter rules and/or their stricter application in one Member State compared with other States can seriously distort the conditions of competition since compliance with anti-pollution measures frequently occasions heavy financial and other burdens for those concerned.

### *Export Trends*

The Community market has no protection against imports from EFTA and very little against imports from other third countries. Nevertheless, with the exception of book printing, relatively little printing work is placed outside Western Europe. Imports tend to consist mainly of material, particularly advertising literature, printed outside on behalf of foreign principals (not domestic customers of print) and imported by them to support their activities in the Community. However, book printers do place a substantial amount of printing work in the Far East, Eastern Europe and some in North America when exchange rates are favourable. There is also a sizeable import of periodicals.

While the domestic Community markets remain the focus of most printers, Community external trade is an important facet of demand for a number of Member States. The main destinations of Community exports in 1986 were the USA

**Table III**  
**External Trade**  
**Extra-EC exports as a share of total exports**

|                | (%) |
|----------------|-----|
| United Kingdom | 68  |
| Spain          | 66  |
| Denmark        | 61  |
| Portugal       | 59  |
| Germany        | 55  |
| France         | 53  |
| Greece         | 42  |
| BLEU           | 31  |
| Italy          | 26  |
| Netherlands    | 25  |
| Ireland        | 21  |

### Share of total EC external trade

|                | Imports (%) | Exports (%) |
|----------------|-------------|-------------|
| BLEU           | 2.5         | 2.5         |
| Denmark        | 6.8         | 3.7         |
| Germany        | 25.5        | 35.0        |
| Greece         | 0.2         | 0.2         |
| Spain          | 9.2         | 7.2         |
| France         | 13.5        | 15.5        |
| Ireland        | 0.9         | 0.4         |
| Italy          | 3.5         | 6.5         |
| Netherlands    | 6.4         | 4.4         |
| Portugal       | 1.1         | 0.4         |
| United Kingdom | 30.4        | 24.2        |

Sources: Eurograf, Eurostat.

(18% of total exports), Switzerland (17%) and Austria (11%). Lesser clients were Sweden, Canada, Australia, Norway and Japan in order of decreasing importance.

In 1986, extra-Community imports originated mainly from the USA (30%), Switzerland (19%), and Austria (9%). Other, less important suppliers were Andorra, Japan, Sweden, Hong Kong and Finland.

At present, the main competition for the EC printing industry is intra-Community.

### Forecasts and Outlook

The outlook for the industry is relatively healthy assuming steady increases in disposable incomes, buoyant business activity and a continuation of the growth in advertising expenditures. Estimates to 1990 are available for some Member States and these indicate moderate to strong growth in turnover with Germany anticipating real growth of 2-3%, France around 7% and the Netherlands 8-9%. Employment trends are likely to be mixed; some countries expect at least marginal growth in employment, others anticipate a decline indicating continued restructuring and productivity improvements.

Overall, the industry is well-placed to take advantage of growth opportunities given recent investment in technology

**Table IV**  
**Intra-Community Trade, 1986**

| (Million ECU)  | Intra-EC Imports | Intra-EC Exports | Balance (1) |
|----------------|------------------|------------------|-------------|
| BLEU           | 497.2            | 394.2            | -103.0      |
| Denmark        | 104.6            | 71.7             | -32.9       |
| Germany        | 319.3            | 879.3            | +560.0      |
| Greece         | 17.0             | 6.3              | -10.7       |
| Spain          | 93.8             | 109.6            | +15.8       |
| France         | 932.8            | 404.5            | +528.3      |
| Ireland        | 100.9            | 50.3             | -50.6       |
| Italy          | 166.0            | 394.9            | +228.9      |
| Netherlands    | 395.9            | 389.2            | -6.7        |
| Portugal       | 30.1             | 7.9              | -22.2       |
| United Kingdom | 474.2            | 350.9            | -123.3      |

(1) As exports are recorded fob and imports cif, total of national balances do not even out.

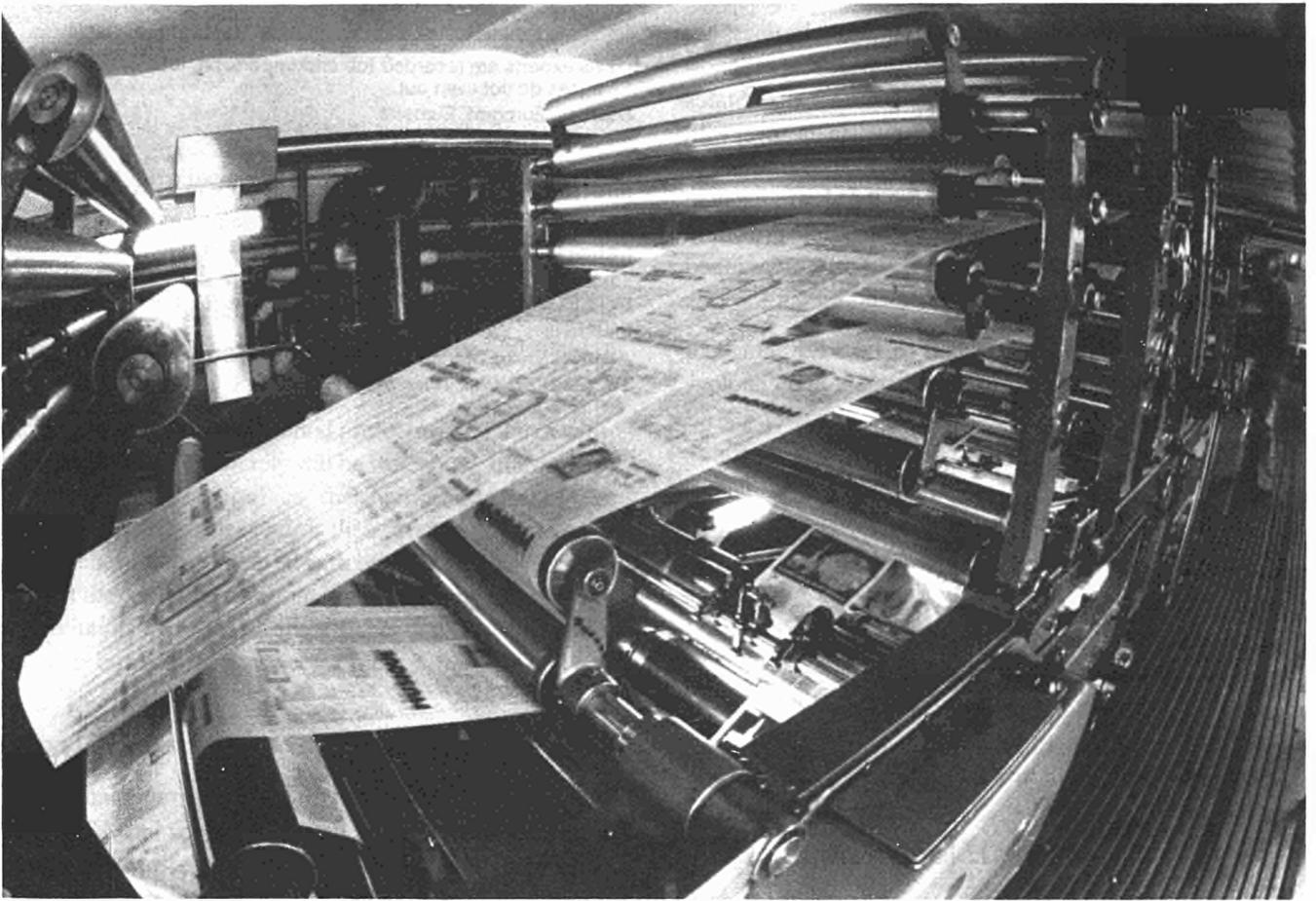
Sources: Eurograf, Eurostat.

and training. However, competitive pressures from countries outside the EC will continue to present challenges for the industry.

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# DAILY NEWSPAPERS

(NACE 474.4)

Since the emergence of other forms of mass communication, the daily newspaper has undergone a decrease in popularity and hence in income. Television advertising in particular has encroached upon the daily newspaper's financial basis, which derives to a large extent from advertising. In many countries, the weaker newspapers have been granted public subsidies to stay in business. It is recognized that new developments in printing and related techniques have made a high degree of computerization and automation inevitable. This has led to job losses in the manual labour sector of this traditionally highly unionized industry; however, the number of journalists is currently increasing.

## Current Situation

The daily press in the EC includes 1 934 titles, with a daily print-run of 74 million copies.

With some exceptions, companies in the sector have evolved from the traditional family-owned or single proprietorship enterprise towards medium or large-sized enterprises. This is due to the high investment levels required for modernization and automation (e.g. a printing machine costs approximately 16 million ECU) and the fact that a certain circulation level needs to be reached for economies of scale to be realized.

The sector's income depends on two key factors: the number of copies sold and the take-up of advertising space. Newspaper circulation levels vary widely between Member States.

## Main Indicators Daily Newspapers

|                                   | 1982       | 1986       |
|-----------------------------------|------------|------------|
| Apparent consumption (tonnes) (1) | 4 249 830  | 4 936 562  |
| Total EC production (units) (2)   | 72 262 658 | 74 262 494 |
| Employment (3)                    | 234 000    | 227 000    |

(1) EC 10, excluding Spain and Portugal.

(2) EC 9, excluding Greece, Spain and Portugal.

(3) CAEJ estimates.

The reading rate for daily papers, which can be defined as the ratio of print-runs to population, appears to be linked to reading levels in general. A rough distinction can be made between northern Member States such as the UK, Germany and the Netherlands, where the reading rate is between 300 and 400 copies per 1 000 inhabitants, and southern Member States such as Italy, Spain, Portugal and Greece, where approximately 100 dailies are read per 1 000 inhabitants.

Given the role of the daily newspaper in democratic societies, i.e. the dissemination of different currents of opinion - a right guaranteed under the Convention of Human Rights - newspapers need to be sold at a price that makes them accessible to large portions of the population.

## Current Trends

The daily press has made considerable efforts to modernize its production techniques; composition rooms, editorial

Table I

|                 | Number of newspapers<br>(units) |              | Daily print-runs<br>(units) |                   |
|-----------------|---------------------------------|--------------|-----------------------------|-------------------|
|                 | 1982                            | 1986         | 1982                        | 1986              |
| Belgium         | 38                              | 36           | 2 258 755                   | 2 180 238         |
| Denmark         | 46                              | 46           | 1 820 718                   | 1 836 837         |
| Germany         | 1 202                           | 1 273        | 25 538 282                  | 20 918 480        |
| Greece          | N/A                             | 129          | N/A                         | 1 320 608         |
| Spain           | N/A                             | 102          | N/A                         | 3 005 086         |
| France          | 101                             | 88           | 10 899 000                  | 9 886 000         |
| Ireland         | 5                               | 5            | 650 225                     | 554 882           |
| Italy           | 88                              | 78           | 7 489 678                   | 8 378 000         |
| Luxembourg      | 4                               | 4            | 110 000                     | 115 000           |
| Netherlands     | 48                              | 48           | 4 562 000                   | 4 527 000         |
| Portugal        | N/A                             | 25           | N/A                         | 420 000           |
| United Kingdom  | 101                             | 100          | 18 934 000                  | 21 120 363        |
| <b>Total EC</b> | <b>1 633</b>                    | <b>1 934</b> | <b>72 262 658</b>           | <b>74 262 494</b> |

Source: CAEJ.

offices, dispatching departments and rotary press rooms have all undergone far-reaching changes to basic methods of production.

Investments made in recent years should allow the daily press to offer its readers and advertisers an excellent printed product of high editorial quality.

Table II gives consumption figures in tonnes, rather than value. These data provide a more reliable picture, since the price of paper is different in each Member State (e.g. in Belgium, it is relatively cheaper than in the UK).

**Table II**  
**Consumption in tonnes of paper (1)**

|                 | 1982             | 1986             |
|-----------------|------------------|------------------|
| Belgium         | 196 490          | 193 795          |
| Denmark         | 165 000          | 189 000          |
| Germany         | 1 286 513        | 1 448 016        |
| Greece          | 54 000           | 85 000           |
| Spain           | N/A              | 267 066          |
| France          | 569 000          | 499 175          |
| Ireland         | 34 827           | 29 710           |
| Italy           | 315 000          | 366 000          |
| Luxembourg      | 8 000            | 8 000            |
| Netherlands     | 381 000          | 463 300          |
| Portugal        | N/A              | 37 500           |
| United Kingdom  | 1 240 000        | 1 350 000        |
| <b>Total EC</b> | <b>4 249 830</b> | <b>4 936 562</b> |

(1) No figures on value are available.  
Source: CAEJ.

In the advertising market, newspapers compete directly with other media. The appearance of a new advertising medium inevitably results in a revised division of advertising expenditure amongst the traditional media. Television advertising is one of the main competitors of the written press.

In the area of advertising, the daily press in most EC countries has seen its market share of total advertising expenditure diminish; this is particularly a result of increased television advertising and the introduction of commercial television channels. Between 1980 and 1985, advertising in newspapers as a share of total advertising expenditure has marginally declined in Belgium, Germany, the Netherlands, Portugal and the UK; in these countries it represents around 30% to 40% of the total. Member States which have experienced a much sharper decline in newspapers' share of advertising expenditure include Ireland, Italy, France and Greece: for these countries the relative share of advertising in newspapers is much lower. The only country which has experienced an increase in this area is Spain; however, the rise was only marginal.

**Table III**  
**Percentage of Advertising Expenditure in Daily Press**

|                | 1980 (%) | 1985 (%) |
|----------------|----------|----------|
| Belgium        | 32.4     | 28.3     |
| Denmark        | 89.2     | 89.2     |
| Germany        | 41.8     | 37.9     |
| Greece         | 25.9     | 15.3     |
| Spain          | 30.1     | 33.8     |
| France         | 27.1     | 20.3     |
| Ireland        | 52.6     | 30.6     |
| Italy          | 25.4     | 19.5     |
| Netherlands    | 42.0     | 39.7     |
| Portugal       | 28.6     | 28.4     |
| United Kingdom | 34.3     | 31.4     |

Source: CAEJ.

In some Member States, radio and television stations protected by a State monopoly have been authorized to increase their advertising volume.

Between 1982 and 1986, the number of newspapers in the EC has stayed relatively stable, although this masks a slight fall in Belgium and the UK, and a more marked decline in France and Italy. Conversely, in Germany there has been an upward trend in the number of newspaper titles.

As far as readership patterns are concerned, it appears that adolescents are reading less in general and fewer daily newspapers in particular.

### *Employment Trends*

Although figures for 1982 and 1986 are not entirely comparable (EC 10 compared with EC 12), employment in general is decreasing slightly. In EC 10, employment in the sector fell from 234 000 to 227 000. This tendency is more marked in the manual labour sector as a result of computerization of printing techniques and the introduction of other new technologies. On the other hand, the proportion of journalists to total employees has increased from 15.6% to 19.1%.

### **Forecast and Outlook**

The daily newspapers are aware that continuous efforts are needed in several key areas. This particularly relates to improvements in editorial content: the increase in the number of journalists demonstrates that newspapers have invested in this area. Many newspapers have also undertaken readership surveys in order to understand the rapid changes in lifestyle and taste among their readers. Another important area is the quality of newspaper; the possibilities here have been enhanced by increased use of colour, as well as more variety in the visual presentation of material.

**Table IV**  
**Employment in 1982 and 1986**

|                | 1982 (1)      |               |                      | 1986 (2)       |               |               |                      |                |
|----------------|---------------|---------------|----------------------|----------------|---------------|---------------|----------------------|----------------|
|                | Journalists   | Manual labour | Administr. personnel | Total          | Journalists   | Manual labour | Administr. personnel | Total          |
| Belgium        | 968           | 2 762         | 2 068                | 5 798          | 1 045         | 2 499         | 2 025                | 5 569          |
| Denmark        | 1 650         | 5 100         | 4 400                | 11 150         | 1 970         | 5 700         | 4 600                | 12 270         |
| Germany        | 10 397        | 26 353        | 36 495               | 73 245         | 11 173        | 25 560        | 35 901               | 72 634         |
| Greece         | 1 058         | 1 005         | 469                  | 2 532          | 1 711         | 2 005         | N/A                  | 3 716          |
| Spain          | N/A           | N/A           | N/A                  | N/A            | 2 560         | 5 089         | 2 222                | 9 871          |
| France         | 6 000         | 15 500        | 14 000               | 35 500         | 4 870 (3)     | 9 570         | 6 090                | 20 530         |
| Ireland        | 555           | 864           | 1 084                | 2 503          | 503           | 738           | 1 012                | 2 253          |
| Italy          | 4 024         | 14 076        | N/A                  | 18 100         | 4 077         | 12 576        | N/A                  | 16 653         |
| Luxembourg     | 58            | 420           | N/A                  | 478            | 60            | 500           | N/A                  | 560            |
| Netherlands    | 3 146         | 4 072         | 6 672                | 13 890         | 3 061         | 4 222         | 6 421                | 13 704         |
| Portugal       | N/A           | N/A           | N/A                  | N/A            | 400           | 3 200         | N/A                  | 3 600          |
| United Kingdom | 8 800         | 41 200        | 21 100               | 71 100         | 12 000        | 35 600        | 18 200               | 65 800         |
| <b>Total</b>   | <b>36 656</b> |               |                      | <b>234 287</b> | <b>43 430</b> |               |                      | <b>227 160</b> |

(1) EC 10, excluding Spain and Portugal.

(2) EC 12.

(3) Regional daily press only.

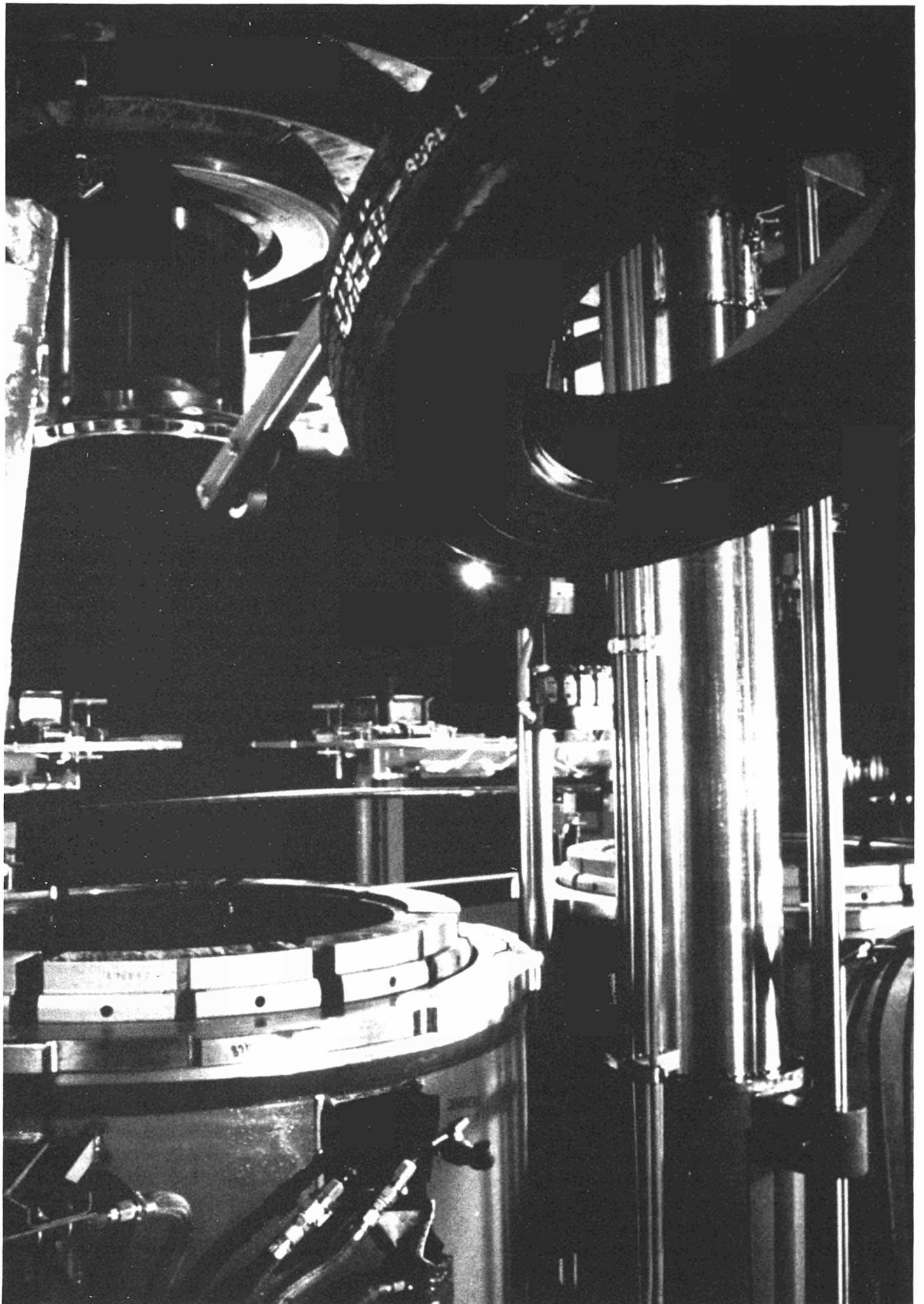
Source: CAEJ.

Many newspapers also recognize the value of diversification: the primary goal of newspaper publishers is not to sell paper, but to disseminate information and opinions. Experience gathered by newspaper publishers and editorial teams has prompted newspapers to expand into other fields of information.

The future of the written press also depends on external factors such as the price of raw materials, especially newsprint, which is an important element in production costs.

With a view to 1992 and beyond, it is extremely difficult to provide a reliable forecast on the development of the newspaper sector, although some increase in concentration of ownership is anticipated. With regard to advertising in newspapers, no significant changes are anticipated in the national markets.

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## RUBBER

(NACE 481)

*The rubber industries, whose 1986 production came to more than 16 billion ECU, are declining slightly in volume in comparison to 1980. The drop that came in the years between 1980 and 1982 has barely been offset by later rises. In order to maintain Europe's strong position and its foreign trade surplus, the rubber industries must make significant productivity gains and show enough profitability to attract the necessary capital for continuing modernization efforts.*

Rubber-processing is a relatively old activity which calls for much research and development and large investments. Rubber processing has differing aspects in its two sub-sectors: tyres and industrial rubber. The tyre sub-sector features an industry devoted entirely to a single category of products made for very specific uses. It is highly concentrated with a small number of firms. The strategy of the firms in this sub-sector can only be judged on a world-wide scale. On the other hand the industrial rubber sub-sector, which produces other rubber articles, is much more diverse with firms of all sizes producing a wide variety of products for use in many activity sectors.

In 1986 the two sub-sectors were of nearly equal economic importance in the EC. The differences between them can explain the dissimilarity of trends within each sub-sector.

Complete statistical data has only be obtained for Belgium, Luxembourg, the Netherlands, France, Britain, Italy and Germany. These seven countries account for 87% of the rubber industry work-force in the 12 EC countries. In these seven countries the overall activity in the sector, as measured by turnover in constant value, reached a record level in 1980. It then dropped by 11.5% between 1980 and 1982 and rose again in 1985 and 1986. The work-force shrank by 21.5% between 1980 and 1986 but with significant differences between countries. In the UK, for example, 30.7% of the jobs in the industry were lost while the figure was only 6.7% in Germany.

Gross investment as a proportion of turnover declined between 1982 and 1984 but later rose. The ratio of gross investment to turnover did not return to its 1980 level until 1986. Nearly all investment since 1980 has gone towards improving productivity in order to make the European rubber industry more competitive since, on the whole, the industry has excess production capacity.

The effects of productivity investments between 1980 and 1982 were masked by the fact that job cuts of 12% did not match the drop in activity. As a result, production per person did not increase. After 1983, however, economic recovery and the reabsorbing of surplus workers made an increase in production per person possible.

### Main Indicators Rubber

| (Million ECU)              | 1980    | 1981    | 1982    | 1983    | 1984    | 1985    | 1986    | 1986    |
|----------------------------|---------|---------|---------|---------|---------|---------|---------|---------|
| Apparent consumption       |         |         |         |         |         |         |         |         |
| a. New tyres               | 5 077.1 | 5 235.5 | 5 194.7 | 5 326.5 | 5 831.2 | 6 176.5 | 6 427.7 | 6 983.2 |
| b. Other rubber articles   | 4 913.5 | 4 985.4 | 5 592.5 | 5 834.5 | 6 253.3 | 6 708.6 | 7 119.7 | 7 669.3 |
| Net export earnings        |         |         |         |         |         |         |         |         |
| a. New tyres               | 699.9   | 908.0   | 649.7   | 766.8   | 927.2   | 929.0   | 844.2   | 1 044.2 |
| b. Other rubber articles   | 466.5   | 557.4   | 555.8   | 556.7   | 613.3   | 713.0   | 617.5   | 631.0   |
| Total Community production |         |         |         |         |         |         |         |         |
| a. New tyres               | 5 777.0 | 6 143.5 | 5 844.4 | 6 093.3 | 6 758.4 | 7 105.5 | 7 271.9 | 8 027.4 |
| b. Other rubber articles   | 5 380.0 | 5 542.8 | 6 148.3 | 6 391.2 | 6 866.6 | 7 421.6 | 7 737.2 | 8 300.3 |
| Employment (1 000)         | 394.7   | 368.0   | 350.3   | 332.4   | 322.3   | 315.6   | 312.6   | 351.9   |

1980: EC 9, 1981-1986: EC 10, 1986 (second column): EC 12.

**Table I**  
**Trends in Community Production by Product**

| (Thousand tonnes)                 | 1980    | 1981    | 1982    | 1983    | 1984    | 1985    | 1986    |
|-----------------------------------|---------|---------|---------|---------|---------|---------|---------|
| Tyres for passenger cars          | 931.1   | 829.1   | 845.2   | 868.9   | 906.8   | 916.4   | 966.9   |
| Tyres for vans, lorries and buses | 721.3   | 652.1   | 542.4   | 539.8   | 594.5   | 615.1   | 624.6   |
| Other tyres                       | 332.7   | 314.9   | 304.0   | 295.5   | 280.6   | 286.7   | 280.8   |
| Inner tubes                       | 100.5   | 89.3    | 76.0    | 67.8    | 68.6    | 62.1    | 49.5    |
| Total                             | 2 085.6 | 1 885.4 | 1 767.6 | 1 772.0 | 1 850.5 | 1 880.3 | 1 921.8 |

EC 7: Belgium, Luxembourg, the Netherlands, France, UK, Italy and Germany.

Source: National rubber associations.

## THE MANUFACTURE OF TYRES

The tyre industry covers four distinct types of products:

- tyres for private cars;
- tyres for utility vehicles (vans, lorries, buses);
- other tyres (tractors, construction vehicles, planes, motorcycles, bicycles, etc.);
- inner tubes for all vehicles.

Designing and manufacturing tyres often calls for avant-garde science and technology. Every field of science is involved. The means to be implemented are huge and grow as technology changes and improvements are made to automobiles. These factors, along with increasing internationalization, have led to the gradual concentration of the firms in the tyre industry.

### Current Situation

In the seven European countries mentioned above, the 1986 tonnage of tyres and inner tubes produced can be broken down as follows: passenger cars 50%, heavy goods vehicles 33% and special vehicles 17%. The same categories accounted for 55%, 30% and 15% of production value respectively.

The production of tyres for passenger cars was depressed between 1981 and 1982. The trend started earlier in Germany and hit France particularly hard. From 1983 to 1986, production rose by 4% over 1980 and growth was strong in Germany and Italy in 1987 with rates of 10% and 11% respectively. The foreign trade balance has also maintained a healthy surplus.

The tonnage of tyres produced for heavy goods vehicles dropped by 25% between 1982 and 1983 and was still 13% below the 1980 level in 1986. There has been a slight pick up in Italy and the United Kingdom but only the Benelux countries have increased their production over the last six years. This decline is mainly due to a sharp decrease in internal consumption of about 13% which stems from a variety of factors including an overall improvement in tyre wear. Another contributing factor is that 1985 new-vehicle registrations only

reached 1980 levels. The trade balance is still in surplus but has slipped in terms of constant value.

**Table II**  
**1986 National Production by Product**

| (Thousand tonnes)                 | BLEU  | D     | F     | I     | UK    |
|-----------------------------------|-------|-------|-------|-------|-------|
| Tyres for passenger cars          | 52.5  | 315.4 | 297.3 | 156.4 | 145.3 |
| Tyres for vans, lorries and buses | 70.1  | 128.6 | 196.6 | 98.1  | 131.2 |
| Other tyres                       | 38.0  | 75.3  | 110.8 | 38.0  | 18.7  |
| Inner tubes                       | 2.8   | 4.3   | 22.7  | 16.2  | 3.5   |
| Total                             | 163.4 | 523.6 | 627.4 | 308.7 | 298.7 |

EC 7.

Source: National rubber associations.

There was a steady decline in the production of other types of tyres from 1981 to 1984, particularly in the United Kingdom and France. It then stabilized at about 16% less than the 1980 level. The sharp drop in consumption can be attributed to weak demand in the construction industry and in agriculture. The trade balance has improved and is slightly positive.

The consumption and production of inner tubes were halved in six years by the development of tubeless tyres. France and Italy are the only countries that still manufacture substantial amounts of inner tubes. The constant value of imports has stayed the same and the former trade balance surplus has disappeared.

### Industrial Structure

Technological and economic constraints mean that the tyre industry is increasingly concentrated in the hands of a few firms. In 1988 four leading manufacturers - Goodyear (USA), Michelin (EC), Bridgestone (Japan) and Firestone control 53% to 54% of the world market outside the Eastern Bloc. By adding five other major groups - Continental, Pirelli, Uniroyal, Sumitomo and Yokohama - 82% to 83% control of the same market is achieved.

The manufacturers must therefore have a world-wide strategy and be judged at the same level. Each manufacturer enjoys a large market share on its own continent and is one of

**Table III**  
**Production and Foreign Trade**

| (Million ECU)           | 1980    | 1981    | 1982    | 1983    | 1984    | 1985    | 1986    |
|-------------------------|---------|---------|---------|---------|---------|---------|---------|
| <b>Production</b>       |         |         |         |         |         |         |         |
| Current value           | 5 749.5 | 6 066.0 | 5 760.8 | 6 001.4 | 6 659.9 | 7 005.9 | 7 170.1 |
| Index                   | 100.0   | 105.5   | 100.2   | 104.4   | 115.8   | 121.9   | 124.7   |
| Constant value (1)      | 5 749.5 | 5 524.6 | 4 857.3 | 4 812.7 | 5 064.6 | 5 087.8 | 5 045.8 |
| Index                   | 100.0   | 96.1    | 84.5    | 83.7    | 88.1    | 88.5    | 87.8    |
| <b>Imports extra-EC</b> |         |         |         |         |         |         |         |
| Index                   | 523.5   | 522.5   | 615.1   | 609.8   | 717.8   | 824.4   | 677.6   |
|                         | 100.0   | 99.8    | 117.5   | 116.5   | 137.1   | 157.5   | 129.4   |
| <b>Exports extra-EC</b> |         |         |         |         |         |         |         |
| Index                   | 1 235.3 | 1 445.9 | 1 283.1 | 1 406.4 | 1 672.8 | 1 790.3 | 1 556.8 |
|                         | 100.0   | 117.0   | 103.9   | 113.8   | 135.4   | 144.9   | 126.0   |
| <b>X/M</b>              | +2.36   | +2.77   | +2.09   | +2.31   | +2.33   | +2.17   | +2.30   |

EC 7.

(1) Million 1980 ECU.

Sources: National rubber associations and Eurostat.

the challengers on others. Thus the situation of a firm cannot be assessed merely on a national scale. Competition between tyre manufacturers is fierce. The motorcycle and bicycle tyre industry in the EC has been exposed to increasing imports from outside Europe which has caused a sharp drop in the number of European factories and in EC production volume.

### Forecast and Outlook

The tyre industry is a lively sub-sector of the EC rubber industry. Its performance must be improved and its lead must be maintained. World market growth is likely to remain weak, except in Japan and the new industrialized countries.

To survive, the European groups must keep their place amongst the front runners and to do so they must follow the example of their major world competitors by:

- making considerable productivity gains through optimized use of their means of production and their work-force;
- offering enough profitability to attract the capital necessary for the continued modernization of their equipment in Europe and the acquisition and development of production plants overseas.

### INDUSTRIAL RUBBER (OTHER RUBBER ARTICLES)

This sector covers some 25 product sub-groups. Only four individual sub-groups topped 5% of the total tonnage in 1986. They can be broken down as follows:

- belts and hoses;
- adhesives and tyre cement;

- other industrial rubber articles (including carpets and floor coverings);
- rubber derivatives (ebonite);
- hygienic and surgical articles;
- rubber-coated textiles, clothing and other articles made with bonded or vulcanized rubber-coated textiles (not including sewn articles);
- rubber sporting and camping goods and toys;
- rubber reclaiming.

Industrial rubber covers a wide variety of articles which are either used by industry, such as conveyor belts, hoses for handling bulk products, cylinder coatings, off-shore pipes, or incorporated into production, such as fan belts, door seals, washing machine hoses, hydraulic hoses, heels, coated textiles for inflatable boats, or else they are sold directly to the consumer in the form of garden hoses, floor coverings, gloves, mattresses, rubber shoes, etc.

### Current Situation

The rubber industry apart from the tyre sector has had zero overall growth since 1980. After falling by 5% to 7% between 1981 and 1984, activity climbed back up to its 1980 level in 1986, both in constant value and in volume. The trade balance with non-EC countries is still positive. However the disparities between the various products is such that this overall average gives no idea of trends in the individual sub-sectors. The only way to define the real factors behind trends in each branch of the industry would be to conduct a finely detailed analysis for each group of products.

The consumption of each of the major categories of articles often depends on overall economic activity and the activity

**Table I**  
**Trends in Community Production by Product**

| (Thousand tonnes)                                | 1980    | 1981    | 1982    | 1983    | 1984    | 1985    | 1986    |
|--|---------|---------|---------|---------|---------|---------|---------|
| Adhesives and tyre cement                        | 117.0   | 109.0   | 107.2   | 102.2   | 102.6   | 108.5   | 107.5   |
| All types of belts and conveyor belts            | 94.1    | 97.2    | 105.3   | 101.0   | 88.1    | 101.6   | 91.5    |
| Tubes and hoses                                  | 149.7   | 131.9   | 139.9   | 130.8   | 138.9   | 152.9   | 155.9   |
| Other products (including tyre repair equipment) | 1 186.1 | 1 106.1 | 1 124.6 | 1 114.9 | 1 116.8 | 1 144.2 | 1 192.6 |
| Total  | 1 546.9 | 1 444.2 | 1 477.0 | 1 448.9 | 1 446.4 | 1 507.2 | 1 547.5 |

EC 7.

Source: National rubber associations.

of a specific sector (particularly the automotive industry). Some markets, especially those which incorporate rubber articles into other products, impose specific demands for standards and performance. This means the manufacturer often has to make heavy investments in research and modernization. The market strategy is usually continental in scope as industries incorporating rubber articles into their products cannot be at the mercy of problems with supplies coming from afar. However some individual products can be the object of a world-wide strategy, as is the case for hoses for pouring concrete.

### *Factors behind Production Trends*

The industry has started to use the most advanced means, including computer-aided production, sophisticated tools and higher quality basic materials. Thus this older industry is being rejuvenated and reclaiming a dominant position.

However, the newly industrialized countries and developing countries are increasingly obtaining low-technology production means and using them to meet their own and neighbouring countries' needs. These new factories make exports to industrialized countries possible at prices that reflect the

lower labour costs. Some firms have also set up production plants in developing countries for labour-intensive articles such as rubber gloves in order to remain competitive with these countries.

**Table II**  
**1986 National Production by Product**

| (Thousand tonnes)                                | BLEU | D     | F     | I     | UK    |
|--|------|-------|-------|-------|-------|
| Adhesives and tyre cement                        | 7.1  | 25.5  | 29.4  | 13.9  | 31.6  |
| All types of belts and conveyor belts            | 11.4 | 45.1  | 11.8  | 11.4  | 11.8  |
| Tubes and hoses                                  | 8.2  | 36.1  | 22.0  | 40.9  | 48.7  |
| Other products (including tyre repair equipment) | 45.3 | 500.9 | 211.9 | 270.6 | 163.9 |
| TOTAL  | 72.0 | 607.6 | 275.1 | 336.8 | 256.0 |

Source: National rubber associations.

### *Industrial Structure*

The "scattered" nature of the producing firms can be explained in part by the diversity of the markets involved. The industrial rubber industry is made up of firms of all sizes. There are about 10 firms with work-forces of more than 3 000 or 4 000 among the 1 500 or so EC firms. The variety of

**Table III**  
**Production and Foreign Trade**

| (Million ECU)      | 1980    | 1981    | 1982    | 1983    | 1984    | 1985    | 1986    |
|--------------------|---------|---------|---------|---------|---------|---------|---------|
| Production         |         |         |         |         |         |         |         |
| Current value      | 5 299.0 | 5 416.6 | 5 996.4 | 6 233.2 | 6 690.4 | 7 236.4 | 7 568.1 |
| Index              | 100.0   | 102.2   | 113.2   | 117.6   | 126.3   | 136.6   | 142.8   |
| Constant value (1) | 5 299.0 | 4 933.2 | 5 056.0 | 4 998.6 | 5 087.7 | 5 255.2 | 5 325.9 |
| Index              | 100.0   | 93.1    | 95.4    | 94.3    | 96.0    | 99.2    | 100.5   |
| Imports extra-EEC  | 466.1   | 512.0   | 568.3   | 641.8   | 761.0   | 818.9   | 757.8   |
| Index              | 100.0   | 109.9   | 121.9   | 137.7   | 163.3   | 175.7   | 162.6   |
| Exports extra-EEC  | 931.7   | 1 074.5 | 1 141.5 | 1 208.5 | 1 386.5 | 1 538.0 | 1 385.4 |
| Index              | 100.0   | 115.3   | 122.5   | 129.7   | 148.8   | 165.1   | 148.7   |
| X/M                | +2.00   | +2.10   | +2.00   | +1.88   | +1.82   | +1.88   | +1.83   |

EC 7.

(1) Million 1980 ECU.

Sources: National rubber associations and Eurostat.

articles is such that it would be unwise to attempt to define an overall strategy for this sub-sector.

Articles whose production requires heavy investment (for example, conveyor belts) or whose design and manufacture call for big research capacities with laboratories and production control for long runs (high-performance articles for example, V belts, automotive transmission belts, mooring fenders, dilatable hoses, off-shore pipes) are manufactured by large- and medium-scale firms. Products made in relatively short runs, special products and products which do not require big investments are manufactured by large numbers of small- and medium-scale industrial firms which can be as small as 10 or 20 employees in some cases.

### **Forecast and Outlook**

The EC industrial rubber industry is important for the Community even though it is less concentrated than the tyre

industry. It should continue to meet the Community's needs for common products in all activity sectors. It should also continue to grow with the growth industries.

To do so, as is the case for the tyre industry, it will have to:

- make considerable productivity gains by optimizing the use of its production means and its work-force (labour costs will continue to make up a large proportion of production costs);
- offer enough profitability to attract the capital necessary for investment to meet the demands of competition.

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# PLASTIC PROCESSING

(NACE 483)

*The output of the plastics processing industry was valued at 38 billion ECU in 1987. This sector employs around 560 000 persons. Production in the Federal Republic of Germany is third only to the USA and Japan. Since plastics continue to replace metal, wood and other traditional materials at a very competitive price, the annual growth of production and consumption has remained above 5% over the past few years. Community trade balance has constantly shown a modest surplus, half of which is accounted for by the German industry. In the future, growth should be maintained because of the increased demand for new or improved products. At the same time, important technological investments have recently meant a slower increase in employment but a rise in the skill levels of the average employee.*

The plastics processing industry is composed of companies who buy resins and compounds and convert them into products. Thus, it includes injection moulding, blow moulding, blown film, thermo-forming and rotational moulding as well as conversion into finished products, printing, decorating, welding, etc. They may be custom processors who produce components used by other manufacturers or they may be in-house operations integrated into the manufacturing process.

Products made by plastics processors range from such mass-produced items as low density polyethylene packaging film to such specialized ones as composites used in space-shuttle components. In short, virtually every type of product manufacturer uses, or can use, plastic components.

## Current Situation

EC plastics processing patterns may be compared with the situation in the USA and Japan. The EC countries have a

population roughly three times that of Japan and 50% greater than that of the USA. But the production figures for a typical engineering and commodity resin demonstrates the differences between the processing industries in the world's three most advanced industrial areas.

For ABS, the highest-volume engineering plastic, EC production in 1987 was estimated at 451 000 tonnes, up from 422 000 tonnes the previous year, with more than half of the end products in the appliance, automotive and electrical/electronics industries.

In Japan, ABS production rose from 452 000 to 475 000 tonnes, while in the USA it was slightly higher, rising from 491 000 to 545 000 tonnes. Thus Japan, with a third of the population of the EC, processes a comparable amount of ABS products.

The statistics for low density polyethylene, a typical commodity material, are significant. Production in the EC rose from slightly above 4.4 million tonnes in 1986 to more than 4.6 million tonnes in 1987. At a little more than 1.1 million tonnes, Japanese figures were virtually unchanged, while US figures - 7.3 million and 8.2 million tonnes - are nearly one and a half times that of the EC and Japan.

The differences between the figures for the EC, the USA and Japan can be explained by the export market and domestic consumption markets. For example, processors in the EC devote a far larger share of their production to components made for domestic consumption than those in Japan and slightly more than processors in the USA. The building and construction industry, which is essentially domestic, is representative. Market shares for EC countries include 25% for Germany, 20% for France, and 20% for the United Kingdom. The market share for the USA is comparable at 18%.

Market share comparisons in the electrical/electronics field reveal the patterns in the same three EC countries, Japan and

## Main Indicators Plastics Processing

| (Million ECU)                  | 1980   | 1981   | 1982   | 1983   | 1984   | 1985   | 1986   | 1987   | 1988   | 1989   | 1990   |
|--------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Apparent consumption (1)       | 24 406 | 24 719 | 27 065 | 29 734 | 32 773 | 34 786 | 36 515 | 38 186 | 39 467 | 40 335 | 40 734 |
| Net export earnings (1)        | +1 723 | +1 894 | +1 913 | +2 101 | +2 372 | +2 746 | +2 501 | +2 593 | +2 723 | +2 832 | +2 943 |
| Total Community production (2) | 28 433 | 29 052 | 31 384 | 34 476 | 37 860 | 40 269 | 40 956 | 42 734 | 44 537 | 46 341 | 48 135 |
| Employment (1 000) (2)         | 566.3  | 538.5  | 522.9  | 517.9  | 526.2  | 536.4  | 552.2  | 558.0  | 563.7  | 569.4  | 575.1  |

1987-90 (estimates and forecast).

(1) EC 10 (excluding Spain and Portugal).

(2) EC 12.

the USA. The figures for the three EC countries are Germany, 15%; France, 5%; the United Kingdom, 10%. This compares with a market share of 13% for Japan and 7% for the USA.

This indicates that the emergence of Germany and Japan as leading exporters of electrical/electronic equipment is reflected in the growth in plastics processing.

### *Production Trends*

Plastics consumption and production has been rising steadily in the EC since 1980. While most of the tonnage has been in the commodity plastics (high density polyethylene, low density polyethylene, polystyrene, polypropylene and PVC), the more profitable growth area has been in engineering plastics where improved grades of such materials as ABS, polyamide (nylon), polycarbonate and thermoplastic polyesters offer attractive margins on relatively low tonnage.

A comparison of applications in a typical commodity material (PVC) with those of a typical engineering material (polyamide) indicates the trend.

For example, PVC tubing production fluctuated sharply starting at 153 000 tonnes in 1984, rising to 160 000 tonnes in 1985, dropping to 150 000 tonnes in 1986 and hitting 165 000 tonnes in 1987. Overall, between 1984 and 1987 growth was a scant 8%.

On the other hand, considerations of weight reduction and design freedom have led to a widespread replacement of metal by engineering materials for automotive components. In 1984, the automotive industry in the EC used some 52 000 tonnes of components made with polyamides (nylons). Volume rose to 57 000 tonnes the following year, to 67 000 tonnes in 1986, and to 71 000 tonnes in 1987; in three years, growth was nearly 30%.

The latest statistics from Germany, the leading EC producer of plastics products and a barometer for the EC, indicate that the plastics processing industry grew 5.3% in 1987 with comparable growth expected for 1988. This compares with GDP

growth of 3.9% for 1987 and projected growth of 2.5% in 1988.

Total production for 1987, estimated at 15 994 million ECU, of which 63% was for domestic consumption and 37% for export. The 1987 increase in export, up by 7.7% is expected to continue its rise in 1988, while domestic consumption is expected to level off.

### *Employment Trends*

Nearly 560 000 persons, about 80% of them production or maintenance workers, are currently employed in the plastics processing industry. While the work-force has remained virtually stagnant throughout the 1980s, and projected increases for the next decade are not likely to be more than an annual rate of 3%, the industry faces a potential problem in finding skilled workers to replace the 60 000 or so who retire or move into other fields, and to fill the 30 000 to 35 000 new jobs created each year. As a policy, training should be standardized so that graduates can work in any EC member country.

### *Major Structural Features*

Sales per production worker are steadily rising with the increasing use of sophisticated control systems, automation and downstream finishing operations. Of the major EC plastics processing countries, sales per employee in the French industry were 73 000 ECU in 1987 compared with 84 000 ECU in Germany and Italy.

One study points out the differences that exist between the processing industries in the EC countries. Italy, with about a third the turnover in plastics products as Germany, has twice as many processing plants, 4 850 compared with 2 014. But the German plants employ 228 000 people, compared with only 101 000 for Italian plants.

The figures for the French processing industry indicate the complexity of national comparisons. With 3 408 processing plants employing 89 376 people, the French industry has a turnover of 7 800 million ECU and sales per employee of 73 000 ECU.

**Table I**  
**Industry Structure**

| 1980                                | 1980   | 1981   | 1982   | 1983   | 1984   | 1985   | 1986   | 1987   |
|-------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|
| Number of companies (1)             | 11 867 | 12 544 | 12 334 | 13 715 | 15 575 | 15 501 | 16 821 | 17 222 |
| Number of employees per Company (1) | 48     | 43     | 42     | 38     | 34     | 35     | 33     | 32     |
| Sales per employee ECU (1)          | 49 565 | 53 444 | 59 914 | 66 490 | 75 553 | 77 092 | 78 962 | 82 156 |
| Average hourly labour cost (2)      | 6.6    | 7.2    | 7.7    | 8.3    | 8.8    | 9.4    | 9.9    | 10.4   |

(1) EC 11 (excluding Greece).

(2) EC 10 (excluding Spain and Portugal). 1980, 1982-1983, 1985-1986 Estimates.

Source: EUTRAPLAST.

**Table II**  
**Turnover and Investment**

| (Million ECU)      | 1980   | 1981   | 1982   | 1983   | 1984   | 1985   | 1986   | 1987   |
|--------------------|--------|--------|--------|--------|--------|--------|--------|--------|
| Turnover (1)       | 26 795 | 27 439 | 29 865 | 32 730 | 37 901 | 39 447 | 41 645 | 43 798 |
| Net investment (2) | 1 423  | 1 307  | 1 432  | 1 781  | 2 001  | 2 362  | 2 525  | 2 688  |

(1) EC 11 (excluding Greece). 1987 estimated.)

(2) EC 8 (excluding Greece, Netherlands, Spain and Portugal). 1987 estimated.

Source: EUTRAPLAST.

The Italian processing industry is composed of a large number of small custom moulders. For example, nearly 98% of the plants employ less than 50 people, compared with 65% for France and only 13% in the Federal Republic of Germany.

At the other end of the scale, the processing industry in Germany is becoming increasingly concentrated in large custom processing and in-house operations, particularly for the automotive, electrical/electronics and appliances sectors. Thus nearly 48% of the German plants employ 100 to 499 people, compared with 15% for France and less than 1% for Italy. Some 22% of German plants employ more than 500 people, including some with more than 1 000 employees. The French figure is 3%, and the Italian figure negligible.

### *Trends in Member States*

The four largest EC producers of plastics products - Germany, France, the United Kingdom and Italy - have shown marked increases in both domestic production and exports.

German production rose by 58% from 1980 to 1986, from 9 618.3 million ECU to 15 196.7 million ECU. With the index year of 1980 set at 100, trade with other EC countries reached 227 in 1980, with an increase in current ECU from 1 941 to 3 381. A similar rate of growth was shown for extra-Community exports, with the index rising from 100 to 226. During this considerable expansion, the number of people employed in plastics rose only slightly from 193 000 to 204 000. Investment in new plant and equipment actually declined from 559.3 to 517.1 million ECU from 1980 to 1982, then rose sharply to 752.8 and 877.8 million ECU in the two following years.

France, with the second largest plastics processing industry in the EC, showed growth of 37% in the 1980-1986 period. EC members are by far France's best market with an increase of 54% during the six-year period, compared with 44% for non-EC countries. The 1986 figures show trade with EC countries valued at 1 072 million ECU while exports to non-EC countries were valued at 599 million ECU. France, however, is a bigger buyer than seller of plastics products in the EC. Imports more than doubled during the period, from 1 040 to 2 180 million ECU. Thus France buys roughly about

twice the amount it sells to its EC trading partners. French purchases of plastics products from non-EC countries are very modest.

With a 36% increase in the value of its products over the six-year period, employment in the French plastics processing industry has actually decreased, from 94 706 to 89 376. Investment in plant and equipment has risen every year except one (1981) during the six-year period, increasing by more than 60%.

The increase in plastics processing in the United Kingdom during the period was the lowest in the EC, with the index rising from 100 to 124 and value of products from 4 814 to 5 970 million ECU. Imports exceeded exports by 2 187 to 1 545 million ECU. The UK's exports to the EC countries exceeded those to non-EC countries, but by the smallest margin of the major EC producers, with 1986 figures of 824 million ECU and 703 million ECU respectively. However, there has been a marked shift in UK exports, from outside to within the EC. In 1980, the value of intra-Community exports amounted to 442.2 million ECU, compared with 614.3 million ECU to non-EC countries. In 1986, the value of exports to other countries were up only marginally to 703.2 million ECU. This marked the first year that the EC accounted for most of export sales.

Employment in the UK plastics processing industry has remained remarkably stable during the six-year period. In 1986 it employed 130 500 people, some 2 500 less than six years earlier. But investment has risen sharply, from 289.4 million ECU in 1980 to 512.5 million ECU in 1986.

Italy has a particularly strong trade balance both within and outside the EC. Exports to EC countries went from 548.1 million ECU to 1 276 million ECU during the period, while imports increased from 447.2 million ECU to 957.1 million ECU. For non-EC countries, the balance is even more favourable; the 1986 figures show that the Italian processing industry sold 758.8 million ECU worth of products and imported only 240.3 million ECU worth. Much of Italian exports go to countries in the Mediterranean area.

**Table III**  
**Production and Foreign Trade**

| (Million ECU)                 | 1980   | 1981   | 1982   | 1983   | 1984   | 1985   | 1986   | 1987   |
|-------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|
| Production                    |        |        |        |        |        |        |        |        |
| Current value (1)             | 28 433 | 29 052 | 31 384 | 34 476 | 37 860 | 40 269 | 40 956 | 42 734 |
| Index                         | 100    | 102.2  | 110.4  | 121.3  | 133.2  | 141.6  | 144.0  | 150.3  |
| Constant value                | 28 433 | 26 204 | 25 982 | 27 096 | 28 337 | 28 839 | 28 851 | 28 910 |
| Index                         | 100.0  | 92.2   | 91.4   | 95.3   | 99.7   | 101.4  | 101.5  | 101.7  |
| Quantities (1 000 tonnes) (1) | 18 240 | 18 111 | 18 320 | 20 198 | 21 335 | 21 945 | 22 959 | 24 064 |
| Imports extra-EC (2)          | 1 282  | 1 455  | 1 698  | 1 927  | 2 432  | 2 690  | 2 646  | 2 840  |
| Index                         | 100.0  | 113.6  | 132.5  | 150.4  | 189.8  | 209.9  | 206.4  | 221.6  |
| Exports extra-EC (2)          | 3 005  | 3 349  | 3 611  | 4 028  | 4 804  | 5 436  | 5 147  | 5 453  |
| Index                         | 100.0  | 111.4  | 120.2  | 134.1  | 159.9  | 180.9  | 171.3  | 181.5  |
| X/M                           | 2.3    | 2.3    | 2.1    | 2.1    | 2.0    | 2.0    | 1.9    | 1.9    |

(1) EC 12: 1987 estimated.

(2) EC 10 Excluding Spain and Greece. 1987 estimated.

Source: EUTRAPLAST.

## Forecasts and Outlook

### *Short-and Medium-term Forecasts*

Recent technological developments in both commodity and engineering plastics processing are changing the structure of the industry. These changes are mainly due to increased automation and improved control systems. These will require considerable capital investment on the part of the processor, resulting in increased productivity without a corresponding increase in the work-force.

Both consumption, based on total tonnage, and value of processed products have risen sharply in 1987 and will continue to rise through 1990. For the EC as a whole, consumption should increase at an annual rate of about 6% through 1990, with sales of plastics products rising by an annual rate of nearly 8%.

In Germany, consumption rose by 4.53%, with per capita consumption reaching 120.8 kg, by far the highest in the EC. With new applications opening up in the automotive and electrical/electronics industries, and with improved packaging film and blow-moulding materials for bottles, the consumption rate should rise by at least 5% in 1988, with subsequent increases from 5%-6% in 1989 and 1990.

Consumption in France should increase more dramatically, mainly on the basis of increased packaging applications. The annual increase of 9% in 1987 should be maintained over the next three years. Annual consumption increases of more than 12% are expected for Spain (12.2% for 1987) on the basis of a continuing industrial boom. It appears unlikely that the United Kingdom will maintain the 10% increase registered in 1987, as high-volume packaging applications are already well-developed.

Sales increases at an annual rate of about 8% are likely for plastics processors in the EC, with increases in sales per employee up at a more modest 4%-5%. Growth rates will vary widely among EC members. For example, Germany's sales increases of 5.2% in 1987 and sales-per-employee increase of only 1.45% should improve only slightly, as both market saturation and operating efficiency are at high levels. At the other end of the scale, Spain's 15.4% sales increase and 15.7% sales-per-employee increase could be maintained in 1988, and continue at about 10% for 1989 and 1990.

### *Long term Forecasts*

Two important developments dominate the plastics processing scene.

Firstly, as equipment becomes more sophisticated, with increased emphasis on robotics and downstream operations, more and more product manufacturers, such as automotive and electrical appliance companies, will integrate plastics processing into the total operation. The new technologies will involve large capital investments, and will require a small, highly trained work-force. These investments will be paid off in three to five years. Thus the long-term (five to 10 years) prospects for profitability are excellent.

Secondly, improved materials and processing technology for multi-layer packaging film and for blow-moulded bottles are opening up new high-volume applications with higher profit margins than those normally associated with commodity plastics. As thin-gauge multi-layer packaging materials with excellent barrier properties begin to replace traditional packaging materials, the percentage growth in commodity plastics could keep pace with that of engineering materials.

The overall outlook for the plastics industry in the next five years is healthy with expansion into markets previously dominated by conventional materials such as metals, wood and ceramics. Substantial investment in new equipment will be translated into higher productivity and larger profit margins. Work-force productivity should rise sharply, with better-paid and more highly skilled employees.

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# FIBRE REINFORCED PLASTICS

(NACE 483)

*The Community fibre reinforced plastics industry produced 772 000 tonnes in 1986 corresponding to a turnover of 11.4 billion ECU. Real growth in the industry has been strong, reaching 12% over 1986 and 8.1% in terms of tonnage. Industry concentration is low and the number of jobs it provides has increased by a third over six years. Sales per employee doubled from 82 000 ECU in 1980 to 162 000 ECU in 1986. This represents a real increase of 12% a year. European production and consumption should increase by 6% to 10% a year over the next five to six years and the long-term outlook is for even faster growth as the compression technique for making medium-range car parts becomes widespread.*

This industrial sector is defined as the manufacture of articles consisting of a thermoset plastic matrix reinforced with long fibres, i.e. l/d 10 000. It does not include thermoplastics with random short fibres (typically a few mm long) reinforcement or inter-penetrating thermoplastic networks.

## Current Situation

The Community industry is already producing 26% of the world total of 3 million tonnes. It is gaining fast on the American industry which produces 29%. Japan's share will remain weak at about the current 9%. Extra-EC trade in this industry is negligible.

The EC market for glass-reinforced plastics (thermoset composites) rose by a substantial 6.5% in 1987 to reach 827 000 tonnes, with an estimated rise to 881 000 tonnes in 1988. This compares with a tonnage increase of 8.1% and 5.2% in the two previous years. The consumption pattern has shown a steady rise from 1981, when it stood at 490 000 tonnes. Since

then there has been an increase every year, with an average annual increase of about 6.5%.

By contrast, the average annual increase in the USA during the period was 4.5% to reach consumption of 905 000 tonnes in 1987, with consumption of 940 000 tonnes estimated for 1988. In Japan, the reinforced plastics market soared from 232 000 tonnes in 1980 to 278 000 tonnes in 1987.

## Consumption Trends

Output of reinforced plastics amongst leading EC producers - Germany, the United Kingdom and France - fall within a very narrow range. For 1986, the last year when complete figures for all countries were available for comparison, the range was between 161 500 tonnes for France, 155 400 for the United Kingdom, 157 700 tonnes for Germany and 121 800 tonnes for Italy.

In Germany, reinforced plastics tonnage rose from 145 800 tonnes in 1985 to 157 700 tonnes in 1986, following two low-growth years. The growth markets are in transportation and in electrical applications. In transport, the share of the reinforced plastics market rose from 25.5% to 30% in two years, while for electrical components it rose from 28% to 30%. The market growth in these two sectors has been accompanied by the growth of compression and thermoset injection moulding, which accounted for 50.9% of the total reinforced plastics tonnage at the beginning of the period and 59.5% at the end of the period.

The evolution of the German industry by process is interesting. In 1978, SMC/BMC (compression and injection moulding) volume was 37 000 tonnes, rising to 65 000 tonnes in 1986. The annual growth rate from 1982 to 1986 was 9%. During the same period, the volume for hand layup dropped from 22 000 to 14 000 tonnes.

## Main Indicators Reinforced Plastics

| (Million ECU)              | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986   | 1987   | 1988   | 1989   | 1990   |
|----------------------------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|
| Apparent consumption (1) / |       |       |       |       |       |       |        |        |        |        |        |
| Total Community production | 4 572 | 4 651 | 5 181 | 7 238 | 8 296 | 9 860 | 11 380 | 13 024 | 14 784 | 16 504 | 18 427 |
| Employment (1 000)         | 55.8  | 48.2  | 48.3  | 60.0  | 63.7  | 65.9  | 70.2   | 74.0   | 77.8   | 81.4   | 84.9   |

(1) There is no significant trade outside the EC.

**Table I**  
**Consumption by User in the EC and the United States**

| EC 12                                   | 1980           |           | 1986           |           | Average annual growth 1986/1980 |  |
|---|----------------|-----------|----------------|-----------|---------------------------------|--|
|   | (1 000 tonnes) | (% share) | (1 000 tonnes) | (% Share) | %                               |  |
| Marine and ships                        | 68             | 12        | 34             | 4         | -8.3                            |  |
| Building and construction               | 107            | 19        | 124            | 16        | 2.7                             |  |
| Consumer products                       | -              | -         | 93             | 12        | N/A                             |  |
| Electrical                              | 99             | 18        | 166            | 22        | 11.2                            |  |
| Pipe, ducts, tanks and industrial parts | 120            | 22        | 138            | 18        | 2.5                             |  |
| Transportation                          | 106            | 19        | 160            | 21        | 8.5                             |  |
| Other applications                      | 59             | 10        | 57             | 7         | -0.5                            |  |
| Total                                   | 558            | 100       | 772            | 100       | 6.4                             |  |

| United States                | 1980           |           | 1986           |           | Average annual growth 1986/1980 |  |
|------------------------------|----------------|-----------|----------------|-----------|---------------------------------|--|
|                              | (1 000 tonnes) | (% share) | (1 000 tonnes) | (% share) | %                               |  |
| Aircraft, aerospace          | 11             | 2         | 14             | 1         | 4.5                             |  |
| Appliance/business equipment | 40             | 6         | 52             | 6         | 5.0                             |  |
| Construction                 | 130            | 18        | 173            | 20        | 5.5                             |  |
| Consumer goods               | 45             | 6         | 55             | 6         | 3.7                             |  |
| Corrosion resistant products | 112            | 16        | 115            | 13        | 0.5                             |  |
| Electrical                   | 68             | 10        | 75             | 9         | 1.7                             |  |
| Marine                       | 125            | 18        | 136            | 16        | 1.5                             |  |
| Transportation               | 136            | 19        | 220            | 25        | 10.3                            |  |
| Other applications           | 36             | 5         | 31             | 4         | -2.3                            |  |
| Total                        | 703            | 100       | 871            | 100       | 4.0                             |  |

Source: GPRMC.

Growth in the French market has been dramatic - from 139 000 tonnes in 1984 to 161 500 in 1986. The 1986 breakdown by industry shows that transport, mainly automobile and truck components, accounted for 35.5% of the tonnage, with electrical parts accounting for 20.5%. This compares with EC market shares of 20% and 21% respectively. Sports and leisure applications, largely in the marine sector, accounted for 11% of the French reinforced plastics market, nearly double the 6% EC market share. Other key factors in the growth of leisure and sport applications include the strong position of the French ski industry in the international market, and the growth of the wind-surfing board market.

Reinforced plastics production in the United Kingdom was virtually unchanged from 1983 to 1984 (at 128 100 tonnes and 126 700 tonnes respectively), then it soared 11.7% to 143 800 tonnes in 1985, 8.3% in 1986 to 155 400 tonnes and the trend continues to be upwards

Italy, the other major producer of reinforced plastics in the EC, saw its production rise from 110 500 tonnes in 1983 to 131 200 tonnes the following year, then drop to 112 700 tonnes in 1985 and rise to 121 800 tonnes in 1986.

### *Factors behind Production Trends*

An increasing number of manufacturers in the EC are replacing such conventional materials as metals and wood with

reinforced plastics (also called composites) to achieve greater design freedom, weight-saving, and improved mechanical strength/weight ratios. While reinforced plastics components include such exotic applications as carbon fibre/epoxy radomes used in the aerospace industry, the great bulk of the tonnage and turnover in the EC involves the use

**Table II**  
**Production by Country**

|                | (% share of tonnage) |      |                                 |
|----------------|----------------------|------|---------------------------------|
|                | 1980                 | 1986 | Average annual growth 1986/1980 |
| Belgium        | 5                    | 6    | 12.5                            |
| Germany        | 22                   | 20   | 4.3                             |
| Spain          | 6                    | 6    | 4.9                             |
| France         | 20                   | 21   | 7.6                             |
| Italy          | 17                   | 16   | 4.1                             |
| Netherlands    | 4                    | 5    | 12.7                            |
| United Kingdom | 20                   | 20   | 6.2                             |
| Others         | 6                    | 6    | 7.5                             |
| Total          | 100                  | 100  | 6.7                             |

Source: GPRMC.

of unsaturated polyester, reinforced with long glass fibres or glass mats to make large parts such as hulls for boats, industrial storage tanks and panelling for the construction and transportation industries.

The oldest and least expensive production method for the moulding of large reinforced polyester parts such as boats and recreational vehicle structures involves hand layup and sprayup processes. A pigmented polyester resin (gelcoat) is applied to a mould (like a paint) and allowed to cure. Then a layer or reinforcement is applied and is saturated with liquid unpigmented polyester and again allowed to cure. The process continues with further layers of reinforcement and liquid resin until the desired thickness has been reached. The process is relatively slow and labour-intensive but it requires little capital investment in moulds or processing equipment, and it produces parts with excellent mechanical properties.

Other manufacturing methods, however, such as processing with sheet or bulk moulding compounds involving considerable investment in presses and dies, now accounts for some 60% of reinforced plastic tonnage.

In one process, compression moulding, a sheet of reinforced plastic is placed on the bottom mould half. The top mould half descends, exerting pressure to form the finished part. This process is used for mass production of such large components as automotive bumpers and dashboards. Bulk moulding compounds are forced into a mould and processed like injection moulded parts.

Other commonly used processes include filament winding for high-performance pipe and hollow components, rotational moulding for containers with capacities as great as 100 000 litres, and continuous lamination for industrial skylights, greenhouses and container liners.

The Western European statistics indicate that the reinforced plastics industry is rapidly changing from labour-intensive to more highly automated production. For example, compression moulding accounted for only 18% of the tonnage in 1970, rising to 36% in 1980, and to 59% in 1986. Industry estimates are that it will top 65% by the end of 1988. The reasons for the increase in this mass production moulding process are not hard to find. Automotive manufacturers are using the process for making grills, opening panels and truck hoods, while appliance and electrical manufacturers find it an effective low-cost method for producing housings.

In contrast, hand layup and sprayup market share has dropped sharply, from 43% in 1970 to 30% in 1980 to 17% in 1986. Some reasons for this drop can be discerned by examining the market share of sports and leisure in the reinforced plastics market, now only 6%. Meanwhile, the market share of transportation (mainly automotive) has risen to 21%. In addition, with faster cycling compression and injection moulding equipment, processors of reinforced plastics are more inclined to invest in expensive dies and processing equipment for increased production efficiency.

## Major Structural Features

The reinforced plastics industry by the standards of manufacturing in general, and in plastics processing in particular, is composed of small companies with a relatively low turnover. This is mainly due to the nature of the industry, for example, the construction of 6 metre boat hulls by sprayup calls for a great deal of painstaking manual labour, long curing times and a level of craftsmanship not encountered in most manufacturing. Curing times are measured in hours and, even in assembly line production of automotive parts, curing times are in minutes.

The best estimates are that a typical North American reinforced plastics processing company has about 80 employees and its EC counterpart about 40. A survey of North American and Western European processors bears out this estimate.

Figures for Western Europe show that 91% of the companies have five or less executives, 64% have five or less technicians, and 76% have five or less administrators. Some 50% of the companies have 15 or less skilled workers, and 30% have 40 or less. Only 10% of all companies have more than 40 skilled workers. Some 69% of these companies employ up to 15 unskilled workers, 21% employ from 16 to 40 unskilled workers, and only 10% employ more than 41.

**Table III**  
**Annual Sales per Employee**

| (1 000 ECU) |     |
|-------------|-----|
| 1980        | 82  |
| 1981        | 97  |
| 1982        | 107 |
| 1983        | 121 |
| 1984        | 130 |
| 1985        | 150 |
| 1986        | 162 |
| 1987 (1)    | 176 |

(1) Estimated.

Source: GPRMC.

North American employment of executives, technicians and administrators is similar to that of Western Europe, but the number of production workers is considerably higher. For example, while 41% of the companies employ up to 15 skilled workers, 32% employ from 16 to 40, 9% employ 41 to 75 and 18% employ more than 75. For unskilled workers, only 5% employ 5 or less compared with 32% for Western Europe, and 40% of the companies employ 41 or more, compared with 10% for Western Europe.

A survey of 210 plastics processors throughout the world showed that slightly more than half had an annual turnover of less than 1.8 million ECU. Some 33 companies had a turnover of more than 5 million ECU, up from 21 and 25 the two

previous years. However, only 16 companies had a turnover of 3 million ECU to 5 million ECU, down from 20 to 25 the two previous years. The greatest concentration is in the 1 million ECU to 3 million ECU bracket, with more than a third of the companies (76). None of the companies had a turnover of less than 70 000 ECU, but 16 had a turnover between 70 000 ECU and 125 000 ECU, and 20 had a turnover between 125 000 ECU and 350 000 ECU.

While no figures are available for the EC as a whole, average annual sales per company for Germany, France and the United Kingdom provide an idea of the typical company size (All figures are for 1985.) Germany has the highest EC average, with 3.5 million ECU, followed by France with 3.0 million ECU. This compares with an average company turnover of 4.3 million ECU in the USA.

For an industry with an annual world output of well over 3 million tonnes, the reinforced plastics industry seems like an anachronism, with the small entrepreneur and his dozen or so craftsmen still playing an important role. The United Kingdom, for example, has 1 075 companies, France 700, West Germany 650, and Italy 640. The figures indicate the differences between the industries in Germany and the UK, with the latter having about 60% more companies despite a slightly smaller population. The UK industry is still heavily based on speciality companies producing components parts in small volume for local markets, while the German industry includes several companies mass-producing automotive and electrical components.

While compression and injection moulding, as well as other automated and semi-automated processes will continue to account for an increasing share of the reinforced plastics market, the small craftsman who relies on hand layup and sprayup will continue to stay in business. But little is expected in the way of technical developments, and production rates will remain unchanged.

The shift to compression moulding, however, involves much more than merely upgrading equipment; it requires large capital investment to enter the field. Few of the traditional hand layup shops are likely to take this step.

Hence growth is taking place in the compression (SMC) and injection (DMC) sectors where automated feeding and parts

removal systems speed up production, and improved composites provide better mechanical control and offer reduced cure times.

## Forecasts and Outlook

### *Medium term Prospects*

Some of the recent developments, disclosed at the European Composites Congress held in Paris in April 1988, indicate the likely trends in reinforced plastics for the next few years. These include improved fabrics and pre-forms for resin transfer moulding, sheet moulding compounds that retain their fibre length during injection moulding, resins with improved thermal and flammability properties, new technologies for composites in the automobile industry, and new ways to reduce blister formation in marine components.

For example, a new epoxy resin for resin transfer moulding permits much faster movement of the resin through the mould to make larger and thicker parts at reinforcement levels of up to 55%. New low-profile polyester resins are now being used for truck inner doors with class A finishes. A new thickening agent for SMC aids fibre length retention in injection moulding, with improving strength of the components. Due to new high-performance SMC, a front end for the Peugeot which weighs between 25 and 30 kg is under development.

With development in materials keeping pace with development in equipment, reinforced plastics producers will continue to make heavy inroads in the construction, consumer goods, electrical and automotive fields, based on weight saving, design flexibility, or both.

### *Longer term Prospects*

Community production of reinforced plastics components, which rose from 558 000 tonnes to 772 000 tonnes from 1980 to 1986, should continue growing at annual rates from 6% to 10% for the next five or six years. The large tonnage breakthrough will be when SMC becomes a standard production method for medium-scale production of automotive body

**Table IV**  
**Trends in Production Value and Volume**

| (Million ECU)                 | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986   | 1987   | 1988   | 1989   | 1990   |
|-------------------------------|-------|-------|-------|-------|-------|-------|--------|--------|--------|--------|--------|
| Current value (1)             | 4 572 | 4 651 | 5 181 | 7 238 | 8 296 | 9 860 | 11 380 | 13 024 | 14 784 | 16 504 | 18 427 |
| Index                         | 100.0 | 101.7 | 113.3 | 158.3 | 181.5 | 215.7 | 248.9  | 284.9  | 323.4  | 361.0  | 403.1  |
| Constant value                | 4 572 | 4 098 | 4 227 | 5 627 | 6 174 | 7 072 | 7 919  | 8 670  | 9 437  | 10 098 | 10 903 |
| Index                         | 100.0 | 89.6  | 92.5  | 123.1 | 135.0 | 154.7 | 173.2  | 189.6  | 206.4  | 220.9  | 238.5  |
| Quantities (1 000 tonnes) (1) | 558   | 490   | 500   | 630   | 679   | 714   | 772    | 827    | 881    | 936    | 990    |

(1) 1987 estimated, 1988-1990 forecast.

Source: GPRMC.

parts. Indications are that this will be by the end of the next decade.

To date, two factors have inhibited the growth of reinforced plastics in this sector: the difficulty in obtaining the top class finish demanded by the consumer, and the low output rates compared with injection moulding of thermoplastics or traditional metal stamping. Both these difficulties are being overcome.

As a result of new developments in materials and processing techniques, it is possible to achieve excellent surface finishes for large automotive parts. State-of-the-art compression moulding systems can achieve a production rate approaching that of injection moulding, although this is still considerably slower than metal stamping.

The advantages of compression moulding over the other two processes make it an ideal system for medium-scale production. The cost of dies capable of producing such parts as automobile fenders is relatively modest. The cost of investment in equipment is considerably less than would be required for an injection moulding machine, since SMC involves the use of long reinforcement fibres, the part is also stronger.

Today, SMC is widely used in truck components, although use by passenger car components is still in its infancy. But all of the major EC automobile manufacturers are developing

SMC components, first for specialized vehicles, then for small- and medium-scale production. Eventually, probably within a decade, these components will be for mass production.

Microprocessor technology will play an increasingly important role in reinforced plastics production, particularly in filament winding. These innovative tools enable product manufacturers to compensate for the higher costs of advanced composites over structural metals by rationalizing the design, production and quality control of structures by exploiting such property advantages as strength-weight ratio, corrosion resistance and electrical insulation. Thus, structures with highly complicated geometries can be produced in quantity at reasonable costs.

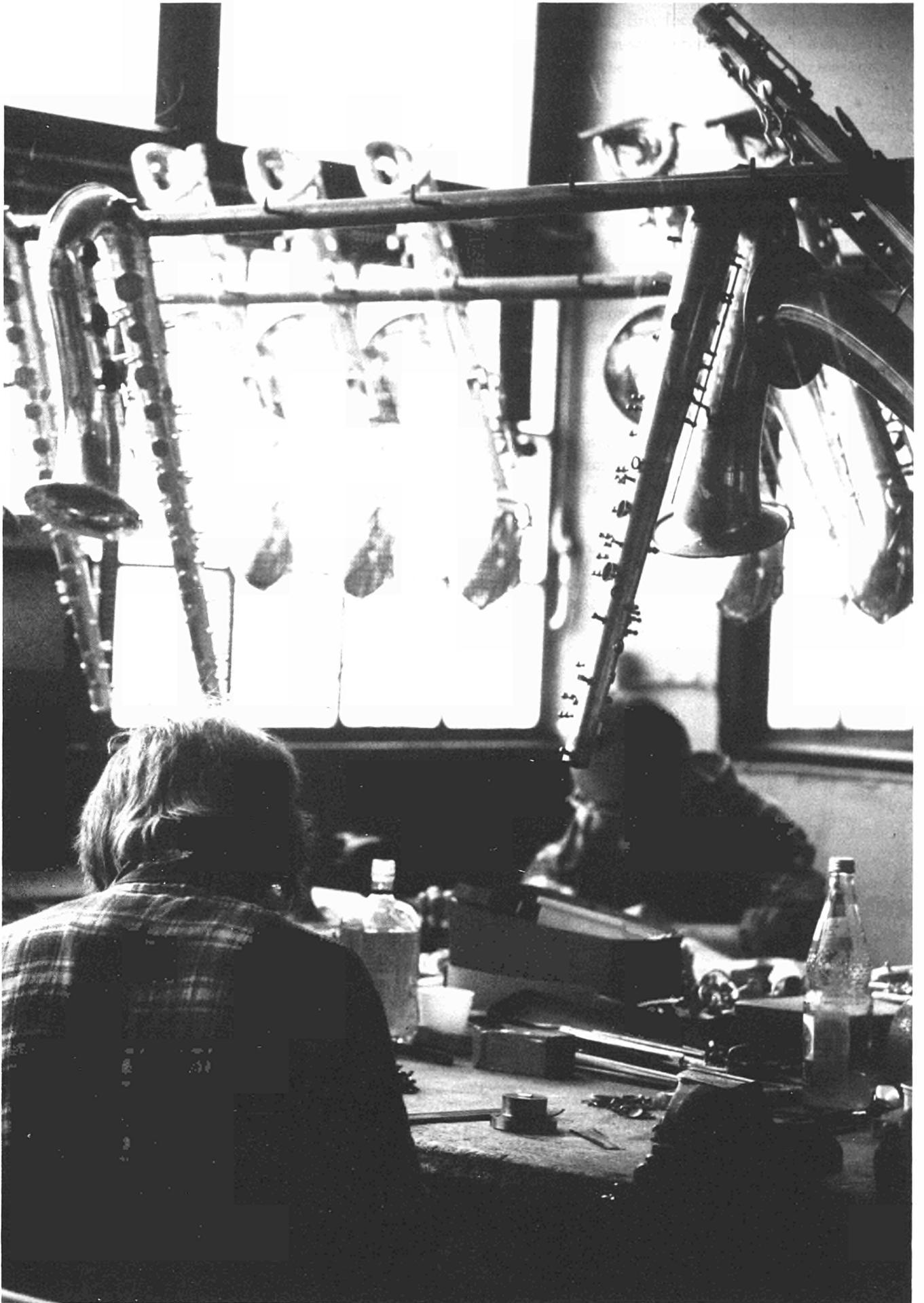
By the turn of the century, reinforced plastics processing will have shed most of its cottage industry image. It will be a highly automated industry producing both specialized reinforcements and commodity components for the automobile, electrical/electronic, marine and sporting goods industries in a variety of thermoset materials.

GPRMC: European Organization of Reinforced Plastics/Composite Materials

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## MUSICAL INSTRUMENTS

(NACE 492)

*There has been an increasing demand for musical instruments in the 1980s as a result of changing lifestyles and the development of musical culture in the general public. Asian imports account in large part for the supply of electronic instruments, which have a fairly large share of the market. Current trends in Community production are likely to continue into the 1990s with the emphasis on traditional, high-quality instruments, the gradual development of electronic instruments and increasing activity in the restoration of old instruments.*

The following products are regarded as part of the musical instruments sector:

- keyboard instruments (such as upright and grand pianos, organs and harpsichords);
- wind instruments (such as oboes, flutes, saxophones, bagpipes);
- string instruments (such as violins, guitars, mandolins, banjos);
- other instruments (such as accordions, percussion instruments, electronic organs, synthesizers);
- accessories and parts (bows, strings, bridges, components for electronic instruments).

This definition includes both traditional instruments, whether early or modern, and sophisticated electronic instruments.

### Current Situation

The Community industry has a large market estimated at 919 million ECU in 1986. However, consumption of musical instruments in the EC remains low compared with that in the United States and Japan. This is certainly due to the fact that the market is made up of individual national markets with specific characteristics, which are still very marked. There is, nonetheless, a trend towards greater uniformity where electronic instruments are concerned.

A volume growth rate of 1% was recorded in the EC market between 1980 and 1986. However, this trend does not necessarily reflect an increase in private music-making, as purchasing an instrument and actually playing it are two very different things. The resale of instruments and the rental market, which are significant in all European countries, must also be taken into account.

Three basic factors are likely to affect the favourable development of the musical instrument market :

- greater purchasing power and changing lifestyles, which have led to a renewed interest in music-making;
- higher enrolment in national music academies and regional music schools;
- an increase in instrument-playing stimulated by more music making in the home, particularly in France and the United Kingdom, and a diversification of outside musical activities as in Germany, Benelux, Denmark and France, where there is a relatively large number of concerts and festivals.

### Main Indicators Musical Instruments

| (Million ECU)              | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 |
|----------------------------|------|------|------|------|------|------|------|
| Apparent consumption       | 630  | 701  | 712  | 752  | 808  | 854  | 919  |
| Net export earnings        | -133 | -191 | -170 | -168 | -173 | -175 | -231 |
| Total Community Production | 497  | 510  | 542  | 584  | 635  | 679  | 688  |
| Employment (1 000) (1)     | 17.7 | 17.0 | 16.1 | 15.6 | 15.2 | 15.0 | 14.9 |

(2) EC 5: France, Germany, Italy, the United Kingdom and Denmark.

**Table I**  
**Production and Foreign Trade**

| (Million ECU)    | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 |
|------------------|------|------|------|------|------|------|------|
| Production (1)   | 497  | 510  | 542  | 584  | 635  | 679  | 688  |
| Index            | 100  | 103  | 109  | 118  | 128  | 137  | 138  |
| Imports extra-EC | 294  | 367  | 355  | 381  | 408  | 429  | 464  |
| Index            | 100  | 125  | 121  | 130  | 139  | 146  | 158  |
| Exports extra-EC | 161  | 176  | 185  | 213  | 235  | 254  | 233  |
| Index            | 100  | 109  | 115  | 132  | 146  | 158  | 145  |
| X/M              | 0.55 | 0.48 | 0.52 | 0.56 | 0.58 | 0.59 | 0.50 |

(1) EC 7 (excluding Benelux, Portugal and Greece which have very low production levels).

Source: Eurostat.

### *Foreign Trade*

In 1986, 49% of the EC musical-instruments market was supplied by EC instrument-makers and 51% by imports from outside the EC. Imports represented only 47% in 1980. EC industries are continually faced with stiff competition from other European countries such as Austria, East Germany and Finland in the field of traditional instruments, and from non-European countries such as the United States and Japan when it comes to up-market, sophisticated instruments. There is also a challenge from Israel, South Korea, Hong Kong and China. Asian countries have succeeded in gaining a firm foothold in the EC market, mainly by selling technically sound products of consistent quality at lower prices.

In contrast, EC manufacturers are not big exporters. Musical instrument exports outside the Community only accounted for 32% of total production in 1980 and 34% in 1986. The EC's balance of trade figures in this area have therefore shown a deficit for several years. The import-export ratio was 0.50 in 1986 compared with 0.55 in 1980.

### *European Production*

With production estimated at 688 million ECU in 1986, the EC ranks third behind the United States and Japan. EC production has actually fallen slightly, dropping by 1% a year between 1980 and 1986. However, the situation varies greatly according to the musical instruments and country concerned.

### *Employment Trends*

In 1986, the Community musical instrument industry included some 180 firms with more than 20 employees. However, many firms, both cottage industries and larger concerns, had gone out of business in the previous six year period as a result of commercial and financial difficulties. The number of people working in the industry fell from 17 700 in 1980 to 14 900 in 1986, which represents a drop of 2.8% a year. The figures vary from country to country, with the biggest job losses in the United Kingdom and France and smaller ones in Germany and Italy.

### *Product Specialization*

National differences loom fairly large in the musical instrument industry for traditional reasons, some of very long standing. Some countries have established a world-wide reputation for particular instruments, for example:

- Germany for upright and grand pianos, violins, hunting horns and harmonicas;
- Italy for acoustic guitars and accordions;
- France for woodwind and brass instruments;
- the Netherlands for pianos;
- the United Kingdom for pianos and electric organs.

In 1986, as in 1980, the bulk of European production comes out of Germany and Italy, which together accounted for 75% of the total value.

### *Main Factors behind the Situation*

In a growing consumer market, the Community's musical instrument industry has failed to establish a firm position and is lagging behind its competitors. There are a number of reasons for this. Firstly, high labour costs are a major handicap for the industry when competing with foreigners with larger, more efficient and more flexible production methods. Secondly, due to the small size of firms and specialization by nationality, musical instrument manufacturers tend to be an individualistic and highly independent breed. As a result, investments in production and marketing tend to be low for the sector as a whole, except for one or two larger companies which have achieved reasonable profitability levels. The case of electronic music is an illustration; investments in the EC grew initially but are still not enough to match the sums laid out by Japanese, South Korean and American firms. Thirdly, because of poor financial resources, the automation of production has also been slow to develop in contrast to the persistent streamlining efforts made in Japan and the United States in recent years. These two countries have achieved large production runs by using computer-aided design and micro-computer and software developments to produce

musical instruments at lower costs. In addition, American and Japanese firms have introduced greater manufacturing flexibility by sub-contracting the manufacture of electronic components. This has given them a further advantage over their European counterparts, for whom this type of flexibility is virtually unheard of.

The EC industry may be outflanked in size and number, but it nevertheless has a number of advantages which a few dynamic firms with good technical and human potential are beginning to exploit. European firms concentrate on products in the top of the market range. This high-quality production implies smaller production runs or even single instruments being made to order and is geared to an experienced clientele rather than the general public. The EC industry, with its specifically national features, also plays an important role in transmitting European musical culture through the instruments it manufactures - baroque flutes in France, pianos and violins in Germany and guitars in Spain.

### *The Position of the Firms*

There are only a few large companies in the EC musical instrument industry. They include:

- Germany: Hohner, Schimmel, Steinway and Sons;
- Denmark: Forbenius and Sønner, Drittel, Daneben;
- France: Selmer, Savarez, Piano de France, Courtois, Promifi;
- Greece: Ecorda;
- Italy: Crumar, Elka, Farfisa;
- United Kingdom: Fletcher, Coppock and Newman, Grainger and Campbell, H. H. Electronic.

### *Structural and Geographical Distribution*

The EC musical instrument industry suffers from two major structural handicaps. To begin with, the industry is fragmented with many small- and medium-scale firms. Only 180

out of 300 firms employ more than 20 people. Secondly, the EC lacks multinational firms similar to those from the United States and Japan. This situation has led to restructuring and mergers in all the EC countries.

Geographically, the bulk of the firms in the industry are concentrated in four countries - Germany, Italy, France and the United Kingdom - which accounted for more than 90% of total EC production in 1986. Some local regions have gained world-wide reputations. These include Paris and Mirecourt in the Vosges in France, Berlin, Bavaria and Baden-Württemberg in Germany and London and in the United Kingdom.

### **Forecast and Outlook**

The EC musical instrument market will continue to grow in volume (1.3%) in 1988 as a result of the growth of music-making by individuals, private groups and military associations. The demand is likely to reflect a gradual return to acoustic music and a steady development of electronic music through new applications.

The medium-term EC musical instrument market should continue to grow in volume up to 1990. Musical-instrument playing by the general public is likely to continue to develop as a result of musical education in schools and special institutions. The trend will be sustained by the spread of public festivals like the midsummer night Fête de la musique in France or private festivals such as rock festivals. However, there is one factor that could adversely affect this development. Consumers will probably become more selective than they have been in recent years in dividing their spending between at-home and outside leisure pursuits, with musical instruments being included in the former.

Imports from Asian countries - Japan, South Korea and Taiwan - are likely to increase in this growth market. Technological advances in electronics coupled with computerization have enabled Japanese firms to develop a strong competitive edge in terms of price and quality compared with other firms in the sector, including EC firms. In spite of certain advantages, the EC musical instrument industry is likely to be faced with a number of difficulties in the next few years, owing to

**Table II**  
**National Specialization**

|                             | BLEU | DK | D | GR | E | F | IRL | I | NL | P | UK |
|-----------------------------|------|----|---|----|---|---|-----|---|----|---|----|
| Keyboard instruments        |      | X  | X |    |   |   |     |   | X  |   | X  |
| Wind instruments            |      |    |   |    |   | X | X   |   |    |   |    |
| String instruments          |      |    |   |    | X | X |     |   | X  |   | X  |
| Other instruments           | X    |    |   |    |   |   |     | X | X  |   | X  |
| Accessories and spare parts |      |    | X |    |   | X |     |   |    |   | X  |

No national production but trade-oriented activity for Belgium.

the nature of its professional structure and its lack of flexibility in responding to the latest consumer trends which favour high-quality, reasonably-priced, all-electronic products. The impact of parallel markets, such as the second-hand piano market, which often distort competition, may also cause problems.

The EC industry can nevertheless consolidate the position it has already achieved and improve its domestic and foreign market positions by organizing an effective development strategy geared to:

- musical research, which is generally led by composers in public institutes, universities and private companies;

- improving distribution channels and sharing out profits more equitably all down the line, especially among distributors and music teachers;
- promoting the design of traditional instruments, especially high-quality instruments, by stepping up staff training programmes at all levels.

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# TOYS

(NACE 494)

*The EC toy industry is presently experiencing difficulties, owing to tough competition from American and Asian manufacturers. However, a policy of cooperation between European manufacturers, enabling them to reach the critical mass required to compete on the international market and a choice of more aggressive development strategies (leadership in traditional toys at the top and middle of the market; development of marginal opportunities in down-market products in order to break into this end of the market) should allow the EC industry to strengthen its position on both the domestic and foreign markets.*

The toy industry has been defined in terms of the following products:

- cars and vehicles on wheels for children, such as pedal cycles, scooters, hobby-horses, pedal cars, dolls' prams and similar toys;
- dolls of all types (made of plastic or other materials), accessories and spare parts for dolls;
- other toys and scale models such as wooden toys, trains and electrical circuits, weapons, projectors and other optical toys, musical toys, model kits, construction games, miniature models made of cast metal, toys for babies and toddlers, figurines, structures with characters, soft toys and all other toys made of plastic, metal, fabrics, rubber and other materials;
- articles for parlour games, such as playing cards, non-electronic board games, table-tennis equipment, billiards, video games.

Coin-operated amusement machines, articles for entertainment and parties and articles or objects used in open-air

games and sports were not included in the statistical survey of the toys and games sector.

## Current Situation

### European Production

With an estimated output of 3.4 billion ECU in 1986 and 1987, the EC 9 is the second largest producer of games and toys in the world after the United States. Production value in Community industries rose 2.6% a year during the 1980-1987 period, but this represented a yearly volume drop of 3%. However, beneath the overall pattern there is considerable variation in development trends from one country to another.

### Consumption Trends

The Community toy industry has a large domestic market which represented some 4.1 billion ECU in 1986 and 4.3 billion in 1987. Apparent consumption of games and toys is however two and a half times lower than in the United States owing to a much lower unit consumption. Also, national market consumption varies according to strongly individual characteristics, although a certain degree of homogenization is taking place.

Whilst the American market has continued to grow, despite large fluctuations, the European market has been slack since 1980, especially in France, Germany and Italy. This is linked to:

- Europe's shrinking child population (9% fewer under-14s between 1980 and 1986);
- stiff competition from other leisure products such as clothes, records, cassettes and travel for the over-10s;

## Main Indicators

### Toys

| (Million ECU)                  | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  | 1987  |
|--------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Apparent consumption (1)       | 3 229 | 3 214 | 3 565 | 3 641 | 3 822 | 3 861 | 4 102 | 4 300 |
| Net export earnings (1)        | -357  | -330  | -441  | -492  | -533  | -531  | -686  | -853  |
| Total Community production (1) | 2 872 | 2 884 | 3 124 | 3 149 | 3 289 | 3 330 | 3 416 | 3 447 |
| Employment (1 000) (1) (2)     |       | 102   |       |       | 81    |       |       | 62    |

(1) EC 9: Belgium, Luxembourg, Denmark, Germany, France, Italy, the Netherlands, Ireland and the United Kingdom.

(2) Excluding Denmark.



- the traditional character of the European market, in sharp contrast to the American and Japanese markets, which are dominated by "fad" toys and electronic games.

However, despite the traditionalism of the European market, "fad" toys have developed a larger share over the last few years. This has led to large foreign multinationals, which are leaders in the fad "toy" segment, gaining a stronger foothold and hampering the development of Community production, which remains essentially traditional.

### *Foreign Trade*

The EC market is basically covered by production from Community countries, which accounted for 83% of apparent toy and game consumption in 1986.

But EC manufacturers are nevertheless having to cope with a strong and rising tide of products from South-East Asia on the domestic market. These represented 70% of total extra-Community imports in 1986 as against 45% in 1980.

The United States is largely responsible for this new flow of goods as American companies, especially the multinationals, have been relocating production plants in the Far East over the last few years.

The Community industry's export capacity represented 42% of production in 1986 (intra- and extra-EC) but its share of non-Community markets remains low (14% of European production). Although the situation has improved slightly, the Europeans only hold a meagre share of the American market which is the most promising in terms of size and growth potential. In 1984 the EC accounted for barely 6% of imports, which altogether make up only 20% of the American market.

The imbalance between imports and exports in EC trade with non-Community countries has created a situation in which the balance of trade represents a structural deficit, characterized by an import-export ratio of 41% in 1986 as against 45% in 1980.

### *Employment Trends*

The EC toy industry counted some 2 700 firms in 1986. A relatively large number of both small- and medium-sized firms in difficulty (10%-25% depending on the country) have disappeared from the scene since 1980, causing a drop in employment levels. Staff reductions have varied considerably from country to country. From 1980 to 1986, they hit as much as 20% to 30% of the sector's workforce in Germany, France and the United Kingdom.

### *Factors behind the Economic Situation*

The difficult situation in which the Community toy industry finds itself can be attributed to the characteristics and trends of the domestic market outlined above. However, a number of other factors which are symptomatic of the state of the industry are also responsible for the weak competitive position of the EC toy industry as a whole.

#### **The small investment capacity of EC companies, linked to their small size**

Lack of financial resources is a basic handicap for European industries in their bid to compete with American and Japanese multinationals in the sector. The problem can be seen at various levels:

- "fad" toys, which represent an increasingly large share of the market, require a large advertising budget, which can be as high as 10% of turnover;
- investment in R&D is a decisive factor in competition. Novelty is becoming a strong selling point on the traditional market as well as on the market for "fad" toys. Innovation is a means for distinguishing a firm's products from the competition in a market where imitation is rife;
- The EC companies' lack of financial weight has limited their ability to go international at a time when the spectacular spread of television has introduced a world-wide dimension into the toy market. This was one of the major trends observed in the 1975-1985 period;
- finally, for lack of financial resources, the EC toy industry runs the risk of lagging far behind the multinationals which dominate the market in production automation. This type of modernization is becoming increasingly important for stock control and cutting material costs which represent 35%-50% of the cost of a toy on markets with large production runs.

#### **The absence of international-scale specialized design firms in the EC**

The lack of such an infrastructure to promote innovation has also curbed the EC toy industry's innovative capacity. In comparison, some 50% of American manufacturers' new products are designed outside the company.

#### **Insufficient production runs**

Owing to the patchwork nature of the EC market and the small size of firms, production runs are too small to be able to benefit from economies of scale comparable to those made by American multinationals which offer a single world-wide range. These extra costs accumulate at different levels: purchase of raw materials (35% to 50% of turnovers), sub-contracting, advertising costs and particularly the cost of television advertising. Undersized production runs also put

a brake on productive investments which could reduce production costs.

### High wage costs in Europe

This is a major handicap for the EC toy industry in relation to foreign competitors, most of whom have relocated to South-East Asia. China and South Korea have become the hub of international sub-contracting, because of the marginal cost of labour in these countries (50 American cents per hour instead of \$16.50 in Germany). The handicap represented by labour costs, which account for about 15% of the ex-works product price in Europe, is particularly penalizing in a sector where assembly operations are numerous and difficult to automate for small production runs.

### Lower production flexibility in the EC toy industry, although the situation is improving

Home-based piece work and national sub-contracting is widely developed in the Community toy industry, particularly in Southern Europe. However, EC manufacturers have very little recourse to international sub-contracting compared with American and Japanese multinationals in the sector, who often have more than 50% of their products manufactured in Taiwan and Hong Kong. There are however clear indications that EC manufacturers are beginning to follow the pattern set by their large competitors.

The flexibility offered by this type of production presents a major advantage for toy manufacturers, who have to deal with a cyclical market influenced by fashion trends.

### Weak international managerial capacity

Ignorance of foreign distribution channels, especially those further afield, is a serious obstacle for small- and medium-sized EC firms with international ambitions. Indeed their marketing approach is much less developed than that of foreign multinationals. Few Community firms now have the capacity to develop a licensing policy or to open up factories abroad.

### Strong points and a viable "traditional" product

Although the EC toy industry suffers from a number of disadvantages compared with its competitors, it nevertheless includes a number of young, dynamic firms capable of holding their own on both domestic and international markets. The success of such firms illustrates the strong points the EC toy industry should be concentrating on which:

- its creativity;
- the quality of its products;
- the ability to transmit European culture through the traditional toys it offers (e.g. educational toys).

There is also room on the international market for marginal production of ordinary, down-market products, an area in which a number of small- and medium-sized EC businesses have operated with some success because of an aggressive marketing policy as well as a combination of flexible production methods and sub-contracting to keep production costs down.

### Characteristics of Firms

Profitability levels have fallen in EC companies specializing in the toy sector since 1980. This is mainly due to a rise in production, marketing and advertising costs, which are difficult to pass on to the consumer because of the strong competitive pressure in the sector.

They tend to have a shaky financial structure due to a lack of equity, associated with a low self-financing capacity which rarely covers more than 50% of financial requirements. Another feature is high short-term debts, linked to the seasonal nature of sales and high financial costs. Financial costs on average represent 3% to 5% of turnovers in EC companies. They remain high because of the strain of seasonal selling on company funds and the lack of equity.

Table I  
Production and Foreign Trade

| (Million ECU)    | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  | 1987  |
|------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Production       | 2 872 | 2 884 | 3 124 | 3 149 | 3 289 | 3 330 | 3 416 | 3 447 |
| Index            | 100   | 101   | 109   | 110   | 114   | 116   | 119   | 120   |
| Imports extra-EC |       | 651   | 653   | 774   | 857   | 982   | 1 033 | 1 166 |
| Index            |       | 100   | 100   | 119   | 132   | 151   | 159   | 179   |
| Exports extra-EC |       | 294   | 323   | 333   | 365   | 449   | 502   | 480   |
| Index            |       | 100   | 110   | 113   | 124   | 153   | 171   | 163   |
| X/M              |       | 0.45  | 0.49  | 0.43  | 0.43  | 0.46  | 0.49  | 0.41  |

EC 9

Statistical definition "Nimexe": 97.01, 02, 03 and 04 (overall)

Source: Eurostat, national professional organizations and BIPE.

## *Major Structural and Geographical Features*

The EC toy industry suffers from two main structural handicaps. The first is the number and diversity of firms in the sector. It is estimated that 80 % to 90 % of the firms operating in the sector on a full-time basis (excluding seasonal activity) employ fewer than 20 salaried workers. The second problem is the absence of multinational firms comparable to American and Japanese groups, with the exception of Lego. This explains why production is so dispersed. The share of the 10 largest companies (national and foreign) is never more than 50% of national production in the EC's main producing countries. The sluggishness of the domestic market and the pressure of competition in the sector have caused a number of companies, even medium-sized ones, to go out of business in the past few years (-10% to -30% in the EC's five main toy manufacturing countries between 1980 and 1984). The industry is highly concentrated geographically. Some 95% of the firms, accounting for approximately 90% of EC production are situated in Germany, Italy, France, the United Kingdom and Spain. Within those five countries the firms are often located in a particular region: Bavaria and Baden-Württemberg in Germany, Lombardy in Italy, the Jura and Rhône-Alpes (Ain) in France, and the Alicante and Barcelona provinces in Spain.

### **Forecast and Outlook**

The sluggishness of the EC toy market will probably persist given the prospect of a further decline in the child population and stiff competition from other leisure products.

However the main problem is the extent to which large South-East Asian companies have penetrated the EC market and the impact this has had on the organization of the sector. This invasion is likely to continue if market access conditions remain unchanged.

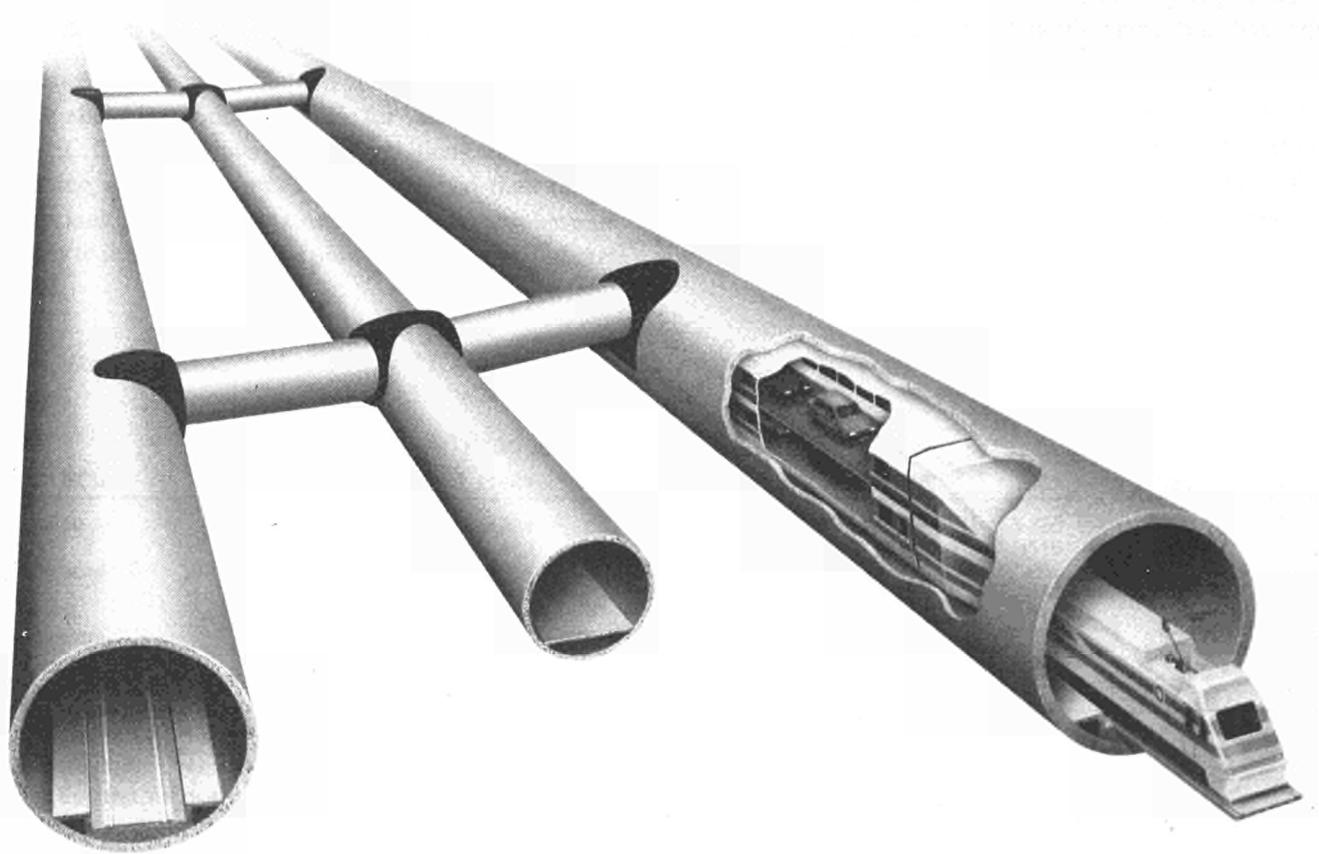
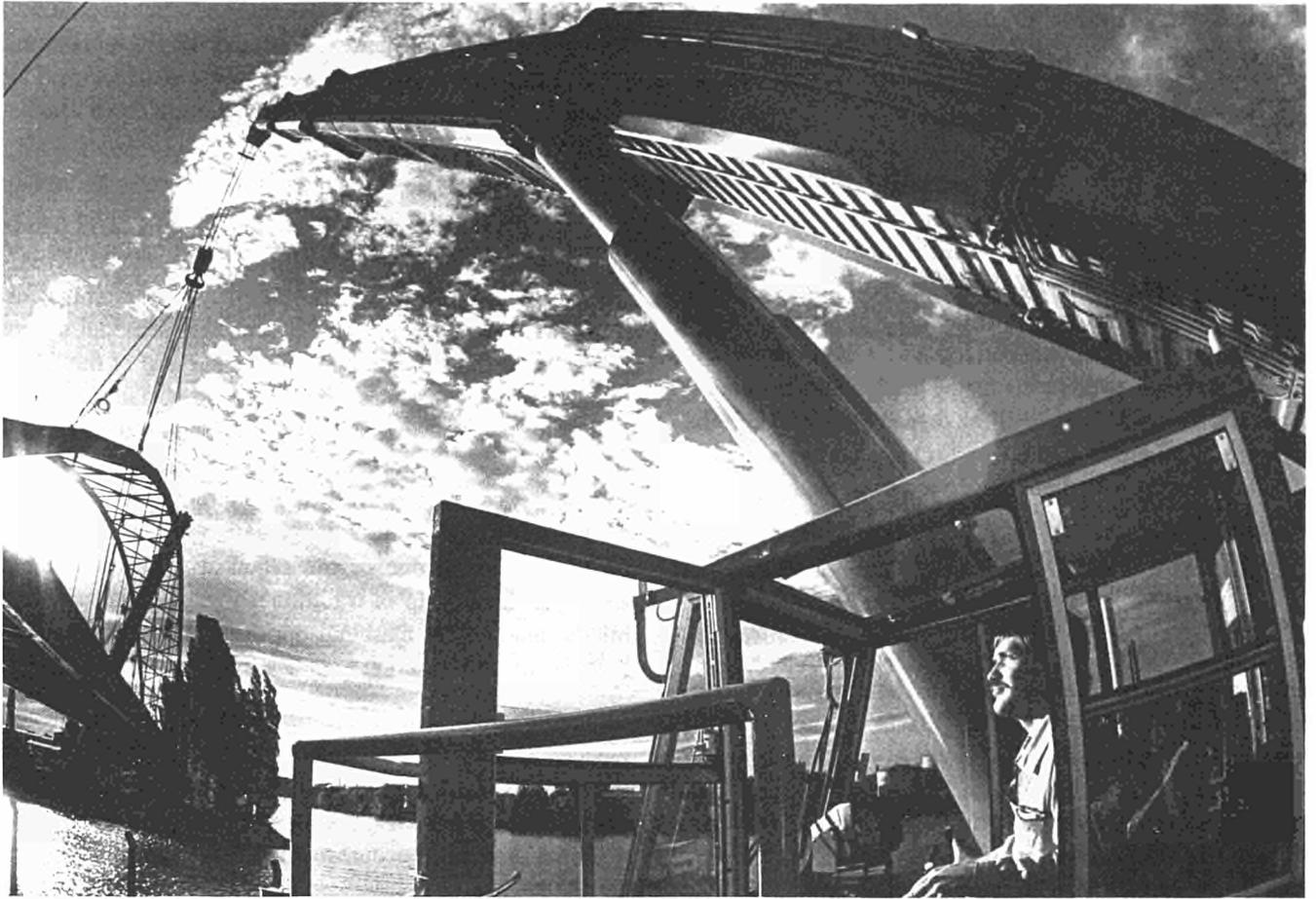
In this case, the present trends in EC toy production can be expected to continue in the short- and medium-term. These include a slowing-down of home production and an increasing shift of manufacturing to South-East Asian countries. Also, firms are likely to diversify into less seasonal leisure products. In this difficult context, the survival of the Community toy industry, which represents an important economic and cultural stake for Europe, will depend on the development of a policy of cooperation between EC manufacturers so that they can reach the critical mass required to establish their position on the international market. It will also depend on their choosing one or the other of two development strategies: leadership in traditional toys in the luxury and middle markets, or marginal opportunist strategies at the bottom end of the market to gain a foothold.

The fact that a number of EC firms have shown the will and tenacity to maintain a strong position on both domestic and international markets suggests that, in spite of the threatening climate, the Community toy industry's development potential should be encouraged.

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## CONSTRUCTION

(NACE 50)

*Construction is a labour-intensive sector and therefore vital for employment. There is some export business but imports are negligible. The industry suffered a steady decline from 1970 to 1985, causing widespread bankruptcies and unemployment. The recovery recorded from 1986 to 1988 remains shaky. Productivity gains achieved in other sectors have by-passed the building industry, making it extremely dependent on State investment policy, demography, savings, home-buying incentive schemes and interest rates.*

The construction industry includes the following six sectors:

- building and civil engineering (non-specialized), demolition
- construction of apartment and office blocks
- civil engineering: road, bridge and railway construction
- installation work
- improvement and renovation
- maintenance, modernization, redevelopment.

### CURRENT SITUATION

In 1985 the construction sector accounted for 53% of total investments and 7% of jobs. In 1987, industry production in the EC was put at 364 billion ECU.

The construction industry as a whole is in a state of decline and has gone through some upheaval in recent years. Between 1970 and 1985 the mean annual variation in added value in the construction industry was -0.6% as opposed to a general variation of + 2.3%. The construction industry's share of the total thus fell from 7.9% to 5.7%. Over the same period, the construction industry's contribution to employment fell from 8.7% to 7% representing a mean annual variation of - 1.5% compared with a general variation of zero. In the seventies about 10 million people were employed in the sector but the figure has now fallen to some 8.5 million. The construction and civil engineering industry's share of

investment per product dropped from 58.8% to 52.6%, representing a mean annual decline of 0.5%, whereas investments as a whole rose 0.9% over the same period.

Production has however increased since 1986 and in 1988 had almost reached the record 1980 level. But it is not clear whether this situation will persist, or if the long-term negative trend will re-emerge. It depends on the way the sector and the various sub-sectors react to the economic policies introduced by the various countries and the specific measures adopted for the sector. The overall recovery recorded in the construction industry in Europe after 1985 covers a whole range of varying trends in the different sub-sectors. Two of these are at present showing an upturn, i.e. the housing modernization sector and the private, non-residential sector. Modernization was at a low ebb until 1982 and then increased 20% in six years. The private, non-residential building sector has developed even faster with 22% growth recorded over five years.

The two sub-sectors which come directly under government responsibility, i.e. public building and works, are still operating below 1980 levels (-6% and -4%) but have improved slightly over the past three years (+ 3% and + 5%). Construction of new housing dropped sharply at the beginning of the decade (-22% in five years) and has since gone into a period of stagnation.

The construction industry cannot take advantage of economies of scale or location as manufacturing can. Each building is unique and must be constructed where it is required and not in the most favourable location. Also, there is no regular or continuous activity. This is why the construction industry has gradually slumped and its products have become more expensive. In the period from 1970 to 1985 apparent productivity of labour rose an average of 0.9% in the construction industry as opposed to 2.3% over the whole of the industrial spectrum, 3.4% in manufacturing, 4.5% in energy production and 4.8% in agriculture. In the same period the implied prices of the gross added value rose 9.4% in the construction industry as against 8.5% across the spectrum and 7.8% in the industrial sector in spite of the fact that capital goods prices increased less.

**Table I**  
**Total Construction**  
**% variation in production volume over previous year**

|                | 1981  | 1982 | 1983  | 1984  | 1985 | 1986 | 1987 | 1988  |
|----------------|-------|------|-------|-------|------|------|------|-------|
| Belgium        | -22.9 | -5.6 | -6.2  | -5.9  | -0.4 | 2.1  | 3.0  | 3.0   |
| Denmark        | -15.1 | 0.4  | 0.7   | 4.9   | 6.7  | 12.6 | 2.0  | -4.5  |
| Germany        | -4.7  | -3.8 | 0.8   | 0.8   | -6.4 | 2.0  | -1.0 | 0.0   |
| Spain          | -2.5  | 0.5  | -2.5  | -5.5  | 0.5  | 5.0  | 6.0  | 7.0   |
| France         | -1.1  | -4.6 | -4.6  | -4.8  | 0.0  | 2.5  | 2.5  | 1.5   |
| Ireland        | 7.0   | -7.0 | -16.5 | -8.0  | -7.0 | -4.9 | -7.7 | -14.2 |
| Italy          | -1.4  | -6.6 | 0.8   | 0.6   | -0.5 | -0.7 | 0.1  | 0.5   |
| Netherlands    | -10.5 | -7.0 | -2.5  | 4.0   | -0.5 | 5.5  | 3.0  | 1.0   |
| Portugal       | 5.4   | 11.5 | -2.8  | -17.9 | -5.8 | 3.0  | 7.5  | 4.0   |
| United Kingdom | -9.5  | 1.6  | 4.2   | 3.5   | 1.1  | 2.7  | 6.8  | 4.9   |
| EC 10 (1)      | -4.4  | -1.9 | -0.6  | -1.1  | -1.3 | 2.2  | 2.5  | 2.0   |

(1) Excluding Greece and Luxembourg.

1987 Estimate.

1988 Forecast.

Source: FIEC.

### *Consumption Trends*

The rise in household incomes has stimulated demand for urban housing, especially in terms of quality and size (better equipped and larger dwellings). This has given impetus to the renovation industry.

The general rise in incomes has increased the demand for:

- second homes, which has been partly satisfied by modernization schemes
- buildings for leisure activities (hotels, holiday villages, amusement parks)
- transport and parking facilities.

In the corporate market demand has grown for higher quality buildings ("smart" buildings) and better facilities.

### *Export Trends*

Despite the recent drop in construction work outside Europe, the European construction industry has always been actively involved in the export field. These contracts are worth several billion ECU a year to the Community industry whereas imports from third countries are virtually non-existent.

However, foreign projects represent only a very small share of total business (about 5%) and concern only a limited number of large companies. This being the case and taking into account the important part played by construction in the Community economy, it is obvious that the industry has a key role to play in terms of the general structure and overall stability of the economy.

**Table II**  
**Construction in the European Community**  
**% variation in production in real terms over previous year**

|                                     | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 | 1988 |
|-------------------------------------|------|------|------|------|------|------|------|------|
| Total building                      | -5.1 | -3.1 | -0.2 | -0.8 | -1.4 | 1.8  | 3.2  | 2.2  |
| of which housing                    | -5.4 | -3.5 | 1.8  | -1.5 | -4.1 | 0.5  | 1.3  | 1.4  |
| new housing                         | -9.3 | -5.2 | 3.4  | -3.8 | -8.8 | -2.1 | 0.3  | -0.9 |
| modernization & maintenance housing | 0.0  | -0.8 | 0.7  | 2.4  | 3.0  | 4.7  | 4.8  | 3.3  |
| non-residential                     | -3.7 | -2.0 | -3.4 | 1.3  | 1.3  | 3.3  | 5.4  | 3.8  |
| non-residential private             | -4.4 | -2.3 | -2.8 | 1.7  | 3.5  | 4.6  | 6.2  | 5.1  |
| non-residential public              | -2.3 | -3.0 | -0.2 | -1.4 | -2.5 | 1.9  | 1.9  | -0.6 |
| Total Civil engineering             | -2.8 | -2.7 | -1.8 | -0.9 | -1.2 | 3.6  | 0.6  | 1.0  |
| Total construction                  | -4.4 | -1.9 | -0.6 | -1.1 | -1.3 | 2.2  | 2.5  | 2.0  |

Excluding Greece and Luxembourg.

1987 Estimate.

1988 Forecast.

Source: FIEC.

## Employment Trends

As construction is not capital-intensive, any money spent on the industry creates five times as many jobs as the same amount of money invested elsewhere.

### Factors Behind Production Trends

The main factors behind production trends are:

#### Government economic policy

This has a direct impact on the demand for non-residential public property and civil engineering works. Budgetary constraint in the early 1980s, aimed at fighting inflation, was one of the factors which led to the drop in construction work and can be regarded as partly responsible for the long-term decline which set in. The general trend, to which some adhere passively rather than actively promote, is to favour public consumption at the expense of investment, which becomes relegated to a secondary position in the economy.

**Table III**  
**Construction's Share in Total Employment %**

|                | 1970 | 1977 | 1985 |
|----------------|------|------|------|
| Belgium        | 8.5  | 8.2  | 5.7  |
| Denmark        | 9.7  | 8.3  | 6.5  |
| Germany        | 8.9  | 8.0  | 7.2  |
| France         | 9.6  | 8.7  | 7.1  |
| Italy          | 10.3 | 8.4  | 7.6  |
| Netherlands    | 10.6 | 9.3  | 7.2  |
| United Kingdom | 6.3  | 6.2  | 6.1  |
| EC 7           | 8.7  | 7.9  | 7.0  |
| Spain          | N/A  | N/A  | 7.2  |
| Luxembourg (1) | 9.9  | 9.7  | 9.9  |
| Portugal (2)   | -    | 9.5  | 10.1 |

(1) = Latter figure in this column applies to 1982.

(2) = Latter figure in this column applies to 1981.

Source: Eurostat, FIEC.

The international economic situation and economic policies pursued by governments affect construction indirectly through, for example, the exchange rate, the rate of inflation, general interest rates and the rate of return on government bonds - to which the construction industry is particularly sensitive - and through various kinds of income and property taxes.

#### Government and Local Authority policies for the sector

The most typical examples are zoning and rent policies which have often had a delaying effect or have even actively dissuaded people from investing in property. There have, however, been a number of incentives which have had the opposite effect on the sector, for example building and renovation bonuses, property acquisition saving schemes, housing grants and tax relief for mortgages.

## Demographic Trends

A number of factors have come into play, for example stagnation of overall population growth, an increase in the number of small households and the decline in internal mobility. The result has been a change in the qualitative nature of demand which existing housing stock can only partially satisfy.

### The Position of the Firms

It is difficult to paint any overall picture of European construction companies, since there are hundreds of thousands of them, varying in size, location and activity sub-sector.

One stark fact is that a lot of firms, especially in the medium-sized range, went out of business during the crisis which hit the sector in the first half of the decade, and that the overall structure of the sector underwent a general shake up as a result.

Construction has not recovered pre-1980 levels in the Community as a whole and has remained well under them in a number of countries such as Ireland (-49%), Belgium (-31%), Germany (-12%) and France (-9%). This has given rise to fierce competition in the sector with often dangerously low bidding prices, creating serious and sometimes disastrous financial problems for the firms concerned.

In addition the drop in solvent demand for construction work in developing countries has aggravated the financial situation of exporting companies, causing them to fall back on, and thereby increase competition in, their home markets.

**Table IV**  
**% Mean Annual Employment Increase**  
**(in Construction and in All Industries)**

| Country        | Construction |       | All Industries |       |
|----------------|--------------|-------|----------------|-------|
|                | 85/70        | 85/77 | 85/70          | 85/77 |
| Belgium        | -2.7         | -4.8  | -0.1           | -0.3  |
| Denmark        | -2.0         | -2.4  | 0.7            | 0.7   |
| Germany        | -1.6         | -1.3  | -0.3           | 0.0   |
| France         | -1.8         | -2.5  | 0.2            | -0.1  |
| Italy          | -1.5         | -0.7  | 0.4            | 0.5   |
| Netherlands    | -2.7         | -3.4  | -0.2           | -0.3  |
| United Kingdom | -0.5         | -0.6  | -0.1           | -0.3  |
| EC 7           | -1.5         | -1.6  | 0.0            | 0.0   |
| Greece         | N/A          | N/A   | N/A            | 1.1   |
| Spain          | N/A          | N/A   | -1.2           | -2.2  |
| Ireland        | N/A          | N/A   | 0.1            | -0.1  |
| Luxembourg (1) | 1.0          | 0.5   | 1.0            | 0.1   |
| Portugal (2)   | N/A          | 1.8   | N/A            | 0.3   |

(1) = 1982/1977 in place of 1985/1977.

(2) = 1981/1977 in place of 1985/1977.

Source: Eurostat, FIEC.

**Table V**  
**Variation in the Volume of Construction Business per Country (% variation over previous year)**

| Country        | 1981  | 1982 | 1983  | 1984  | 1985 | 1986 | 1987 | 1988  |
|----------------|-------|------|-------|-------|------|------|------|-------|
| Belgium        | -22.9 | -5.6 | -6.2  | -5.9  | -0.4 | 2.1  | 3.0  | 3.0   |
| Denmark        | -15.1 | 0.4  | 0.7   | 4.9   | 6.7  | 12.6 | 2.0  | -4.5  |
| Germany        | -4.7  | -3.8 | 0.8   | 0.8   | -6.4 | 2.0  | -1.0 | 0.0   |
| Spain          | -2.5  | -0.5 | -2.5  | -5.5  | 0.5  | 5.0  | 6.0  | 7.0   |
| France         | -1.1  | -4.6 | -4.6  | -4.8  | 0.0  | 2.5  | 2.5  | 1.5   |
| Ireland        | 7.0   | -7.0 | -16.5 | -8.0  | -7.0 | -4.9 | -7.7 | -14.2 |
| Italy          | -1.4  | -6.6 | 0.8   | 0.6   | -0.5 | -0.7 | 0.1  | 0.5   |
| Netherlands    | -10.5 | -7.0 | -2.5  | 4.0   | -0.5 | 5.5  | 3.0  | 1.0   |
| Portugal       | 5.4   | 11.5 | -2.8  | -17.9 | -5.8 | 3.0  | 7.5  | 4.0   |
| United Kingdom | -9.5  | 1.6  | 4.2   | 3.5   | 1.1  | 2.7  | 6.8  | 4.9   |

(1) 1987 Estimate.

(2) 1988 Forecast.

Source: FIEC.

### *Major Structural Features*

In this industry companies tend to be small. About 80% of construction firms in EC countries have less than ten workers. They are widely dispersed over the territory due to the distribution of demand over every region and social class. They have a greater than average impact on employment and economic development (1.5 to 2.0 times greater according to country).

### *Trends in Each Member State*

It is difficult to describe what has happened in each sub-sector in the different Member States of the EC. However construction trends vary considerably from one country to another as is shown in Table V. It is nevertheless interesting to note that construction has developed most in countries where there were grave deficiencies in this particular sector.

## **Forecasts and Outlook**

### *Short Term Forecasts*

Signs of growth in the EC construction industry have been confirmed in 1988 for the third year in a row. However the growth rate for 1988 is expected to be slightly lower at 2% than for the two previous years because of the reduction in new construction and non-residential public building.

After falling 10% over the period 1981-1985 and increasing 3.6% in 1986, investments in civil engineering projects are again at the stagnation point.

The countries predicting growth in the construction industry in 1988 are Spain (+7%), the United Kingdom (+4.9%), Portugal (+4%), Belgium (+3%) and France (+1.5%). In Germany and Italy the level of business should remain unchanged, while reductions are expected in Denmark (-4.5%) and especially Ireland (-14.2%).

There is not enough data at this stage to predict trends for 1989. The present positive climate may persist with a growth rate of between 1% and 2%.

### *Medium Term Forecasts*

It is difficult to make medium-term forecasts in this sector because of its dependence on government policy in the various countries and also because it is hard to know whether renewal of growth since 1986, the first such growth in fifteen years, will be any more than a temporary phenomenon. However it can reasonably be expected that growth in the construction industry will persist but at a much slower than average rate.

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# HOUSING

(NACE 501)

*The Community housing sector has been in decline since the early 1980s. The sector is widely dispersed throughout the Community with many small-scale firms. There is practically no intra- or extra-EC trade. The short- and long-term macroeconomic outlook for the sector is good and towards the end of the decade it could once again attain the level of activity registered in 1980.*

The activities of the housing sector comprise such products as newly built or renovated dwellings as well as services like the management, maintenance and financing of dwellings. Hence, this sector is involved in construction for sale to owner-occupiers, for renting and for various forms of shared ownership.

This sector produces and manages the consumer product with:

- the largest diversity of fashioning and equipment, comprising not only its intrinsic qualities but environmental and neighbourhood effects as well
- the lowest degree of geographical mobility, imposing on-site-production on the one hand and causing an enormous number of various independent sub-markets on the other
- the largest extent of financial requirements, claiming by far the largest part of the indebtedness or of the disposable income of private households
- the highest degree of temporal immobility, given the especially long life time of this product. This may tie down its initial usage for a very long period of time may - often as a disadvantage - but is the reason for its value most of all for private households.

These particular circumstances entail specific evolutionary and cyclical factors influencing the development of the

housing sector as compared to other consumer goods industries in general and to other building sectors in particular.

That is why the corresponding statistical units, i.e. house-building enterprises and local units, differ similarly from enterprises operating in non-residential building sectors, most of all by their specifically consumer orientated products and ancillary activities.

As the evolution of the housing sector depends heavily on the nature of the output of its products and of its specifically consumer orientated ancillary services, the purposes of inquiry and analysis require appropriately classified data to show the participation of the housing sector in the economic process of the EC. Such distinguishing data cannot be obtained using the NACE groups or subgroups.

## Current Situation

The specific traits of the housing sector and its pattern of development can be drawn from the character of its products and markets. Their large diversity of fashioning and equipment gives rise to a heavily structured volume of production in quantitative as well as in qualitative perspectives, which differ largely from one country to another. This disrupts any analysis based on pure quantitative comparison of volume figures within a country as well as within different countries.

As the structures and requirements of fashioning and equipment of dwellings change swiftly, the repercussions on the state and development of the housing sector may not show up in unstructured volume production figures. Their geographical immobility means on-site production with its constraints on production processes. This also gives rise to a large self-employed production, which should be left out of volume production figures in industrial surveys. As nearly all national statistics include the self-employed production of houses and dwellings in different proportion, these can hardly be used for comparison or aggregation.

## Main Indicators Housing

| (Thousand dwellings)                 | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  | 1987  |
|--------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Overall new residential construction | 1 607 | 1 695 | 1 653 | 1 808 | 1 772 | 1 557 | 1 476 | 1 355 |

Italy excluded in 1980, and Greece, Ireland, Luxembourg and Portugal excluded in 1981 and 1982; Ireland and Luxembourg excluded in 1986, and Greece, Ireland and Luxembourg excluded in 1987.

On the other hand, the high degree of geographical immobility multiplies the number and variations of sub-markets, subdividing national housing markets into a heterogeneous pattern of production, pricing and trade cycle dependence. As a consequence, an industrial survey of the EC housing sector can rarely offer an overall view without indicating the qualitative differences of these sub-markets, which mostly are not interconnected, not even within national boundaries. Their large financial requirements result in a more decisive impact of the cost of product financing as compared to the production costs of the housing sector.

Normally the main distinguishing indicators and factors which account for the development in other industrial sectors - such as productivity, production costs, labour relations and technological innovation - have much less effect in the housing sector as compared to the costs of financing. Thus, a relative increase in interest rates has nearly the same impact on the overall annual burden to the disposable income, e.g. of an owner-occupier, as a similar increase in overall production costs or the purchasing price in total. The difference is that the latter costs rarely drop, but the impact of financing costs fluctuates according to the economy and the effects of legislative and fiscal action.

In the same way, the evolution of interest rates also influences the propensity to undertake maintenance and repair activities more intensively than do the costs of such activities. The development of the housing sector is thus more closely linked to trends on the financial markets, which may also be the origin of the main internal and external constraints.

Their especially long lifetime qualifies the products of the housing sector to be used as consumer goods as well as serving as private long-term investment assets. That is why, in the long run, the development of the housing sector is also influenced by the prospects of alternative investment assets.

### *Production Trends*

The volume of production of the housing sector in the EC has dropped to its lowest level since the beginning of this decade as far as new residential construction is concerned. This downward trend occurred in most of the member countries of the EC with interruptions at different intervals. This can be followed up by the evolution of the figures for overall new residential construction, which generally show a slight improvement since 1987. As these data also include non-commercialized dwellings, for example, those constructed by self-employed owner-occupiers, no exact report can be given on the state of the industrial production of the housing sector. In addition, the statistical basis is only more or less reliable because of the different degrees of illicit activities in this sector. In the extreme, as is the case in some parts of Italy,

more than half of the stock of new dwellings have been constructed illicitly over the last decade.

Estimates derived from changes in the pattern of production in market shares of distinct sorts of products and their evolution indicate an ongoing downward trend of the industrial production in the housing sector. Due to the low degree of geographical mobility of the products of this sector, the highlights in the regional and national pattern of production balance the overall production only to a small extent, thus barely affect the overall national or European level of production.

This evolution was most significant in Germany, Italy and Ireland, where, only half of the 1984 volume of completed new residential construction will be achieved in 1988. An increase of new residential construction may be possible only in Belgium, Spain and Portugal. This shrinkage in production is mostly due to the downturn of State subsidies for new residential construction or public building. Only rehabilitation and modernization work on existing residential buildings continue to expand in nearly all countries of the EC. In some of them, the volume of these activities already equals that of new residential construction. The amount of this kind of production cannot be identified exactly as the statistical units are not yet sufficiently defined. That is why the statistical results showing the evolution of rehabilitation and modernization activities in different countries - as far as they exist - can neither be compared nor aggregated.

The production of the housing sector is most commonly divided into individual and collective residential buildings, that is single-family houses as compared to flats (as rental houses or houses of shared ownership). The proportions of these kinds of products are quite different in individual Member countries of the EC and develop differently. In Belgium, Denmark and Germany, 70% to 85% of the new residential construction are single-family houses, whereas this sector represents only about 35% in Italy. In these countries the proportion of single-family houses is still increasing. This proportion is at about 60% in UK and France and has just begun to diminish, giving rise to a larger construction of flats.

The evolution of these proportions is decisive as to the part the industrial production can play within the construction of houses in total and which kinds of firms may participate in the markets of the housing sector. This can be followed up by the extreme cases of the evolution in France and Germany. In France, a steady growth in the volume of collective housing can be reported from 1985 up to the present time with its benefits to the industrial production of housing, whereas in Germany, the downturn in new residential construction is mostly due to the abrupt shrinkage in the construction of flats, especially for rental purposes. In Germany, the forecast is for an almost complete stoppage in the construction of rental housing. Such contrasting developments in the housing

**Table I**  
**Overall New Residential Construction**

| (Thousand dwellings) | BLEU | DK | D   | GR  | E   | F   | IRL | I   | NL  | P  | UKTotal |       |
|----------------------|------|----|-----|-----|-----|-----|-----|-----|-----|----|---------|-------|
| 1980                 | 49   | 30 | 363 | 103 | 263 | 378 | 28  | N/A | 110 | 41 | 103     | 1 468 |
| 1987                 | 27   | 25 | 195 | N/A | 180 | 308 | N/A | 270 | 105 | 40 | 205     | 1 355 |

Source: UECL.

sector are not brought about by changes in productivity, production costs or technology, as in other industrial sectors. The particular distinguishing factors of the housing sector have to be analysed more specifically.

### *International Comparisons*

The participation of foreign firms in the production of the housing sector is marginal regarding imports as well as exports. Most countries, therefore, confine their national statistical enquiries to the imports and exports of construction materials, without any indication of imports or exports of the housing sector and its products. The reasoning for this form of statistical enquiry and analysis is based on the fact that the "exported" products of the housing sector are finished and put in place abroad, and thus are not "national" production. In consequence, the firms operating in this manner are regarded as foreign firms with foreign production. For better statistical analysis, the external performance of such firms should be differentiated as to the extent of their external value-added content, created by internal management, manpower, machinery and materials.

As to the production of the housing sector at world level, comparison can only be made with other national markets, not with the external performance of other countries. The most comparable market evolution is that of the US housing sector, where recent population and economic growth has initiated the largest increase in housebuilding ever experienced over a 10 year period. About 17% of today's housing stock was built in the last ten years. This increase was concentrated on single-family houses mostly on the fringe areas of existing urban areas. To a considerable degree, rehabilitation activities were orientated at core areas, where older houses in well-located neighbourhoods were changed into shared ownership.

A comparison of the overall level of production of the housing sectors of the U.S. and the EC cannot be drawn exactly, as housing units should be compared to dwellings. With a level of housing construction at 1.6 million private housing units and 0.2 million mobile homes, the per capita production of the U.S. housing sector can be considered as nearly double that of the EC.

### *Employment Trends*

Employment conditions in the housing sector can hardly be appraised by the national statistics of the member countries as they do not distinguish the housing sector from the rest of the construction sector.

In addition, the large variety of firms working in this sector make it difficult to conceive its labour conditions. To a large extent, the employees and manual workers of the sector are employed by very small firms. The firms often operate in varying degrees with independent subcontractors or self-employed workers. A large number of firms do not limit their activities to the housing sector but also carry out other construction work.

Even the hourly labour costs cannot always be deduced from the direct contractual payments and the social security contributions, as voluntary payments can vary largely in relation to regional disparities in the development of the construction sector; at present this is especially the case for the southern parts of England.

### **Forecast and Outlook**

The overall prospects for the housing sector in the EC can only be delineated by taking into consideration the specific national and regional developments in the member countries. In general, the following macro economic conditions as well as the specific key factors are favourable for the housing sector nearly everywhere:

- solid rates of economic growth
- continued growth in real earnings
- pressure to keep real interest rates down
- favourable tax reforms
- shortages of dwellings in the most dynamic parts of the EC.

The expected development of the overall new residential construction may thus attain its 1985 level of production in 1989. The estimated figures include the non-commercialized production of owner-occupiers. Given a growing proportion of single-family and detached houses, this could mean a

further decline in the overall commercialized production of the housing sector.

Such general estimates conceal the regional and qualitative disparities as they are outlined in this report, disparities

which may be particularly stressed by changes resulting from the opening of the single European market.

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# INDUSTRIAL ENGINEERING

*The EC industrial engineering sector is the world leader; exports are substantially higher than those of the United States and Japan. However, they are operating in a stagnating market, due principally to a reduction in demand in the Third World. The creation of the single market in 1992 should favour activity in this sector, particularly in the spheres of public infrastructure and environmental projects.*

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In general terms, the plant maker has the responsibility for ensuring the creation and fulfilment of industrial investment projects or of collective infrastructures. It is, therefore, a mixed activity comprising a manufacturing aspect.

The definition of the plant maker and the technical scope of his sphere of activity makes it difficult to class the main groups in the NACE classification. This classification system does not represent the business or development of this complex sector. Taking this particular situation into account, in 1970 the "European Committee of Plant Makers" introduced a uniform and clear method which is comparable to the annual survey on the number of large contracts gained by the member firms of the national associations affiliated to the European Committee. These statistics are now considered to be representative of this sector in the EC.

However, to define the main industrial sectors directly relating to the plant-making business, the main groups of economic activities in the EC are listed below:

NACE 31 - Manufacture of Metal Structures;

NACE 32 - Construction of Machinery and Mechanical Equipment;

NACE 34 - Electrical and Electronic Construction;

NACE 37 - Medical-surgical Equipment.

Historically, the plant-making sector established itself at the beginning of this century. The first large contracts were completed in foreign markets and mainly in the developing countries of that period and in different sectors, which at that time were eager to enter new technology fields developed by Western countries. This trend towards technology transfer particularly affected the following basic industries: steel, metallurgy, mining, chemicals and fertilizers, cokeovens, glass, textiles and food as well as activities relating to the public sector. The latter category includes railways, hydro-electric and thermal power generating stations. This cycle of

investments sharply declined under pressure from the international situation, but soon recovered again in Europe after the Second World War.

The European industry's desire to improve its competitiveness in new products and reduced costs caused them to look for technical, economic and financial means capable of optimizing their situation. In the glass industry, the manufacturing process involving float glass was developed in 1959, and completely revolutionized the industry, which gradually converted to this method by making the necessary investment.

Technological advances were astounding: new improved methods were perfected and diffused world-wide. An international commission set up research and development programmes with favourable results. The fertilizer industry was also affected, and started rationalizing when natural gas was discovered in Italy, France and the Netherlands. From 1955, the oil and petrol industry invested heavily in expanding its refining capacity in most European countries and from 1960 began diversification mainly into the petrochemical sector.

The use of new raw materials or by-products led to a wide range of new products such as plastics, synthetic fibres, synthetic rubbers, detergents, and ammonia and nitrogenous fertilizers. Each of these products gave birth to a new industry and sometimes led to profound changes in the old production framework.

The sugar refinery industry became very concentrated following a series of mergers. The treatment of sugar beet was automated to the maximum and the daily capacity of processing sugar beet was greatly increased due to technological improvement of installations for the continuous extraction of sugar juice. Stocking capacity was improved as a result of the development of storage silos which could hold up to 60 000 tonnes of sugar.

This period of re-industrialization in Europe which continued until 1970 in several EC countries had a major impact on European plant making which, during this time, developed numerous new technologies and improved its expertise in organization and contract management which will increase its value in the future. During this long period, Europe was the main market for contractors. However, from as early as 1960, a sizeable business was growing in the young developing countries and from 1970 this market became very important for several EC countries.

At present, the plant-making sector is very diversified and its importance for each Member State is related to its

industrial power. The geographical location of the sector tends to be more concentrated in large industrial zones. Of 170 plant makers within the EC, nearly 50% are concentrated in Germany, France and Italy, while Greece and Ireland have none.

Among the main plant-makers in the EC are: Davy Corp, Fiat Impresit, Mannesmann Anlagenbau, Saipem, SPIE-Batignolles, Technip, Lurgi, l'Air liquide, Ansaldo, SNAM-Progetti, Coutinho, HKD Humboldt Wedag, Siemens, Abay, Focoex and CGEE-Alsthom. The position of European companies especially within the EC is strong and stable. However, in 1987 Japanese competition in the European market was keenly felt. However, the European order book still represents 16% of total orders originating from the European market.

### *Export Trends*

Since 1980, the world contracting market has declined, with the exception of 1982 when there was a slight peak. In 1980, the whole market was estimated at 77.6 billion ECU, rising to 125.5 billion in 1982 and decreasing to 86.6 billion ECU in 1987. The main factors explaining this downward trend are linked to the slump in the oil producing countries, whose development plans were cut due to the fall in the price of crude oil, as well as to the heavy debts of developing countries and the instability of exchange rates.

The value of contracts won on foreign markets by German, French, Italian and Belgian plant makers in 1987 is estimated at 11.5 billion ECU and their market share at the international level has expanded despite the downward trend of the market.

At the international level, the market was shared between European companies (40%), American companies (24%) and the Japanese (13%).

### *Employment Trends*

The economic and social weight of this sector is very strong; it represents almost 240 000 people. However, there has been a slight decrease in employment since 1980, due to the combination of two main factors: a transfer of the activities of several large mechanical and electrical construction companies to newly industrialized countries and the sluggish world demand which caused a reduction in employment. An example of this is in Germany where the plant-maker sector employed 106 000 people in 1980, 95 000 in 1981 and 80 000 in 1987. This trend was also experienced in other EC countries and, in the medium term, a continuing slight decrease is expected.

### *Geographical Features*

In recent years competition has increased from contractors originating from countries such as Argentina, South Korea, India, Brazil and Turkey. These are countries which have already achieved their first industrial development. They compete for contracts in the developing countries and the Middle East, especially in the area of civil engineering and public works, while aiming for entire plants in the areas of less developed technology.

The number of contracts decreased between 1980-1987 and this continued decline in the market corresponds to fundamental structural changes in the international hierarchy. The value of orders for industrial plants reached 61 billion ECU in 1986 with the Japanese share standing at 7.5 billion ECU or 12.6% of the market. Only 20% of this figure represented foreign orders; the remaining 80% were realized on the domestic market. Exports of industrial plants by the Japanese are tending to decline as a proportion of total Japanese activity; in 1981 they represented 50%. Decreases were mainly concentrated in the Asian and Middle Eastern market, while very few contracts were won elsewhere. The appreciation of the yen partly explains this performance. This situation led to a decrease in the number of workers: for the 25% of main Japanese companies, the number of workers fell from 140 000 in 1981 to 120 000 in 1986 and could decrease even further in the short term to 112 000 people.

In the United States, the industry was confronted with similar difficulties over the last few years, but the large American engineering firms took steps to avoid the negative effects of the crisis. The impact was softened due to their highly specialized technology and relative independence of the Third World market. Outside of the United States, these companies are particularly active in the European and Middle Eastern market.

American engineering companies are among the world leaders, including the Bechtel Group, M. W. Kellogg, Foster Wheeler, Parsons, Brown and Root, and Lummus Crest. However, they are closely followed by European companies. Japanese engineering companies are also ranked alongside the Europeans, for example Mitsubishi Heavy Industries, Toyo Engineering, Kobe Steel, Chiyodo Corp, Takenaka Corp, Mitsui Engineering and Shipbuilding, and JGC Corp. Among the other engineering companies which have attained an international ranking are Toubro and Larsen-India and Daewo Corp, Hyundai Engineering and Construction of South Korea.

### *Structural Features*

The responsibilities entrusted to the plant maker by the investor can be large, complex and involve high risks. In its simplest form, it may be a "procurement" responsibility only.

In the mid 1960s, the "turnkey" form of contract was widely used. It implied total responsibility on the part of the contractor who was expected to supply not only technology, equipment and its installation in correct working order, but also to complete the preliminary engineering work and general technical services. From 1973 the "product in hand" contract obliged the contractor to assure the continuous operation of installations and also to train the owner's personnel, that is, to provide the necessary professional and technical training for the correct working order of installations. In the context of extending his responsibilities, the main contractor was forced to accept more and more technical risks.

The plant maker had to fulfil three main tasks:

- technological - to inform the owner of the technology required to complete the project (this pre-supposes that the plant maker has the necessary technological expertise and a knowledge of the design and construction of machinery and production systems as well as its adjustment to local operating conditions);
- project management - a responsibility to ensure the best combination of the key success factors such as planning, coordinating and completion of the project in terms of cost, deadlines and handover of the whole plant to the owner, whose qualitative and quantitative performance should meet the terms of the contract;
- financial capability - a sufficient knowledge of financial engineering.

The structure of plant maker firms can be split into three main types. Firstly, there is the general contractor or coordinating engineering; these firms do not generally have any specific technical expertise - they obtain this from the market. In addition, they do not perform the function of constructor of equipment, but they are often skilled in technical negotiating, organizing and coordinating projects where they provide the management and delegate different tasks such as civil engineering, process equipment and assistance from specialized firms. On the other hand, they often have knowledge of finance for engineering and may rely on a finance group who can finance the project with favourable terms. This type of contractor emerged in the 1970s.

The second type of firms is the plant maker with own technical know-how; some industrial groups using original technological procedures have undertaken the geographical transfer of their technology. This policy of training in technological methods permitted those who gave out the qualifications to indirectly increase their share of the market and to develop technological innovations under the best conditions.

Finally, there are the manufacturing concerns; some large European heavy equipment manufacturers were induced to develop the additional functions of plant makers to respond to market demand. This phenomenon occurred particularly

in the iron and steel, metal, chemical, cement, and electricity production industries. Thus, the construction contractor performs a complex job which includes providing varying proportions of top level technology closely linked to the business of construction. The aim of this is to complete an investment project, generally "turnkey".

Plant makers in Europe vary greatly in size according to the category in which the plant maker can be classified. Generally these firms are medium-sized, but some manufacturing concerns often employ more than 1 000 people. This is particularly true in mechanical construction, boilermaking, electrical and mechanical engineering.

Plant makers must sustain a constant research and development policy in order to maintain competitiveness in their field. To master procedures, they must discover how to optimize their ability as entrepreneurs, especially at the level of contract management; this is one of the key elements for the successful execution of these contracts, especially when the project is in a foreign country where institutional, political and administration problems are difficult to master.

Negotiation of a turnkey contract is a long, complex and highly risky process. Initially, it relies on an intention or a decision to invest and it is often preceded by market surveys and feasibility studies, technical procedures and geographical location evaluation, all intended to allow the investor to make the best decision. The drawing up and negotiation of these contracts implies an in-depth knowledge of the local monetary problems of exchange and financial transfers. Currently, the conclusion of a complete contract in a developing country often requires three years of negotiations. The setting-up of these contracts - which is the moment when the investor receives the down payment - frequently requires a year. This situation involves a considerable increase in negotiation expenses and reduces the profit margin for the plant maker.

## Forecasts and Outlook

### *Short-term Forecast*

In the short term, the outlook is not especially good. Investment in developing countries will slow down even more, as long as their debt burden problem is not solved. The decrease in oil revenues will also negatively affect the process plant market chiefly in Middle Eastern countries.

Moreover, the continued drop in demand reflects a much deeper structural change in the market. For a few years, EC engineers have been aware of this development and are reviewing possible changes in their structure to meet market requirements. Large projects have been disappearing recently and are being replaced by small-size projects.

Negotiations are longer and financial risks increase while profit margins are shrinking.

For 1988-89, EC plant makers expect a quantitative stabilization in their order books. Re-shaping of some production activities with a slight decrease in the labour force can also be expected.

### *Medium-term Forecast*

For the next five years, the prospects remain quite favourable. The unification of the single market in 1992 has caused numerous commentators to consider that Community plant makers will take advantage of this situation. The prospects for public infrastructure projects as well as projects from the

private sector seem very positive. As a result, EC engineering companies are convinced that they must concentrate their activities more on the Community market and less on export markets.

However, for exports, they will have to geographically relocate their market and concentrate more on the Asian and OECD countries, developing their markets in new technology and high-tech activities such as environmental protection.

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## WHOLESALE AND INDUSTRIAL DISTRIBUTION

(NACE 61)

*The wholesale trade in Europe is undergoing an important transformation. The demand for semi-skilled services in warehousing and transport is diminishing, but electronic commerce and developing international trade are creating new opportunities which offer attractive prospects to those wholesalers who are able to make the necessary investment. These developments have led to increasingly sophisticated competition within a widening range of product lines. Data processing and training are key factors in the response of wholesalers to the rapidly evolving challenge of changing market conditions.*

The last 20 years have seen profound developments in the distributive sector; there has been a transformation of the structure, and to some extent also the function, of the wholesale trade. The General Industrial Classification of Economic Activities within the European Community defines wholesale distribution as follows: "This class includes units exclusively or primarily engaged in the resale of goods in their own name to retailers or other wholesalers, to manufacturers, to users, including craftsmen, or to other major users. The goods can either be resold in the same condition or after undergoing ... processing, treatment, packing or repacking. Generally speaking the latter's role involves, on the one hand,

the storing of goods and, on the other, taking title to and/or having the right to dispose of the goods in question".

This definition reflects the traditional role of the wholesale trade as suppliers of warehousing and transport services, with particular emphasis on the bulk supply of consumer goods to the retail trade, and of raw materials and other bulk goods to industry and agriculture. A number of interrelated developments in the structure of distribution make it increasingly difficult to define the frontiers between wholesaling and other commercial activities and to a large extent this definition of the wholesale trade is no longer accurate. (The latest edition of the US Department of Commerce's "Industrial Outlook" reflects the same problem of definition.) Existing statistics on the wholesale trade in the Member States of the European Community need to be treated with great caution since they may or may not include such related commercial operations as:

- traditional wholesalers also involved in retailing or retail-like activities (e.g. retailers' cooperative buying operations, wholesaler-owned retail chains, and "cash and carry")
- mail order and telemarketing operations
- the sales offices and/or subsidiary distributors of manufacturing companies

**Table I**  
**Distribution as a Proportion of GDP (1)**

| (%)            | 1980        | 1981        | 1982        | 1983        | 1984        | 1985        | 1986        |
|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Belgium        | 15.0        | 14.5        | 14.5        | 14.9        | 14.7        | 15.4        | 16.9        |
| Denmark        | 14.2        | 14.1        | 14.1        | 15.0        | 14.9        | 15.4        | 15.4        |
| Germany        | 12.1        | 12.1        | 11.6        | 11.9        | 12.0        | 11.6        | 11.4        |
| Greece         | 12.8        | 12.8        | 12.5        | 13.1        | 13.0        | 13.0        | N/A         |
| Spain          | 14.7        | 14.9        | 14.6        | 14.8        | 15.0        | 15.2        | N/A         |
| France         | 13.2        | 13.5        | 13.1        | 13.4        | 13.5        | 13.3        | 13.5        |
| Ireland        | 10.2        | 10.8        | 11.0        | 10.2        | 10.4        | N/A         | N/A         |
| Italy          | 16.3        | 16.1        | 16.1        | 15.8        | 15.8        | 16.2        | 16.2        |
| Luxembourg     | 15.2        | 16.0        | 16.1        | 16.1        | 15.5        | 15.9        | N/A         |
| Netherlands    | 13.3        | 12.9        | 12.9        | 12.8        | 12.8        | 12.9        | 13.2        |
| Portugal       | 17.9        | 18.5        | 18.2        | 17.8        | N/A         | N/A         | N/A         |
| United Kingdom | 11.7        | 11.6        | 11.6        | 11.9        | 12.5        | 12.1        | 12.4        |
| <b>Total</b>   | <b>12.7</b> | <b>12.7</b> | <b>12.5</b> | <b>12.7</b> | <b>12.8</b> | <b>12.5</b> | <b>12.4</b> |

(1) Recovery, repair, wholesale and retail services as percentage of gross value-added at factor cost.

Source: Eurostat National Accounts ESA.

**Table II**  
**Share of Distributive Trades in Total Employment (1)**

| (%)            | 1980        | 1981        | 1982        | 1983        | 1984        | 1985        | 1986        |
|----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Belgium        | 10.4        | 10.2        | 10.0        | 9.9         | 10.0        | 10.1        | 10.2        |
| Denmark        | 8.9         | 13.5        | 12.9        | 12.6        | 12.6        | 12.8        | N/A         |
| Germany        | 11.5        | 11.3        | 11.0        | 10.8        | 10.9        | 10.8        | 10.7        |
| Greece         | 4.9         | 5.1         | 4.8         | 5.0         | 5.0         | 5.2         | 4.9         |
| Spain          | 8.0         | 7.7         | 7.6         | 7.4         | 7.2         | 7.1         | 7.4         |
| France         | 11.5        | 11.4        | 11.4        | 11.5        | 11.4        | 11.3        | 11.3        |
| Ireland        | 11.6        | 11.5        | 10.9        | 10.6        | 10.8        | 11.0        | 11.0        |
| Italy          | 7.6         | 7.7         | 7.8         | 7.7         | 8.0         | 8.1         | 8.2         |
| Luxembourg     | 16.4        | 16.9        | 16.9        | 16.9        | 16.9        | 17.5        | 17.1        |
| Netherlands    | 12.6        | 12.5        | 12.2        | 11.9        | 12.0        | 12.1        | 12.2        |
| Portugal       | 6.1         | 6.6         | 6.7         | 6.6         | 6.7         | 6.8         | 4.9         |
| United Kingdom | 15.5        | 15.1        | 14.9        | 14.9        | 15.0        | 15.0        | 15.0        |
| <b>Total</b>   | <b>10.9</b> | <b>10.6</b> | <b>10.7</b> | <b>10.6</b> | <b>10.7</b> | <b>10.7</b> | <b>10.4</b> |

(1) Employment in trades, restaurants and hotels as a percentage of total civilian employment.

Source: *Eurostat Review 1977-86*, pp. 106 & 114.

- commercial agents and other suppliers of distributive services who facilitate trade without necessarily taking title to the goods traded.

Mainly because of definitional problems there are no useful statistics covering wholesale distribution for the Community as a whole. The brief overview that follows draws, in particular, on a survey of wholesaling prepared in 1985-87 by a group of expert officials from national administrations and on a number of authoritative commentaries relating to the wholesale trade in individual Member States.

The incomplete figures given in Tables I and II for value-added and employment in the distributive sector as a whole within the Community are based on data collected by the SOEC (Eurostat). They suggest that economic activity in the distributive trades over the last 10 years has grown at a rate broadly comparable with that of the economy as a whole. Although there is little reliable evidence, it seems that the

growth of commercial activities other than retail shopkeeping (i.e. wholesaling broadly defined) may have been rather more rapid than that of the retail trade.

However, this positive picture for the wholesale trade overall is the result of a combination of opposing trends.

### Current Situation

The traditional role of the wholesalers as the link between manufacturers of consumer goods and the retail trade has been sharply eroded by the rapid development, especially in northern Europe (see the section on retail trade) of large vertically integrated retailing operations supplied directly by manufacturers.

As a result of these pressures, which were sharply accentuated by the cyclical downturns in commercial activity in the mid-1970s and early 1980s, many traditional wholesalers have gone out of business. At the same time, however, other firms (perhaps between one-third to one-half of the businesses concerned) have succeeded in adapting to the changing economic environment. Successful survival strategies have included productivity improvements, diversification, and specialization.

Improved productivity has been achieved by investment in transport, mechanical handling, and above all the application of data processing to stock management. In particular, the introduction of bar code scanners and electronic point of sale (EPOS) terminals make it possible not only to maintain stocks at an optimum level, but to monitor on a day-to-day basis the profitability of each product line. Links with suppliers and customers rely increasingly on electronic data interchange, and integrated national EDI networks for commercial purposes (e.g. TRADNET in the UK, DIS in the

**Table III**  
**Employment in the Wholesale Trade**  
**by Member State, 1986**

| (1 000)        |                |
|----------------|----------------|
| Belgium        | 158.0          |
| Denmark        | 138.1          |
| Germany        | 914.9          |
| Spain          | 244.8          |
| France         | 813.3          |
| Ireland        | 38.5           |
| Luxembourg     | 7.9            |
| Netherlands    | 269.6          |
| United Kingdom | 914.6          |
| <b>Total</b>   | <b>3 499.4</b> |

Source: Eurostat, *Employment and Unemployment, 1988*.

Netherlands, MERCATIS in France) are under development in most of the advanced countries of the Community. At a Community level the European Numbering Association is working with the Commission on the development of an international EDI network for the distributive trades.

A considerable degree of diversification has occurred, especially into retailing in the case of wholesalers of consumer goods, but also into the supply of business services including marketing, financial services, transport (including import-export documentation) and product-related consultancy. A recent German study found that nearly half the firms surveyed were engaged in activities in addition to traditional wholesaling.

Specialization may take a number of forms. One approach is to specialize in a particular product category (e.g. alcoholic and soft drinks, gardening supplies, tobacco), but to carry an increased range of competing lines; this involves an active purchasing and importing policy. Another approach is to target a specialized category of customer, for example, schools, caterers, petrol stations. A third is for specialist importers to develop their own design and marketing capacity - designing and selling concepts to retailers, and then using their specialist knowledge of purchasing opportunities worldwide to identify the best sources for manufacture.

### *Industry Structure*

A common feature of these strategies is that they are not in general available to the very small firms, often family businesses, which traditionally formed the backbone of the wholesale trade. Data for the early 1980s presented in a 1985 study by the EC Commission showed that a very small minority of larger firms accounted for a strikingly disproportionate share of turnover; in Germany, for example 4% of firms, those with payrolls of 50 employees or more, accounted for 51% of total employment and 55% of total turnover in the sector as a whole.

National studies based on more recent data provide strong indications that this trend towards larger firms, serving larger geographical areas, has continued and, indeed, accelerated in the more recent past. It appears that the departure of many small firms from the market in the face of changing commercial conditions has reinforced the process of innovation and specialization in the field as a whole; surviving firms inherit enlarged markets, and are offered the opportunity to acquire dying businesses on favourable terms.

Thus, despite a general contraction of the wholesale trade in consumer goods, a significant proportion of businesses have demonstrated that the retail sector as a whole has a continuing need for the specialized wholesaling services such as warehousing, stock control, and purchasing expertise. Despite the general trend towards vertical integration of trade in consumer goods, there is a continuing strong demand for

wholesale services; this is particularly the case for goods which have special storage requirements (e.g. fresh and frozen foods), or where product innovation and growing international trade give rise to keen competition, both on price and quality, and hence to a wider product range than many retailers can handle (e.g. household chemicals, home maintenance materials, wine and tobacco).

### *Industrial Distribution*

Traditional wholesale activity also plays an important role in the supply chain within the industrial sector, particularly in relation to the supply of raw materials and chemicals. Here, too, though perhaps to a lesser extent, the same sort of pressures have operated as improved transport facilities, and the development of sophisticated methods of stock management (just-in-time techniques) have encouraged the development of direct links, including electronic data interchange (EDI) between purchasers and suppliers.

However, while these traditional warehousing and transport functions are experiencing continuing commercial pressure and contraction, the overall size and scope of the wholesale sector is growing as wholesale activities penetrate upstream into the field of industrial distribution. To a significantly greater extent than in the US (and in some respects than in Japan), the marketing and distribution function in European industry is still fully integrated in the corporate structure of manufacturing firms. Nevertheless, there is an unmistakable trend towards the "externalization" of the distribution function.

This process typically involves three stages. In the first stage a firm wishing to improve its penetration of a widening geographical market creates a network of dispersed sales offices and depots, which nevertheless remain fully controlled by the headquarters' marketing department. In the second stage the dispersed sales network acquires a greater or lesser degree of autonomy, operating its own accounting system and in some cases acquiring a separate legal identity from its parent company. At this stage there may already be scope for the semi-independent distributor to buy in goods and services related to his main product line from sources other than the parent company; one motive behind the current sharp increase in cooperation agreements, mergers and takeovers across national frontiers appears to be the possibility for manufacturers of complementary product lines to share a common sales network. In the third and final stage distributors become wholly independent, and may operate like traditional consumer goods wholesalers, pursuing active buying policies, and carrying a range of competing product lines from different manufacturers.

Available statistics show that trading in industrial machinery is the largest single source of employment in the wholesale trade, as well as the most rapidly growing sector. One recent

UK study suggests that around 75% of new jobs "created" in the wholesale sector arise simply from the re-classification of activity that has been externalized by manufacturing firms.

Only where trading in industrial goods develops to the third of these stages is it really appropriate to describe the enterprise as an independent distributor. This type of merchant wholesaling in industrial goods is still the exception rather than the rule; it is perhaps strongest in the case of machinery used in a very wide variety of small firms, for example agricultural machinery, small and standardized machine tools, and office equipment. An interesting feature which emerged from the EC Commission's 1985 study is that productivity, crudely measured by the ratio of turnover to employment, is significantly lower among wholesalers in industrial goods than in the wholesale trade in general. This appears to reflect the fact that industrial "wholesalers" are still, on the whole, closely integrated with their manufacturing base and are as much suppliers of know-how and consulting services related to their products as of traditional wholesale services.

### Forecast and Outlook

The outlook for the wholesale trade over the medium term is not easy to assess. Closer integration between manufacturers, retailers, and industrial customers based on the continuing development of EDI networks seems likely to continue to squeeze the traditional wholesale trade. On the other hand, the completion of the internal market will require both industry and commerce to place a greater emphasis on competitive purchasing and marketing strategies Community-wide. Increased specialization and cheaper and quicker transport links across frontiers will encourage trade in fresh and frozen foods, and will create an incentive for traders to handle a larger product range; both these developments will create new opportunities in areas where wholesaling services have demonstrated their resilience.

At the same time, increased specialization in industrial goods will mean that it will be essential for manufacturers to obtain immediate access to markets throughout the Community, and in the case of all but the largest firms this will increase the demand for distributive services. Effective exploitation of the internal market will require the development of an inte-

grated continental distribution system for industrial goods of the kind that exists (though in very different forms) in Japan and the USA. It remains to be seen whether the upstream penetration of traditional wholesaling, described above, can form the basis for the internationalization of the distribution of industrial goods or whether, alternatively, such services can be more effectively supplied by specialized purchasing and marketing agencies operating through their exploitation of knowledge based on EDI.

Note on statistical tables:

The figures, drawn from material published by Eurostat, need to be interpreted with great caution. They are not based on harmonized definitions, and form no basis for inter-country comparison. Some examples of the difficulties of definition relating to the wholesale trade are given at the beginning of this contribution.

In particular the wide discrepancy, for some Member States, between the share of distributive services in GDP (Table I) and their share in employment (Table II) cannot be adequately explained on the basis of differences of definition between countries. These discrepancies also arise from the fact that employment figures (Table II) are drawn from national employment and social security sources, in which the methodology differs significantly from those of the National Accounts statistics (Table I). A more consistent picture emerges from the employment figures contained in the National Account statistics, but these are not available for all countries.

Eurostat are involved in a major exercise to improve coverage of the service sector in general, including the distributive trades.

Based on a study by national experts, and after consultation with FEWITA and FTA, prepared by:

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# RETAIL DISTRIBUTION

(NACE 64/65)

*The performance of the retail trade was poor during the early 1980s, as real personal incomes declined. More recently countries have again experienced growth in retail sales. Reorganization in the structure of retail business has been evident in many countries particularly as a response to technological developments in data processing and communications technology. The single market is expected to provide business opportunities for the retail trade, both in terms of markets and supply sources within the Community; marketing skills and new technology will be essential factors in these developments.*

Retailing is defined as sales through all retail outlets, fixed or mobile, and including car sales and mail order sales.

The nature of retailing varies greatly from country to country depending on economic background, geography and culture.

## Current Situation

In the period 1980-85, real growth in retail sales was experienced in Denmark, France, Italy, Portugal and the UK; in Luxembourg and Spain, retail sales were static whilst in the remaining five Member States sales declined in real terms. Even these countries have experienced growth more recently.

Consumer spending has been a major source of economic growth during the period of recovery in Italy, the UK and Germany, where wages have risen faster than inflation. Similarly, growth experienced in Spain has been consumer-led, especially since Spain's accession to the Community in 1986.

However, in France the rate of increase in consumer spending has been very low due to a decline in real wages.

## Current Trends

The proportion of consumer spending accounted for by retail sales varies between 40% and 75%.

In 1984, retail sales accounted for more than 50% of consumer spending in eight of the present 12 Member States (the average for the whole EC was 52.5%). Although the number of Member States with retail sales accounting for more than 50% of consumer spending has risen, retail sales as a percentage of consumer spending is generally declining.

Increases in personal disposable income cause shifts in the pattern of consumer demand; an increased proportion of income is spent on luxury items and the emphasis of retail sales changes from essentials such as food, clothes and household items to non-essential luxury items and consumer durables; with increasing affluence consumer demand shifts to the non-goods sector i.e. services and leisure activities.

A significant trend in many Member States where disposable income has increased is the rise in new car purchases.

While the largest Member States provide, of course, the largest retail markets, the absolute size of this market does not correspond to relative GNP. Thus Germany and France are almost equal at 218.6 and 216.9 billion ECU, followed by Italy with 172.7 and only then the UK at 150.8 billion. Per capita sales were highest in Luxembourg at 4 291 ECU, followed by France, Denmark and Belgium.

**Summary Table**  
**Retail Sales 1980-85**

| (Million ECU)   | 1980           | 1981           | 1982           | 1983           | 1984           | 1985           |
|-----------------|----------------|----------------|----------------|----------------|----------------|----------------|
| Belgium         | 32 300         | 33 200         | 33 200         | 32 600         | 33 700         | 35 400         |
| Denmark         | 13 200         | 14 200         | 15 200         | 16 800         | 18 100         | 19 600         |
| Germany         | 165 600        | 173 200        | 184 200        | 198 300        | 212 700        | 218 600        |
| Greece          | 11 100         | 12 900         | 14 200         | 14 200         | 15 700         | 15 100         |
| Spain           | 53 100         | 60 300         | 66 400         | 65 100         | 69 600         | 72 400         |
| France          | 156 300        | 174 800        | 185 900        | 190 300        | 201 400        | 216 900        |
| Ireland         | 4 600          | 5 400          | 5 900          | 6 200          | 6 400          | 7 000          |
| Italy           | 103 400        | 107 700        | 123 900        | 140 000        | 164 300        | 172 700        |
| Luxembourg      | 1 400          | 1 600          | 1 600          | 1 700          | 1 700          | 1 800          |
| Netherlands     | 31 800         | 32 100         | 35 400         | 37 200         | 37 600         | 38 400         |
| Portugal        | 8 000          | 10 100         | 11 100         | 9 900          | 9 700          | 10 000         |
| United Kingdom  | 100 000        | 116 400        | 125 000        | 128 800        | 139 000        | 150 800        |
| <b>EC Total</b> | <b>680 800</b> | <b>741 900</b> | <b>802 000</b> | <b>841 100</b> | <b>909 900</b> | <b>958 700</b> |

Source: Euromonitor.

**Table I**  
**Retail Sales Volumes at Constant 1980 Prices**

| 1980=100       | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  | 1987  |
|----------------|-------|-------|-------|-------|-------|-------|-------|-------|
| Belgium        | 100.0 | 95.4  | 96.9  | 95.3  | 95.2  | 96.7  | 100.8 | 100.2 |
| Denmark        | 100.0 | 99.4  | 101.1 | 102.7 | 105.8 | 107.0 | 109.9 | 106.2 |
| Germany        | 100.0 | 98.3  | 94.8  | 95.6  | 96.1  | 96.8  | 100.1 | 103.7 |
| Greece         | 100.0 | 96.7  | 92.7  | 92.2  | 96.2  | 93.8  | 91.3  | 96.2  |
| Spain          | 100.0 | 102.0 | 103.0 | 107.0 | 101.0 | 100.0 | N/A   | N/A   |
| France         | 100.0 | 98.7  | 99.3  | 96.4  | 92.0  | 90.5  | 91.5  | 90.9  |
| Ireland        | 100.0 | 99.4  | 94.0  | 90.7  | 89.4  | 91.0  | 90.5  | 89.3  |
| Italy          | 100.0 | 100.1 | 99.8  | 98.9  | 100.6 | N/A   | N/A   | N/A   |
| Luxembourg (1) | 100.0 | 103.9 | 108.7 | 103.3 | 101.1 | 100.8 | 103.6 | 108.6 |
| Netherlands    | 100.0 | 96.4  | 93.6  | 91.8  | 89.3  | 89.7  | 91.9  | 94.6  |
| Portugal       | 100.0 | 113.0 | 116.0 | 103.0 | 92.0  | 109.0 | N/A   | N/A   |
| United Kingdom | 100.0 | 100.2 | 102.1 | 107.4 | 111.3 | 116.4 | 122.6 | 129.8 |

(1) Estimates.

Source: Eurostat.

In some Member States retailing is an important source of foreign exchange, due to spending by tourists. It is also an important contributor to many other sectors of the economy apart from the consumer goods manufacturers, including the construction industry, commercial vehicle manufacturers, transportation, packaging and information technology.

### *Employment Trends*

Retailing is a very important source of employment in all of the Member States. It also provides many part-time jobs, which are often particularly attractive to women; in 1984, nearly 60% of all retail employees in the Member States were women.

In 1984 the average percentage of part-time retail employees was 23.9%. However the average is reduced by Greece and Portugal, which have very few part-time workers. Part-time employees account for more than 30% of all retail em-

ployees in the Netherlands, Denmark, the UK, Germany and Belgium.

A general trend has emerged away from full-time to part-time workers: in Germany, the number of full-time employees has been falling whilst the number of part-time employees has been increasing.

For the young, the retail business offers a number of levels of entry: at 15 or 16 as a school-leaver, to work as a shop assistant; at 17-18 with higher educational attainment, entry to management training schemes; and finally, as a university graduate, joining a graduate training scheme.

The sector provides considerable training in various forms. It is most organized in larger outlets and multiples, but is also important in the smaller and independent stores where the emphasis may be upon on-the-job learning. In the UK and Denmark, retailers have played an important role in developing training as a means to combat youth unemployment.

**Table II**  
**Retail Sales as a Percentage of Consumer Expenditure 1980-84**

|                | 1980 | 1981 | 1982 | 1983 | 1984 |
|----------------|------|------|------|------|------|
| Belgium        | 58.8 | 57.3 | 57.1 | 54.1 | 51.7 |
| Denmark        | 49.2 | 49.0 | 48.7 | 48.5 | 48.4 |
| Germany        | 49.6 | 49.4 | 48.4 | 48.0 | 47.7 |
| Greece         | 60.4 | 58.4 | 54.8 | 54.6 | 54.2 |
| Spain          | 48.0 | 49.0 | 49.0 | 50.0 | 50.0 |
| France         | 53.1 | 52.5 | 53.9 | 51.1 | 50.7 |
| Ireland        | 52.6 | 50.6 | 50.8 | 51.7 | 52.0 |
| Italy          | 55.0 | 55.0 | 56.0 | 57.0 | 60.0 |
| Luxembourg     | 71.0 | 73.7 | 76.7 | 74.7 | 74.0 |
| Netherlands    | 42.0 | 41.9 | 41.3 | 40.6 | 39.0 |
| Portugal       | 70.3 | 68.1 | 62.1 | 61.5 | 60.5 |
| United Kingdom | 43.4 | 42.2 | 41.8 | 41.6 | 42.2 |

Source: Euromonitor.

**Table III**  
**Retail Sales and Per Capita Retail Sales, 1984**

|                 | Retail sales<br>(Million ECU) |             | Per capita retail sales<br>(ECU) |
|-----------------|-------------------------------|-------------|----------------------------------|
| Germany         | 212 700                       | Luxembourg  | 4 291                            |
| France          | 201 400                       | France      | 3 335                            |
| Italy           | 164 300                       | Denmark     | 3 234                            |
| UK              | 139 000                       | Belgium     | 3 108                            |
| Spain           | 69 600                        | Germany     | 3 076                            |
| Netherlands     | 37 600                        | Italy       | 2 608                            |
| Belgium         | 33 700                        | Netherlands | 2 323                            |
| Denmark         | 18 100                        | UK          | 2 127                            |
| Greece          | 15 700                        | Ireland     | 1 665                            |
| Portugal        | 9 700                         | Spain       | 1 658                            |
| Ireland         | 6 400                         | Greece      | 1 373                            |
| Luxembourg      | 1 700                         | Portugal    | 829                              |
| <b>EC total</b> | <b>909 900</b>                |             |                                  |

Source: Euromonitor.

Retailing is also an important indirect employer as mentioned above; for example in the UK it is estimated to be responsible for 10% of employment in tourism.

### *Wage Trends*

Wage levels in retailing are generally lower than in many other sectors of the economy. Negotiation methods vary: in Italy, negotiations take place on a national level involving the appropriate retail trade associations and representatives of the employees; in the UK, wage negotiations are on a company by company basis, backed up only by national minimum wages laid down by wage councils.

EC average monthly earnings in the retail sector in 1984 were 792 ECU. Monthly earnings were highest in Denmark at

1 345 ECU and lowest in Portugal at 332 ECU (figures are not available for Spain).

Monthly labour costs per employee are highest in Italy at 1 467 ECU and lowest in Portugal at 332 ECU, whilst the average for all Member States is 1 126 ECU.

The average number of hours worked per week is similar throughout the Member States, between 36 and 40 hours per week for both the food and non-food sectors.

### *New Technological Developments*

Developments in technology have been making an impact upon retailing for a long time. Electro-mechanical cash registers were introduced into retailing in the early 1970s; in the

**Table IV**  
**Retail Employees, 1984**

|                 | All employees    | Part-time as<br>% of all employees | Women as<br>% of all employees |
|-----------------|------------------|------------------------------------|--------------------------------|
| Belgium         | 98 131           | 32.9                               | 63.0                           |
| Denmark         | 53 193           | 44.2                               | 57.5                           |
| Germany         | 1 044 497        | 33.5                               | 65.8                           |
| Greece          | 17 600           | 0.1                                | 59.1                           |
| Spain           | N/A              | N/A                                | N/A                            |
| France          | 614 333          | 16.4                               | 60.9                           |
| Ireland         | 28 422           | 22.2                               | 61.3                           |
| Italy           | 191 785          | 8.5                                | 51.8                           |
| Luxembourg      | 4 271            | 11.2                               | 69.6                           |
| Netherlands     | 212 364          | 53.5                               | N/A                            |
| Portugal        | 52 237           | 3.2                                | 45.2                           |
| United Kingdom  | 1 556 795        | 37.0                               | 63.0                           |
| <b>EC Total</b> | <b>3 873 628</b> | <b>(average) 23.9</b>              | <b>(average) 59.7</b>          |

Sources: Eurostat and UK Employment Gazette.

**Table V**  
**Wage Trends, 1984**

| Country        | Retail employee<br>monthly earnings<br>(ECU) | Retail employee<br>monthly earnings<br>(PPS) (1) | Monthly labour costs<br>per retail employee<br>(ECU) |
|----------------|--|--|--|
| Belgium        | 954  | 1 168  | 1 463.6  |
| Denmark        | 1 345  | 1 311  | 1 505.7  |
| Germany        | 878  | 901  | 1 467.3  |
| Greece         | 297  | 456  | 470.7  |
| Spain          | N/A  | N/A  | N/A  |
| France         | 739  | 813  | 1 345.8  |
| Ireland        | 822  | 998  | 1 023.5  |
| Italy          | 856  | 1 091  | 1 467.4  |
| Luxembourg     | 873  | 1 056  | 1 067.4  |
| Netherlands    | 944  | 1 005  | 1 267.0  |
| Portugal       | 221  | 455  | 332.0  |
| United Kingdom | 787  | 901  | 971.8  |
| <b>Average</b> | <b>792</b>                                   | <b>923</b>                                       | <b>1 125.7</b>                                       |

(1) Purchasing Power Standards.  
Source: Eurostat.

mid-1970s, electronic cash registers were introduced by many of the larger and more dynamic retailers who could afford the necessary capital expenditure. More recently, the introduction of computers into retailing has enabled data to be more easily assembled, stored, transmitted and processed. This development was closely followed by the introduction of experimental on-line EPOS (Electronic Point of Sale) systems. Whilst these trial systems were being evaluated and modified, their use was mainly confined to discount and department stores. EPOS Systems provide retailers with the ability to monitor customer requirements and preferences more closely and to respond to these much more quickly. Stock control and ordering is facilitated and, in some cases, handled entirely by computerized processes.

Numerical product coding, including such characteristics as size and colour, was developed in Europe as the foremost means of automatically controlling stock throughout the distribution chain. The code, machine readable as a bar code, enables even the country of manufacture and the manufacturer to be identified. Initially, most coded goods were grocery products, hence their use in supermarkets. These codes can be read at the point of sale by various methods, such as scanning with a laser beam or reading it with a wand or light pen. EPOS systems can either be operated by individual stores or, in the case of multiple stores, they can be linked to a central unit for stock control and purchasing purposes. In other areas where coded products are not available directly from the manufacturers, retailers have developed their own individual systems or variations on the more universal bar code system; many department stores operate their own systems. Germany has the most developed use of coding.

The benefits to customers have included an improved response to demand, quicker checkout times, and a more de-

tailed sales receipt. Customers also benefit from the generally improved quality of service. Besides providing superior management information, these new systems have led to improved operational efficiency and better customer service. Many boring routine jobs, such as price marking, are eliminated by these systems and staff can therefore devote more time to the customers.

Since the credit card is now well-known and accepted as a form of payment and electronic banking is becoming increasingly common, a logical development has been the introduction of Electronic Funds Transfer at Point of Sale, the EFT-POS system.

The use of EFT-POS is most advanced in France and Belgium, where certain retailers and banks have joined together to operate EFT-POS schemes. Payment is made electronically using a card similar to a credit card which, following the entry into a terminal of the customer's Personal Identification Number (PIN). Such schemes are widely found in petrol stations and hypermarkets. Operational details vary, the most sophisticated ones in France making use of a credit card containing a microchip and therefore capable of data storage and processing. In the UK, several regional experiments in EFT-POS are under way; however, banks and retailers have announced their intention to implement a nationwide scheme, whereby all participating retailers would accept any bank's cards.

The benefits to retailers of such schemes are enormous: faster payment, with much less paperwork and with no risk of loss of money or time associated with problematic cheques.

The development of advanced means of communication has also given rise to the advent of tele-shopping, i.e. shopping using an adapted television set or a special computer termi-

nal. Tele-shopping uses either cable TV networks or established national data networks. The most obvious development is for the use of tele-shopping by mail order companies, whose customers already do their shopping at home, replacing the catalogue with an interactive screen. The necessary organization and distribution channels for such retailing already exist within the mail order sector and, to a certain extent, for many of the larger non-food stores. The success of tele-shopping is dependent upon a reliable telecommunications infrastructure.

Tele-shopping is most widespread and successful in France, partly due to the commitment of the French Government to the development of a national data network. Tele-shopping exists in a limited form in Italy, the Netherlands, Spain and the UK. In France, tele-shopping by means of Minitel has experienced rapid expansion in a fairly short period of time; many of the schemes have not sought to challenge existing established retail operations but instead are seeking to fill separate niches in the market. Some schemes are specifically tailored to appeal to the young urban professionals who have limited leisure time.

In the UK, some tele-shopping schemes offer more of a social service, to assist those who find traditional methods of shopping difficult, i.e. the disabled and the elderly. Ordering terminals have often been installed at focal points within the community and have also been used to provide community news and information.

Factors such as increasing familiarity with computers on the part of the younger generation and the rising number of working women, are likely to enhance the future for tele-shopping. However, many consumers are not yet ready to fully accept the concept of tele-shopping. For older customers, tele-shopping may not be seen as an attractive alternative to traditional shopping; the social activity associated with traditional shopping is important and there may be a feeling of being daunted by the terminal even if it is only a TV set.

The use of personal computers has been of great benefit to smaller and independent retailers. By making many tasks such as bookkeeping, VAT returns and stock control less time-consuming, the retailer is able to devote more time to the customer. The use of simple stock control packages has also enabled small shopkeepers to rationalize their product lines and respond to customer requirements much faster.

### *The Consumer*

The sophisticated consumer in the well-developed retail market has a high disposable income. This is reflected in the high level of car ownership, with a high percentage of households owning television sets, telephones, fridges and freezers. Emphasis has tended to be upon the quality of goods in conjunction with price; examples of this type of retail market are

Belgium and France where independent retailers, offering good quality service and high quality goods, account for a large proportion of retail sales.

Several factors have contributed to this pattern. The number of women in employment is rising in nearly all countries and this has resulted in less time being available for shopping. The trend towards bulk weekend shopping for essential items at hypermarkets and large supermarkets is well established and has been reinforced by the greater mobility of these consumers, given the high level of car ownership, as well as better techniques for preserving foods. To those for whom time is at a premium, hypermarkets and large supermarkets offer attractive shopping venues as they are often located in shopping centres offering other services such as dry cleaners, hairdressers, petrol stations and car repairs etc. The demographic profile of the consumer has also changed in recent years. Two very important sectors have been identified, both with a relatively high level of spending power. These are the young, who are becoming increasingly more discerning with regard to their purchasing habits, and the over-40s, who - as working couples no longer needing to provide for their children - find themselves with increased spending power. The latter development has been particularly noticeable in Germany.

Those Member States which have less mature retail markets, mostly the Mediterranean countries and those with a large rural population, are experiencing rapidly changing consumer demand mostly due to economic growth. As disposable income has increased, so consumer tastes and requirements have become more sophisticated. Increased ownership of television sets and spending on foreign holidays has introduced new ideas and tastes, which are in turn reflected in customers' demand for increased product ranges and better quality service.

In Spain and Portugal, for instance, consumer spending has grown dramatically since accession to the EC. This growth has meant an increase in sales of non-essential items and the development of more sophisticated tastes; it has also meant a need to conform to EC regulations and requirements regarding food packaging and presentation and labelling of goods.

The distribution of a population in a country is often reflected in the structure of the retail trade. In Italy the majority of retail outlets, especially in the non-food area, are located in the centre and north of the country, reflecting the population distribution. In Ireland, the development of multiple supermarkets was initially hindered by the rural location of the population. In Greece, where department stores are mainly located in the major cities, an increase in agricultural incomes and the establishment of new industries in the north of the country has given the consumer much greater purchasing power. This has resulted in demand for a much wider range of goods, again mostly non-essential items.

**Table VI**  
**Numbers of Retail Outlets by Country**

| Country        | Year | Total outlets |
|----------------|------|---------------|
| Belgium        | 1984 | 121 690       |
| Denmark        | 1981 | 50 826        |
| Germany        | 1979 | 412 714       |
| Greece         | 1978 | 160 599       |
| Spain          | 1970 | 391 434       |
| France         | 1984 | 661 390       |
| Ireland        | 1977 | 32 332        |
| Italy          | 1983 | 1 033 725     |
| Luxembourg     | 1981 | 3 872         |
| Netherlands    | 1984 | 157 642       |
| Portugal       | 1976 | 81 074        |
| United Kingdom | 1984 | 342 022       |

Source: Euromonitor.

### *Major Structural and Geographic Features*

Each Member State has a very individual retail structure, which reflects its geography, economic and social structure, the culture and the degree of maturity of the market.

Two types of structure can be identified, at opposite ends of the scale. At one extreme is the highly fragmented retail structure found in Italy, which has the largest number of retail outlets at over 1 million, the largest number of retail food outlets, and the lowest customer-to-shop ratio at 55.

At the other end of the scale is the UK, which has a highly developed retail market; whilst ranked fifth in terms of total number of retail outlets, it has the highest number of people per shop (165). The UK is ranked third in terms of the number of food outlets as a percentage of total outlets, the highest of all the Member States with well-developed retail markets.

**Table VII**  
**Shop Densities - Number of Persons per Store, 1984**

|             |     |
|-------------|-----|
| UK          | 165 |
| Germany     | 148 |
| Portugal    | 125 |
| Ireland     | 110 |
| Denmark     | 101 |
| Spain       | 99  |
| Luxembourg  | 92  |
| Netherlands | 91  |
| France      | 83  |
| Belgium     | 81  |
| Greece      | 62  |
| Italy       | 55  |

Source: Euromonitor.

A general trend is towards fewer shops and greater rationalization in retail outlets, with a corresponding increase in the size of outlets. In recent years, growth in the multiples sector has been led by an expansion of large food stores, especially in the UK.

Department stores and variety stores account for an average 5% of total retail sales. The majority of department stores are operated by consumer cooperatives and multiples. In the UK and Germany, the department stores sector accounts for a much larger percentage of retail sales. In the latter country this sector is very important as it is strongly linked with the mail order sector, between them accounting for 19% of retail sales. In the UK, department stores and variety stores account for 13.6% of retail sales - the highest in the EC - and this is mostly due to the importance of variety stores.

France has the largest number of hypermarkets and superstores, with 550 units in 1984 and is ranked first amongst the Member States in terms of the percentage of retail sales attributable to this sector, at 12.9%. However, it appears that the spectacular growth experienced in the late 1970s and the early 1980s is now slowing down.

Hypermarkets are now prominent in all the major markets except Italy. The problems involved with hypermarket developments are discussed later in the section on regulatory environment.

In most Member States, hypermarkets and supermarkets account for an average of 50-60% of all food sales. Hypermarkets alone account for the highest percentage in Luxembourg at 31%, followed by France at 25%. Italy has the lowest level with hypermarkets accounting for only 10% of food sales. Supermarkets alone account for the highest percentage in Denmark at 47%, followed jointly by the UK and the Netherlands with 33%. The lowest percentage is again in Italy at 9%. Taken together, hypermarkets and supermarkets account for the highest percentage of food sales in Denmark (57%), followed closely by Luxembourg (56%). In the UK, France and the Netherlands, the percentage is around 45%; not surprisingly, the lowest percentage is again in Italy at 10%, a reflection of the highly fragmented retail structure for food.

Many of the food multiples and consumer cooperatives are gradually diversifying their range of goods into the general sphere of retailing, for example by selling more non-food items; the aim is to increase their share of the total retail market.

The retail structure is becoming increasingly concentrated as a result of these developments. In France, where legislation regarding monopolies is not as restrictive as in some other Member States, three central groups have gained control of approximately one third of total retail sales and of approximately half of food retail sales. Much of this concentration occurred in 1984 against a background of increasing de-

**Table VIII**  
**Food, Beverage and Tobacco Outlets as a Percentage of Total Outlets**

| Country        | Year | Number of<br>food, beverage and<br>tobacco outlets | % of<br>total<br>outlets |
|----------------|------|--|--------------------------|
| Belgium        | 1984 | 36 739   | 30.2                     |
| Denmark        | 1981 | 15 832   | 31.1                     |
| Germany        | 1979 | 115 748  | 28.0                     |
| Greece         | 1978 | 64 036   | 40.0                     |
| Spain          | 1970 | 229 665  | 58.6                     |
| France         | 1984 | 265 833  | 40.2                     |
| Ireland        | 1977 | 14 133   | 43.7                     |
| Italy          | 1983 | 423 575  | 41.0                     |
| Luxembourg     | 1981 | 1 335  | 34.5                     |
| Netherlands    | 1984 | 50 401   | 32.0                     |
| Portugal       | 1976 | 46 317   | 57.1                     |
| United Kingdom | 1984 | 162 814  | 47.6                     |

Source: Euromonitor.

mands for government intervention. In the UK also, the retail structure is highly concentrated, especially in the food and groceries sector.

In general, multiple stores tend to buy directly from manufacturers or importer/agents, and buying is usually a head office function, with some scope to cater for regional variations. Many independent stores tend to buy from wholesalers or conduct their buying through some sort of purchasing group. However, in some countries, multiple chains also belong to purchasing groups, as is the case in France. Purchasing groups and voluntary chains are most important in Germany and the Netherlands.

In some Member States there is a trend away from the retail trade towards other distribution channels. For example in France and the UK, many manufacturers have opened their own outlets, often selling end-of-line products: goods related to vehicles and textiles and dairy products. Similarly, there has been an increase in direct wholesaling to the public; this is most significant for food products and large consumer items. Sales through exhibitions are also important for all types of goods.

### *Regulatory Environment*

Controls relating to the activity of retailing and the retailer vary greatly. In all Member States, rules and regulations need to be observed regarding hygiene, health and safety, and employment. However, these are common to all industries and activities.

There are some laws which are specific to retailing, for example legislation regarding opening hours. In some Member States, these laws are nationally determined; in others they are subject to regional or provincial jurisdiction. Permitted weekly opening hours average 50, and vary between

40 and 59. In France it is theoretically possible to open 24 hours a day if employment regulations are satisfied, as there is no legislation regulating shop opening hours. In some Member States which have fairly strict regulations, there have been calls for liberalization.

In all Member States, retailers need to obtain a licence in order to trade. Sometimes the licence is needed only in relation to the selling of certain types of merchandise, as for example in the UK; in other cases, the retailer needs one to open an outlet and to trade as in the Netherlands, where it is necessary to hold various qualifications to obtain a licence.

Another means of regulating retailing are planning controls. In all Member States it is necessary to obtain planning permission before building and/or opening retail premises. This has particularly affected the development of hypermarkets and superstores, which are mostly dependent upon developing green field sites outside urban areas. In France and the UK, the competition to gain planning permission for such sites is very fierce, especially since the number of remaining areas with the necessary population density to support such enterprises is declining rapidly. In the UK for example, there has been much controversy over the development of such enterprises especially in the South-East "Green Belt" area around London. In Belgium large retailers have had to develop their existing sites if they wish to expand their sales area as the planning permission needed to develop new sites is very difficult to obtain.

The development of large-scale outlets and the expansion of retail multiples has also been controlled in other ways. For example Law 426 was introduced in Italy during the 1970s to control the entry of new commercial enterprises into the retail market, in terms of specific and general consumer products. This law has served to protect the independent retailers and contributed to the fragmentation of the retail

structure, especially in the food sector. Similarly, until recently, the expansion of multiple retailers was controlled in Denmark by a law which restricted the number of branches which could be owned by any one retailer in a particular area. Since this law has been repealed, the multiples sector has expanded rapidly in Denmark.

In France laws have been introduced regarding various trade practices, following the advent of discriminatory pricing and sales conditions which developed with the growth of the large supermarket chains and other large stores, and in order to protect the smaller retail concerns. Under statutory law, all sales practices that affect sales prices or conditions offered to different purchasers of goods or services sold in France are illegal unless such change is related to corresponding differences in cost to the supplier of the goods and services. All Member States have laws prohibiting misleading advertising.

Taxation varies greatly, but value-added tax is common to all Member States. However, VAT rates and products covered vary widely. Some Member States have only two rates, as in the UK, where the rates are 15% and 0%; others have up to four different rates. Similarly, the threshold for VAT registration varies between countries, with Ireland and the UK having the highest. VAT laws are to be harmonized by 1992 under the Commission's internal market programme.

### *Retail Outlets*

This section is divided into 11 parts, each of which describes a type of outlet. Some repetition of information occurs as the different types of outlets and organizations overlap.

### **Hypermarkets and Superstores**

The most commonly used definition for a hypermarket is a store with a sales area of 2 500 square metres or more, with at least 35% of the selling space devoted to non-food pro-

ducts. In some countries, the term hypermarket is only used for stores with over 5 000 square metres of floor space, in which case stores with a sales area of between 2 500 and 5 000 square metres are called superstores.

There are indications that the extremely rapid growth experienced by hypermarkets is now slowing down. France, where the first hypermarket was opened in 1963, has the largest number and these account for approximately 13% of total retail sales, more than in any other EC country. French retailers have also been responsible for the introduction of this form of retail outlet into some of the less developed retail markets, such as Portugal and Spain.

Hypermarkets are prominent in all the major retail markets with the exception of Italy, which in 1985 had only 20 hypermarket outlets accounting for less than 1% of total retail sales. In Denmark, the difficulty experienced in obtaining planning permission for out-of-town sites has led to a change in the usual hypermarket profile, towards units with a smaller sales area within towns.

As hypermarkets have developed and increased their expertise in the retail market, so they have broadened their range of products. This is especially noticeable in the non-food sector and has meant that hypermarkets have been increasingly encroaching on the traditional domain of the department store. In some countries, department store groups are operating their own hypermarkets, for example in Belgium, Denmark and Spain.

The increasing importance of non-food sales has also led to the establishment of non-food superstores alongside the hypermarkets. Traditionally, these have been in the following product areas: do-it-yourself and building materials, furniture, carpets and electrical goods. Most of the stores offer very competitive prices and, in some countries, they have seriously affected the more traditional outlets for these goods.

**Table IX**  
**% of Retail Sales By Outlet**

| Country        | Hypermarkets & superstores | Supermarkets | Department & variety stores | Mail order |
|----------------|----------------------------|--------------|-----------------------------|------------|
| Belgium        | N/A                        | N/A          | 5.7                         | 0.8        |
| Denmark        | 5.0                        | 29.0         | 7.0                         | 1.0        |
| Germany        | 9.0                        | 14.3         | 5.8                         | 4.8        |
| Spain          | N/A                        | N/A          | 5.0                         | 1.0        |
| France         | 12.9                       | 10.9         | 5.0                         | 2.5        |
| Ireland        | N/A                        | N/A          | 6.0                         | N/A        |
| Italy          | 0.4                        | N/A          | N/A                         | N/A        |
| Netherlands    | N/A                        | 15.5         | 5.2                         | 1.2        |
| United Kingdom | 6.6                        | 13.4         | 13.6                        | 3.3        |

Source: Euromonitor.



## Supermarkets and Superettes

The most widely-used definitions for these two types of store are as follows. A supermarket is a store with a selling area of between 400 square metres and 2 500 square metres, selling at least 70% foodstuffs and everyday commodities. Superettes are usually self-service stores with a selling area of less than 400 square metres, predominantly selling food and general household items.

Generally, superettes are independent stores, run as a family concern, which may or may not be affiliated to a purchasing group or a voluntary chain. Supermarkets in the more structured retail markets tend to belong to the multiple chains, for example in the UK, whilst in the less structured retail markets such as exist in Greece, they are mostly family concerns. However, in the Netherlands, which has a fairly well developed retail structure, the majority of supermarkets are independent. It is mostly due to the growth of the multiple groups and consumer cooperatives that supermarkets have significantly increased their market share. For example in Ireland in the late 1960s, the rapid emergence of the supermarket was due to the increased activity of the retail multiples.

In some countries, large supermarkets complement the hypermarkets and superstores, especially where planning permission or other controls impede hypermarket development. Within the food sector the impact of the large store is becoming increasingly important with hypermarkets, superstores and supermarkets accounting for over 40% of all food sales in Member States with the most developed retail structures.

**Table X**  
**Food Retail Trade by Outlet**

| (%)            | Year | Hyper-market | Super-market | Total |
|----------------|------|--------------|--------------|-------|
| Denmark        | 1983 | 10           | 47           | 57    |
| Spain          | 1984 | 15           | 20           | 35    |
| France         | 1983 | 25           | 21           | 46    |
| Italy          | 1983 | 1            | 9            | 10    |
| Luxembourg     | 1983 | 31           | 25           | 56    |
| Netherlands    | 1985 | 10           | 33           | 43    |
| United Kingdom | 1984 | 12           | 33           | 45    |

Source: Euromonitor.

Supermarkets are traditionally located within towns and urban areas, and they are often found within shopping centres. However more recently the larger stores, providing parking facilities, have been found in out-of-town sites. Many supermarkets are also located within department stores.

Superettes are mostly located in the High Street or urban areas. They are particularly important in Belgium, where they account for 3.6% of total retail sales and are increasing

in terms of numbers and market share. This is also occurring in Italy, where the licensing procedure is facilitating the spread and growth of superettes, as it is much easier to obtain a licence for an outlet with a sales area of less than 400 square metres.

In many countries where most food and household items are bought at a large supermarket or hypermarket once a week, the smaller superettes play an important role in supplementing this weekly shop by providing easy local access for mid-week convenience purchases. In some countries, the smaller supermarkets are diversifying to help maintain their market share; for example, in the Netherlands supermarkets are now selling wines, sports equipment, DIY materials and car accessories. Both supermarkets and superettes have greatly benefited from the introduction of POS techniques.

## Department Stores

The most widely accepted definition of a department store is an outlet with a sales area of at least 2 400 square metres, selling mainly non-food merchandise and at least five lines in different departments. Department stores, usually located on several floors, sell women's clothing and have at least 25 employees. In many stores, one of the departments is a supermarket. All department stores are located in urban areas, but recently they have been found in shopping centres either in towns or on the edge of towns. In Greece and Portugal, department stores are only found in the capital and large cities.

The success of the department stores sector in recent years has varied. In Spain the department store sector, although dominated by only two groups, increased its market share by 16% per annum between 1980 and 1984 (see Table IX). In France the department store sector has suffered due to competition from hypermarkets, and market share has fallen. The department store sector is most important in the UK, where it accounts for 13.6% of total retail sales. In Belgium, where a growing department stores sector accounts for 5.7% of total retail sales, one company dominates this sector. This company accounts for 8% of total retail sales, the highest share of national retail trade accounted for by one company in the whole of Europe.

Department stores have changed substantially in recent years. Growth has either been achieved and maintained by these changes or they are being made in an attempt to restore market share. Apart from overall rationalization of administration and cutting back on staff, two differing avenues of change have been pursued. Stores have either specialized in two or more areas (often fashion and furniture), introduced more "shops within shops" or opened specialist branches as in Germany. The "shops within shops" vary in scope from a few shelves to whole departments. Alternatively, stores have widened the range and variety of goods offered for sale, and sometimes the method of selling, for example

stores diversifying into fast-food and mail order. In Belgium, recent success in the department stores sector has been largely due to diversification into food products, and in France many department stores have either been converted into hypermarkets or variety stores.

Variety stores are often seen as a "down market" form of department store. Usually located on one floor and offering an assortment of fast-moving goods on a self-service basis, they have tended to give priority to textile products. In France the department stores often own complimentary variety stores in middle to low class areas, offering cheaper goods.

Department stores can be either independent often belonging to a central purchasing group, or belong to a multiple chain. Many department stores are operated by cooperative consumer societies.

### **Ambulant Trading**

Ambulant trading can be defined as commercial retailing by a travelling trader, at regular or irregular intervals, at specific points in a given town or in different towns or geographical areas, with goods being displayed and with a minimum service provided. The nature of this form of trading varies considerably from country to country. As a form of retail activity, it is commonest in the Mediterranean Member States. Ambulant trading is a highly adaptable form of distribution which is particularly suited to family businesses; it is also proving increasingly popular in countries with unemployment problems since setting up costs are minimal. There are of course also a number of well-known and sometimes historic ambulant markets throughout Europe.

In many countries new or recent legislation has been passed concerning this form of trading. In Belgium, for example, legislation has been passed which no longer discriminates in favour of the established retailers but reinforces itinerant trading as a branch of the retail trade in its own right, with an emphasis on quality rather than quantity. In Luxembourg the government sees ambulant trading as a means of solving the problems of supply in rural areas where the number of small food outlets has declined and in some places disappeared altogether, although it feels that such trade must be controlled by appropriate legislation.

In most Member States some form of licence is needed to undertake trading of this nature. In some, such as the Netherlands, traders need to have attended a training course, whilst in others, such as Luxembourg, only a minimum age requirement needs to be satisfied. Much ambulant trading occurs in specially designated market sites, often regulated by the municipal authorities and where permanent stall-holders may display attributes more akin to regular established retailers than ambulant traders. Increasingly, vans are being used for trading rather than market stalls, thus making the traders

more mobile, but involving a greater commitment in terms of initial investment.

For this form of trading, the customer is often a rural inhabitant. Manufacturers find this type of outlet useful for slightly defective or damaged goods. In many countries, ambulant traders obtain their goods from the same sources as established retailers; however as their costs are significantly lower, they can offer very competitive prices. Many Member States are seeking to ensure the enforcement of hygiene and health and safety standards in this form of retailing, as well as establishing sufficient protection for the consumer.

### **Mail Order/Distance Selling**

Mail order retailing is usually defined as the purchase of goods through the postal system, either by direct response to an advertisement or mail item or through a catalogue, with goods credit purchases common. However, more recently mail order has also been associated with newer forms of retailing such as tele-shopping, often more accurately called "distance selling". Similarly, many mail order goods are now distributed by forms of distribution other than the postal system. The mail order market is perceived as a growth market, especially in view of the potential offered by improved communication links.

Up to 1984, mail order had not achieved more than a 5% share of retail sales in any EC country (see Table IX). Germany has the highest share with 4.8%, followed by the UK and France. Mail order sales are mostly of non-food items and they have therefore suffered during times of recession when retail sales emphasis has been upon food and other essential items. In Italy, 40% of the mail order market is accounted for by the south of the country and the islands, due to the low level of non-food outlets in these areas. This is in sharp contrast to most of Italian retailing which tends to be concentrated in the more densely populated north.

Germany has over 3 000 mail order firms, ranging from the largest in Europe to the smallest. These mail order companies spend over 10% of their annual turnover on advertising and issue a wide range of general and specialist catalogues, usually replacing them every six months. Concentration is particularly noticeable in the German mail order sector, where only three groups of companies account for over 60% of mail order trade.

In Member States with a less well developed retail structure, mail order is in its infancy, for example in Portugal and Spain. In both countries, mail order is growing rapidly and in Portugal growth has been particularly impressive in mail order sales of books.

Mail order customers appreciate being able to compare goods and prices in the privacy of their own home; they are also guaranteed that prices remain fixed for the six-month life

of the catalogue. Customers are also appreciative of the use of new technologies, such as home computers, to facilitate their ordering, and the more efficient and better quality service that new technology provides.

### Direct Selling

Direct selling is the distribution and marketing of products and services to consumers, primarily in their homes through personal explanation and demonstration. Direct selling companies operate on two basic plans: person to person selling, where a demonstration of the product is given by a salesperson in the home usually by prior arrangement; and party plan, where a person acts as a host/hostess and invites friends to product demonstrations. The advantages of this type of retail activity lies in the individual attention which can be given to the consumer by the direct salespeople and the opportunity to observe, test and judge products in their home or among friends. There is also the convenience of direct delivery to the home.

Direct selling has been particularly successful in the sale of certain categories of goods (domestic appliances, beauty care products, books, etc.). It is also useful for consumers in rural areas, making available goods and services which are not provided through other outlets in the area. Naturally, this form of retailing finds itself increasingly in competition with new technological ways of introducing products directly into the home, such as videotext.

Direct selling offers employment opportunities to non-qualified individuals to become gradually integrated, be it part-time, half-time or full-time, into the labour market. Of total direct sales employees 84% are women and 91% work part-time. Direct sales accounted for 3 095 million ECU in 1987, approximately 0.3% of total EC retail sales.

### Franchise and Exclusive Distribution

A franchise is the right to use the name/product/concept of a "parent" granted by the franchisor to the franchisee in return for a percentage of turnover, whilst allowing the franchisee to retain their independence. Franchising is often said to be similar to affiliated independent retailing; however, it differs in that franchising operates with a successful trading concept used as a means of expansion rather than as a plan for survival.

Franchising offers the franchisor the opportunity for rapid self-financing expansion and offers the franchisee the opportunity to benefit from the proven formula and marketing expertise of an already established company. The franchisor grants a contractual licence which imposes certain obligations on the franchisee, for example it may specify certain sources of supply, specific methods and standards of trading and limit operations to one specific site or geographical area unless a special multiple licence is obtained. In return the franchisee may receive any combination of the following: a trading name and corporate identity, know-how of specific products or services, equipment and/or ingredients etc. The franchise licence is usually for a set period of time with no renewal obligation. A one-off payment is usually made for the licence and subsequently royalties are collected regularly throughout the duration of the licence; these are calculated as a previously agreed percentage of turnover excluding VAT.

Three types of franchise can be identified. The first is first generation franchising, often known as exclusive distribution or supply dealerships. This format is used by manufacturers or suppliers who require a defined and secure distribution network for their goods. The franchisor in general has no involvement in the franchise business and offers the least in

**Table XI**  
**Direct Selling, 1987**

|                | Number of companies | Total employees | % female employees | % part-time employees | Total sales (million ECU) |
|----------------|---------------------|-----------------|--------------------|-----------------------|---------------------------|
| Belgium        | 10                  | 15 500          | 75                 | 85                    | 51                        |
| Germany        | 15                  | 131 700         | 90                 | 95                    | 1 120                     |
| Greece         | 5                   | 17 170          | 94                 | 94                    | 18                        |
| Spain          | 12                  | 82 500          | 92                 | 95                    | 247                       |
| France         | 61                  | 215 000         | 75                 | 90                    | 746                       |
| Ireland        | 12                  | 2 000           | 50                 | 90                    | 9                         |
| Italy          | 23                  | 111 400         | 94                 | 96                    | 626                       |
| Netherlands    | 7                   | 11 000          | 90                 | 80                    | 72                        |
| United Kingdom | 34                  | 287 000         | 90                 | 97                    | 453                       |
| <b>Total</b>   | <b>179</b>          | <b>872 070</b>  | <b>84</b>          | <b>91</b>             | <b>3 095</b>              |

terms of support and development of the outlet. Exclusive distribution is not normally allowed under EC laws but is permitted for certain clients, such as motor vehicle dealerships.

The second type of franchise is usually called second generation or business format franchise and usually has the following characteristics: a detailed and defined trading format or style; active involvement of the franchisor in the control, support and development of the franchised network; and finally a legal agreement that defines the precise nature of trading conditions and the respective roles and responsibilities of the franchisor and franchisee.

The third type of franchise, known as a fractional franchise, can be either first or second generation but is only part of a broader business operated by the franchisee. For example, many confectionery shops operate fractional franchises.

Franchising now accounts for nearly 4% of total retail sales within the Community and is growing rapidly. The development of this type of retailing has been most noticeable in the more mature retail markets of Belgium, France, the Netherlands, the UK and Germany.

**Table XII**  
**Business Format Franchising, 1986**

|                | Number of franchises | Number of franchised outlets | Franchise sales (million ECU) |
|----------------|----------------------|------------------------------|-------------------------------|
| Belgium        | 69                   | 2 744                        | 2 800                         |
| Germany (1)    | 259                  | 18 000                       | 7 000                         |
| Spain          | 90                   | 8 200                        | 1 800                         |
| France         | 456                  | 22 968                       | 14 500                        |
| Italy (1)      | 79                   | 8 024                        | 2 100                         |
| Netherlands    | 227                  | 7 422                        | 4 800                         |
| United Kingdom | 300                  | 20 000                       | 3 200                         |
| <b>Total</b>   | <b>1 480</b>         | <b>86 458</b>                | <b>36 200</b>                 |

(1) 1983 estimates.

Source: European Franchising Federation.

France is one of the most mature franchise markets with 456 franchisors and over 22 000 franchised outlets. It also has the most advanced "international" franchising with approximately 90 franchisors in other Member States operating approximately 3 000 sales outlets. Recently, some of the most spectacular growth in franchising has been experienced in the UK, which has 300 business format franchises with 20 000 outlets.

Franchising is recognized as a means of combating unemployment, by encouraging self-employment and entrepreneurial skills. Both the Belgian and Italian Governments' support for small businesses has assisted the growth of franchising in their respective countries.

## Cooperatives

Cooperative societies are affiliated to the world-wide Federation of Cooperative Retailing, which was founded in 1895 to promote fair trading. In all the countries in which cooperatives operate, there are usually a number of societies controlling retail outlets, which mainly sell food and basic commodities. The number of societies has tended to fall over recent years as the movement has rationalized its activities. The cooperative societies are often dominated by a large central buying organization.

Cooperative societies operate through all types of retail outlets, ranging from hypermarkets to small local supermarkets. In many countries, the number of cooperative outlets has been falling whilst total sales area has increased, reflecting the trend towards larger stores. In Portugal, cooperatives are mostly small shops and in Greece the only cooperative outlets are supermarkets in rural areas operated by local agricultural cooperatives for the benefit of their members.

Cooperatives have the largest market share in Denmark, accounting for 16% of total retail turnover and showing a trend towards further increases in market share. The average size of a cooperative outlet in Denmark is 443 square metres; cooperatives account for 37% of total food sales but only 24% of food outlets. In France the market share of cooperatives has remained static at approximately 3%. Recently, these organizations have been diversifying into less traditional areas in an attempt to improve market share; one example of this is the opening of furniture outlets. In Italy where cooperatives are already expanding, diversification has occurred into non-food product areas; there has also been geographical movement into the south of the country, and concentration on hypermarkets and shopping centres.

## Independent Retailers

Independent retailers are generally defined as belonging to the sector of the retail trade which is not organized; they are often family businesses and unless they are general stores situated in rural areas they usually specialize in particular commodities. Many independent retailers are affiliated to or integrated into voluntary chains or buying groups.

Independents are generally located in High Street or urban areas and in most countries are synonymous with the traditional "corner-shop". However, independents operate through many outlets and in Belgium where independents predominate, one third of hypermarkets and 51% of supermarkets are operated by independents.

In general, the independent is most important in the less developed retail markets, for example Portugal and Spain. Belgium, however, is an exception to this rule; independents account for nearly 70% of retail sales. In many other countries, whilst the number of independent outlets remains sig-

**Table XIII**  
**Retail Trade by Organization (1)**

|                | Year | Coop | DVMO   | MULT | AFFI   | IND | Total |
|----------------|------|------|--------|------|--------|-----|-------|
| Belgium        | 1983 | N/A  | 7      | 15   | 9      | 69  | 100   |
| Denmark        | 1984 | 16   | N/A    | 28   | ( 56 ) |     | 100   |
| Spain          | 1984 | 3    | 5      | 10   | 8      | 74  | 100   |
| France         | 1983 | 3    | 8      | 25   | 16     | 48  | 100   |
| Ireland        | 1984 | 1    | 8      | 34   | 7      | 50  | 100   |
| Netherlands    | 1985 | N/A  | 2      | 27   | 34     | 37  | 100   |
| Portugal       | 1984 | 4    | ( 40 ) |      | 4      | 52  | 100   |
| United Kingdom | 1984 | 5    | 18     | 47   | 5      | 25  | 100   |

(1) Coop - cooperative societies; DVMO - department and variety stores and mail order; MULT - multiples, including hypermarket chains; AFFI - voluntary chains and buying group members; IND - non-affiliated independent retailers.

Source: Euromonitor.

nificant, market share is being lost to the multiples. For example, in France independents account for 99% of outlets but only 70% of sales.

Retail technology has had an enormous impact on independents with the introduction of more sophisticated POS techniques improving service to customers and stock control.

### Multiple Stores

Multiples are retail companies operating a number of retail outlets, usually with a degree of sophistication in a particular commodity range. The number of branches required for the definition "multiple" to apply varies from as few as two up to as many as 25 but is generally held to be five. The multiples are most dominant in the more developed retail markets.

In recent years growth in retailing has been focused on the multiples sector, and most apparent amongst large food stores. This has particularly been the case in the UK, where the multiples represent the largest market sector with 47% of retail sales (see Table XII). In Denmark multiples are growing in importance, especially since the relaxation of outdated legislation which restricted the number of branches owned by any one retailer in a particular area. However, the strength of the cooperative societies in the food sector has to some extent limited the emergence of multiples.

Whilst the Irish retail market is similar in many respects to that of the UK, it is noticeable that the growth of multiple retailers has been much slower due to the greater proportion of the population dwelling in rural areas. The growth of the multiples has, in many countries, led to a very high degree of concentration in the retail market, for example in France where three companies control approximately one third of retail sales, as described above. Another notable feature of the French multiples is that unlike most other countries, many of the food multiples belong to one or more of the large purchasing organizations.

In recent years, the multiples sector in the UK has been characterized by a series of mergers and acquisitions, not only in the food sector, but also in non-food areas; retailing groups have been formed encompassing many different types of outlets and selling distinct product lines.

In many countries, the growth of the multiples sector has been accompanied by a decline in the small, single independents, as for example in the Netherlands.

Multiples are found in all locations depending on the nature of the outlets they operate, for example hypermarkets in their traditional out-of-town sites and department stores in the High Street.

### Purchasing Groups

Two types of purchasing groups exist: voluntary chains and buying groups. Retailers who belong to either of these are commonly known as affiliated retailers.

Voluntary chains are wholesaler-owned buying organizations which distribute basic commodities, especially foods and household goods, to smaller retail outlets. Affiliation to such a chain or "symbol", as they are often called, not only gives the retailer the opportunity to buy at better prices, but also enables him to benefit from a corporate image and from the advantages of joint advertising. Voluntary chains originated in the Netherlands and are still very much confined to European retail markets. Some chains are found throughout Member States, such as Spar and VG.

Buying groups are joint purchasing organizations comprising a number of retailers, mostly independents, who jointly control a centralized buying organization. The central organization has its own corporate identity and engages in bulk buying thereby securing better prices from manufacturers. These buying groups are predominantly found in non-food areas, for example, independent department stores. Other services provided by the groups include advice on advertising, finan-

cial and legal matters, and marketing. Any size of store may be affiliated.

These groups represent a type of integrated or affiliated retailing, aiming to compete with the larger retail organizations and multiples. Some voluntary chains and buying groups allow members to supplement their stocks from other sources.

Affiliated retailers are strongest in Germany but are increasingly coming under pressure from multiple groups. In countries where independents form a large section of the retail market, both types of affiliated retailing are important. In France, the activities of some buying groups have come under scrutiny for not being in the interests of the consumer. Conversely, in Greece the Government is encouraging grocers and other small retailers to organize themselves into purchasing organizations in order to increase their competitiveness.

## Outlook

The achievement of the single market in 1992 has a range of implications for the retail trade. Commercial opportunities in the retail business will be available; new sources of supply

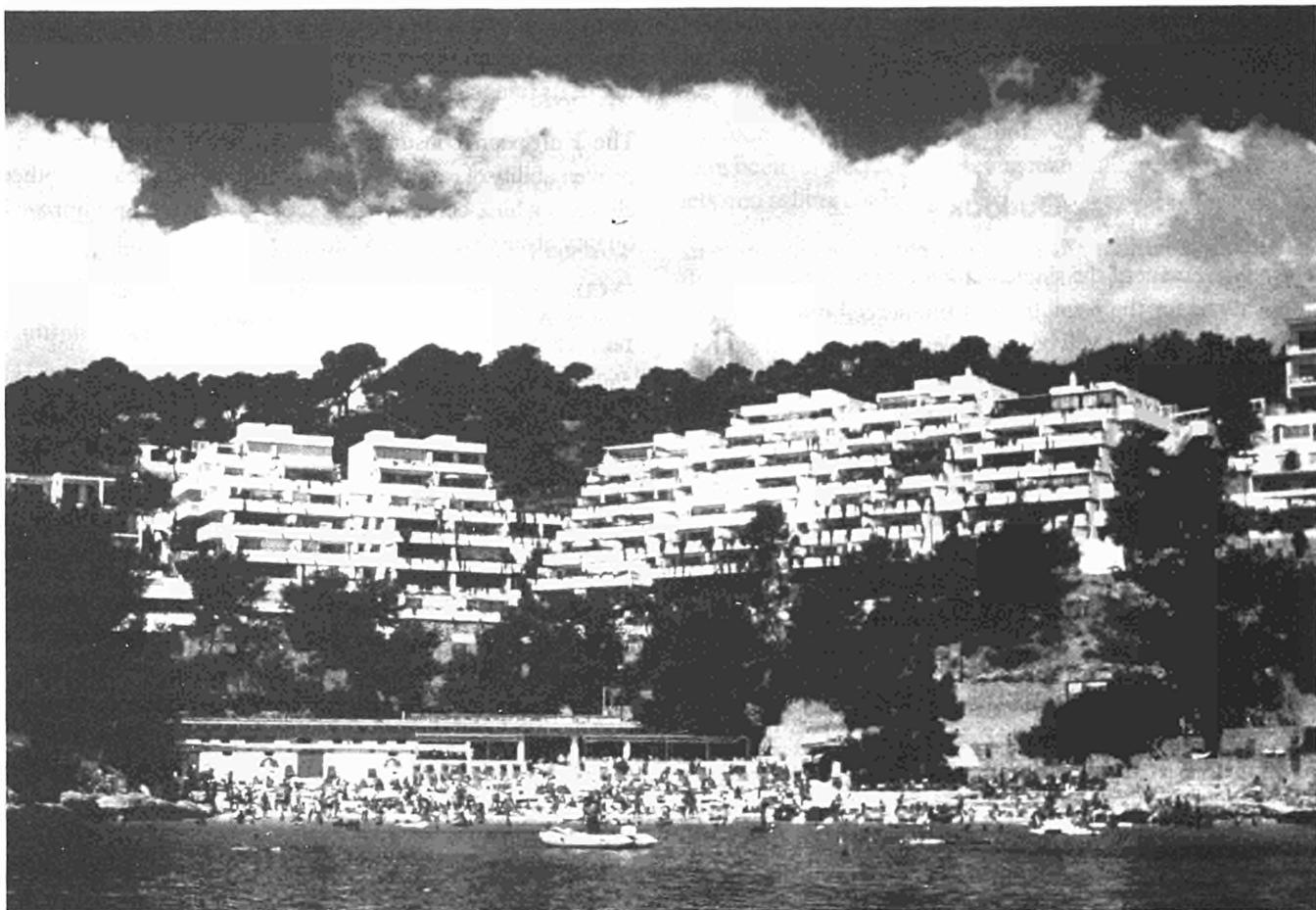
will open up, free from the bureaucratic difficulties which previously accompanied cross-border activities.

New sources of finance may well be available and there may also be opportunities to buy into the retail markets of other Member States. However, there may also be involvement of foreign companies in the Community retail markets.

The retail market - like other sectors - is expected to become more competitive, and provide a challenge to the abilities of retailers. Emphasis will be on marketing skills and the use of new technology. It is in this field that differences will be seen, with more and more retailers turning to the use of bar codes, and new methods of both payment and marketing (such as videotex, Minitel and other products). However, the European retail sector has already proved that it knows how to operate in a competitive environment and how to make best use of its financial, physical and human resources.

The European consumer will also benefit from the well-proven ability of retailers to adapt to technological and other changes whilst continuing to seek to provide an improved quality of service.

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# HOTELS

(NACE 665)

The sector is benefiting from the general increase in living standards, a shift in holiday habits away from long summer holidays to several shorter holiday periods, as well as from expanding business travel. Chains have become an important factor in the market. Given the increasing longevity of the population, there is still considerable growth potential, especially in certain "niche" markets.

In a Community market where 1986 GDP was 3 525.4 billion ECU, revenue from international tourism reached 58.67 billion ECU - that is, 1.66% of GDP.

The European Community receives a large number of tourists from Member States, including both vacationers (principal and secondary holidays) and business visitors.

Given the fact that the length of the working week has decreased and living standards have increased, more people have the free time and, in the case of some groups, the financial means to take holidays.

Although the volume of business visitors varies from one Member State to another, this segment is growing in all countries. The expenditure ratio between business tourism and traditional tourism is of the order of 1 to 3.

International conferences held in Europe, an important vehicle for business tourism, represent 41.1% of all conferences held worldwide.

## Current Situation

The hotel-restaurant sector registered more rapid growth than the other sectors as a whole. The hotel chains, which, depending on country, represent 5-30% of market share in volume terms (number of rooms) have grown by some 17% in their countries of origin and by 10-15% in the EC countries since 1985 (this applies to the largest chains). Hotels in the lower range have registered significant growth over the past few years and should expand further in order to respond to consumer demand. Growth in extra-EC countries has remained constant, and various approaches aimed at market penetration have been adopted.

The importance of the hotel trade and similar establishments can be seen by the fact that the European Community had approximately 137 935 hotels, representing 3 662 879 rooms, in 1986.

There have been important changes in hotels and hotel structures during the past 10 years. The sector is becoming increasingly concentrated, as is true of most other service and retail sectors, and is tending towards the formation of hotel chains (which are recording growth rates of over 20%), voluntary groupings and associations.

Market segmentation, which has generally been initiated by the large chains, including foreign hotel chains, is becoming more pronounced in order to provide differentiated services

**Table I**  
**GDP and Tourism Revenue**

| (Billion ECU)   | GDP            | Tourism revenue | Share of GDP (%) |
|-----------------|----------------|-----------------|------------------|
| Belgium         | 114.4          | 2.32            | 2.03             |
| Denmark         | 84.1           | 1.79            | 2.13             |
| Germany         | 910.4          | 8.00            | 0.88             |
| Greece          | 40.5           | 1.87            | 4.62             |
| Spain           | 232.6          | 12.16           | 5.23             |
| France          | 737.6          | 9.88            | 1.34             |
| Ireland         | 24.9           | 0.65            | 2.61             |
| Italy           | 611.9          | 10.05           | 1.64             |
| Luxembourg      | 5.1            | N/A             | N/A              |
| Netherlands     | 179.0          | 2.29            | 1.28             |
| Portugal        | 28.9           | 1.60            | 5.54             |
| United Kingdom  | 556.0          | 8.06            | 1.45             |
| <b>Total EC</b> | <b>3 525.4</b> | <b>58.67</b>    | <b>1.66</b>      |

Sources: Eurostat. World Tourism Organization.

**Table II**  
**Hotels and Similar Establishments**

|                    | Hotels         | Rooms            |
|--------------------|----------------|------------------|
| Belgium (1)        | 1 974          | 60 000           |
| Denmark (2)        | 1 100          | 32 907           |
| Germany (3)        | 20 270         | 800 000          |
| Greece             | 4 191          | 190 661          |
| Spain (2)          | 22 000         | 563 906          |
| France             | 19 859         | 496 677          |
| Ireland (1)        | 859            | 21 000           |
| Italy (2)          | 30 000         | 903 622          |
| Luxembourg         | N/A            | N/A              |
| Netherlands        | 1 934          | 55 000           |
| Portugal           | 307            | 59 106           |
| United Kingdom     | 35 441         | 480 000          |
| <b>Total EC 11</b> | <b>137 935</b> | <b>3 662 879</b> |

(1) Number of rooms estimated.

(2) Number of hotels estimated.

(3) Registered hotels only.

Sources: World Tourism Organization, Management Horizons.

to clearly defined consumer groups (services for tourists, businessmen, weekend guests, conference guests).

All the large hotel chains target their clientele and manage two or more classes of hotel aimed at different market segments. The creation of different categories of hotel often follows upon the acquisition by top-of-the-range hotel chains of hotels belonging to a lower category. This allows chains better to meet the needs of a heterogeneous clientele.

Businessmen need specific services (rapid means of communication, rooms with full facilities, rapid check-in and check-out, etc.) different from those required by holiday makers. Moreover, by carefully targeting their clientele according to the facilities offered by various categories of hotel, chains are able to increase their occupancy rate.

It is generally calculated that for a hotel to be profitable, an occupancy rate of about 60-65% is needed. This can pose a problem for hotels whose main clients are business travellers and which are thus empty on weekends. In fact, the major chains are increasingly introducing special weekend rates in order to attract holidaymakers, particularly in the UK.

### Market Structure

The 20 largest chains in the EC include 2 901 units, representing 398 338 rooms. Trusthouse Forte, the largest European chain, accounts for 27% of the number of hotels.

**Table III**  
**Major European Chains**

| Rank         | Company            | Country | Rooms          | Units        |
|--------------|--------------------|---------|----------------|--------------|
| 1            | Trusthouse Forte   | UK      | 74 800         | 793          |
| 2            | Accor              | F       | 62 410         | 534          |
| 3            | Club Méditerranée  | F       | 53 733         | 212          |
| 4            | Sols               | E       | 29 450         | 110          |
| 5            | Ladbroke           | UK      | 26 379         | 208          |
| 6            | Wagon Lits         | F       | 24 540         | 187          |
| 7            | Grupo Unidos       | E       | 22 000         | 125          |
| 8            | Méridien           | F       | 18 000         | 53           |
| 9            | Société du Louvre  | F       | 15 876         | 164          |
| 10           | Crest              | UK      | 9 758          | 79           |
| 11           | Iberotel           | E       | 7 900          | 37           |
| 12           | Queens Moat Houses | UK      | 7 749          | 87           |
| 13           | Mount Charlotte    | UK      | 6 935          | 58           |
| 14           | Penta              | UK      | 6 893          | 15           |
| 15           | Lonrho             | UK      | 6 120          | 12           |
| 16           | Ciga               | I       | 5 451          | 33           |
| 17           | Melia              | E       | 5 340          | 17           |
| 18           | Climat de France   | F       | 5 024          | 124          |
| 19           | Steigenberger      | D       | 5 000          | 30           |
| 20           | Maritim            | D       | 4 980          | 23           |
| <b>Total</b> |                    |         | <b>398 338</b> | <b>2 901</b> |

Source: DAFSA.

Although practice varies from country to country, independent hotel operators, who usually own their establishments, generally form associations to allow them to negotiate in the market. The groups, for their part, divide their hotel portfolios among subsidiaries, franchises, and management contracts. The first two categories represent between 70-90% of the hotel stock of the chains. This distribution often depends upon the degree to which franchising is practised in an individual country. In France, the distribution of hotels belonging to chains is as follows: subsidiary, 33%; franchise, 41%; management contract, 19%; and others, 7%.

Thus far, the VAT rate has varied in different Member States of the Community, going from 6-22%, with additional differences in reimbursement levels.

**Table IV**  
**VAT Rates in the Hotel Industry, 1988**

|                | Standard (%) | Luxe (%) |
|----------------|--------------|----------|
| Belgium        | 6.0          | 6.0      |
| Denmark (1)    | 22.0         | 22.0     |
| Germany        | 14.0         | 14.0     |
| Greece (1)     | 6.0          | 6.0      |
| Spain (2)      | 6.0          | 12.0     |
| France (1)     | 7.0          | 18.6     |
| Ireland (1)    | 10.0         | 10.0     |
| Italy (3)      | 9.0          | 19.0     |
| Luxembourg     | 6.0          | 6.0      |
| Netherlands    | 7.0          | 7.0      |
| Portugal       | 8.0          | 8.0      |
| United Kingdom | 15.0         | 15.0     |

(1) VAT not reimbursable.

(2) 12% for 5 star hotels.

(3) 19% for 3 star + hotels.

Source: HOTREC.

### Current Trends

A relatively recent development is that of accommodating two types of client in one hotel but offering them different facilities. Some hotels provide more modest rooms, with separate entrances or storeys, in a separate part of the hotel for budget clients, such as groups.

The problem of developing client loyalty has already been tackled by the airlines, which have created hotels (Air France-Méridien, Pan Am-Intercontinental, etc.), particularly abroad, with reservation systems linked to the airline's ticket reservation system. However, this system of combined airline-hotel reservation is no longer sufficient. Growing competition among the major chains for loyal customers, particularly business travellers, has given rise to innovations

such as additional services for special card holders. The advantages offered include:

- guaranteed reservations
- reduced fares
- rapid check-in and check-out
- the best rooms within a given price range
- gifts
- à la carte room service.

Such cards are provided upon payment of a yearly fee or on the basis of a firm's occupancy rate.

These advantages are offered to attract business clients, who spend more on average than the individual tourist and who are the most important clientele of the hotel chains.

The holiday market has become strongly segmented according to country, providing new forms of accommodation in response to an intensified desire for a change in surroundings and an opportunity to learn about a region in depth through cultural and sports activities (holiday villages, guest houses, farms, bed and breakfast).

To develop this type of tourism, transportation costs must be kept low. Preferred destinations are cities offering cultural interest, and the countryside.

Agro-tourism is one form of "new" vacation opportunity, but it remains limited (niche marketing) as it can only be developed at a local level because of its very specific parameters for local accommodation as well as cultural, tourist and sports activities.

As a result of its specific character, agro-tourism has encountered development problems: it has no centralized reservation system or major communication system at its disposal.

The Mediterranean countries receive the greatest number of tourists, but the growing competition represented by the Asian and African countries cannot be ignored. Moreover, decreasing transportation costs are making it easier for people to travel to distant destinations.

The beaches of the Mediterranean no longer satisfy the diverse tastes of today's tourists, many of whom are looking for "extemporaneous" regional visits organized by the local population or for education and cultural tours.

Europe has seen an increase in holidays offering alternatives to the traditional tour. France, for example, is making efforts to promote alternative holidays.

### *Investment Trends*

In 1986, foreign establishments within the EC represented 166 hotels, concentrated primarily in France, the UK and the

Federal Republic of Germany, while the major chains belonging to Member States accounted for 1 103 hotels abroad (outside the EC).

The expansion of European (EC) groups has primarily taken place in the country of origin or outside the Community, with 10% of hotels within the Community and 35% outside it.

One reason for this phenomenon is chain policy, which is based on the rapid penetration of markets and profitability. To these ends, chains have acquired other profitable medium-sized groups in interesting market segments, and these are most often outside the European Community.

Investment within and without the EC is generally undertaken by the large hotel chains, which have the means to research the market and to develop appropriate marketing concepts.

In the Mediterranean countries of the EC, there is a trend in the hotel-restaurant sector towards middle and upper-range accommodation.

Hotel chains are tending towards franchising when this offers an attractive return on investment.

## **Forecast and Outlook**

The European Community is undergoing changes of importance to the hotel-restaurant and catering sectors. These changes are due to increasingly clear-cut divisions of the specific concepts developed by the hotel chains on the one hand and the independent hoteliers on the other hand, as well as to the position held by the chains, to the detriment of the independents. These changes have been brought about by concentration of the European hotel chains and the use of more precise marketing concepts.

At the same time, given the diversity and specific character of its resources, the Community is experiencing perceptible growth in the demand for new forms of accommodation, which should result in the emergence of "unique" forms of lodging (or "niche" marketing).

Regionalism is one of the strong points of this expansion and consequently should benefit the independents if the necessary resources and techniques are introduced.

There has been strong growth in the use of computerized reservation systems by hotel chains following the growth experienced by the airlines after they installed such reservation systems in their hotels. This phenomenon can be expected to continue and to become more marked within both the hotel and voluntary chains. Given the significant investment that this computerized network represents, it will be difficult for the independent hoteliers to follow suit.

Retired people with leisure time and enough money for holidays tend to travel further and to remain on holiday longer than other groups.

Given that one person out of three in Europe will be over 55 in the year 2000, this segment of the market represents considerable potential for the hotel industry, particularly in the off-season.

Although agro-tourism is enjoying constant growth, its development depends on the size of the local market and on the expansion of accommodation-related activities.

Faced with competition from non-EC destinations, the Community must integrate traditional tourist products and existing or new concepts of tourism with local and regional resources in order to provide additional activities for its visitors so as to attract consumers seeking traditional environments at reasonable prices.

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**Table V**  
**Hotel Groups - Number of Establishments**

|                       | In country of origin | Total EC     | Rest of Europe | Outside Europe | Total        |
|-----------------------|----------------------|--------------|----------------|----------------|--------------|
| <b>UNITED KINGDOM</b> |                      |              |                |                |              |
| Trusthouse Forte      | 220                  | 236          | 9              | 551            | 796          |
| Ladbroke              | 54                   | 62           | 0              | 150            | 212          |
| Crest                 | 44                   | 82           | 1              | 0              | 83           |
| Forum                 | 3                    | 17           | 0              | 0              | 17           |
| Penta                 | 2                    | 10           | 3              | 2              | 15           |
| GW                    | 33                   | 0            | 0              | 13             | 13           |
| Stakis                | 32                   | 33           | 0              | 0              | 33           |
| <b>Total UK</b>       | <b>388</b>           | <b>440</b>   | <b>13</b>      | <b>716</b>     | <b>1 169</b> |
| <b>FRANCE</b>         |                      |              |                |                |              |
| Accor                 | 320                  | 417          | 15             | 104            | 536          |
| Club Méditerranée     | 107                  | 126          | 26             | 60             | 212          |
| Pullman International | 62                   | 105          | 6              | 72             | 183          |
| Société du Louvre     | 147                  | 157          | 1              | 10             | 168          |
| Méridien              | 8                    | 12           | 0              | 40             | 52           |
| <b>Total France</b>   | <b>644</b>           | <b>817</b>   | <b>48</b>      | <b>286</b>     | <b>1 151</b> |
| <b>SPAIN</b>          |                      |              |                |                |              |
| Grupo Unidos          | 110                  | 110          | 0              | 15             | 125          |
| Sol International     | 100                  | 100          | 0              | 10             | 110          |
| Melia                 | 13                   | 13           | 0              | 4              | 17           |
| <b>Total Spain</b>    | <b>223</b>           | <b>223</b>   | <b>0</b>       | <b>29</b>      | <b>252</b>   |
| <b>GERMANY</b>        |                      |              |                |                |              |
| Steigenberger         | 23                   | 24           | 5              | 1              | 30           |
| Dorint                | 25                   | 28           | 1              | 0              | 29           |
| Maritim               | 19                   | 21           | 0              | 2              | 23           |
| <b>Total Germany</b>  | <b>67</b>            | <b>73</b>    | <b>6</b>       | <b>3</b>       | <b>82</b>    |
| <b>ITALY</b>          |                      |              |                |                |              |
| Ciga                  | 22                   | 29           | 0              | 2              | 31           |
| Jolly                 | 29                   | 32           | 0              | 0              | 32           |
| <b>Total Italy</b>    | <b>51</b>            | <b>61</b>    | <b>0</b>       | <b>2</b>       | <b>63</b>    |
| <b>Total EC</b>       | <b>1 373</b>         | <b>1 614</b> | <b>67</b>      | <b>1 036</b>   | <b>2 717</b> |

# TRAVEL AGENTS AND TOUR OPERATORS

(NACE 771)

In an economy with 2.5-3% annual growth, the tourism sector, which includes the travel agent/tour operator segment, is growing by 3-10% annually, depending on country.

The share of household budget allocated to non-business tourism is between 2.5-3% for the major EC countries, but this is a vulnerable budget item because for many consumers it would be the first item to be cut, if necessary.

European tourist destinations for major holidays tend to be within the Community Member States, primarily those of the Mediterranean, which account for a sizeable number of tourists to coastal areas and increasing numbers of visitors to rural areas in the interior.

Secondary holidays, of which there tend to be two or three annually, are more likely to be spent in cities or devoted to winter sports.

## Current Situation

Vacation programmes may be oriented towards Europe or far destinations, with the latter enjoying strong growth.

The best-selling programmes are those to the seaside, major cities, holiday villages, winter sports areas and charter flights. All these programmes, whether aimed at the high or low price range, are centred around a medium-range programme, the common denominator being the quality/price/service relationship.

This must be compatible with the demands of the consumer who wants to travel abroad for the same price as or more cheaply than would be possible in his own country.

## Market Structure

The number of outlets belonging to groups or independents within the Community is 31 512, with a ratio of 975 outlets per 10 000 inhabitants, although large disparities exist among Member States. This sector is of greatest importance in the United Kingdom, Germany and the Benelux countries, which account for 63% of all EC outlets.

The number of direct and indirect jobs created by this sector is constantly growing for the major firms (estimated 4-5%). The development and expansion of travel agencies and tour operators are increasingly tending to merge.

The profits recorded by travel agencies are not very high (often less than 1% of net margin before taxes), while those of tour operators tend to be a bit higher.

EC chains are at present concentrating on developing core services. This makes the market more difficult for the independents, who do not have sufficient volume to offer competitive prices.

At the same time, small firms and independents that have developed exclusive programmes aimed at specific client groups have been able to sell these programmes and create market positions for themselves in terms of profit, if not in terms of global market share.

**Table I**  
**Travel Destinations, 1970 and 1986**  
**(Share of International Tourism Revenue)**

| Rank                               |             | 1970<br>(%)   | 1986<br>(%)    |
|------------------------------------|-------------|---------------|----------------|
| 1                                  | USA         | 13.0          | 10.0           |
| 2                                  | Spain       | 9.4           | 9.3            |
| 3                                  | Italy       | 9.2           | 7.6            |
| 4                                  | Germany     | 7.6           | 7.5            |
| 5                                  | France      | 6.6           | 6.1            |
| 6                                  | Canada      | 6.6           | 6.1            |
| 7                                  | Austria     | 5.6           | 4.7            |
| 8                                  | Switzerland | 4.1           | 3.3            |
| 9                                  | Mexico      | 3.1           | 3.0            |
| 10                                 | Netherlands | 2.4           | 2.3            |
| <b>Total revenue (million ECU)</b> |             | <b>17 510</b> | <b>131 260</b> |

Source: World Tourism Organization.

## Current Trends

For the past several years, the development of this sector within the Community has been carried out by companies belonging to Member States. Recent expansion has seen the appearance of foreign companies penetrating the market to a significant degree through new concepts aimed at a specific clientele (Thomson, Kuoni, Hotelplan).

Europeans tend to travel within the Member States, particularly in a north-south direction. The trend towards shorter holidays is continuing, as is the trend towards secondary holidays devoted to winter sports and urban or rural breaks.

Northern Europeans tend to travel abroad and thus to use travel agencies and tour operators. Itineraries are flexible enough to respond as closely as possible to increasingly spe-

Table II

| (Million)      | Number of tourists from abroad |              | Number of hotel nights |              |              |              | Total        |              |
|----------------|--------------------------------|--------------|------------------------|--------------|--------------|--------------|--------------|--------------|
|                | 1985                           | 1986         | From abroad            |              | Domestic     |              | 1985         | 1986         |
|                |                                |              | 1985                   | 1986         | 1985         | 1986         |              |              |
| Belgium        | 7.0                            | 7.0          | 5.5                    | 5.3          | 2.4          | 2.4          | 7.9          | 7.7          |
| Denmark        | 3.5                            | 4.4          | 4.6                    | 4.3          | 4.2          | 4.4          | 8.8          | 8.7          |
| Germany        | 12.7                           | 12.2         | 24.9                   | 24.5         | 107.6        | 110.8        | 132.5        | 135.3        |
| Greece         | 6.5                            | 7.0          | N/A                    | N/A          | N/A          | N/A          | N/A          | N/A          |
| Spain          | 27.5                           | 29.9         | 78.9                   | 87.7         | 42.1         | 41.8         | 121.0        | 129.5        |
| France         | 36.7                           | 36.0         | 41.0                   | 37.0         | 75.6         | 82.1         | 116.6        | 119.1        |
| Ireland        | 2.4                            | 2.3          | 3.7                    | N/A          | N/A          | N/A          | N/A          | 3.7          |
| Luxembourg     | 0.6                            | 0.6          | 0.9                    | 1.0          | 0.1          | 0.1          | 1.0          | 1.1          |
| Netherlands    | 3.3                            | 3.1          | 6.7                    | 6.6          | 5.0          | 5.2          | 11.7         | 11.8         |
| Portugal       | 4.9                            | 5.4          | 11.6                   | 12.6         | 5.4          | 5.1          | 17.0         | 17.7         |
| United Kingdom | 14.4                           | 13.7         | 167.7                  | 155.7        | 95.0         | 95.0         | 262.7        | 250.7        |
| <b>Total</b>   | <b>119.5</b>                   | <b>121.6</b> | <b>345.5</b>           | <b>334.7</b> | <b>337.4</b> | <b>346.9</b> | <b>682.9</b> | <b>681.6</b> |

Source: OMT

cific demand by tourists attempting to benefit as fully as possible from their travels.

The development of reservation and information systems requires sizeable investments which the chains can afford but which tend to slow development by independents.

Some services are being developed within the agencies in order to provide the consumer a complete range of services, such as after-sales service ensuring the consumer of assistance at any time during or even after his trip.

Travel agency cards (membership, credit cards) are not yet a reality but they should appear at some point within a global concept of improved, homogeneous customer service.

Operating conditions governing this sector in EC countries vary in terms of:

- technical qualifications
- sites and equipment
- equity
- registration fee
- guarantee procedures
- professional insurance.

These conditions may make it difficult to establish or operate agencies in some countries.

### *Investment Trends*

Sectoral concentration has existed for several years now, particularly in the United Kingdom and Germany. This concentration has brought about the emergence of groups that have developed a significant number of outlets and general concepts (core services).

The present trend is for these chains to develop specific programmes, either on their own or by acquisition.

Recently, British travel agents have begun to orient their work towards the tour operators (British Airways being the first airline to propose this type of service).

General practice has been for chains to acquire tour operators of substantial size, with specific itineraries and in-depth knowledge of the market, in order to effect a rapid and specific penetration of certain travel segments.

Development of this sector has also been strongly taken in hand by retailers, the service sector and the press, which have developed a regular, specific clientele as a result of their first-class establishments and through their publications. For these groups, this is a further means of differentiation and of increasing profitability.

Over the past several years, travel agency chains have been investing in business activities that are compatible with their main activities (hotels, car rentals, hotel management, restaurants, leisure parks). This continuing phenomenon is important since these activities result in a net margin higher than that of the agencies.

Attempts are being made (by British and German groups) to expand abroad in order to increase the profitability of programmes that were being sold at higher prices in other countries.

None the less, acquisition remains one of the most widely used means for securing a segment of the leisure or business market, for it makes it possible for chains to acquire direct financial interests and to penetrate the market on a large scale.

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# DEALING IN SCRAP AND WASTE METALS

(NACE 621)

*The European Community has few ore deposits. The recovery of scrap and waste metals constitutes an internal source of raw materials which is reliable, flexible and economical, generating currency savings and ensuring regular supplies. The industry is widespread in all Community countries. Scrap metal is the basis of a third of all Community steel production, with some 41.5 million tonnes in 1986 out of a total production of 124.6 million tonnes. The proportion is tending to rise in the Community as a whole since scrap metal resources are growing.*

*Recovery of the two principal non-ferrous metals, aluminium and copper, is increasing by volume. For the four principal non-ferrous metals, scrap recovery meets between 25% and 35% of needs.*

Contrary to traditional circuits, the cycle of the waste recovery industry goes from the consumer to the producer. Geographical areas of high consumption are one of the two sources of raw materials for this activity, whilst outlets are in industrial sites (the iron and steel and metalworking industries). The second source of supply is manufacturing scrap, which is recovered at the end of the production process and returned, like consumer waste, to iron and steelworks or metalworks.

The structure of the waste recovery industry differs from country to country. It is best organized in Germany.

Scrap and waste metal dealers can be divided into three categories: collectors, small wholesalers and large wholesalers. The small-scale collectors form the largest category,

collecting mainly household waste. Small wholesalers are the first stage in industrial waste recovery. Their suppliers are mainly industry, collectors, demolition firms and even public authorities. Large wholesalers run recovery operations on an industrial scale, buying and selling internationally. Automobile demolition firms also play a significant role.

Scrap iron represents, on a Community scale, about 50% of the value of recovered metals and over 90% of the quantity. For that reason, scrap iron will be treated separately and in depth. The most important non-ferrous metals are aluminium (15% of the total value of recovered metals), copper (15%), lead (3%) and zinc (5%). Other metals are recovered on a smaller scale, including precious metals (gold, silver, platinum) and other metals such as chrome, nickel, tin, antimony, tungsten, titanium, etc. The share by value of each metal varies considerably from year to year, depending on changes in relative prices.

## FERROUS METALS

Scrap iron, bulky and useless to those industries and consumers who "produce" it, is an important raw material for steel producers. As it has already been worked, smelted and purified, scrap iron is both an "energy concentrate" and a resource which is little influenced by political uncertainties. It is thus economical to incorporate it into the manufacturing process, although the savings achieved vary according to its price. The longer a country has been industrialized, the more scrap iron reserves it has; they play an important and growing part in the EC, which has few ore deposits. This substitute raw material, to a certain extent, enables steel producers to choose the least problematical source of supply at any given time.

### Main Indicators

#### Scrap Iron

| (Million tonnes)         | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 |
|--------------------------|------|------|------|------|------|------|------|
| Apparent consumption (1) | 35.8 | 34.7 | 34.3 | 34.6 | 38.4 | 38.0 | 41.5 |
| Net exports              | +0.4 | +3.2 | +2.6 | +4.4 | 4.4  | +4.7 | -0.1 |
| Resources used (2)       | 36.2 | 37.9 | 36.9 | 39.0 | 42.8 | 42.7 | 41.6 |

Excluding internal scrap from iron and steelworks, recycled directly.

There is no available data concerning employment in this sector.

(1) EC 9 (excluding Greece, Spain and Portugal before 1986), EC 12 (excluding Greece in 1986).

(2) In iron and steelworks and cast iron foundries.

## Current Situation

There are two main sources of scrap iron for the recovery cycle. Firstly, scrap metal from steelworks and manufacturers (e.g. production of steel tubes in the first case, production of items for the mechanical engineering or construction industries in the second). This scrap metal normally goes through the recovery cycle, but within the iron and steel industry it can go directly from a "producing" works to a "consuming" works. The second source is scrap iron, including all discarded, demolished or dismantled ferrous objects. This is fed back into the economic cycle by scrap metal dealers who process it, transport and deliver it to EC or non-EC steelworks. Scrap iron is taking a growing share due to the development of resources and processing technologies which limit losses (recovery of bulky objects such as metal bedsteads, recovery of tin cans in waste incinerator plants, automobile crushers which can also process electrical appliances, etc).

There is one more major category of ferrous scrap, namely steel scrap from steelworks which is recovered directly by the steelworks themselves (internal scrap). As it does not go through the recovery cycle it has been excluded from the statistics provided here.

Scrap iron comes in many forms. As the sources of scrap iron are very different, so its shape and state differ (chemical content, thickness, dimensions, incorporation in a larger whole). The fact that scrap iron comes in various states, is geographically scattered and is worth relatively little, means that sorting, classification and transport costs figure prominently in the sale price.

## Consumption Trends

Recycled scrap iron has become increasingly important in the manufacture of cast iron and steel at a time when Western economies are increasingly dependent on developing countries for their supplies of raw materials. Thus scrap iron (excluding internal scrap) today forms the basis of 31% of Community steel production. The iron and steel industry is the principal user, both in electric furnaces, for which scrap iron is the only raw material, and in blast furnaces, for which it is a more or less economical supplement depending on its price. Other users of scrap iron include cast iron foundries, steel foundries, re-rollers and electrometallurgy.

Despite the fall in Community steel production (from 127.7 million tonnes in 1980 to 112 million tonnes in 1986 for EC 10 and 141 million tonnes to 124.6 million tonnes for EC 12), real consumption of scrap iron rose slightly from 36.3 million tonnes in 1980 to 37.2 million tonnes in 1985 (EC 10). It represented 28.6% of steel production in 1980 and 31% in 1985.

## Factors behind Production Trends

Community scrap iron resources outside the iron and steel industry rose between 1980 and 1985 before falling back sharply in 1986.

The two principal sources of scrap iron have evolved differently.

In steelworks, where the "production" of scrap has decreased in line with falling demand for steel in client sectors (mainly the mechanical engineering, automobile, construction and oil industries), automation has led to less scrap. New steel scrap, which is generally stored and transported by dealers, represents a diminishing proportion of raw materials, down from 44% of Community scrap iron resources in 1980 to 33% in 1985.

Scrap iron from automobile demolition, ship breaking and discarded products in general always goes through dealers, who store, sort, classify, prepare, transport and finally sell it to European or foreign iron and steel works. The older industrial nations in Europe have growing quantities of scrap iron; they now represent a dominant share of the Community's resources, up from 19 million tonnes (53%) in 1980 to more than 27 million tonnes (64%) in 1985 (EC 10).

In general, scrap iron resources vary rather slowly and depend more on the past than on the present. The present does however affect scrap iron prices and low prices can lead to a reduction in resources or to stock-piling. This was the case in 1986, when scrap iron resources fell by 15% as prices dropped sharply. Technological advances (in crushers, for example) can also increase the recovery rate of scrap iron. For reasons of cost, scrap iron is processed near collection points or along routes leading to major centres of consumption where prices are determined.

Demand, on the other hand, which by its nature is concentrated in heavy industry, can vary much more dramatically. It depends on the amount of melting equipment in operation or idle at a given time, as well as on economic conditions in the iron and steel industry and is a determining factor in the pricing mechanisms.

The major problems for scrap dealers are demand and price fluctuations. The iron and steel industry plays a major role - in determining prices as suppliers are less concentrated and less organized. Market prices are highly unstable; this instability has direct repercussions on the number of dealers and the tonnage of scrap iron recovered.

Export prices caught up with import prices in 1986.

Prices are relatively uniform throughout the EC even though levels may fluctuate considerably. Spain is the sole exception, prices being sustained by strong demand and more influenced by American prices.

**Table I**  
**Trade Trends**

| (Million tonnes)     | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 |
|----------------------|------|------|------|------|------|------|------|
| <b>Export</b>        |      |      |      |      |      |      |      |
| Other Western Europe | 0.2  | 0.3  | 0.2  | 0.3  | 0.4  | 0.4  | 0.3  |
| USA                  | 10.1 | 5.8  | 6.2  | 6.8  | 8.6  | 8.9  | 10.6 |
| Japan                | 0.2  | 0.2  | 0.2  | 0.1  | 0.2  | 0.2  | 0.5  |
| EC                   | 3.1  | 4.3  | 4.2  | 5.7  | 6.3  | 6.7  | 3.2  |
| <b>Import</b>        |      |      |      |      |      |      |      |
| Other Western Europe | 1.3  | 1.6  | 2.3  | 2.7  | 3.3  | 3.4  | 3.4  |
| USA                  | 0.5  | 0.6  | 0.4  | 0.6  | 0.5  | 0.6  | 0.7  |
| Japan                | 3.0  | 1.8  | 2.0  | 3.9  | 4.0  | 3.3  | 3.2  |
| EC 12                | 4.1  | 1.8  | 3.1  | 2.3  | 3.3  | 3.6  | 3.3  |

Source: International Iron and Steel Institute (IISI) and Eurostat.

### *Export Trends*

The international scrap iron market is largely dominated by the United States, which remains the largest exporter accounting for 10.6 million tonnes in 1986. The EC imported some 1 million tonnes from the USA, 60% of which was imported into Spain.

Despite American domination, EC foreign trade is significant. Exports increased to almost 7 million tonnes in 1985 whilst imports ran at around 3 million tonnes, giving a net export balance of over 3 million tonnes in 1985. Exports decreased in 1986 due to a drop in prices on international markets caused partly by the fall of the dollar.

### *Industry Structure*

Scrap dealing is widespread and varied. There are many small-scale firms as well as larger firms which are sometimes integrated into major European groups.

As demand for scrap iron is rather variable, scrap dealers bear the brunt of fluctuating economic conditions. Firms regularly enter and leave the industry, with some of them absorbed by larger firms. There is a general tendency towards concentration amongst large-scale wholesalers.

### **Forecast and Outlook**

In the future, the European Community should see new growth in the rate of continuous casting, still relatively low in 1986 (barely 70% in EC 12) and in the automation of the iron and steel industry, providing improvements in productivity.

This will result in a fall in amounts of recycled internal scrap and hence an increase in the need for external scrap iron as a relative share of production. But future progress is likely to be less significant than that achieved since 1980. Similarly, the comparatively slow development of electric steel is likely to lead to a slight decrease in demand for scrap iron as a relative share.

The major uncertainty in demand for scrap iron from outside the iron and steel industry is thus the level of steel production. If current levels were to be sustained for five years there would be an increase in demand for external scrap metal relative to 1986; this is likely to be mainly supplied from the recovery of scrap iron. Resources at that point should allow such an increase, given reduced levels of waste and a reduction in exports and taking into account past developments in the demand for steel. As the average lifetime of steel products is about 10 years, it is possible to ascertain that demand for steel fell some 10 years ago, in the early 1980s.

It is more likely that steel production will decrease: BIPE forecasts estimate production of 114 million tonnes in 1993. Under these conditions there would be only a slight increase in demand for external scrap iron which it should be possible to supply from resources.

But as flat products become more important in iron and steel production, ferrous scrap will contain more and more non-ferrous materials (plastics, other metals), thus imposing new technical constraints on dealers and producers.

Because of the new competition with traditional converter steelworks, electric steelworks will be requiring increasing supplies of high quality (i.e. well-sorted) scrap iron. In the

**Table II**  
**Average Price for Scrap Iron**

| (ECU/Tonne)                  | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 |
|------------------------------|------|------|------|------|------|------|
| Imports from third countries | 105  | 114  | 107  | 152  | 174  | 107  |
| Exports to third countries   | 82   | 88   | 90   | 131  | 141  | 108  |

Source: United Nations Publications.

future, given the foreseeable spread of automation, the best use of scrap iron will depend on its having been well sorted and on its physical state (dimensions, density, etc.) being adapted to the new requirements of mechanized and computerized production and the necessary improvement in quality for finished products.

## NON-FERROUS METALS

The recovery rate for non-ferrous scrap metal is fairly high. Recovered aluminium currently represents almost 30% of total consumption of the metal in the Community, and recovered copper almost 35%. Non-ferrous scrap metal is used mainly to produce either secondary metal or, after refining, in the manufacture of half-finished products; it may also be mixed with new metal.

There are two basic categories of non-ferrous scrap from pure metal or alloys:

- manufacturing scrap "produced" by the clients of metallurgists (this may be recovered directly by metallurgists in exchange for new metal; otherwise it passes into the recovery cycle).
- scrap metal from discarded products (electrical conductors, household appliances, automobiles). This is returned to the industrial cycle by collectors and dealers.

As with scrap iron, this study does not take into account manufacturing scrap from metalworks (producing raw metal or half-finished products) which recycle their scrap directly and thus do not form part of the commercial recovery cycle.

There is a price for each category of scrap, based on its metal content and the relevant new metal prices. The evolution of scrap prices does not necessarily match that of new metal prices; fluctuations can be such that scrap metal recovery may become uneconomical. In this case, dealers may speculate or stock-pile until conditions improve. Thus the amount of scrap which finds its way back into the industrial cycle varies in the short term according to its price.

**Table III**  
**Recovery of Non-Ferrous Metals in the EC**

| (Thousand tonnes) | 1980  | 1981  | 1982  | 1983  | % 83/80 |
|-------------------|-------|-------|-------|-------|---------|
| Aluminium         | 1 021 | 1 011 | 898   | 1 223 | 20      |
| Copper            | 1 010 | 1 100 | 1 125 | 1 137 | 13      |
| Lead              | 635   | 663   | 574   | 603   | -5      |
| Zinc              | 515   | 453   | 473   | 453   | -12     |
| Tin               | 15    | 19    | 15    | 20    | 32      |

Source: Eurostat.

## Current Situation

### Aluminium

Although the use of aluminium is comparatively recent it has become the leading non-ferrous metal, with consumption growing strongly. Its physical characteristics (immutability, good conductivity, lightness) guarantee many outlets in all industries, particularly the electrical and transport industries. It is thus highly important for an industrialized country, which explains why recovery rates are comparatively high: approximately 1.2 million tonnes in 1983 and almost 1.6 million tonnes in 1986. Since it can be used in so many different ways, it is mostly recovered when it is transformed into finished products, though it is also recovered from scrapped road vehicles, packaging, household appliances and construction products.

Aluminium scrap can either be used directly or remelted to make secondary aluminium. Germany recycles over 600 000 tonnes of aluminium scrap per year, Italy almost 400 000 tonnes.

### Copper

Copper has been in use for millenia and, in terms of tonnage extracted and consumption, is currently the second most important non-ferrous metal. It is used either pure or in alloys such as brass (copper-zinc) or bronze (copper-tin). Copper is used extensively in the electrical and construction industries, since it is present in a wide range of electrical machines and appliances, vehicles and various hardware products.

Recovered copper, at over one million tonnes per year, represents about one-third of total EC consumption. Since 1985, there has been a tendency towards stagnation both in demand and in recovered waste. The main countries producing secondary copper are Germany (over 150 000 tonnes) and Belgium (100 000 tonnes). The main users of waste for direct production or half-finished products are Germany (250 000 tonnes) and Italy (almost 200 000 tonnes).

### Lead

Recovered lead, mainly from old batteries, represents a considerable share (30%) of Community supplies although fluctuating international price levels inevitably affect the profitability threshold for lead recovery. Community leaders in the production of secondary lead are Germany and Britain, with each producing approximately 130 000 tonnes per year.

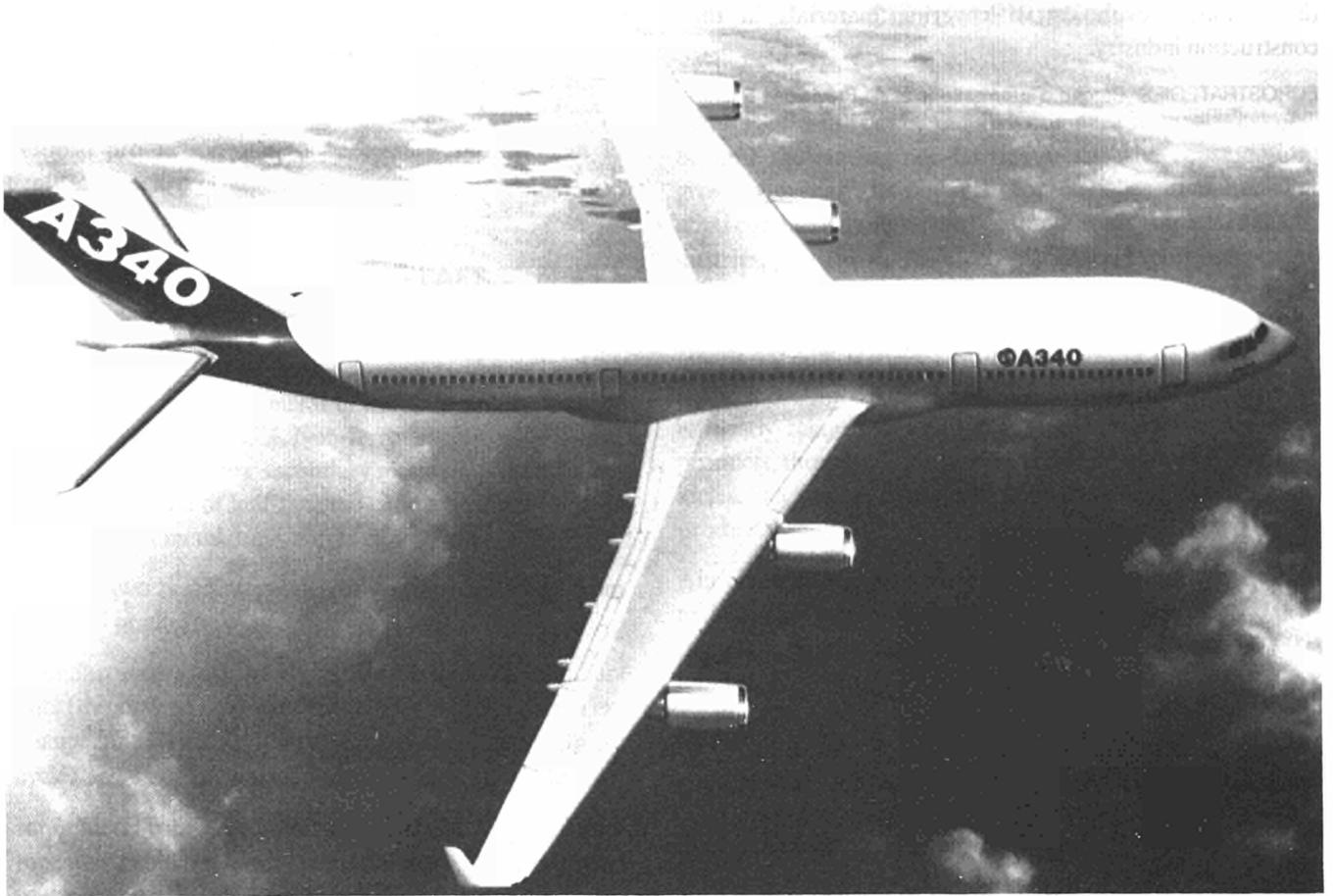
### Zinc

Zinc scrap is either remelted or used directly for half-finished products. Brass scrap is generally recycled in the manufacture of half-finished brass products. The construction and automobile industries are the main sources of scrap zinc, representing about 25% of Community demand for the metal. Amounts of recovered zinc are tending to decrease due to

the technical evolution of covering materials in the construction industry.

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## AIRLINES

(NACE 75)

*Airlines in the EC account for around one-third of the worldwide air passenger market. Both passenger traffic and air freight have been growing steadily since 1983 and this trend is expected to be sustained over the medium to longer term. However, this will be against a background of intensified competition both in terms of price and the quality of service provided. The creation of the internal market will be a very important factor in the liberalization of air traffic in the EC; this process has already begun with the adoption of the EC Council package in December 1987.*

### Current Situation

Air traffic (excluding military air movements) is divided between the commercial sector and general aviation. General aviation, which will not be considered further here, includes in addition to private planes and flying schools, private company planes, air taxis and aerial surveying flights. At certain international airports, the share of general aviation activity amounts to as much as 30% of total flights, but general aviation is increasingly being restricted as traffic density increases and capacity limits are put under stress.

Commercial aviation is divided into passenger traffic - including carrier and charter traffic - and air freight, which includes regular air freight, courier transport and air mail.

Airports keep statistics listing the various traffic sectors separately; however, a comprehensive survey on a national level is more useful for an assessment within an EC framework. Table I shows the most recent available passenger counts for EC Member States. Since about 1 billion air passengers were transported worldwide during 1987, the EC countries thus had a slightly higher proportionate share of the world market (33.5%) when compared with the EC share of world GDP (30%).

Table II shows the latest available figures for passenger volume; some of the figures discussed below relate to 1986 rather than 1987.

The national airlines (carriers) are the main providers of air services. Following its merger with British Caledonian, British Airways, with almost 20 million air passengers in 1987, is almost 50% ahead of the next largest company measured by number of international flight passengers. One of the car-

rier's main objectives is to defend this position. On the basis of the number of international passengers, Air France is in second place, with almost 10 million passengers, and with particularly emphasis on its connections with Africa. This airline offers the most extensive flight network. While Lufthansa is in third position with regard to number of international passengers (9 million), in terms of international freight, it occupies second place, with 460 000 tonnes, and in terms of international freight-tonne-kilometres, it ranks first with a figure of 2.8 billion. Freight will also be a company priority in the future. The Spanish carrier Iberia transported 6 million international passengers in 1986 (fifth place). However, with 7.5 million domestic passengers, this sector retains priority, so that the carrier occupies third place in Europe on the basis of the number of passengers transported. For SAS the number of international passengers amounted to almost 6 million in 1986 (sixth place); the emphasis is on providing connections between all Scandinavian and international hubs. With more than 5.5 million international passengers (eighth place), Swissair has succeeded in making Zurich attractive as a centrally located European hub, particularly for routes to

**Table I**  
**Latest Available Passenger Counts**

| Country            | Airport   | Year | Passengers<br>(1 000) |
|--------------------|---|------|-----------------------|
| Belgium            | Brussels  | 1987 | 6 400                 |
| Denmark            | Copenhagen  | 1987 | 11 400                |
| Germany            | all airports                                      | 1987 | 62 400                |
| Spain              | 7 airports with over<br>2 million passengers p.a. | 1986 | 43 700                |
| France             | all airports                                      | 1987 | 65 100                |
| Ireland            | 4 airports with over<br>400 000 passengers p.a.   | 1987 | 7 600                 |
| Italy              | 7 airports with over<br>500 000 passengers p.a.   | 1987 | 29 700                |
| Luxembourg         | Luxembourg  | 1987 | 890                   |
| Netherlands        | 3 airports with over<br>100 000 passengers p.a.   | 1987 | 13 900                |
| Portugal           | 4 airports with over<br>500 000 passengers p.a.   | 1986 | 6 900                 |
| UK                 | all airports                                      | 1985 | 71 200                |
| <b>Total EC</b>    |   |      | <b>334 900</b>        |
| <b>World total</b> |   |      | <b>+/- 1 000 000</b>  |

Sources: Association of European Airlines - AEA, Brussels, International Air Transport Association - IATA, Cointrin-Geneva, Arbeitsgemeinschaft Deutscher Verkehrsflughafen - ADV, Stuttgart, International Civil Airports Association - ICAA, Orly Aéroport.

Asia. The Dutch carrier, KLM, building on traditional commercial relationships, transported 5 million international passengers in 1986 (ninth place). Emphasis is on the North Atlantic routes as well as the Far East. Alitalia, the Italian carrier, carried fewer than 5 million international passengers (tenth place), but 3.6 million domestic passengers on the country's extensive flight network.

The capacity of the EC carriers, measured in freight tonnage and load factors, is shown in Tables III and IV.

Apart from these carriers, which dominate the scheduled services sector, special charter companies - which are larger than some national airlines - operate in certain countries. This is particularly true of the British company Britannia, with 4.5 million passengers, and DanAir with 3.5 million passengers. The difference between a scheduled flight and a charter flight is that the scheduled flight must be offered at specific times for the period covered by the schedule, while even though charter flight dates and times are sometimes advertised, such flights are not subject to an obligation to publish schedules and adhere to them. Long-term planning by tour operators working with charter companies and the reputation acquired by the large charter companies nevertheless blurs the distinctions, particularly with regard to intercontinental traffic. In addition, scheduled airlines are subject to more intense international pricing competition on long routes, and a large share of their loads on such routes consists of passengers paying less than full fare in tourist class; these factors place them in competition with the charter companies.

### Market Growth

Continuous growth - particularly in international traffic outside Europe - and a steady decline in prices owing to increased supply and greater price differentiation characterize developments over recent years.

Both supply and demand have grown in this area (see Table II) following the liberalization of air traffic in the USA and advances by Asian companies in the EC market; prices have risen more slowly than the general price index. (Prices have also gone down, in real terms, on intra-European flights and this occurred prior to the EC liberalization measures.)

Growth is primarily due to greater world economic integration and recent sustained economic growth, leading to increased demand in the commercial sector and allowing a growing number of people to take holidays by air as the result of the increased purchasing power of private households. A 1985 study by the German Aeronautics Administration (Deutsches Versuchsanstalt für Luft- und Raumfahrt) has shown that the correlation between the growth in GDP and the growth in passenger volume is generally of the order of 1.5. Given anticipated annual growth of 2-3% in GDP until the year 2000, a further increase in number of passengers of between 3 and 5% annually can be expected. All available forecasts are in this range. The numbers relating to increases in freight tonnage are similar.

The major carriers plan to increase their fleets and improve the services they offer in order to secure their market shares. For the most part, differentiation strategies will be employed

**Table II**  
**Number of Passengers Transported - Main Airlines**

| (1 000)        | Airline | 1980     | 1981     | 1982     | 1983      | 1984     | 1985     | 1986     | 1987     |
|----------------|---------|----------|----------|----------|-----------|----------|----------|----------|----------|
| Belgium        | SN      | 1 974.4  | 2 050.8  | 2 000.8  | 1 956.6   | 2 031.6  | 2 188.5  | 2 233.2  | 2 362.1  |
| Denmark        | SK      | 8 301.2  | 8 416.1  | 8 828.4  | 9 367.6   | 10 250.7 | 10 893.1 | 11 869.7 | 12 632.9 |
| Germany        | LH      | 1 3046.4 | 12 964.4 | 12 775.0 | 13 3102.0 | 14 069.9 | 14 582.5 | 15 172.7 | 16 864.5 |
| Greece         | OA      | 4 689.3  | 4 901.0  | 5 336.7  | 5 011.9   | 6 878.1  | 7 457.2  | 6 479.5  | 6 567.6  |
| Spain          | IB      | 1 365.5  | 1 378.7  | 1 343.6  | 12 698.3  | 12 483.0 | 13 220.5 | 13 592.9 | 14 102.0 |
| France         | AF      | 10 921.4 | 1 1565.0 | 11 583.2 | 11 683.8  | 12 025.6 | 12 482.9 | 12 025.5 | 13 361.3 |
| Ireland        | EI      | 1 830.2  | 1 978.6  | 1 949.1  | 1 780.8   | 1 830.5  | 1 828.8  | 1 972.0  | 2 279.0  |
| Italy          | AZ      | 7 309.7  | 6 985.4  | 7 252.3  | 7 368.2   | 7 824.0  | 8 310.8  | 8 383.4  | 9 149.4  |
| Luxembourg     | LG      | N/A      | 174.8    | 203.7    | 204.1     | 234.0    | 239.4    | 247.7    | 272.9    |
| Netherlands    | KL      | 3 849.5  | 3 989.1  | 4 108.2  | 4 207.9   | 4 518.9  | 4 825.7  | 5 074.0  | 5 898.9  |
| Portugal       | TP      | 1 718.9  | 1 914.9  | 1 999.9  | 1 926.6   | 2 023.6  | 2 025.6  | 2 131.9  | 2 439.1  |
| United Kingdom | BA      | 16 132.7 | 15 304.9 | 14 837.8 | 14 174.7  | 15 520.7 | 16 938.3 | 16 997.5 | 19 100.0 |
|                | BR      | 1 721.0  | 1 911.6  | 1 990.7  | 2 058.5   | 2 225.1  | 2 405.6  | 2 381.4  | 2 741.4  |

Sources: Association of European Airlines - AEA, Brussels, International Air Transport Association - IATA, Cointrin-Geneva, Arbeitsgemeinschaft Deutscher Verkehrsflughafen - ADV, Stuttgart, International Civil Airports Association - ICAA, Orly Aéroport.

so that increasing competition will not have to take place solely in terms of pricing. With regard to intra-European traffic, there is still much less competition in scheduled services; because of shorter distances, other means of transport are also competitive and the number of international scheduled carriers has remained limited to one company per country. (Even in Great Britain, only one such airline exists following the merger between BA and BCAL). Consequently, inter-European traffic has remained under government control. Bilateral agreements (which govern all air transport relations in the world) between two countries under which flights and conditions are fixed for each of the two national carriers are adhered to; however, bilaterals in Europe are becoming more flexible as a result of the EC package.

In the freight sector, the reasons for growth are generally the same as those applying to passenger traffic, i.e. increased economic production and growing commercial integration. The immediate reason for a dispatcher to transport goods by air freight is the need for speed and the concomitant requirement that transport costs be reasonable in relation to the value of the goods being transported. For example, in addition to perishable goods, this applies to expensive electronic equipment, and replacement parts and repair tools in cases where an expensive installation is brought to a standstill by the absence of these items, thereby incurring high opportunity costs.

In addition, over the past few years, increased transport of documents and other high-value packages has led to a division of the air freight market; the segment of courier and express services that is not sensitive to price but is critical in terms of time has largely split off from the rest. Based on the availability of a complete infrastructure extending from sender to recipient, express services offer quick and direct trans-

portation of goods and provide a guarantee of delivery times to the client: for example, overnight services within the EC between northern Spain/Italy to Scandinavia. Growth rates - which are potentially double-digit and would lead to a doubling of turnover in less than five years - demonstrate the need for this type of guaranteed rapid transport. The essential pre-conditions for the functioning of this service are hubs that are not closed due to bad weather and that allow night flights, so that from all directions small aircraft can transport goods which can then be sorted, with planes able to begin distributing goods two hours later.

### *New Trends in the Market*

Apart from responses to overall market growth, it is also becoming evident that airline activities are particularly conducive to competition for market shares. Besides the trend towards growing refinement of the tariff system, these activities include services provided at the airport and during flights, as well as supplementary services for travellers.

The feasibility of tariff differentiation rests on the fact that business travellers generally need a high degree of flexibility and often change flights at short notice. These full-fare passengers provide a basic core, but are not able to provide full capacity utilization of planes. For this reason, the airlines contract for marginal business to cover fixed costs, thus guaranteeing capacity utilization. As restrictions for passengers increase (advance booking requirements, permissible length of stay, flexibility with regard to the return journey), the risk of overall yield dilution decreases and airlines can offer a proportional discount on the full fare paid by business travellers.

Competition via improved services is primarily targeted at the full-fare segment of the market. The traveller can choose

**Table III**  
**Freight Forwarded on Passenger Services**

| (1 000 tonnes) | Airline | 1980  | 1981  | 1982  | 1983  | 1984  | 1985  | 1986  | 1987  |
|----------------|---------|-------|-------|-------|-------|-------|-------|-------|-------|
| Belgium        | SN      | 69.1  | 74.9  | 76.7  | 77.8  | 79.8  | 87.7  | 87.6  | 90.9  |
| Denmark        | SK      | 89.1  | 94.0  | 88.7  | 84.1  | 90.6  | 91.7  | 93.2  | 94.8  |
| Germany        | LH      | 242.0 | 245.3 | 241.2 | 277.1 | 308.0 | 311.3 | 357.4 | 399.4 |
| Greece         | OA      | 36.7  | 40.3  | 39.4  | 46.2  | 52.2  | 60.9  | 57.0  | 62.3  |
| Spain          | IB      | 156.2 | 153.6 | 159.2 | 171.8 | 171.2 | 179.2 | 175.6 | 157.4 |
| Ireland        | EI      | 21.9  | 27.6  | 26.5  | 24.7  | 28.4  | 19.9  | 17.4  | 17.8  |
| Italy          | AZ      | 83.6  | 90.7  | 101.6 | 108.0 | 118.3 | 126.5 | 139.8 | 144.1 |
| Luxembourg     | LG      | N/A   | 0.6   | 0.7   | 0.7   | 0.6   | 0.7   | 0.9   | 0.9   |
| Netherlands    | KL      | 143.3 | 165.9 | 154.5 | 178.2 | 218.1 | 214.5 | 232.0 | 267.9 |
| Portugal       | TP      | 23.7  | 25.2  | 26.8  | 24.2  | 28.5  | 30.0  | 32.3  | 35.1  |
| United Kingdom | BA      | 151.6 | 134.3 | 117.4 | 155.3 | 191.3 | 194.6 | 201.9 | 222.6 |
|                | BR      | 34.6  | 38.2  | 36.2  | 43.9  | 50.9  | 57.9  | 67.7  | 71.1  |

Sources: Association of European Airlines - AEA, Brussels,  
International Air Transport Association - IATA, Cointrin-Geneva,  
Arbeitsgemeinschaft Deutscher Verkehrsflughafen - ADV Stuttgart,  
International Civil Airports Association - ICAA, Orly Aéroport.

between several airlines and does so on the basis of seating capacity, on-board service, use of a private lounge at the airport, safety standards, etc. Differentiated (service) classes, familiar from intercontinental flights, are also appearing in intra-European traffic.

In the next few years, the expansion of services before and after the flight itself will become increasingly important. Links already exist between airlines and car rental companies and hotels and, in the case of charter companies, with tour operators and travel agencies. With information on available flights and tariffs having become too complex for most travel agency employees, they are now offered via EDP terminals. The traveller can thus be sure of being offered the most favourable tariff or the most favourable connection among the companies offering this service. Alongside similar developments in the United States, two such reservation systems are being set up in Europe: Amadeus (Air France, Lufthansa and others) and Galileo (British Airways, Swissair and others).

In the following analysis of the major airlines, charter companies which are all smaller than the scheduled airlines presented here are not considered. Their main destination is the Mediterranean area, particularly Spain (10 million tourists per year) and Greece (5 million tourists per year). Important structural differences by comparison with the regular airlines consist of a single-class system, a distinctly higher load factor (85-90% as compared to 65-70% for regular airlines) and, in the case of the intensively competitive British and Scandinavian companies, a considerably higher number of flying hours per airplane than is the case for regular airlines on EC routes (approximately 4 000 as opposed to 3 000 flying hours per airplane per annum). A further important difference is that charter companies

generally only offer services within the framework of all-inclusive tours; a differentiation strategy towards the customer is therefore hardly feasible.

A trend in the freight sector that will become increasingly pronounced in the future is that the airlines, through improved cooperation and coordination with forwarding agents, are attempting to diminish the main competitive edge of courier and express services. Since the time spent by air freight on the ground is about four times as long as the effective flying time, efforts are being made by regular freight carriers to reduce these delays in order not to lose further market share. Goods for which time is not such a critical factor are being serviced at increasingly low cost and with only a slight loss of time through a sea-air freight combination, the goal being to reserve for air transport only those goods for which it is essential. Express services, for their part, will try to extend their route networks as quickly as possible. Using single-engine propeller planes it pays, for example, to set up a new flight link even for a daily transport volume of half a tonne. With the growing economic strength of southern Europe, linking up Greece and Portugal to the route networks of courier services will become profitable.

## Outlook

For airlines, the liberalization of 1992 represents a decisive event, because important segments of State regulation that protect market shares and flight tariffs will no longer be applicable.

The change of the rigid 50:50 quota between two national airlines serving the same route, which could change to 60:40,

**Table IV**  
**Load Factor**

| (%)            | Airline | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 |
|----------------|---------|------|------|------|------|------|------|------|------|
| Belgium        | SN      | 59.4 | 64.0 | 64.2 | 65.3 | 67.0 | 65.7 | 65.9 | 67.7 |
| Denmark        | SK      | 59.7 | 61.6 | 63.9 | 66.0 | 67.0 | 67.4 | 66.3 | 69.4 |
| Germany        | LH      | 59.1 | 59.8 | 59.6 | 60.0 | 62.4 | 62.0 | 60.3 | 66.6 |
| Greece         | OA      | 64.1 | 65.9 | 52.1 | 64.9 | 67.0 | 66.0 | 61.8 | 65.5 |
| Spain          | IB      | 58.8 | 61.6 | 59.5 | 59.7 | 64.7 | 66.2 | 67.0 | 70.5 |
| France         | AF      | 61.6 | 64.4 | 64.1 | 65.8 | 68.0 | 67.9 | 65.2 | 69.5 |
| Ireland        | EI      | 66.9 | 69.9 | 70.0 | 68.3 | 66.0 | 69.3 | 71.5 | 71.6 |
| Italy          | AZ      | 58.6 | 59.2 | 60.9 | 61.5 | 63.8 | 64.5 | 61.5 | 64.7 |
| Luxembourg     | LG      | N/A  | 49.0 | 49.1 | 51.3 | 53.8 | 51.4 | 52.5 | 55.0 |
| Netherlands    | KL      | 57.8 | 63.2 | 62.5 | 62.8 | 69.0 | 67.5 | 65.4 | 68.8 |
| Portugal       | TP      | 57.9 | 64.2 | 64.9 | 65.3 | 69.3 | 68.8 | 66.8 | 70.9 |
| United Kingdom | BA      | 62.5 | 65.9 | 67.4 | 64.7 | 67.0 | 68.6 | 66.1 | 71.8 |
|                | BR      | 53.1 | 56.6 | 58.2 | 61.8 | 63.7 | 61.0 | 59.6 | 63.5 |

Sources: Association of European Airlines - AEA, Brussels,  
International Air Transport Association - IATA, Cointrin-Geneva,  
Arbeitsgemeinschaft Deutscher Verkehrsflughafen - ADV, Stuttgart,  
International Civil Airports Association - ICAA, Orly Aéroport.

represents a relaxation that may mean growth of some 50% for the more efficient carriers, without necessarily encroaching on the market share of other airlines. The fact that overflying airlines will be allowed to let passengers disembark and board at intermediate stops represents a further relaxation. For charter companies in particular, this lifts the restriction that only a company attached to the country of departure or arrival may transport passengers. For countries with dense passenger traffic that are flown over - for example, the Federal Republic of Germany - competition will become internationalized and, to the advantage of the consumer, charter flights could come down in price by more than 10%, as indicated by the cost and profit structures of potential competitors.

Moreover, the charter companies will enter into competition with the established regular carriers on connecting routes not

bound for the south, which will alter the pricing structure for the regular carriers as well. This will lead to increased capacity on attractive regular routes, and prices may be expected to decrease. The regular airlines will react to this by price differentiation between classes, leading to less differences between regular and charter traffic as a whole, as has already happened on intercontinental routes.

In the air freight sector, there is already a high degree of price competition so that price reductions are feasible only with increased capacity, for example, extra freight on additional passenger routes.

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# AIRPORTS

(NACE 764)

*Strong growth has been recorded in the volume of airport traffic in terms of flights, passengers and freight. However, these growth rates are expected to moderate slightly over the medium term. The impact of 1992 on airport facilities, mediated through the response of airlines to the single market, will be important and is expected to particularly affect freight services and duty-free shops.*

The following is a description of the most important EC airports from an aviation perspective. It provides an overview of essential factors which determine the quality of an airport as a medium between supply in the aviation field provided by airlines and demand for air traffic services, and of development plans affecting the situation until 1992.

Given the European perspective of this description, the impact of an airport on the region (such as the number of jobs created), the various aspects of general aviation and the politics and economy of smaller airports will not be addressed.

## Current Situation

The importance of an airport can be measured on the basis of the number of passengers checked in, the volume of freight forwarded or the number of commercial flights. Tables I, II and III provide figures for these three items, covering the 17 most important EC airports and three other important European airports, for the years 1980-87.

According to these statistics the major airports, or their respective catchment areas, have all registered sustained growth. Annual growth for airports built between 1980 and 1987 amounted to 5.6% in the number of passengers, 5.3% in the quantity of freight forwarded and 5.3% in the number of commercial flights. Below average growth in the number of flights primarily reflects the use of larger airplanes. Some airports have reached the limits of their capacity, requiring regional airports to take over some of the traffic, e.g. London Gatwick for charter traffic, Paris Charles de Gaulle for international traffic. A clear concentration occurs in regions

**Table I**  
**Growth in Number of Passengers at the Largest EC Airports (1)**

| Airport & rank        | Country | Number of passengers (1 000) |        |        |        |        |        |        | Average annual growth (%) |         |
|-----------------------|---------|------------------------------|--------|--------|--------|--------|--------|--------|---------------------------|---------|
|                       |         | 1980                         | 1981   | 1982   | 1983   | 1984   | 1985   | 1986   | 1987                      | 1980-87 |
| 1 London Heathrow     | UK      | 27 742                       | 26 401 | 26 406 | 26 749 | 29 147 | 31 289 | 31 315 | 35 080                    | 3.6     |
| 2 Frankfurt           | D       | 16 834                       | 16 915 | 16 493 | 17 016 | 18 297 | 19 543 | 19 753 | 23 288                    | 4.7     |
| 3 Paris Orly          | F       | 15 670                       | 17 012 | 16 062 | 16 258 | 17 174 | 17 671 | 18 544 | 20 604                    | 4.0     |
| 4 London Gatwick      | UK      | 9 707                        | 10 730 | 11 154 | 12 477 | 13 954 | 14 883 | 16 309 | 19 578                    | 10.5    |
| 5 Paris Ch.-de-Gaulle | F       | 10 091                       | 10 936 | 12 923 | 13 411 | 13 628 | 14 642 | 14 427 | 16 445                    | 7.2     |
| 6 Rome                | I       | 10 707                       | 10 921 | 11 408 | 11 407 | N/A    | N/A    | 12 864 | 14 721                    | 4.7     |
| 7 Amsterdam           | NL      | 9 401                        | 9 669  | 9 744  | 9 680  | 10 554 | 11 385 | 11 685 | 13 628                    | 5.4     |
| 8 Stockholm (1)       | S       | 4 266                        | 4 637  | 4 942  | 7 412  | 8 638  | 9 088  | 10 593 | 12 049                    | 16.0    |
| 9 Madrid              | E       | 9 699                        | 9 961  | 10 252 | 10 158 | 10 222 | 10 644 | 10 843 | 11 794                    | 2.8     |
| 10 Copenhagen         | DK      | 8 575                        | 8 192  | 8 401  | 8 287  | 8 873  | 9 400  | 9 971  | 11 373                    | 4.1     |
| 11 Palma de Mallorca  | E       | 7 296                        | 7 925  | 8 605  | 8 736  | 9 128  | 8 821  | 9 917  | 11 256                    | 6.4     |
| 12 Athens             | GR      | 9 131                        | N/A    | N/A    | 9 068  | 10 296 | 11 004 | 9 600  | 10 746                    | 2.1     |
| 13 Zurich (1)         | CH      | 7 627                        | 7 997  | 7 977  | 8 256  | 8 673  | 9 102  | 9 251  | 10 615                    | 4.8     |
| 14 Dusseldorf         | D       | 7 061                        | 7 217  | 7 157  | 7 138  | 7 520  | 7 914  | 8 570  | 9 878                     | 4.9     |
| 15 Milan              | I       | 5 269                        | 5 587  | 4 932  | 5 979  | 6 238  | 6 612  | 7 140  | 9 706                     | 9.1     |
| 16 Munich             | D       | 5 731                        | 5 630  | 5 628  | 6 065  | 6 871  | 7 653  | 7 669  | 9 575                     | 7.6     |
| 17 Manchester         | UK      | 4 323                        | 4 723  | 4 991  | 5 087  | 5 960  | 6 059  | 7 626  | 8 700                     | 10.5    |
| 18 Brussels           | B       | 4 960                        | 5 061  | 4 984  | 4 958  | 5 220  | 5 528  | 5 739  | 6 400                     | 3.7     |
| 19 Geneva (1)         | CH      | 4 010                        | 4 172  | 4 170  | 4 195  | 4 303  | N/A    | N/A    | 5 597                     | 4.9     |
| 20 Cologne            | D       | 1 919                        | 1 772  | 1 661  | 1 669  | 1 855  | 1 961  | 1 973  | 2 230                     | 2.2     |

(1) Non-EC airports included for comparison purposes.

Sources: Association of European Airlines - AEA, Brussels,  
International Air Transport Association - IATA, Cointrin-Geneva,  
Arbeitsgemeinschaft Deutscher Verkehrsflughafen - ADV, Stuttgart,  
International Civil Airports Association - ICAA, Orly A rogare.

with a high volume of traffic or logistically suitable hubs. Certain airports tend to specialize in either passenger traffic or freight; this detailed information, i.e. the distinction between carrier and charter passengers, or normal air freight/courier services, is not evident from the above tables but can be derived from data relating to individual airports.

The capacity limit of individual airports is determined by a number of factors. It cannot be fixed at a set upper limit on the number of passengers or the volume of freight but can only be approximately determined. The number of flights is limited by the layout of runways as well as by the number of gates in the terminal and positions on the apron (excluded are general aviation movements which further reduce the possible number of commercial flights). Further reduction in capacity occurs at many airports as a result of restrictions applying to night flights. The number of passengers is limited by the connection between the airport and the traffic network (roads and railways), the number of check-in counters and the check-in capacity of each counter (electronic data processing infrastructure). The volume of freight that can be forwarded, besides being limited purely by the relevant infrastructure, is restricted by the frequency and duration of

closures due to bad weather and the extent to which night use of the airport is possible. Installation of a freight hub, which is essential if high volume is to be achieved, is only possible if these major requirements can be largely met.

Analysis of business reports and press information relating to the planning of individual airports shows that, as a whole, the most important investments are those aimed at increasing passenger check-in capacity (London, Frankfurt), but that certain airports (Amsterdam, Brussels) deliberately emphasize freight. Investment with a view to increasing flight capacity is generally not as urgent; below-average growth rates have been the recent trend in this area and political restrictions on flight capacity increases may limit investment.

With regard to passenger traffic as well as freight, it is sensible for airlines to create routes radiating outwards from a central hub. The main reasons for the concentration of hubs are:

- infrastructure only needs to be constructed at one location; typically, this will be the headquarters of the organizing airline, where both administration and maintenance can be concentrated

**Table II**  
**Growth in Freight Volume at the Largest EC Airports (1) (2)**

| Airport & rank        | Country | Freight volume (tonnes) |         |         |         |         |         | Average annual growth (%) |         |         |
|-----------------------|---------|-------------------------|---------|---------|---------|---------|---------|---------------------------|---------|---------|
|                       |         | 1980                    | 1981    | 1982    | 1983    | 1984    | 1985    | 1986                      | 1987    | 1980-87 |
| 1 Frankfurt           | D       | 594 673                 | 589 985 | 589 026 | 628 310 | 686 787 | 735 891 | 784 283                   | 909 249 | 6.3     |
| 2 London Heathrow     | UK      | 468 547                 | 450 369 | 441 324 | 469 791 | 544 425 | 529 845 | 543 279                   | 576 309 | 3.0     |
| 3 Paris Ch.-de-Gaulle | F       | 402 332                 | 447 321 | 469 460 | 497 895 | 506 442 | 506 137 | 510 561                   | 546 259 | 4.5     |
| 4 Amsterdam           | NL      | 318 079                 | 329 733 | 316 760 | 370 409 | 438 162 | 436 064 | 451 355                   | 513 711 | 7.1     |
| 5 Brussels            | B       | 158 407                 | 156 614 | 147 288 | 122 192 | 143 024 | 165 745 | 192 292                   | 233 537 | 5.7     |
| 6 Zurich (2)          | CH      | 156 751                 | 161 993 | 168 052 | 179 775 | 204 837 | 210 732 | 220 683                   | 229 502 | 5.6     |
| 7 Paris Orly          | F       | 164 357                 | 170 714 | 155 459 | 164 294 | 205 231 | 187 010 | 202 160                   | 217 721 | 5.6     |
| 8 Rome                | I       | 148 896                 | 134 469 | 146 668 | 161 700 | N/A     | N/A     | 178 885                   | 200 826 | 4.4     |
| 9 London Gatwick      | UK      | 119 980                 | 132 525 | 120 243 | 109 571 | 143 100 | 157 241 | 164 176                   | 191 709 | 6.9     |
| 10 Madrid             | E       | 144 067                 | 151 005 | 152 666 | 153 939 | 163 885 | 170 575 | 169 566                   | 164 371 | 1.9     |
| 11 Copenhagen         | DK      | 139 527                 | 139 582 | 139 015 | 141 481 | 147 295 | 143 106 | 130 558                   | 148 905 | 0.9     |
| 12 Milan              | I       | 63 443                  | 48 765  | 42 106  | 50 847  | 60 814  | 60 094  | 65 905                    | 119 202 | 9.4     |
| 13 Cologne            | D       | 48 418                  | 53 060  | 48 043  | 54 180  | 51 873  | 74 859  | 94 633                    | 118 520 | 13.6    |
| 14 Luxembourg (3)     | L       | 59 850                  | 72 183  | 64 101  | 62 288  | 74 307  | 69 369  | 77 955                    | 96 846  | 8.0     |
| 15 Athens             | GR      | 62 500                  | N/A     | N/A     | 75 429  | 86 291  | 94 526  | 88 727                    | 92 820  | 5.1     |
| 16 Manchester         | UK      | 24 322                  | 28 845  | 23 658  | 24 462  | 28 741  | 31 797  | 39 032                    | 64 774  | 15.0    |
| 17 Stockholm (2) (3)  | S       | 46 544                  | 42 490  | 40 636  | 50 880  | 58 990  | 57 760  | 59 768                    | 63 770  | 4.6     |
| 18 Munich             | D       | 30 483                  | 29 285  | 29 721  | 30 182  | 34 614  | 33 298  | 37 776                    | 54 065  | 8.5     |
| 19 Geneva (2)         | CH      | 35 788                  | 32 706  | 32 561  | 36 441  | 43 833  | N/A     | N/A                       | 47 918  | 4.3     |
| 20 Dusseldorf         | D       | 34 641                  | 31 242  | 28 782  | 30 852  | 37 391  | 38 959  | 39 578                    | 39 756  | 4.9     |
| 21 Palma de Mallorca  | E       | 28 482                  | 25 954  | 24 672  | 24 437  | 24 857  | 24 257  | 24 993                    | 22 522  | -3.3    |

(1) Not listed are airports forwarding less than 70 000 tonnes of freight and not among the 20 largest Western European airports in number of passengers and flights.

(2) Non-EC airports included for comparison purposes.

(3) Freight sector only.

Sources: Association of European Airlines-AEA, Brussels, International Air Transport Association-IATA, Cointrin-Geneva, Arbeitsgemeinschaft Deutscher Verkehrsflughafen-ADV, Stuttgart, International Civil Airports Association-ICAA, Orly Aéro-gare.

- the planning of routes is considerably simplified if all planes regularly return to home base and from there are assigned a completely new route
- keeping replacement machinery available for unexpected breakdowns of scheduled planes is only economically justifiable at hubs
- profitability is easier to calculate for new routes
- the transport route, particularly for freight and courier goods, is clearly established so that the position of goods can be traced at any given time.

The drawback of hub systems, i.e. that the hub can be overburdened by the very limited use of other airports, is only now becoming evident; given steady growth, this will become a problem in future. Consequently, more traffic will be diverted to other suitable airports with traffic facility links.

An analysis of traffic statistics for various airports shows that each airport develops a characteristic priority in the relationship between flights, passengers (carriers and charters) and freight volume (air freight, courier services). Such a specialization is determined by geographical location, national conditions, historical development and new economic developments.

Geographical location, particularly in the case of transatlantic traffic, is causing airports located in the west of Europe to become preferred European hubs for American airlines, since they make it possible for air passengers to continue to their final destinations without difficulty. A further example of a geographically influenced choice of airport is represented by the courier and freight service hubs of Brussels, Cologne and Amsterdam. From these locations, important European economic centres can be reached by road in less than a day.

National conditions are reflected in the relationship between carrier passengers and charter passengers. In France, where almost 50 million passengers check in Paris alone, there is almost no charter traffic of the kind being developed in the UK, Germany, Benelux or Scandinavia, which are characterized by individual networks and steady growth. One reason for this, apart from the alternative of using other means of transport, is that August is the holiday month for the entire country. Any charter company that might be set up would be overburdened during this period - as is the case throughout Europe - while being largely under-utilized during the remainder of the year. It is uncertain whether the airplanes of such a company would reach the 3 000 flying hours needed to break even for the year. In London, for example, histori-

**Table III**  
**Growth in the Number of Commercial Flights for the Largest EC Airports (1)**

| Airport & rank        | Country | Number of commercial flights (1 000) |      |      |      |      |      |      | Average annual growth (%) |         |
|-----------------------|---------|--------------------------------------|------|------|------|------|------|------|---------------------------|---------|
|                       |         | 1980                                 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 | 1987                      | 1980-87 |
| 1 London Heathrow     | UK      | 273                                  | 247  | 251  | 260  | 273  | 283  | 289  | 307                       | 1.5     |
| 2 Frankfurt           | D       | 211                                  | 210  | 204  | 206  | 212  | 222  | 235  | 258                       | 2.7     |
| 3 Stockholm           | S       | 70                                   | 72   | 73   | 135  | 149  | 162  | 188  | 202                       | 16.3    |
| 4 Copenhagen          | DK      | 145                                  | 134  | 138  | 142  | 145  | 149  | 157  | 192                       | 4.1     |
| 5 Amsterdam           | NL      | 144                                  | 138  | 138  | 139  | 141  | 151  | 159  | 175                       | 2.8     |
| 6 Paris Orly          | F       | 175                                  | 178  | 155  | 153  | 154  | 155  | 164  | 171                       | -0.3    |
| 7 London Gatwick      | UK      | 123                                  | 125  | 132  | 137  | 140  | 147  | 155  | 171                       | 4.8     |
| 8 Paris Ch.-de-Gaulle | F       | 103                                  | 102  | 123  | 131  | 133  | 140  | 145  | 155                       | 6.0     |
| 9 Rome                | I       | 144                                  | 135  | 133  | 134  | N/A  | N/A  | 138  | 143                       | -0.1    |
| 10 Brussels           | B       | 86                                   | 81   | 79   | 78   | 82   | 88   | 90   | 139                       | 7.1     |
| 11 Zurich             | CH      | 119                                  | 127  | 127  | 120  | 124  | 128  | 132  | 137                       | 2.0     |
| 12 Munich             | D       | 95                                   | 92   | 9    | 96   | 101  | 115  | 124  | 137                       | 5.3     |
| 13 Geneva             | CH      | 70                                   | 68   | 67   | 68   | 71   | 74   | 77   | 134                       | 9.8     |
| 14 Manchester         | UK      | 61                                   | 61   | 69   | 64   | 70   | 72   | 85   | 126                       | 10.9    |
| 15 Madrid             | E       | 117                                  | 114  | 113  | 113  | 109  | 114  | 114  | 114                       | -0.4    |
| 16 Athens             | GR      | 112                                  | 101  | 101  | 104  | 109  | 116  | 110  | 113                       | 0.1     |
| 17 Milan              | I       | 83                                   | 79   | 66   | 78   | 80   | 83   | 90   | 112                       | 4.4     |
| 18 Dusseldorf         | D       | 88                                   | 87   | 83   | 84   | 86   | 91   | 99   | 110                       | 3.3     |
| 19 Palma de Mallorca  | E       | 71                                   | 71   | 76   | 78   | 75   | 70   | 75   | 82                        | 2.0     |
| 20 Cologne            | D       | 54                                   | 45   | 39   | 40   | 43   | 50   | 59   | 65                        | 2.8     |

(1) Non-EC airports included for comparison purposes.

Sources: Association of European Airlines - AEA, Brussels, International Air Transport Association - IATA, Cointrin-Geneva, Arbeitsgemeinschaft Deutscher Verkehrsflughafen - ADV, Stuttgart, International Civil Airports Association - ICAA, Orly Aérogare.

cal development has led to a situation where Heathrow - as a carrier hub that has been working to capacity for a long time now - handles almost no charter traffic, while the highest percentage of charter flights, representing 56% of passengers, is to be found at Gatwick.

New economic developments, particularly the increase in total air freight volume and the rapid growth of courier services (annual growth of over 15%) have led to a structure oriented primarily towards freight service (infrastructure availability on a 24-hour basis). One example of this is Brussels airport, which plays a subordinate role in international passenger traffic. As a result, Brussels, which ranks 18th in terms of passenger traffic, occupies fifth place in terms of freight volume. Similar specialization can be observed in Cologne and Luxembourg.

### *Characterization of Individual Airports*

**London:** Heathrow, Gatwick and Stansted form an ensemble under their proprietor, the British Airport Authority (BAA). Scheduled flights, specifically those with set rights, and international traffic, as well as freight, are directed to Heathrow. Charter passengers are distributed between the two other airports. An increase in capacity is envisaged over the next few years, particularly in relation to passenger terminals; towards the end of the 1990s, runway capacity will also have to be increased.

**Paris:** A large share of international traffic has been shifted to Charles de Gaulle. This airport, which still has reserve capacity in terms of number of flights, will assume a leading role in this area, as it has already done in relation to air freight. An increase in check-in capacity is planned for the new terminal two at Charles de Gaulle; in addition, there are plans to provide connections between de Gaulle and the "train à grande vitesse" (TGV), as well as between the Paris metro system and Orly.

**Frankfurt:** Frankfurt airport has reached the limits of its capacity and a particular hindrance is the absence of a second, independent runway. Over the medium term, it will inevitably become necessary to allocate a certain amount of traffic to the new (as of 1991-92) Munich airport 300 km away from Frankfurt, which is not as favourably situated geographically but which fulfils all technical traffic requirements. Immediate plans for Frankfurt concern improvements in passenger check-in facilities.

**Rome:** In anticipation of the longer term, up to the year 2000, the airport is undertaking a general expansion in both the passenger sector (parking places, terminals) and the freight sector (planning for a new cargo centre). In addition, it is to be connected to the urban rail network (underground).

**Amsterdam:** Amsterdam airport is at present expanding its capacity and will specifically create a position for itself as an alternative to the other major European airports in the air freight sector (for example, there will be almost no reduction of night service).

### *Growth Trends of Individual Airports*

Since 1980 the following airports have registered the highest annual growth rate: flights: Stockholm, +16.3%; Manchester, +10.9%; Geneva, +9.8%; passengers: Stockholm, +16.0%; Manchester, +10.5%; Gatwick(London), +10.5%; freight: Manchester, +15.0%; Cologne, +13.6%; Munich, +8.5%.

The highest growth rates are found in previously secondary areas which, on the basis of increasing total demand, are crossing a threshold above which the construction of infrastructure for a traffic hub becomes economically efficient. In individual cases, future prospects come into play. This is the case, for example, in the construction of the new airport to be opened in Munich in 1991-92.

All expert forecasts assume a further annual growth of 3 to 5% for passengers and freight until the year 2000; estimates for the growth in number of flights, at some 2% annually, are about half as high. The growth forecast is thus slightly below past rates.

### **Forecast and Outlook**

Airports will be indirectly affected by the liberalization of the European flow of persons and goods. Airlines domiciled at these airports which are currently protected to some degree by government regulation, will find themselves in a more strongly cost-oriented environment than is now the case. More efficient competitors will therefore be able to expand their market shares, thus opening up the type of administrative and maintenance capacity in their home airports that already exist in other locations for lower-priced companies. This results in concentration - the consequences of which cannot as yet be gauged - around the hubs of the most efficient operators, to the degree allowed by the capacity of their home airports.

A further change for airports is that as the Community becomes "inland" for customs purposes, the number of "foreign" flights will fall dramatically and the duty-free shops, which now represent a source of revenue amounting to a quarter of turnover, will have to adapt. It is not yet possible to estimate how great a drop in sales must be expected.

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# EXPRESS SERVICES

(NACE 790)

*The demand for express services has grown dramatically over the past six years and has been accompanied by substantial developments in the nature and range of services provided by this sector. Express service companies operate in a highly competitive market; the prospect of the EC single market in 1992 is viewed as the catalyst for further development and is expected to be a key factor in the continued expansion of this service industry.*

The express service industry provides rapid, reliable, and carefully monitored, door-to-door transportation of documents and parcels.

Express services are a part of the infrastructure of communications and transportation services. In terms of speed and specialisation they are situated between the slower, less expensive and less specialized services provided by the traditional postal services as well as by air and surface freight agencies, and the faster communications services are offered by the telecommunications industry.

Since it is so new and changing so rapidly, no standard definition of the "express industry" has yet gained universal acceptance. On the contrary, the commercial scope of the industry has shown a marked degree of evolution over the last several years. The above definition is, more or less, the definition favoured by the International Express Carriers Conference (the trade association of the largest international private express companies) and the Customs Cooperation Council.

This definition includes the following types of express companies: those using passengers on commercial aircraft ("air couriers") and those using priority freight services ("freight forwarders"); express companies with dedicated aircraft or trucks ("integrated carriers"); door-to-door services organized by some commercial airlines (e.g. British Airways' "Speedbird") and railroads, and door-to-door services provided by national post offices ("express mail service"). Despite different origins, all of these services compete with one

another, and most large express service companies make use of more than one mode of long haul transport.

## Current Situation

The express industry provides worldwide on-demand delivery of time-sensitive documents such as cheques and other financial papers, tender offers, blueprints, shipping and engineering documents, legal papers, etc. In general, the items transported by the express industry are "time-sensitive" in that their economic value depends substantially on rapid and timely delivery.

The express industry also transports urgent dutiable items such as samples, circuit boards and other computer equipment, spare parts, periodicals and news media, etc. The industry greatly facilitates the close coordination of activities in widely separate geographic locations, especially the activities of other service industries such as banking, trade, transport, and professional services.

The core of service provided by express transfer does not lie in long haul transport as such, but in the services provided at either end: high quality, on-demand collection and delivery, rapid tracking and tracing, unified administrative control from end to end, and service over a matrix of geographic points (not only point to point).

For analytical purposes the express service industry can be divided into three categories:

- international or extra-EC (shipments from a point in the EC to a point outside the EC or vice versa)
- cross-border or intra-EC (shipments between two points within the EC that cross at least one national boundary)
- domestic (shipments between two cities in the EC that do not involve crossing a national boundary).

Shipments within the same city (intracity) would generally not be regarded as "express" service shipments in the same sense as intercity shipments because the level of organization and administration required for intracity delivery is qualitatively different from intercity service, at least over a matrix of many cities. In general, as a matter of commercial practice, these two levels of operation are provided by different types of commercial organizations.

To date, the only available industry estimates are for international and cross-border services. Moreover, the cross-border figures do not include substantial amounts of traffic transported by surface means.

### Main Indicators Express Services (1)

|                            | 1987  |
|----------------------------|-------|
| Shipments (million) (2)    | 16.7  |
| Turnover (million ECU) (2) | 453.0 |
| Employment                 | 6 695 |

(1) EC 12.

(2) Estimated.

Table I presents rough estimates for the numbers of shipments by all express services in 1987. These estimates were developed from limited data by the International Express Carriers Conference (IECC).

**Table I**  
Estimated Number of Express Shipments, 1987

| (Million)       | Intra-EC   | Extra-EC    | Total       |
|-----------------|------------|-------------|-------------|
| Belgium         | 0.4        | 0.8         | 1.2         |
| Denmark         | 0.1        | 0.2         | 0.3         |
| Germany         | 0.7        | 1.8         | 2.5         |
| Greece          | 0.2        | 0.2         | 0.4         |
| Spain           | 0.3        | 0.5         | 0.8         |
| France          | 0.5        | 1.5         | 2.0         |
| Ireland         | 0.1        | 0.2         | 0.3         |
| Italy           | 0.5        | 1.4         | 1.9         |
| Luxembourg      | 0.1        | 0.1         | 0.2         |
| Netherlands     | 0.5        | 1.1         | 1.6         |
| Portugal        | 0.1        | 0.1         | 0.2         |
| United Kingdom  | 1.5        | 3.8         | 5.3         |
| <b>EC Total</b> | <b>5.0</b> | <b>11.7</b> | <b>16.7</b> |

Source: IECC.

A 1984 survey on the key characteristics of the express service industry by Cresap, McCormick & Paget identified the following as the major customer groups of the express industry, in declining order of importance:

- financial institutions
- engineering and construction
- professional services
- oil, shipping, electronic and heavy manufacturing
- import/export trade
- other.

In short, the express industry is, to a large extent a "service" industry to the service industries. Although no more recent industry survey has been completed, this breakdown of customers may be assumed to be approximately correct today.

Table II presents estimates of the turnover and employment associated with international and cross-border express services in 1987. These estimates were developed from limited data by the International Express Carriers Conference (IECC).

Table III shows the growth of international and cross-border express shipments during the current decade. The 1981 and 1983 data are taken from the Cresap, McCormick & Paget study. The two sets of data are not completely comparable, so Table III must be understood as indicating a general trend only.

**Table II**  
Estimated Turnover and Employment, 1987

|                 | Revenue<br>(million ECU) | Employment   |
|-----------------|--------------------------|--------------|
| Belgium         | 15                       | 1 100        |
| Denmark         | 6                        | 180          |
| Germany         | 83                       | 850          |
| Greece          | 7                        | 80           |
| Spain           | 21                       | 280          |
| France          | 62                       | 780          |
| Ireland         | 8                        | 40           |
| Italy           | 63                       | 920          |
| Luxembourg      | 2                        | 30           |
| Netherlands     | 31                       | 580          |
| Portugal        | 5                        | 55           |
| United Kingdom  | 150                      | 1 800        |
| <b>EC Total</b> | <b>453</b>               | <b>6 695</b> |

Source: IECC.

**Table III**  
Number of Extra-EC and Intra-EC  
Express Shipments, 1981-87

| (Million)       | 1981       | 1983       | 1987        |
|-----------------|------------|------------|-------------|
| Belgium         | 0.1        | 0.3        | 1.2         |
| Denmark         | 0.0        | 0.0        | 0.3         |
| Germany         | 0.1        | 0.6        | 2.5         |
| Greece          | 0.0        | 0.1        | 0.4         |
| Spain           | N/A        | N/A        | 0.8         |
| France          | 0.1        | 0.5        | 2.0         |
| Ireland         | 0.0        | 0.1        | 0.3         |
| Italy           | 0.1        | 0.5        | 1.9         |
| Luxembourg      | 0.0        | 0.0        | 0.2         |
| Netherlands     | 0.1        | 0.3        | 1.6         |
| Portugal        | N/A        | N/A        | 0.2         |
| United Kingdom  | 0.6        | 2.0        | 5.3         |
| <b>EC Total</b> | <b>1.2</b> | <b>4.4</b> | <b>16.7</b> |

Sources: IECC, Cresap, McCormick & Paget.

### *Degree of Internationalization*

By their very nature, international express services have a globally-oriented outlook and management. The essence of express service is to provide tightly coordinated administrative control over international shipments carried to a variety of points.

In this industry, the categorization of firms as "European" and "non-European" is misleading if understood to reflect revenue (out-) flows. Of the revenues earned by the express industry in the EC, a substantial portion is immediately paid out in current operational expenses. The largest share (about 33%) is paid to employees, virtually all of whom are EC citizens. The second category of expenses is transportation costs (about 25%) which are mainly paid to European transport companies. The third largest expense (about 15%) is ad-

ministrative overheads, which are paid to European organizations i.e. telephone administrations, post offices, advertising media etc. Very little of total revenue is converted into assets owned by non-EC nationals. Thus, the European operations of an American or Asian express company are "European" in much the same sense that European post offices are "European" despite the fact that they make use of international "express mail" concepts and procedures originally developed by non-EC postal organizations (including the Universal Postal Union).

With the caveats noted in the preceding section, Table IV lists the major express organizations operating in the EC and their European (or world) headquarters. No data on turnover of individual organizations are currently available.

**Table IV**  
**Major Firms Operating in the EC**

|                            | European headquarters |         |
|----------------------------|-----------------------|---------|
|                            | Location              | Country |
| DHL International          | Brussels              | B       |
| Elan Services              | Hounslow              | UK      |
| Emery Worldwide Services   | Maastricht            | NL      |
| Emery (Administration)     | Zurich                | CH      |
| EMS (Postal Services)      | Brussels              | B       |
| Federal Express            | Brussels              | B       |
| IML Air Services Group     | Feltham (1)           | UK      |
| Jet Services               | Lyons                 | F       |
| Overseas Courier Services  | Brussels              | B       |
| Securicor Express Services | Birmingham (1)        | UK      |
| TNT-Skypack                | Windsor               | UK      |
| TNT-IPEC                   | Arnhem                | NL      |
| United Parcel Services     | Cologne               | D       |
| XP Services                | Maastricht (1)        | NL      |
| World Courier              | Brussels              | B       |

(1) World HQ.  
Source: IECC.

### *Growth Trends*

At least at the intercity scale and above, express services are increasingly becoming a worldwide industry. In relation to express services, it appears that modern commerce requires a higher degree of administrative coordination than is achievable through a set of loosely related organizations providing local or national service. Thus, by its nature, the operational and institutional focus of the express industry is global, or at very least, regional in scope.

The evolution of the worldwide express industry has been heavily influenced by regulatory laws which were originally designed to accommodate industries predating the express services sector. Such regulations include the national postal monopoly laws, international postal treaties, national customs laws, and national and international transport laws.

The future growth of the industry will depend on the degree to which these laws can be adapted to the unique characteristics of the express services business and, in particular, on the extent to which national legislation can be harmonized to permit consistent international operations. A prominent feature of express operations is the central sorting of shipments; this procedure means that the regulatory requirements of dozens of countries must be satisfied for thousands of urgent shipments in a period of a few hours.

Since around 1986, an increasingly important factor in the development of the express industry has been the degree of commercial cooperation between express companies and national post offices. Large mail users make use of express services to "shop" for the post offices which provide the highest quality of international distribution of mailings at the lowest price. Conversely, post offices also use express services to gather large mailings from across national boundaries in order to achieve economies of scale in international services not obtainable from the national market alone. Continued, economically sound development of this so-called "re-mail" market depends upon the adoption of a more cost-based, competitively neutral international postal treaty (Universal Postal Union).

### **Forecast and Outlook**

The experience of the express industry in the United States, an economy roughly equal to the EC, suggests that there is substantial room for growth in the intra-EC express industry. According to the US Air Transport Association, in 1987 the air express industry in the US transported 292 million shipments and earned USD 5.7 billion in revenues (excluding international shipments). Of course, US "air transport" figures should be compared not only to EC cross-border traffic but also to the unknown quantity of EC "domestic" traffic that is transported by air. Nevertheless, the magnitude of the difference between 5 million and 292 million annual shipments strongly suggests that the EC express market can expect continued growth.

It is anticipated that the express industry in the EC will continue to expand rapidly up to the early 1990s and beyond. This expansion will be manifested in an increase in the total amount of business and traffic. It will also be apparent in new and innovative services, required to meet the evolving needs of commerce, as is evident from recent trends in Europe and worldwide. Both types of growth will be driven largely by an overall dramatic increase in the role of all means of logistical support in modern international business.

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# ELECTRONIC INFORMATION SERVICES

(NACE 839.3)

*Along with the developments in electronic communications, electronic information services are expected to grow considerably over the next decade with continued expansion in the range of applications. This sector is currently described as being in the experimental and innovation phase by comparison with the more mature US industry. The single market will have a major impact on the development and availability of these services, although harmonization of regulations and tariffs at the EC level remains a complex issue.*

This sector covers a wide range of activities in various service sectors and can therefore not be classified as an existing NACE sector. Very little reliable data exist on the size of the industry partly due to the problem of defining and delineating the sector. Employment figures are not available.

"Information" is multi-disciplinary: it can cover practically all sectors of human activity from agriculture and banking to yacht-making and zoology.

At one end of the spectrum, electronic information merges into paper publishing (as in Desk Top Publishing and computerized typesetting systems). At the other end, it merges into entertainment (as in teletext, videotext-based computer games).

If, within this definition, things that are simply powered or operated by electricity or areas such as the voice telephone system ("information transferred by electronic means") are excluded, a number of major areas are left which can be defined narrowly as "electric information services" and which fall outside conventional sectors such as television, radio, print publishing, telephony, telex and telegraphy, and computing.

A further relevant factor when trying to define this essentially international industry is the problem of geographic breakdown. Most organizations in this area do not compile statistics on a country-by-country basis; statistics are mainly by region e.g. "Europe", "North America", "Pacific Area and Japan", "Middle East", etc.

## Current Situation

### *Trends in the Use of Electronic Information Services*

Electronic information services may apply to many different industry sectors at the same time:

- Text and bibliographic online systems e.g. Dialog, Data-Star
- Data and transactional online systems e.g. Reuters, Telekurs
- Industry-group online systems, such as SWIFT (inter-bank), SITA (inter-airline), Istel (travel agents), Resinter (hotel booking services), American Express, Visa (worldwide public services)
- Inter-organization online systems, such as those found in Shell, ICI, car hire companies, armed forces and police forces
- Public-access services, such as videotext, electronic phone directories, bank ATMs (Videotext has been most successful in the French market, with the "kiosk" services available via Minitel terminals. The terminals are distributed on a subsidized basis to DGT subscribers. Prestel (UK) and Bildschirmtext (Germany) have achieved far lower penetration of homes, but have had some success in selected business sectors.)
- In-house online services e.g. newspaper publishers, chemical companies
- Stand-alone electronic information services e.g. CD-ROM based products.

However the definition of the sector is narrowed, there are still internal factors that render breakdowns by organization difficult. Reuters, for example, is often omitted from figures concerning online text systems, yet 9% of all Reuters' revenue comes from news text services (with 56% coming from money services, 10% from commodity information and 12% from securities information).

Again, when a bank customer goes online with an ATM (automated teller machine) to find out the balance of money in a given bank account, it is debatable whether this is "online information" and should it be collected in the statistics.

This definitional problem gives rise to the differences in the statistics in Table I.

To look more closely at a few examples of statistics from online retrieval that are not normally counted as such, statistics from industry groups such as the banks' SWIFT network and the airlines' SITA network can be considered, since these figures illustrate the extent of the problem and the importance of their inclusion or exclusion.

SWIFT (Society for Worldwide Interbank Financial Telecommunication) provides a sophisticated telecommunica-

**Table I**  
**Different Statistics for Text and Numeric Databases**

**Host Sales Turnover 1981 and 1982**

| (Million ECU)               | 1981         | 1982         |
|-----------------------------|--------------|--------------|
| UK                          | 135.3        | 182.8        |
| Germany                     | 79.7         | 113.2        |
| France                      | 76.2         | 101.1        |
| Italy                       | 16.1         | 30.6         |
| Benelux                     | 14.3         | 20.4         |
| Denmark                     | 11.6         | 15.3         |
| Greece                      | 1.8          | 3.1          |
| Ireland                     | 0.9          | 1.0          |
| <b>EC Total</b>             | <b>336.0</b> | <b>468.8</b> |
| Scandinavia                 | 34.1         | 44.9         |
| Switzerland                 | 8.1          | 15.3         |
| Austria                     | 9.9          | 14.3         |
| <b>Western Europe Total</b> | <b>388.0</b> | <b>543.4</b> |

**Western Europe, Numeric Databases:  
Use by country**

| (Million ECU)      | 1985         | 1986         | 1987         |
|--------------------|--------------|--------------|--------------|
| Austria            | 16.34        | 16.6         | 18.4         |
| Belgium/Luxembourg | 15.7         | 15.2         | 16.3         |
| France             | 57.0         | 57.5         | 63.8         |
| Germany            | 60.4         | 65.5         | 78.3         |
| Italy              | 30.4         | 29.5         | 31.4         |
| Netherlands        | 28.7         | 30.0         | 34.5         |
| Nordic countries   | 28.8         | 29.0         | 32.1         |
| Spain              | 11.7         | 11.6         | 13.0         |
| Switzerland        | 53.7         | 54.2         | 60.5         |
| UK                 | 268.7        | 281.5        | 323.7        |
| <b>Total</b>       | <b>571.6</b> | <b>590.5</b> | <b>671.9</b> |

**Text and Bibliographic Online  
Services in Europe**

| (Million ECU)  | 1985        | 1986        | 1987        |
|----------------|-------------|-------------|-------------|
| Germany        | 15.1        | 13.7        | 13.8        |
| France         | 13.1        | 24.8        | 25.1        |
| UK             | 19.6        | 22.4        | 23.1        |
| Rest of Europe | 41.3        | 26.6        | 28.0        |
| <b>Total</b>   | <b>89.1</b> | <b>87.5</b> | <b>89.9</b> |

Sources: Business International/EURIPA 1984; Link Resources, 1986.

tion network for inter-bank messaging, fund and information transfer. The network was begun in 1973 by a consortium of 250 European and North American banks. Currently, SWIFT handles transactions amongst more than 2 300 institutions. 54 countries are covered by SWIFT and each day, close to 1 million messages are exchanged.

SITA (Société Internationale de Télécommunications Aéronautiques). The SITA network (1981 figures) connects 12 000 airline offices, 800 cities in 154 countries, 174 switching centres, 11 000 teleprinter terminals, 8 700 VDU reservation terminals, and 45 airline reservation systems. In 1981, the 248 airlines on the network transmitted 4.8 billion messages.

As far back as 1981, American Express was handling 310 million American Express card transactions and 360 million Visa or Mastercard transactions. More than 350 million cheques - sold by more than 100 000 bank branches - were processed and more than 56 million insurance premiums and claim transactions were completed annually. Approximately USD 10 billion (9 billion ECU) per day was transacted in international banking. The system comprised nine major information processing centres, six worldwide data network groups, 70 large computer systems and 229 smaller computer systems. Each day 250 000 American Express card transactions through the world were authorized with an average response time of 5 seconds. The system also handled 500 000 daily messages concerned with trading in securities, commodities, bonds and Treasury bills.

The French Télétel service currently connects to approximately 3 million Minitels. Each Minitel, on average, is used for online services for approximately 95 minutes per month (19 hours per year, or a total of 57 million hours per year).

Reuters interconnects around 150 000 terminals worldwide. For 1987 revenue was UKL 866.9 million (1.23 billion ECU), 57.2% of which came from Europe, with the Far East in second position.

A further complication of statistical collection in this section of the industry, is that electronic information is very rarely separated from other industry data; airline information services, therefore, will come under airline statistics and will be included in operating services; bank ATM usage will be absorbed into the banking sector under customer services, etc.

*Text and Bibliographic Market*

It has often been said that the European market is five years behind the American market. This is only partly true; the European market is more complex because of the number of countries, languages and regulatory regimes. It does not yet enjoy the economics of scope and scale of the American market.

Since companies usually do not break down their published figures into the main geographical areas, the figures for the European area are mainly based on informed estimates. Most figures also include revenue for internal business within the same organization.

**Table II**  
**Current European Text and Bibliographic Turnover**

|  | (Million ECU) |
|--|---------------|
| Questel (European business)                | 6.9           |
| Dialog (European business)                 | 10.4          |
| Data-Star (European business)              | (1) 6.9       |
| ESA-IRS (European business)                | 2.6           |
| Fiz-Inka/STN (European business)           | (1) 6.1       |
| Dimdi                                      | 2.6           |
| Pergamon-Orbit-InfoLine(European business) | 3.5           |
| Others                                     | (1) 3.5       |
| <b>Total</b>                               | <b>42.5</b>   |

(1) Informed estimate.  
Source EUSIDIC.

The total figure for online vendors and database producers in the European market of around 42.5 million ECU is thought to be accurate within a range of plus or minus 30% of this figure. The figure excludes: all videotext services; bank ATM services; reservation systems run by hotels, car hire companies and airlines; inter-bank systems; business information systems in the area of currency, stocks and commodities; credit card verification services; and hybrid services such as Reuters.

The comparable US text and online industry turnover would appear to be USD 380 million (329 million ECU), 82% of which is accounted for by Mead Data Central and Dialog. The worldwide turnover is estimated to stand at 400 million ECU.

### *Distribution Trends*

Society is evolving very rapidly into one where so many transactions and enquiries are conducted electronically and interactively, either via data networks, telephone networks, broadcast networks or stand-alone in-house services, that measuring the use of each service or medium increasingly becomes either less possible or less useful; in North America, for example, many of Reuters' news services are transmitted to customers' in-house equipment via the FM sideband frequency (radio broadcasting). In South America, much of Reuters' distribution to local premises' equipment is via roof-top satellite antennas (satellite TV broadcasting). The same services, in Europe, may be delivered via Reuters' own dedicated telecommunication network. Here, the distinctions between data network, TV broadcasting and radio broadcasting become purely academic, and the situation is likely to become more confused rather than less with the development of newer technologies and the liberalization of existing restrictions.

The final complication is that, in the days of information distribution via either people or paper, commodities or people

crossed frontiers and these movements could be measured in statistical terms. But nowadays, a French user might well access an online database by calling his national network, Transpac, and be transferred to the UK's national network, PSS, to access the Infoquest system available from Istel. Istel, in turn, might switch the customer's request to Easynet in Pennsylvania, USA, which might switch the request to Dialog in California or back to Questel in Paris. The return chain would be Paris-USA-UK-France, and it is not at all clear under which country's or continent's export or import figures this would appear. With the growth of networking, switching and distributed databases, this is a trend that can only grow over the next 10 years.

### **Outlook**

The European market is showing higher growth rates in certain sectors; experimentation and innovation are more pronounced than in the more mature North American market. Forecasts putting its value at USD 18.6 billion (ECU 16.2 billion) by 1990 (Link resources, 1986) may be rather optimistic, but its growth rate is certainly more buoyant than in the United States, where a certain "levelling-off" in an industry in the early stages of maturity is now observable.

About 50% of services sold in Europe are supplied by major American providers such as Chemical Abstracts, Medline, Biosis and Compendex.

European exports are in important sectors such as financial information (notably Reuters, UK), scientific information (Questel, France) and patents (Derwent Publications, UK).

There is no shortage of modems or personal computers in Europe, with an installed base of nearly one million low speed (300/1200 baud) modems. The personal and home computer installed base is expected to grow to 145 million by 1990. How many of these will have telecommunication capabilities depends on several factors, including the development of standard interfaces with data networks and value-added communication services by Europe's PTTs.

Data communications network availability, standards and tariffs have an important effect on the cost and ease of access to information services. European vendors find that problems of network interface management and access by customers significantly hinder sales growth. Packet-switched data networks which connect data terminals to host services have generally developed more slowly in Europe than in the United States, and cross-border tariffs are high. The historical practice of subsidizing national services remains a significant barrier to the creation of a larger internal market in information services within Europe. Over the longer term it is hoped that either the benefits of competition in the provision of Value-Added Networks (VANs) or the development

of Integrated Services Digital Networks (ISDN) may greatly facilitate data transmission within Europe, reducing unit costs to a level at which national/international ratios and telecommunications costs as a whole become a less significant issue.

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Over the longer term it  
is expected that the new  
technology will be developed

# SOFTWARE AND SOFTWARE SERVICES

(NACE 839.2)

*The EC market for software and software services has grown dramatically over the 1980s and this expansion is expected to continue at a rapid pace. Substantial merger and acquisition activity has occurred in the last few years against a background of strong competition and growing internationalization of markets. This has led to increased industry concentration; however, small and medium-sized companies continue to be important in meeting demand in particular market niches. This is a dynamic industry in which technological developments will continue to be a major driving force.*

The market for software consists of the software products and services that are bound up with the sale, lease or use of software. However, the following factors should be borne in mind:

- Many industrial firms develop a large part of the software needed in special software development divisions. However, true market relevance only results if software from one firm is sold or leased to another firm. Internally developed software is therefore not included.
- Software, as such, is only sold occasionally, because it is frequently delivered as a hardware component or as part of a complete system. This element can therefore only be estimated.
- An essential aspect of commercial transactions involving software is the services linked to its supply, installation, maintenance and utilization. Particularly in the case of customer-specific software, these services (for example, consultation and training) cannot be separated from the product itself. Therefore "software services" are incorporated within the software market.
- Finally, a fundamental area comprises those services that are a function of software supply and computing output for third parties (computer services). These services, which are leased, are market-relevant and must be included in an overview of the market.

## Current Situation

In the EC, few official statistics relating to software products and the services associated with them are available. All available data concerning applications and supplies, as well as the costs and revenues of information technology and the software and services that go with it, come from private market research and studies.

According to these studies, the EC market for software and software services reached a value of approximately 22.7 billion ECU in 1987, compared with 19.4 billion ECU in 1986, and representing a growth rate of about 19%. A market volume of approximately 52 billion ECU is forecast for 1992.

Table I shows the distribution of the EC market amongst the Member States.

## Consumption Trends

Owing to the heterogeneity of software applications and procedures, it is sensible to describe consumption trends in relation to different segments of the market.

In firms belonging to various sectors of the economy, there is a relatively clear trend away from in-house development of software in favour of external development by specialized software houses or the use of standard software for many problems ("buy" rather than "make"). For this reason, the market for software is growing at an above-average rate in relation to the total software supply in any particular national economy.

Differentiation between software products and other services is shown in Table II.

Sales of software products in 1987, at approximately 13.5 billion ECU, represented some 58% of the total market; computer services at approximately 6.4 billion ECU, represented some 28%.

**Main Indicators  
Software and Software Services**

| (Million ECU)                 | 1980  | 1981  | 1982  | 1983   | 1984   | 1985   | 1986   | 1987   | 1992   |
|-------------------------------|-------|-------|-------|--------|--------|--------|--------|--------|--------|
| Apparent consumption          | 6 300 | 7 500 | 9 000 | 11 000 | 13 500 | 16 000 | 19 400 | 22 700 | 52 000 |
| Net export earnings           | 50    | 50    | 50    | 50     | 50     | 100    | 150    | 200    | 300    |
| Share of world production (%) | 23    | 24    | 24    | 24     | 25     | 25     | 26     | 27     | 29     |
| Employment (1 000)            | 110   | 128   | 145   | 165    | 190    | 218    | 250    | 287    | 460    |

**Table I**  
**Country Share, Turnover and Employment in Software and Software Services**

| Country                 | Turnover (million ECU) |               | Shares held by various countries 1987 (%) | Approximate number of persons employed 1987 |
|-------------------------|------------------------|---------------|---|---|
|                         | 1986                   | 1987          |   |   |
| BLEU                    | 890                    | 1 040         | 4.6                                       | 8 900                                       |
| Denmark                 | 780                    | 910           | 4.0                                       | 11 000                                      |
| Germany                 | 4 000                  | 4 650         | 20.5                                      | 45 000                                      |
| Greece/Ireland/Portugal | 550                    | 640           | 2.8                                       | 4 500                                       |
| Spain                   | 720                    | 840           | 3.7                                       | 14 300                                      |
| France                  | 4 600                  | 5 360         | 23.6                                      | 58 000                                      |
| Italy                   | 2 560                  | 2 980         | 13.1                                      | 31 200                                      |
| Netherlands             | 1 300                  | 1 630         | 7.2                                       | 24 000                                      |
| UK                      | 4 000                  | 4 650         | 20.5                                      | 48 400                                      |
| <b>Total</b>            | <b>19 400</b>          | <b>22 700</b> | <b>100.0</b>                              | <b>286 800</b>                              |

Sources: International Data Corporation-IDC, ECSA, Eurostrategies.

Software training (approximately 1.1 billion ECU in 1987) and software consultation (approximately 1.7 billion ECU in 1987) together represent 12% of the total.

Corresponding to the trend for firms to increasingly employ their own computing capacities, the computer centre service market has experienced below-average growth of about 14%, while software products grew by 21% and training by an average annual rate of about 23%.

The total market for software products (13.5 billion ECU) can be divided up into:

- standard software (packaged software), with total European turnover of about 7.1 billion ECU in 1987
- customer-specific software (custom software/maintenance), worth about 6.4 billion ECU in 1987.

The trend has clearly proceeded in the direction of standard software, which, with a growth rate of approximately 24%, shows above-average growth compared with the total market for software (growth rate approximately 19%). This is due to the fact that standard software packages are becoming more powerful, more flexible and better adapted to individual conditions. In addition, prices for standard software are falling with growth in the number of pieces sold, so that its use is becoming increasingly attractive in terms of cost.

Differentiation of software products according to how close the software is to the system, indicates that software close to the system (operating systems, programming languages, etc.), constitutes about 24% of software products; there is currently a trend towards increased standardization. The manufacturers of independent operating systems such as MS-DOS and UNIX are in the forefront of this movement.

Software development tools (fourth generation programming languages; data banks; tools for the conception, implementation and testing of software) still amount to some 11%. These will show a strong growth rate in the next few years. The impulse for this strong growth in software development tools is provided by a shortage of qualified software developers and by pressure to significantly increase development productivity.

Application software for the most varied types of problem solving represents the dominant market segment, with over 60% of the total market and a growth rate of about 20%.

### *Export Trends*

The world market for software and software services amounts to approximately 63 billion ECU. The USA market accounts for about 47% of the total, and the EC market for

**Table II**  
**Differentiation Between Software and Other Services, 1986**

| (Million ECU)            | Germany (%)  |            | Spain (%)  |            | France (%)   |            | Italy (%)    |            | UK (%)       |            | Rest (%)     |            | EC Total (%)  |            |
|--------------------------|--------------|------------|------------|------------|--------------|------------|--------------|------------|--------------|------------|--------------|------------|---------------|------------|
| Standard software        | 1 360        | 31         | 290        | 40         | 1 130        | 25         | 800          | 31         | 1 300        | 33         | 1 020        | 29         | 5 900         | 31         |
| Client specific software | 990          | 25         | 190        | 26         | 1 640        | 36         | 800          | 31         | 1 150        | 29         | 730          | 22         | 5 500         | 28         |
| Computing services       | 1 150        | 29         | 160        | 22         | 1 380        | 28         | 670          | 26         | 1 000        | 25         | 1 370        | 38         | 5 650         | 29         |
| Training/consulting      | 500          | 12         | 80         | 12         | 530          | 11         | 290          | 12         | 558          | 13         | 400          | 11         | 2 350         | 12         |
| <b>Total</b>             | <b>4 000</b> | <b>100</b> | <b>720</b> | <b>100</b> | <b>4 600</b> | <b>100</b> | <b>2 560</b> | <b>100</b> | <b>4 000</b> | <b>100</b> | <b>3 520</b> | <b>100</b> | <b>19 400</b> | <b>100</b> |

Sources : IDC, ECSA, Eurostrategies.

**Table III**  
**Product Segments and Supplier Groups, 1987**

| (Million ECU)              | Production growth (%) | Share of production segments (%) | Total market  | Systems houses | Independent software suppliers | Hardware suppliers | Computing centres | Software consultants |
|----------------------------|-----------------------|----------------------------------|---------------|----------------|--------------------------------|--------------------|-------------------|----------------------|
| Standard software          | 23                    | 31                               | 7 100         | 1 140          | 1 550                          | 3 850              | 360               | 200                  |
| Customer-specific software | 18                    | 28                               | 6 400         | 3 050          | 1 660                          | 800                | 770               | 120                  |
| Computing centre services  | 14                    | 28                               | 6 400         | 1 370          | 260                            | -                  | 4 700             | 70                   |
| Training/consulting        | 23                    | 13                               | 2 800         | 440            | 680                            | 350                | 270               | 1 060                |
| <b>Total</b>               |                       | <b>100</b>                       | <b>22 700</b> | <b>6 000</b>   | <b>4 150</b>                   | <b>5 000</b>       | <b>6 100</b>      | <b>1 450</b>         |
| Growth forecast (%)        | 19                    |                                  |               | 20             | 21                             | 19                 | 14                | 22                   |

Sources: IDC, ECSA, Eurostrategies.

some 36%. US firms are very strongly export-oriented, particularly in the area of standard software packages (Lotus 1-2-3, word-processing systems, CAD systems, operating systems, etc.). Marketing of this US software in the EC mostly occurs via special branches of US firms or via independent software suppliers acting as licensees.

Overall, the EC software market is strongly dominated by US imports. Some two million pieces of standard software were imported into the EC from the USA in 1987. At an average unit price of about 1 800 ECU, US turnover in the EC amounted to some 3.6 billion ECU - that is, about 51% of the relevant market segment "standard software".

EC exports outside Community borders are, by comparison, extremely small (about 4-5% of European production volume). Only a small number of European software houses undertake significant extra-European marketing efforts. However, as a result of a trend towards concentration among suppliers (see below), the situation could shift towards greater internationalization.

Taking the EC market for standard software products as amounting to the value of 7.1 billion ECU and imports to 3.6 billion ECU, the EC production volume for standard software packages is then approximately 3.7 billion ECU, of which about 0.2 billion ECU are exported. This EC production volume corresponds to some 18% of worldwide production of standard software.

Total EC production of software products (standard and customer-specific software, without service) as a whole, amounts to 10.1 billion ECU and represents about 27% of world production.

Even within the EC, export orientation is at present still rather limited. France (exports within the EC amounting to approximately 9%) and the UK (about 10%) are the most active countries, while the other Member States produce primarily for their national markets.

### *Industry Structure*

Among suppliers, distinctions can be drawn between five types of firms:

- systems houses; the largest part of their revenue comes from turn-key hardware and software systems, as well as system integration
- independent software suppliers; the main share of their revenue comes from the sale of standard software and customer-specific adaptation of that software
- hardware suppliers; sell software together with their own hardware (this primarily applies to close-to-the-system software, operating systems, programming languages, etc., but also, increasingly, to sector and application-specific solutions)
- computer centres; partly sell software but also make software available to other firms or work out problems for them; they must therefore also be considered as part of the market for software and services
- consultancies; earn most of their revenue from software consultation and training in the software sector.

The share of various market segments held by the different types of suppliers is shown in Table IV.

**Table IV**  
**Market Share by Supplier Group, 1987**

|                                | (%)  |
|--------------------------------|------|
| Software consultants           | 7.7  |
| Systems houses                 | 25.8 |
| Independent software suppliers | 18.5 |
| Hardware suppliers             | 21.8 |
| Computing centres              | 26.2 |

Sources: IDC, ECSA, Eurostrategies.

Some 280 000 persons are employed in software supply, distribution, training and servicing. Based on the value of output in 1987, the average return per worker is approximately 81 000 ECU. Productivity is estimated to have grown by 6% between 1986 and 1987.

Approximately 13 000 to 15 000 firms are involved in the market for software and software services in the EC; average employment therefore is about 20 employees per firm.

Industry concentration and size of firms differs considerably between the EC Member States. While the 10 largest software houses in France account for 44% of turnover, the figure for the UK is 24% and for Germany only 18.6%.

Suppliers of standard software show an above-average growth rate of around about 24%. This underlines the trend, already referred to above, away from customer-specific manufacture toward standard software packages.

Average annual growth from now until 1992 is forecast at approximately 19%. The strongest growth area will be standard software, for which the market share should increase from its current level of about 32% to 43%.

Competition in the EC market is becoming increasingly stiff, particularly amongst the larger software and systems houses. This is due, to the strong advance made by hardware suppliers in the market for standard software; the five largest hardware suppliers already realize 9 billion ECU from software worldwide - IBM alone accounts for 5.5 billion ECU - giving them a world market share of approximately 15%. Falling growth rates and partly stagnating returns in the hardware sector have increasingly induced these hardware manufacturers to expand in the services market, particularly in the area of software. A second competitive factor is the advances made by new and in some cases less expensive supplier groups (research institutes, chartered accounting associations, etc.).

For the individual company, stiffer competition requires a number of responses; greater supply at fixed prices, and a consequent increase in project risk; increased investment in software engineering and project management, necessitating higher capital allocation; more marketing and a higher degree of internationalization, in order to increase the return on investment already undertaken by expanding the market and involving a greater number of pieces or greater repetition of solutions to problems (scale effect).

The consequence of these trends is a greater concentration of software suppliers in the EC, as is demonstrated by the large number of mergers and takeovers in the last few years. Thus, for example, the former BP subsidiary Scicon (UK) was taken over by Systems Designers (UK), and the English software house CAP merged with the French software house SEMA Matra. Such increases in industry concentration produce groups with a 300-700 million ECU turnover which

match the size of US companies and tend to mean increasing orientation towards the world market. (In the US, there are 10 software houses with a turnover of over 400 million ECU. EDS, as the world's largest software house, has revenues of approximately 4.2 billion ECU.)

Now, as earlier, software is a future market, and large industrial concerns are increasingly diversifying into this area. A number of software houses of all sizes are thus being taken over by large firms that were initially strangers to the industry (Germany: AEG's takeover of GEI; Thyssen AG's participation in IKOSS).

In contrast, smaller software firms are increasingly able to hold their own market share in particular niches owing to their closeness to the customer (in terms of location, inter alia), their flexibility and their thorough understanding of certain problems. With an average increase of 23%, their growth rate exceeds that of medium-sized firms.

**Table V**  
**Top Ten European Software Houses, 1987**

|                     | Country | Turnover<br>(million ECU) |
|---------------------|---------|---------------------------|
| 1 Cap-Gemini        | F       | 614                       |
| 2 Sema-Cap (1)      | F/UK    | 370                       |
| 3 SD-Scicon (1)     | UK      | 260                       |
| 4 CISI              | F       | 210                       |
| 5 GSI               | F       | 200                       |
| 6 Logica            | UK      | 175                       |
| 7 Thorn EMI         | UK      | 160                       |
| 8 Slipos            | F       | 140                       |
| 9 Finsiel           | I       | 140                       |
| 10 CIG-Intersys (1) | B       | 100                       |

(1) Merged in 1988.  
Source: Eurostrategies.

## Outlook

The outlook for the software industry will be dependent on several key factors affecting the level of competition in the industry and the cost structures of individual firms. Competition is expected to intensify as a result of increased internationalization within the European Community and on a worldwide scale which is likely to require stronger marketing efforts for suppliers in the industry. On the costs side the focus will be on increased productivity through greater utilization of computer-aided software development tools, and through reduction of conversion and maintenance costs by the use of professional development methods and a transition to standardized operating systems. In addition, strengthening of quality control is also aimed at subsequent reduction of costs and improvements in company image.

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## BANKING AND FINANCE

(NACE 81)

*The following information provides a description of the role of credit institutions and the institutional structure of banking and finance in the European Community. The impact of 1992 on banking and finance has already been felt. Harmonization of banking and finance regulations will have wide-ranging and profound effects on the sector.*

Banks take deposits and on-lend or invest these borrowed funds. This definition of the basic activities of banking is contained in the Council's first banking Directive (77/780/EEC); "credit institutions" - the term used in the Directive - undertaking such activities must be authorized by the supervisory authorities of Member States. As the Directive requires the annual publication of a list of such credit institutions, this list presents an institutional definition of the sector. Certain credit institutions excluded from the scope of the Directive are not in the list, nor are others which, although subject to the Directive, are exempt from some of its provisions.

### *Current Institutional Structure*

While the essential intermediary role of channelling surplus funds (savings) to finance investment and consumption is a common feature of banking in the Community, the actual business of individual credit institutions varies considerably. They may raise funds largely by attracting deposits from the general public, by bidding for large-scale deposits from corporations, or by buying surplus deposits from other banks. The sources of funds may be domestic, that is located in the country in which the bank operates, or foreign; funds may be denominated in domestic or foreign currencies. The banks may lend to members of the general public, to large corporations, to governments, or to other banks; they may increasingly engage not in direct lending or the purchase of securities, but in the provision of stand-by finance - guarantees to lend if other sources are not available. Again, customers may be domestic or foreign and the business conducted in domestic or foreign currencies. In the search for greater profitability in relation to capital, the banks may additionally undertake fee-generating activities not traditionally associated with banking; for example, the provision of management advice, insurance broking, or estate agency services.

The size of banks and range of activities undertaken varies widely. In general, those with more varied sources of funding

and with international business are larger than those relying exclusively on retail deposits as a source of funds and confining their activities to their national market. However, many savings banks, particularly those in Germany and Italy, conforming to the latter type of institution are amongst the largest banks in the world.

It is possible to group the institutions into broad categories. Separate trade associations exist reflecting the distinctions between these categories, but the trend is towards both a blurring of the differences between the type of services offered and greater competition between the institutions.

These broad categories are described below:

- commercial, registered or universal banks: varied funding base; wide-ranging lending and off-balance-sheet activities; often having international business; represented at Community level by the European Banking Federation
- savings banks or institutions: funding base almost exclusively private savings; in general less wide-ranging than commercial banks in lending activity; international business limited but growing; often having more local or regional identity than commercial banks; regional and federal group structures usual; represented at Community level by the Savings Banks Group of the EC
- mutual or cooperative banks: distinguished by mutuality characteristic; otherwise rather similar to savings banks in sources and uses of funds and organizational structure; rural and agricultural links strong; small and medium-sized enterprises important customers; the institutions at the head of cooperative bank groups can be very large, e.g. *Crédit Agricole* was the largest bank in Europe at the end of 1986; represented at Community level by the Association of Cooperative Banks of the EC
- specialized institutions: mortgage credit institutions (including building societies, "Bausparkassen"); finance companies (with varying areas of specialization); represented at Community level by the European Community Mortgage Federation, European Federation of Building Societies, European Federation of Finance House Associations.

These categories are broad divisions only; there are also sub-specializations. For example, in the commercial bank category, investment or merchant banks concentrate on

industrial finance, the trading of stocks and shares, portfolio management, bond issuance, and advice on mergers and acquisitions rather than the provision of services to the general public.

From an analytical perspective, it is not clear whether it is necessarily useful to distinguish between the types of institutions listed above, especially where they are subject to the same regulatory framework (as in the case of commercial and savings banks in Denmark).

### *Private and Public Sector Involvement*

Taking the Community as a whole, private sector involvement clearly dominates. The trend is for State-owned or State-controlled banks to pass into private ownership; this is equally true of France, where the nationalization process was carried out as recently as 1982 and is now being reversed, and of other countries in which State control has a somewhat longer history. Where public ownership exists, it tends to focus on the specialist sector, and particularly on institutions supplying longer-term investment finance.

### *Regulatory Environment*

Government influence over the sector takes three distinct forms:

- control of entry to sector (authorization requirement)
- ongoing prudential supervision of business of authorized credit institutions (including powers to remove authorization)
- monetary, credit, and exchange control policy.

Authorization requirements are set by all Member States following the provisions of the first banking Directive; further requirements are contained in the proposal for a Second Banking Coordination Directive (COM(87) 715).

Effective ongoing prudential supervision of the activities of credit institutions is considered essential by all Member States and is actively pursued on an increasingly harmonized basis under Community legislation. The basic aims are to protect individual depositors and investors and the soundness of the banking system as a whole. Prudential rules affect decisions in most areas of banking business.

In most Member States, the exercise of monetary, credit and exchange control policy has a less direct effect on banks but it clearly affects the environment within which banks operate. The banks devote considerable resources to analysing the likely direction of policy; only in specific circumstances - for example where there are credit ceilings, restrictions on net foreign borrowing - are their commercial judgments directly constrained by government policy.

### *Economic Significance*

The importance of the banking sector cannot be fully captured through statistics. The concepts of product and value-added are awkward ones in the service sector as a whole and *a fortiori* in the case of financial intermediaries. The role of banking intermediaries, as described earlier, is to channel funds from savers to borrowers. If this is not done efficiently, the productivity of the rest of the economy will be adversely affected. Faulty risk analysis resulting in losses may reduce confidence in the financial system, and also create unfavourable economic effects. The system of banking supervision and regulation referred to above reflects the appreciation of the banks' central importance in the economy.

Again, improvements in the quality of banking services cannot be picked up from statistical measures. Several such improvements have taken place recently. European and other banks increasingly offer their customers financial products specifically tailored to their requirements. Examples of these are loans denominated in several currencies and the possibility of converting floating loans into fixed-rate loans. At the same time, banks increasingly provide services which do not enter their balance sheets (off-balance-sheet business) but which enable their customers to reduce their borrowing costs or offset the interest or exchange rate risks incurred.

### *Banking Structure*

The data which appear at the end of this chapter (Table VIII) showing the numbers of credit institutions reveal much about the institutional structure of banking in the Member States. France and Germany account for around two-thirds of the total credit institutions in the Community as a result of their large non-commercial bank sectors. Cooperative banks predominate numerically in Germany, while finance companies are most common in France. Italy also has a large number of cooperative banks and as a result has considerably more credit institutions than the United Kingdom, an economy of similar size.

Beyond this institutional perspective, however, the data are not particularly revealing since, firstly, they do not reveal market shares and, secondly, the large commercial banks have extensive branch networks and their branches are comparable with individual credit institutions not themselves having branches. At the same time, the statistics refer to separately authorized credit institutions and thus do not identify cross-ownership; for example, the special mortgage credit institutions in Germany are mainly subsidiaries of the universal commercial banks.

### *Balance Sheet Size*

Statistics on outstanding assets of EC banks are presented in Table I. They are not entirely comprehensive, but are drawn

from official data supplied by the Member States to the International Monetary Fund.

The size of bank lending in relation to measures of economic activity illustrates the scale and significance of bank operations; the total assets of German banks in 1987 were considerably larger than German GNP in the same year.

The size of the banking sector in the individual countries clearly depends on a number of factors including the size of the national economy, the extent to which wealth is held in liquid assets other than bank deposits, and the role of foreign

banks. Bearing these factors in mind and given that the data for some countries are more comprehensive than for others, the respective balance sheet sizes are closely related to the size of the economies of the Member States. There are two exceptions: Luxembourg and the United Kingdom (although the latter's statistics do not include the extensive business of building societies). In both cases the international operations of foreign banks located in the countries explain the disproportionate size of the banking aggregates. This is particularly the case with Luxembourg, where from 1980-87 an average of 97% of outstanding assets represented claims on non-residents.

**Table I**  
**Community Banks : Assets 1980-87 (1)**

| (Billion ECU)   | 1980            | 1981            | 1982            | 1983            | 1984             | 1985             | 1986             | 1987             |
|---|-----------------|-----------------|-----------------|-----------------|------------------|------------------|------------------|------------------|
| <b>Belgium</b>  |                 |                 |                 |                 |                  |                  |                  |                  |
| - commercial banks                                      | 87.4            | 110.9           | 116.1           | 134.7           | 162.7            | 172.5            | 187.5            | 200.8            |
| - other monetary institutions                           | 3.5             | 3.4             | 3.1             | 3.1             | 3.3              | 3.3              | 3.6              | 4.1              |
| - general savings funds (deposits)                      | 10.1            | 10.4            | 9.7             | 10.1            | 11.0             | 12.5             | 13.1             | 13.7             |
| <b>Denmark</b>  |                 |                 |                 |                 |                  |                  |                  |                  |
| - commercial banks                                      | 16.0            | 17.8            | 20.3            | 25.1            | 33.4             | 42.1             | 49.5             | 51.5             |
| - other monetary institutions                           | 7.8             | 8.3             | 9.0             | 11.0            | 13.7             | 15.7             | 19.2             | 17.5             |
| - other credit institutions (2)                         | 45.6            | 48.0            | 50.1            | 55.2            | 63.4             | 73.0             | N/A              | N/A              |
| <b>Germany</b>  |                 |                 |                 |                 |                  |                  |                  |                  |
| - credit institutions<br>(of which, building societies) | 686.0<br>(45.3) | 787.8<br>(52.1) | 888.1<br>(58.1) | 961.6<br>(61.9) | 1038.8<br>(65.3) | 1092.6<br>(67.1) | 1265.5<br>(69.2) | 1285.6<br>(68.1) |
| <b>Greece</b>   |                 |                 |                 |                 |                  |                  |                  |                  |
| - commercial banks                                      | 13.3            | 16.6            | 18.4            | 19.6            | 22.4             | 20.2             | 21.2             | 20.3             |
| - specialized credit institutions                       | 8.8             | 11.3            | 13.9            | 14.6            | 15.3             | 12.7             | 13.5             | 13.1             |
| <b>Spain</b>  |                 |                 |                 |                 |                  |                  |                  |                  |
| - official credit institutions                          | N/A             | N/A             | 18.5            | 20.9            | 26.4             | 26.6             | 26.3             | 26.5             |
| - other credit institutions                             | 127.9           | 152.6           | 162.5           | 159.3           | 203.6            | 204.3            | 224.4            | 228.3            |
| <b>France</b>   |                 |                 |                 |                 |                  |                  |                  |                  |
| - credit institutions                                   | 493.5           | 555.2           | 626.0           | 674.6           | 727.9            | N/A              | N/A              | N/A              |
| <b>Ireland</b>  |                 |                 |                 |                 |                  |                  |                  |                  |
| - commercial banks                                      | (3) 10.9        | (3) 12.9        | 9.2             | 10.6            | 11.6             | 11.9             | 13.2             | 12.7             |
| - other credit and financial institutions               | 4.0             | 4.8             | 6.6             | 7.2             | 8.2              | 8.8              | 8.3              | 8.6              |
| <b>Italy</b>  |                 |                 |                 |                 |                  |                  |                  |                  |
| - commercial banks (4)                                  | 222.3           | 236.4           | 270.2           | 308.5           | 352.7            | 356.4            | 391.3            | 372.7            |
| - specialized credit institutions                       | 75.6            | 82.0            | 96.8            | 105.9           | 119.2            | 117.3            | 121.3            | N/A              |
| <b>Luxembourg</b>                                       |                 |                 |                 |                 |                  |                  |                  |                  |
| - credit institutions                                   | 82.6            | 108.2           | 116.8           | 127.7           | 146.7            | 151.6            | 165.4            | 173.6            |
| <b>Netherlands</b>                                      |                 |                 |                 |                 |                  |                  |                  |                  |
| - credit institutions                                   | 144.6           | 168.0           | 185.1           | 195.9           | 212.2            | 224.2            | 247.1            | 260.4            |
| <b>Portugal</b>   |                 |                 |                 |                 |                  |                  |                  |                  |
| - commercial and savings banks                          | 12.3            | 16.0            | 16.4            | 15.7            | 16.7             | 16.3             | N/A              | N/A              |
| <b>United Kingdom</b>                                   |                 |                 |                 |                 |                  |                  |                  |                  |
| - banks in the monetary sector                          | 416.5           | 581.2           | 674.6           | 835.7           | 983.7            | 951.0            | 964.5            | 1 031.6          |

(1) 1987 end-June; Portugal 1985 end-June; Italy 1986 end-March, 1987 end-May.

(2) Principally outstanding bonds of mortgage credit institutions.

(3) Estimated and almost certainly over-stated.

(4) Excludes business of foreign bank branches.

Source : IMF, *International Financial Statistics*, January 1988, country pages; assets less reserves.

## General Scope of Banking Activities

There is presently considerable variation in the scope of activities permitted to credit institutions in the various Member States. Banks established in the United Kingdom may freely undertake a wide variety of activities; banks established in Greece may engage in a much narrower range. The position in other Member States lies between these extremes, with most nearer to the British than the Greek model.

The Commission's proposal for a second banking coordination Directive, if adopted in its present form, is likely to widen the scope of allowable banking activities throughout the Community. It contains a list of core banking activities (see Table II) which EC credit institutions will be able to offer throughout the Community, either by exercising the freedom to establish branches or supply cross-border services, provided that their home country authorization allows them to undertake such activities. The effect is likely to be that countries which restrict banks' activities will be persuaded to lift those restrictions; if they do not, their "domestic" banks will be denied business freely available to other EC banks.

**Table II**  
**Proposal for a Second Council Directive**

Business which is integral to banking and shall be included within the scope of mutual recognition

1. Deposit-taking and other forms of borrowing
2. Lending (1)
3. Financial leasing
4. Money transmission services
5. Issuing and administering means of payment (credit cards, travellers' cheques and bankers' drafts)
6. Guarantees and commitments
7. Trading for own account or for account of the customers in:
  - (a) Money market instruments (cheques, bills, CDs, etc.)
  - (b) Foreign exchange
  - (c) Financial futures and options
  - (d) Exchange and interest rate instruments
  - (e) Securities
8. Participation in share issues and the provision of services related to such issues
9. Money broking
10. Portfolio management and advice
11. Safe keeping of securities
12. Credit reference services
13. Safe custody services

(1) Including in particular: consumer credit, mortgage lending, factoring and invoice discounting, trade finance (including forfeiting).

Source: Proposal for a second Council Directive on the coordination of laws, regulations, and administrative provisions relating to the taking-up and pursuit of the business of credit institutions and amending Directive 77/780/EEC, OJ C 84, 31.3.1988, p.1.

## Cross-border and International

A distinction is drawn between cross-border business, which encompasses all foreign and domestic-currency transactions with non-residents, and international business, which covers cross-border business and foreign-currency transactions with residents.

The activities of Community banks are increasingly spread between operations in their home countries, operations in, and with residents of, other Member States, and operations in and with third countries. The assumption must be that the completion of the internal market will further increase the importance of the second category of business mentioned above.

To assess the involvement of banks in business outside their home country boundaries, it is necessary to have consolidated statistics of the operations of the parent operation and its domestic and foreign branches and subsidiaries. These are compiled by the Bank for International Settlements ("International assets and liabilities of banks by nationality and ownership", contained in BIS, *International Banking Developments*, quarterly) and enable the aggregate extent of most EC-country banks' non-domestic business to be assessed (see Tables III and IV). They do not, unfortunately, enable distinctions to be drawn between business with other Member States and that with third countries.

**Table III**  
**Consolidated (1) International (2) Claims of Member State and Other Banks, September 1987**

| Country            | Claims (3)<br>(Billion ECU) | Share of total (3)<br>(%) |
|--------------------|-----------------------------|---------------------------|
| Belgium            | 78.0                        | 2                         |
| Denmark            | 22.5                        | 0.5                       |
| Germany            | 271.2                       | 8                         |
| Spain              | 28.6                        | 0.5                       |
| France             | 288.6                       | 8                         |
| Italy              | 136.0                       | 4                         |
| Luxembourg         | 11.3                        | 0.5                       |
| Netherlands        | 92.0                        | 3                         |
| UK                 | 202.0                       | 6                         |
| <b>EC 9 total</b>  | <b>1 130.2</b>              | <b>32.5</b>               |
| Japan              | 1 222.0                     | 35                        |
| USA                | 546.0                       | 16                        |
| Others             | 553.3                       | 16.5                      |
| <b>Grand total</b> | <b>3 451.5</b>              | <b>100</b>                |

(1) Claims booked in head offices, branches and subsidiaries worldwide.

(2) Foreign and domestic currency claims on non-residents and foreign currency claims on residents.

(3) Numbers and percentages are rounded and may not sum to totals. Source: BIS, *International Banking Developments*, Third Quarter 1987, February 1988, Statistical Annex, p. 25, Table 7.

**Table IV**  
**Cross-border (1) Claims of Banks Located (2)**  
**in Member States and Other Countries,**  
**End September 1987**

| Banks located in   | Claims (3)<br>(Billion ECU) | Share of total (3)<br>(%) |
|--------------------|-----------------------------|---------------------------|
| Belgium            | 123.1                       | 4                         |
| Denmark            | 13.0                        | -                         |
| Germany            | 158.0                       | 5                         |
| Spain              | 21.0                        | 1                         |
| France             | 205.0                       | 6                         |
| Ireland            | 3.5                         | -                         |
| Italy              | 50.3                        | 2                         |
| Luxembourg         | 137.0                       | 4                         |
| Netherlands        | 86.7                        | 3                         |
| United Kingdom     | 693.2                       | 21                        |
| <b>EC 10 total</b> | <b>1 490.8</b>              | <b>46</b>                 |
| Japan              | 441.1                       | 13                        |
| USA                | 423.0                       | 13                        |
| Others             | 921.1                       | 29                        |
| <b>Grand total</b> | <b>3 276.0</b>              | <b>100</b>                |

(1) Foreign and domestic currency claims on non-residents.  
(2) Domestically-owned and foreign-owned branches and subsidiaries.  
(3) Numbers and percentages are rounded and may not sum to totals.  
Source : BIS February 1988, op. cit., Statistical Annex, p.2, Table 2a.

In aggregate, the nine Member States whose banks' international business is included in the BIS data accounted for just under one-third of the total outstanding international banking business of reporting banks at end-September 1987. Total international banking business worldwide is rather larger, because the BIS statistics relate only to banks of the principal industrialized countries and to those located in the major off-shore banking centres. The Japanese share was slightly higher, but the American share is less than half the size of the nine Community countries taken together.

From an analytical perspective it is often usual to net out intra-group transactions, since they can be seen as representing the internal movement of funds rather than the basis of real activity. When this is taken into account, the EC 9 share rises to 38%, and the Japanese and American shares fall to 32% and 12%, respectively. In terms of direct international lending to non-banks, in other words ignoring inter-bank business, the EC 9 with 34% of the total were just ahead of the Japanese, while the Americans (7%) had a smaller share of the market than the German and French banks taken individually. In recent years the American banks have been reducing their international business, while the Japanese banks have been expanding rapidly.

Other statistics collected by the BIS on the basis of the country of location of banks, rather than the nationality of

ownership, indicate the extent to which cross-border business of EC banks is conducted in branches and subsidiaries located outside the home country. In the case of the EC 9, the consolidated cross-border business of domestic banks is considerably greater than the business booked by all banks, domestic and foreign, in the countries themselves. The exceptions are the United Kingdom and Luxembourg, world centres of international banking activity which are host to a large number of foreign banks including those from other Member States. Foreign bank branches predominate in the United Kingdom, while foreign-owned subsidiaries are more common in Luxembourg (see Table VIII).

The statistical record is incomplete but it is clear that the international business of EC banks is largely undertaken by commercial banks. Other credit institutions are increasingly engaging in cross-border activities, for example the Danish mortgage credit banks in Germany and the UK, and the UK building societies in Spain, but in many cases there seems to be, at least initially, concentration on the Euro-banking market as a source of finance rather than a search for loans from foreign markets. French banks had the largest branch network in other Member States at end-1986.

### *Mortgage Credit*

The role of credit institutions in financing residential and non-residential construction is one of their most tangible contributions to capital formation in the Community's economy.

The value of outstanding mortgage loans in the Member States totalled 985 billion ECU at the end of 1986. From an institutional perspective, there are significant differences in the importance of specialist mortgage credit institutions. The latter dominate in Denmark, France and the United Kingdom but the market is very much more evenly divided between various types of credit institutions in other countries. It is perhaps important to note, however, that stock analyses of this kind can conceal significant changes in market share. This is true of the position in the UK, where commercial banks have sharply increased their share of new mortgage loans and the building societies have only recently regained a 50% share of new advances.

This sector is presently notable for the small scale of cross-border business, both within the Community and on a wider international scale.

### *Size Ranking of Community Banks*

Based on the lists compiled by *The Banker* (July 1988), 44 EC credit institutions are in the ranks of the world's 100 largest banks, based on asset size (see Table V).

The largest 10 Community credit institutions in 1987 are shown in Table VI.

**Table V**  
**Nationality of World's Largest Banks by**  
**Size of Assets, 1987**

| Largest 10 |   | Largest 500 |     |
|------------|---|-------------|-----|
| Japan      | 7 | EC          | 162 |
| France     | 2 | of which:   |     |
| USA        | 1 | Germany     | 44  |
|            |   | Italy       | 33  |
|            |   | France      | 20  |
|            |   | UK          | 15  |
|            |   | Spain       | 13  |
|            |   | Belgium     | 9   |
|            |   | Denmark     | 8   |
|            |   | Luxembourg  | 6   |
|            |   | Netherlands | 5   |
|            |   | Portugal    | 4   |
|            |   | Greece      | 3   |
|            |   | Ireland     | 2   |
|            |   | Japan       | 107 |
|            |   | USA         | 28  |
|            |   | Switzerland | 15  |
|            |   | Austria     | 9   |
|            |   | Canada      | 7   |
|            |   | Sweden      | 7   |
|            |   | Others      | 165 |

Source: DG XV.

There are, of course, other ways of ranking credit institutions according to size. If published capital and reserves are used as the criteria - and in view of the Commission's solvency ratio proposal and the Basle Supervisors' Committee recommendation on capital adequacy, many would agree that they are a better measure than assets - the picture is somewhat different (see Table VII).

Table VIII provides information on the number and broad types of credit institutions in the Member States.

**Table VI**  
**Top Ten Community Credit Institutions**  
**by Assets, 1987**

|                                    | Country | Assets<br>(Billion ECU) | World<br>rank |
|------------------------------------|---------|-------------------------|---------------|
| 1. Crédit Agricole                 | F       | 185.8                   | 7             |
| 2. Banque Nationale de Paris       | F       | 158.3                   | 10            |
| 3. Deutsche Bank                   | D       | 146.4                   | 11            |
| 4. Crédit Lyonnais                 | F       | 146.0                   | 12            |
| 5. Barclays Bank                   | UK      | 142.4                   | 14            |
| 6. National Westminster Bank       | UK      | 141.2                   | 15            |
| 7. Société Générale                | F       | 126.0                   | 19            |
| 8. Dresdner Bank                   | D       | 113.1                   | 24            |
| 9. Compagnie Financière de Paribas | F       | 106.0                   | 28            |
| 10. Commerzbank                    | D       | 88.0                    | 32            |

Source: DG XV.

**Table VII**  
**Top Ten Community Credit Institutions by**  
**Published Capital and Reserves, 1987**

|                              | Country | Published<br>capital and<br>reserves<br>(Billion ECU) | World<br>rank |
|------------------------------|---------|---|---------------|
| 1. Barclays Bank             | UK      | 11.0  | 1             |
| 2. National Westminster Bank | UK      | 8.0   | 2             |
| 3. Crédit Agricole           | F       | 7.5   | 4             |
| 4. Deutsche Bank             | D       | 6.0   | 8             |
| 5. Banque Nationale de Paris | F       | 5.0   | 13            |
| 6. Rabobank                  | NL      | 4.1   | 20            |
| 7. Crédit Lyonnais           | F       | 4.0   | 21            |
| 8. Lloyds Bank               | UK      | 4.0   | 22            |
| 9. Dresdner Bank             | D       | 3.6   | 26            |
| 10. Société Générale         | F       | 3.5   | 28            |

Source: DG XV.

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**Table VIII**  
**Number of Credit Institutions in Member States**

| <b>BELGIUM</b>                 | <b>End-1980</b> | <b>End-1986</b> |
|--------------------------------|-----------------|-----------------|
| 1. Commercial banks            | 83              | 88              |
| of which:                      |                 |                 |
| incorporated under Belgian law | 58              | (1) 59          |
| incorporated under foreign law | 25              | 29              |
| 2. Private savings banks       | 30              | (2) 34          |
| 3. Other institutions          | N/A             | 53              |
| of which:                      |                 |                 |
| public law credit              | 6               | 6               |
| others                         | N/A             | 47              |
| <b>Total</b>                   | <b>N/A</b>      | <b>175</b>      |

(1) Of which 33 foreign bank subsidiaries: other EC countries 12, Japan 8, USA 6, others 7.

(2) 392 authorized savings banks were affiliated to CERA, a cooperative society, which is included as one of the savings banks.

| <b>GREECE</b>                  | <b>End-1980</b> | <b>End-1986</b> |
|--------------------------------|-----------------|-----------------|
| 1. Commercial banks            | 28              | 35              |
| of which:                      |                 |                 |
| incorporated under Greek law   | N/A             | 16              |
| incorporated under foreign law | N/A             | 16              |
| 2. Savings banks               | 0               | 0               |
| 3. Cooperative banks           | 0               | 0               |
| 4. Other banks                 | 6               | (1) 9           |
| <b>Total</b>                   | <b>34</b>       | <b>44</b>       |

(1) Of which two not yet under scope of Directive 77/780/EEC and 5 exempted institutions.

| <b>DENMARK</b>                     | <b>End-1980</b> | <b>End-1986</b> |
|------------------------------------|-----------------|-----------------|
| 1. Commercial banks                | 74              | 79              |
| of which:                          |                 |                 |
| incorporated under Danish law      | 74              | (1) 73          |
| incorporated under foreign law     | 0               | 6               |
| 2. Savings banks                   | 165             | 147             |
| 3. Cooperative credit institutions | N/A             | N/A             |
| 4. Other institutions              | N/A             | 18              |
| of which:                          |                 |                 |
| mortgage credit                    | 6               | 6               |
| others                             | N/A             | 12              |
| <b>Total</b>                       | <b>N/A</b>      | <b>244</b>      |

(1) Of which 3 foreign-owned bank subsidiaries (2 USA).

| <b>SPAIN</b>                   | <b>End-1986</b> |
|--------------------------------|-----------------|
| 1. Commercial banks            | 135             |
| of which:                      |                 |
| incorporated under Spanish law | (1) 97          |
| incorporated under foreign law | 38              |
| 2. Savings banks               | 79              |
| 3. Cooperative banks           | 142             |
| 4. Other banks                 | 260             |
| of which:                      |                 |
| mortgage credit institutions   | 24              |
| official credit institutions   | 4               |
| finance houses                 | 232             |
| <b>Total</b>                   | <b>616</b>      |

(1) Of which 7 foreign bank subsidiaries: other EC 4, USA 3.

| <b>GERMANY</b>                                 | <b>End-1980</b> | <b>End-1986</b> |
|--|-----------------|-----------------|
| 1. Commercial banks                            | 246             | 277             |
| of which:                                      |                 |                 |
| incorporated under German law                  | N/A             | (1) 215         |
| incorporated under foreign law                 | N/A             | 61              |
| 2. Savings banks                               | 611             | (2) 600         |
| 3. Cooperative banks                           | 4 235           | (3) 3 604       |
| 4. Other institutions                          | N/A             | 77              |
| of which:                                      |                 |                 |
| mortgage credit (including building societies) | 58              | 67              |
| others   | N/A             | 10              |
| <b>Total</b>                                   | <b>N/A</b>      | <b>4 558</b>    |

(1) Of which 66 foreign bank and securities house subsidiaries: other EC countries 25, USA 15, Japan 7, others 15.

(2) Including 12 regional and national central institutions which represent the individual savings banks.

(3) Including 6 regional "central" banks and one central institution acting on behalf of individual cooperative institutions.

| <b>FRANCE</b>                      | <b>End-1980</b> | <b>End-1986</b> |
|------------------------------------|-----------------|-----------------|
| 1. Commercial banks                | 387             | 386             |
| of which:                          |                 |                 |
| incorporated under French law      | N/A             | (1) 330         |
| incorporated under foreign law     | N/A             | 56              |
| 2. Savings banks                   | 480             | (2) 422         |
| 3. Cooperative banks               | 190             | 192             |
| 4. Other banks                     | N/A             | 1 080           |
| of which:                          |                 |                 |
| finance companies                  | (3) N/A         | 1 049           |
| specialized financial institutions | N/A             | 31              |
| <b>Total</b>                       | <b>N/A</b>      | <b>2 080</b>    |

(1) Of which 89 foreign-owned subsidiaries.

(2) "Caisses d'épargne et de prévoyance" and "caisses de crédit municipal".

**Table VIII**  
**Number of Credit Institutions in Member States**  
**(Continued)**

| <b>IRELAND (1)</b>             | <b>End-1980</b> | <b>End-1986</b> | <b>NETHERLANDS</b>                                 | <b>End-1980</b> | <b>End-1986</b> |
|--------------------------------|-----------------|-----------------|--|-----------------|-----------------|
| 1. Commercial banks            | 40              | 39              | 1. Commercial banks                                | 82              | 83              |
| of which:                      |                 |                 | of which:  |                 |                 |
| incorporated under Irish law   | N/A             | (2) 33          | incorporated under Dutch law                       | 63              | (1) 64          |
| incorporated under foreign law | N/A             | 6               | incorporated under foreign law                     | 19              | 19              |
| 2. Savings banks               | 4               | -               | 2. Savings banks                                   | 62              |                 |
| 3. Cooperative banks           | N/A             | 16              | 3. Cooperative banks                               | (2) 1           | 1               |
| 4. Other institutions          | 2               | 2               | 4. Other banks                                     | N/A             | 29              |
| <b>Total</b>                   | <b>N/A</b>      | <b>57</b>       | of which:  |                 |                 |
|                                |                 |                 | mortgage credit institutions                       | 7               | 8               |
|                                |                 |                 | other capital market institutions                  | N/A             | 2               |
|                                |                 |                 | Other (mainly intermediaries in securities market) | 21              | 18              |
|                                |                 |                 | <b>Total</b>                                       | <b>N/A</b>      | <b>175</b>      |

(1) Credit unions and friendly societies outside scope of Directive 77/780/EEC.

(2) Of which 8 foreign bank subsidiaries: 7 other EC, 1 USA.

(1) Of which 18 foreign-owned subsidiaries (7 EC; 7 Japan; 3 USA; 1 other).

(2) Central, policy-making institution (Rabobank) having 1 865 affiliated banks at end-1986.

| <b>ITALY</b>                       | <b>End-1980</b> | <b>End-1986</b> | <b>PORTUGAL</b>                   | <b>End-1980</b> | <b>End-1986</b> |
|------------------------------------|-----------------|-----------------|-----------------------------------|-----------------|-----------------|
| 1. Commercial banks                | (1) 314         | (2) 268         | 1. Commercial banks               | N/A             | 19              |
| of which:                          |                 |                 | of which:                         |                 |                 |
| incorporated under Italian law     | 289             | 229             | incorporated under Portuguese law | N/A             | 10              |
| incorporated under foreign law     | 25              | 39              | incorporated under foreign law    | N/A             | 9               |
| 2. Savings banks                   | 89              | 90              | 2. Savings banks                  | N/A             | 1               |
| 3. Cooperative banks               | 653             | (3) 717         | 3. Cooperative banks              | N/A             | 0               |
| 4. Other institutions              | 99              | 96              | 4. Other banks                    | N/A             | 3               |
| of which:                          |                 |                 | of which:                         |                 |                 |
| specialized financial institutions | 87              | 89              | investment banks                  | N/A             | 2               |
| other                              | (4) 12          | 7               | other                             | N/A             | 1               |
| <b>Total</b>                       | <b>1155</b>     | <b>1172</b>     | <b>Total</b>                      | <b>N/A</b>      | <b>23</b>       |

(1) Of which 158 'banche popolari'.

(2) Of which 101 'banche popolari' have cooperative form; 1 foreign bank subsidiary (EC).

(3) Not including the 101 'banche popolari' which also have cooperative form.

(4) Probably not comparable with 1986 figure.

| <b>LUXEMBOURG</b>                 | <b>End-1980</b> | <b>End-1986</b> | <b>UNITED KINGDOM</b>          | <b>End-1980</b> | <b>End-Feb. 1987</b> |
|-----------------------------------|-----------------|-----------------|--------------------------------|-----------------|----------------------|
| 1. Commercial banks               | 115             | 115             | 1. Authorized banks            | 330             | (1) 588              |
| of which:                         |                 |                 | of which:                      |                 |                      |
| incorporated under Luxembourg law | N/A             | (1) 98          | incorporated under UK law      | N/A             | 334                  |
| incorporated under foreign law    | N/A             | 17              | incorporated under foreign law | N/A             | 254                  |
| 2. Cooperative banks              | 70              | 58              | 2. Savings banks               | 17              | N/A                  |
| 3. Other banks                    | N/A             | 28              | 3. Cooperative banks           | 1               | N/A                  |
| of which:                         |                 |                 | 4. Other banks                 | 312             | N/A                  |
| mortgage credit                   | N/A             | (2) 3           | of which:                      |                 |                      |
| other                             | 20              | (3) 25          | building societies             | 273             | 164                  |
| <b>Total</b>                      | <b>N/A</b>      | <b>201</b>      | finance houses                 | 38              | N/A                  |
|                                   |                 |                 | national Girobank              | 1               | (2)                  |
|                                   |                 |                 | <b>Total</b>                   | <b>660</b>      | <b>N/A</b>           |

(1) Of which at least 65 foreign-owned (the imprecision is the result of insufficient information on ownership).

(2) Of which 2 German branches.

(3) Mainly foreign-owned (insufficient information).

(1) Of which 254 foreign branches. Of the 334 other credit institutions, 86 were foreign-owned subsidiaries and consortium banks. Of the 67 subsidiaries, 14 were EC-owned, 20 US-owned, 4 Japanese-owned and 29 other; 3 EC banks had stakes in the 19 consortia.

(2) By 1987, name changed to Girobank plc. and included in authorized bank category.

Source: DG XV.

# INSURANCE

(NACE 82)

*The EC insurance industry is a large and important part of the Community's financial sector. In 1985, the value of gross premiums received by insurers totalled 168 billion ECU. Employment in the industry is estimated at around 1.2 million persons.*

The term insurance covers a number of different activities, which are destined to satisfy different needs and to perform various functions in the economy. Two elements characterize the activities of insurance: the diversification of risks and the allocation of financial resources.

The main economic function is to transfer risks to specialized companies which assure risks to a certain amount through the collection of a payment (premium). However, there are differences between types of insurance: the basic underlying principle of non-life insurance is the "mutualization of risks" transferred by a wide range of insured persons or institutions; in life insurance, the principal function is the management and investment of savings; and reinsurance has as its objective the distribution and compensation of mainly large risks.

Insurance companies, especially life insurance companies, are also financial institutions (although not in the technical sense of the EC Directive on Consolidation) which play a very important role in the allocation of resources. The large amounts of money regularly received in the form of premiums have to be properly invested in various types of assets to ensure the necessary solvency and liquidity to meet claims; part of these amounts has to be invested in assets as determined by legislative technical provisions. In this respect, insurance is subject to economic policy.

The following very basic distinctions may be drawn amongst the typical activities of the insurance sector:

- Direct Insurance (life, non-life)
- Reinsurance
- Services auxiliary to insurance, mainly brokerage.

Life and non-life insurance can be further divided into different classes, which have characteristics that may differ widely. Life insurance embraces operations based on capitalization, of which there are a great variety: survival or death insurance, annuities, supplementary insurance against special personal injury or sickness, permanent health insurance, capital redemption operations, management of pension funds, etc. The last three types of operation are not exclusive to insurance companies, even if they meet similar needs. Non-life insurance business can be divided into a number of

classes: accident and sickness, motor insurance, transport (with the distinction between insurance of the merchandise and the means of transport itself), fire and natural forces, civil liability of all kinds (motor, industrial, professional,...) credit and suretyship, financial losses, legal expenses, etc.

These activities have different characteristics; for instance, reinsurance and transport insurance are, by far, the most internationally traded business, due to the fact that, in the case of transport insurance, it is a necessary complement to transportation and is customarily provided by the seller under the usual terms of international trade.

In general, it can be affirmed that life insurance, with the exception of group pensions, is *per se* a mass risk, like some classes of damage insurance such as motor or health insurance. On the other hand, air or maritime insurance and industrial risks such as liability, fire and reinsurance, are usually "large" risks.

The data, in most cases, relate to 1985, the last year for which consolidated figures are available; it provides a "snapshot" of insurance in that year. The scarcity of data on the activities of the insurance sector, especially those which are on the border-line with other sectors, has inevitably meant focusing on institutional aspects of the industry.

## Current Situation

Three indicators serve to measure the size and distribution of the EC insurance market: the volume of premiums collected, propensity to insure (insurance penetration), and the density of insurance.

In 1985, the value of gross premiums received in the EC totalled 168 billion ECU; 59.5% of the premiums were in the non-life sector, and the rest (40.5%) in the life sector.

The EC insurance market has experienced a high rate of growth over the years 1960-80; in 1960 total premiums (including Member States which joined since 1960), amounted to USD 8 546 million representing 18.4% of the world premium income; in 1980 the figure reached USD 117 783 million - 27.3% of the world market. However, in the 1980s, the EC market share fell to less than 23% in 1985 along with increases in the American and Japanese share. Despite this relative diminution, the annual rates of growth within the EC have been high in recent years and especially in the life-insurance sector.

The size of insurance markets differs greatly from one Member State to another; differences in habits, levels of saving,

**Table I**  
**Premiums in 1985 - Data Comparison**

| (Million ECU) | Total EC  |
|---------------|-----------|
| OECD          |           |
| Life          | 67 359.2  |
| Non-life      | 114 387.6 |
| SIGMA         |           |
| Life          | 67 039.0  |
| Non-life      | 90 826.0  |
| VARIA (1)     |           |
| Life          | 68 093.3  |
| Non-life      | 100 026.5 |

(1) "Varia" includes the various sources which are used in the book *The Leading European Insurers*, by F. Granado, L'Argus, Paris 1987.

Sources: OECD, Sigma, *The Leading European Insurers*.

strength and scope of social security schemes and of compulsory insurance, economic development and the economic situation in general, explain the variations in premium volumes and the distribution of premiums amongst sub-sectors or branches.

There are no data to establish a breakdown between mass risks and large or industrial risks nor to distinguish between different types of insurance policies.

In the EC the largest individual markets are Germany, the UK and France; the UK has the largest life insurance premium income and, along with Ireland, the highest proportion of life insurance to total business; the lowest proportions of life insurance to total business were in Portugal, Spain and Italy.

It is useful, however, to compare the figures mentioned above with those from other sources, mainly the OECD and Sigma.

The data from *The Leading European Insurers* coincides generally with that of Sigma for life insurance; for non-life there are more differences between the two especially with regard to figures for Denmark; as for OECD data (Statistics on Insurance for 1985), this often coincides with the two previous sources for life insurance but rather less for non-life, with sometimes big differences with respect to both sources.

The insurance penetration is the total premiums collected by insurers (other than the State) as a percentage of GDP; this gives an indication of the importance of insurance business. It is obviously markedly influenced by the volume and extent of public insurance, given the relative inter-changeability of these categories (this is notably the case in Japan, where the value of life insurance premiums is very similar to the amounts destined for public pension schemes, while for most countries the value of life insurance premiums is considerably lower than those of public pension schemes). For the

EC, total premiums to GDP stood at 5.2% (non-life = 3.1%, life = 2.1%) compared with 7.6% for the USA (non-life = 4.7%, life = 2.9%) and 6.9% for Japan (non-life = 2%, life = 4.9%). Ireland has the highest ratio of premiums to GDP in the world; conversely, Greece is ranked 40th in the world.

It is necessary to use caution in relation to these figures; to take an example, in Spain in 1986 the ratio was 3.6%, distributed as 2.2% for non-life and 1.4% for life; but for 1987 the estimates for life insurance premiums alone are 4.4% of GDP.

It appears to be primarily habits and legal requirements, rather than income, which influences the ratio of non-life premiums to GDP; life premiums to GDP ratio seems to be mainly influenced by the strength of public pension schemes and also the structure of savings and the savings ratio.

The expression "density of insurance" refers to the average premiums paid per head of population; a major factor - but not the only one - is income per capita. In 1985, average premiums paid per head stood at 522 ECU; in the US the comparable figure was 1 647 ECU, and in Japan 1 006 ECU.

With regard to the distribution of premiums between life and non-life (with the exception of Luxembourg, Ireland and perhaps Italy), it appears that insurance in general and, in a more marked way, life insurance, has a positive elasticity [greater than 1] in relation to the income of a country; more wealth implies still more insurance, and in particular in the case of life insurance even if habits and other factors have a particular bearing.

One measure of turnover can be the amount of premium receipts. A breakdown between types of revenue and between large risks and mass risks is not presently available on a consolidated basis for the EC.

Other important indicators for the insurance sector are reinsurance ratios which indicate the proportion of reinsurance with regard to the total amount of premiums received. Data are available for the following two:

- inward reinsurance ratio, which is the amount of reinsurance accepted as a proportion of total gross premiums; it shows the importance of reinsurance business compared with the total business in a given country
- premium retention ratio, which is the proportion of net written premium to total gross premiums; this ratio indicates the percentage of reinsurance which has not been ceded or retroceded and, conversely, the percentage of insurance ceded.

A comparison of the premiums retention ratio with the inward reinsurance ratio should give an indication of which part of insurance has been ceded abroad; in principle, the net flow of reinsurance should be seen from the difference between the proportion of insurance ceded minus the propor-

tion of reinsurance accepted; however, direct figures on these flows are not available.

The importance of reinsurance for life insurance is considerably less than for non-life insurance. Reinsurance is of considerable importance in Italy, the UK and France; equally, the percentage of insurance ceded is relatively high for Italy, while for non-life it is about 20 to 30% in almost all the Member States.

Separate figures on the share of GDP provided by insurance for the whole Community are not obtainable; the existing figures include insurance with other financial services. Nothing indicates, however, that insurance has had rates of growth very different from the rest of financial services; evolution of financial services between 1970 and 1985 is shown in the figures below.

The growth rates of financial services as a whole have been considerably higher than those of the rest of the economy and their share in the sector "market services" has also increased.

### Industry Structure

The private sector is composed of companies, some of which are profit-making, and others mutual, i.e. non-profit-making; the most relevant are the following:

- limited companies, in their various forms (public limited companies, or "limited partnerships")
- companies based on mutual principles (cooperative societies, mutual companies, in which the insured persons are at one and the same time partners and whose premiums form part of the endowment capital of the company; they are normally non-profit-making)

- other kinds of non-profit-making companies, such as the Friendly Societies in the UK
- the special case of Lloyd's of London, an association of syndicates whose members are unincorporated and liable without limit for the risks they underwrite.

In some Member States, a specialization can be observed according to the type of company, and the largest ones are not necessarily public limited companies.

There are at least three ways in which the public sector is active in insurance-related activities. First of all, the social security system aims to a large extent to cover needs similar to those of insurance; the techniques and ways of operation are different, but in some areas social security and insurance are interchangeable activities; this is the case with pension schemes and health accident insurance. Secondly, publicly owned companies have a large market share in some Member States and operate in competition with private companies. The Member States in which publicly owned companies are of the greatest importance are:

- Denmark, where the leading life insurance company, which holds 25% of the life market, is a nationalized company
- France, where nationalized companies and the National Provident Fund write almost 35% of the total business; one of the biggest European insurers (UAP) is still publicly owned
- Ireland where there is a consortium created to reorganize insurance companies in difficulties (Insurance Corporation of Ireland), especially active outside Ireland
- Portugal, where more than 70% of the total business is done by nationalized companies, and another 16% by partly State-owned companies.

Table II  
Reinsurance Ratios, 1985

| (%)            | Reinsurance accepted/<br>gross premiums |          | Net premiums/<br>gross premiums |          |
|----------------|---|----------|---------------------------------|----------|
|                | Life                                    | Non-life | Life                            | Non-life |
| Belgium        | 2.3                                     | 11.5     | 92.2                            | 78.6     |
| Denmark        | 4.1                                     | 7.4      | 97.4                            | N/A      |
| Germany        | N/A                                     | 4.7      | 93.4                            | 75.7     |
| Greece         | N/A                                     | N/A      | N/A                             | N/A      |
| Spain          | 2.8                                     | 5.8      | 87.9                            | 75.7     |
| France         | 7.6                                     | 18.6     | 93.7                            | 79.7     |
| Ireland        | 0.1                                     | 3.0      | 94.0                            | 72.3     |
| Italy          | 23.6                                    | 14.8     | 82.9                            | 76.2     |
| Luxembourg     | 2.1                                     | 2.1      | N/A                             | N/A      |
| Netherlands    | N/A                                     | N/A      | 94.8                            | 82.5     |
| Portugal       | 0.2                                     | 5.3      | 88.9                            | 79.2     |
| United Kingdom | N/A                                     | 24.0     | 100.0                           | 76.3     |
| USA            | 0.2                                     | 0.9      | 99.5                            | 97.1     |
| Japan          | 0.1                                     | 17.9     | 99.9                            | 73.9     |

Source : OECD.

Another sector of activity with a particular public sector involvement is export credit insurance; this covers national agencies which take on board the risk of non-payment for exports; private companies also cover these risks.

It has already been observed that certain social security operations and insurance are interchangeable and that the extension of social security schemes has a bearing on the propensity to insure. Given the increasing difficulties of financing social security pensions due to the fact that the proportion of retired people compared with the active population shows a growing trend all over the EC, and which may lead to a collapse of the public pension systems in the medium to long term, life insurance type products are destined to have an increasing success.

It is in this field of life insurance that innovation is greatest, and where more new products and market players are coming into existence. Since life insurance aims at meeting a double need - investment of surpluses and assuring future revenues - there are a lot of alternative formulas for performing these economic functions, all of them savings-related. One of the most important areas is pension funds, which manage vast amounts of money (for instance, in the UK their funds are currently worth the equivalent of 200 billion ECU compared with a Japanese figure of 138.6 billion ECU). Other important areas are combined systems of insurance and savings accounts, in which the frontier between insurance and banking is unclear.

For all these new products, insurance companies are not the only type of companies involved in this business. They are in direct competition mainly with credit institutions and companies specialized in portfolio management.

In the distribution of insurance, besides the traditional systems - direct selling by companies and sale through brokers or independent agents - credit institutions are potential and actual competitors, due to their extensive networks of branches. Of increasing importance is the system of banks selling insurance policies of their affiliate insurance companies; these insurance policies may or may not be related to bank operations, as, for instance, life policies underwritten at the same time loans are granted, insurance linked to credit card selling, or merely combined savings products making use of the actuarial technique.

In 1985 there were 4 677 insurance companies operating in the EC: of these, 3 607 were domestic undertakings including foreign controlled ones, and 1 070 were branches and offices of foreign undertakings; these figures do not include 2 216 insurance companies controlled by the *Länder* in Germany, nor a number of reinsurance companies in Belgium.

Of the total number of insurance companies, 905 operated in the life sector and 3 208 in non-life, 378 companies engaged in both businesses, and 186 were specialized reinsurers.

At the Community level, in life insurance the 10 leading companies account for 27.9% of all the business, and the top 20 wrote 39.2%. For non-life insurance, the market shares of the 10 and 20 largest companies are, respectively, 17.8% and 26.9%. Taking into account groups of insurers, which operate through separate subsidiaries in different branches and kinds of insurance and in various Member States, the degree of concentration will inevitably be greater.

### *Employment Trends*

Several classifications of employment are possible; some data are available per branch of business, but the most common breakdown is between administrative personnel and sales force, including intermediaries.

In 1985, total employment in insurance represented about 33% of employment in financial services, 2.5% of total employment in market services, and a little less than 1% of total employment in the EC. The only available figures for employment growth rates are for the whole branch of financial services.

The figures provide an overview of the distinctions in the structure of the insurance business and on the differing importance of intermediaries in the Member States. Greece, Portugal and Italy feature the strongest role for intermediaries, while in the other Member States, mainly Luxembourg, Germany, the UK, the Netherlands and Denmark, this share is the lowest. This may give an indication of the structure of the distribution of insurance. The figures do not provide an indication of whether intermediaries are full-time or part-time.

### *Regulatory Environment*

The activities of life and non-life insurance are highly regulated. The regulations are mainly intended to ensure the solvency of insurance companies in order to strengthen the safety of the financial system, and to provide for adequate consumer protection. The prudential requirements have taken the form of:

- authorization procedures and detailed minimum requirements for the taking-up and pursuit of insurance business (minimum own funds and technical provisions, etc.)
- disclosure requirements (publication of accounts) and supervision of solvency by public authorities
- regulation and control of premiums and terms of insurance policies
- mechanisms for enforcing good standards in the conduct of business and governmental intervention in the case of insolvency of a company, and for insurance of extraordinary risks, etc.

**Table III**  
**Employment in Insurance, 1985**

|                 | Insurance<br>under-<br>takings<br>(1 000) | Inter-<br>mediaries<br>(1 000) | Total<br>(1 000) | Inter-<br>mediaries<br>as % of<br>total empl.<br>in insurance | % of total<br>employment | Premiums<br>per<br>employee<br>(1 000 ECU) |
|-----------------|---|--------------------------------|------------------|---|--------------------------|--|
| Belgium         | 30.0                                      | 25.0                           | 55.0             | 45.5  | 1.54                     | 74.2                                       |
| Denmark         | 8.7                                       | 4.0                            | 12.7             | 31.5  | 0.5                      | 417.9                                      |
| Germany         | 198.0                                     | 40.0                           | 238.0            | 16.8  | 0.95                     | 205.9                                      |
| Greece          | 6.5                                       | 20.0                           | 26.5             | 75.5  | 0.74                     | 17.4                                       |
| Spain           | 33.8                                      | 27.0                           | 60.8             | 44.4  | 0.58                     | 84.2                                       |
| France          | 124.6                                     | 82.6                           | 207.2            | 39.4  | 1.03                     | 164.0                                      |
| Ireland         | 12.4                                      | N/A                            | N/A              | N/A   | N/A                      | N/A  |
| Italy           | 42.9                                      | 76.0                           | 118.9            | 63.9  | 0.58                     | 96.9                                       |
| Luxembourg      | 0.9                                       | 0.1                            | 1.0              | 10.0  | 0.62                     | 138.5                                      |
| Netherlands     | 36.5                                      | 15.0                           | 51.5             | 29.1  | 1.01                     | 201.7                                      |
| Portugal        | 14.0                                      | 37.8                           | 51.8             | 73.0  | 1.28                     | 13.5                                       |
| United Kingdom  | 233.6                                     | 93.4                           | 327.0            | 28.6  | 1.36                     | 138.1                                      |
| <b>EC total</b> | <b>741.7</b>                              | <b>421.0</b>                   | <b>1 162.7</b>   | <b>36.2</b>   | <b>0.96</b>              | <b>144.6</b>                               |
| Japan           | 557.0                                     | 831.0                          | 1 388.0          | 59.9  | N/A                      | 87.5                                       |
| USA             | 1 112.0                                   | 700.0                          | 1 812.0          | 38.6  | N/A                      | 217.5                                      |

Sources: OECD, *Statistics on Insurance, 1988; The Leading European Insurers*; Eurostat.

Reinsurance is a much less regulated sector, given that the particular concern of consumer protection does not exist in this field (reinsurance is not subject to direct supervision in half of the Member States of the Community).

### *Financial Activities of Insurance Companies*

The insurance companies play an extremely important role in the financial system of the EC.

Here there is an important distinction between life and non-life insurance, which perform very different functions and also fulfil different needs. Even though non-life insurance participates in the allocation of financial resources (for instance, in the way they invest their technical reserves and their surpluses), this last function is far more significant in the case of life insurance, which is very closely related to saving and therefore plays a major role in the financial markets. This role is carried out by life insurance companies as institutional investors.

In this way, insurance companies manage an enormous volume of assets, and hold participation in other companies, either financial, industrial or commercial, sometimes even acting as heads of groups of companies. They have great import-

ance in underwriting corporate debt and in buying equities in the stock markets; they also take up significant amounts of government debt. Insurance companies are by preference long-term investors, and are also major owners of property.

### *Interpenetration of Markets Inside the EC*

With regard to establishments (affiliates and branches), the UK clearly has the strongest presence, at any rate numerically, in the rest of the Community (44.2% of the total number of establishments owned by EC insurers in other Member States). Next in order but far behind are Germany, France and Belgium. The Member States with the greatest presence of establishments originating from other EC Member States are France and the Netherlands; Greece has 10% of the non-domestic establishments in the EC, and the UK has less than 5% of the total. These percentages give no indication of the importance of the business concerned, but only the number of establishments.

### *International Business*

A comparison with the international (non-EC) insurance trade including business done through establishments, is con-

**Table IV**  
**Insurance Market Shares**

| (USD million)  | Share of world volume |              | Share of world volume |              | Share of world volume |              |
|----------------|-----------------------|--------------|-----------------------|--------------|-----------------------|--------------|
|                | 1960                  | (%)          | 1970                  | (%)          | 1980                  | (%)          |
| EC             | 8 546                 | 18.4         | 24 002                | 21.2         | 117 783               | 27.3         |
| Rest of Europe | 1 374                 | 3.0          | 3 889                 | 3.4          | 22 611                | 5.3          |
| North America  | 33 454                | 72.0         | 71 860                | 43.5         | 202 212               | 47.0         |
| Japan          | 1 025                 | 2.2          | 7 963                 | 7.0          | 59 179                | 13.1         |
| Rest OECD      | 855                   | 1.8          | 2 087                 | 1.9          | 7 831                 | 1.1          |
| OECD           | 45 245                | 97.4         | 109 801               | 97.0         | 400 166               | 95.0         |
| Non-OECD       | 1 222                 | 2.6          | 3 346                 | 3.0          | 21 370                | 5.0          |
| <b>Total</b>   | <b>46 476</b>         | <b>100.0</b> | <b>113 147</b>        | <b>100.0</b> | <b>430 356</b>        | <b>100.0</b> |

Source : Ch. Zvonicek, "Die EG - Ein Wachstumsmarkt für Versicherungen", *Versicherungswirtschaft* 1/84, pp. 58-62.

tained in Table IV. These show that for EC 10 in 1984, 19.8% of the total of EC companies were owned by nationals of a Member State other than that in which they were based; this number of subsidiaries of Member State companies in other Member States (624) was higher than the number of subsidiaries in third countries (522).

The EC market for direct insurance is relatively large (22.2% of the world premium income in 1985); nevertheless, compared with the markets of other developed countries, the EC's share of world insurance business in 1985 decreased in comparison with 1980. However, the strengthening of the dollar over this period has played a significant part in this. The average premium per head in the EC in 1985 (521.97 ECU in 1980) was considerably lower than in other developed countries: Switzerland (1 670.3 ECU/head), USA

(1 647.0), Japan (1 005.2), Canada (875.5), Sweden (816.5) or Australia (659.3). Only four Member States (Denmark, Germany, Netherlands, the UK) have a bigger premium per head than Australia, and of these only one matches Japan (Denmark with 1 038.0 ECU/head).

In 1985, the EC total insurance market was not much bigger than Japan's; however, for life insurance, due mainly to one of the highest personal savings ratio in the world and to a weak public pension scheme, Japan's market is considerably bigger than that of the EC. Currently (March 1988), life insurance monthly premium income in Japan is over 115 billion ECU (about yen 1.5 trillion). The relatively small size, propensity to insure and insurance density of the EC insurance markets can be explained only partially by comparatively higher standards of social protection (this argument may

**Table V**  
**Distribution of Premiums Collected, 1985**

| (Million ECU)           | Non-life       |          | Life           |          | Total          |          | Share of world market |              |              |
|-------------------------|----------------|----------|----------------|----------|----------------|----------|-----------------------|--------------|--------------|
|                         | Total amount   | Per head | Total amount   | Per head | Total amount   | Per head | Non-life (%)          | Life (%)     | Total (%)    |
|                         | USA & Canada   | 220 520  | 842.3          | 137 404  | 524.8          | 357 924  | 1 367.1               | 56.9         | 42.6         |
| EC 12                   | 90 646         | 282.1    | 66 684         | 207.5    | 157 330        | 489.7    | 23.4                  | 20.7         | 22.2         |
| Rest Europe (1)         | 12 832         | 396.9    | 12 850         | 405.2    | 25 682         | 810.1    | 3.3                   | 4.0          | 3.6          |
| Japan                   | 35 310         | 292.4    | 87 923         | 728.2    | 123 233        | 1 020.6  | 9.1                   | 27.2         | 17.3         |
| Australia & New Zealand | 6 719          |          | 3 204          |          | 9 923          |          | 1.7                   | 1.0          | 1.4          |
| Other countries         | 21 561         |          | 14 737         |          | 36 298         |          | 5.6                   | 4.5          | 5.1          |
| <b>Total</b>            | <b>387 588</b> |          | <b>322 802</b> |          | <b>710 310</b> |          | <b>100.0</b>          | <b>100.0</b> | <b>100.0</b> |

(1) Excluding Turkey.

Source : Sigma, May 1987 (1 ECU = USD 0.887 at 30.11.1985).

be valid for, say, the USA - with reservations - or Japan, but not for other countries).

With regard to reinsurance, despite the greater scarcity of data, it can be assumed that EC insurers hold a very large share of the world market. Some indication of this is that the largest reinsurance company in the world is EC-based (Germany); eight out of the world's 15 largest specialized professional reinsurers in 1985 (excluding Lloyd's of London) were from the Community and accounted for 50% of a total of USD 15 280.4 million (20 024.4 million ECU) in premiums; the importance of Lloyd's in this business does not need to be restated.

A distinction must be drawn between premiums received for the sale of insurance policies abroad ("cross-frontier services"), and insurance business done in third countries by EC companies through a permanent presence in the form of branches and subsidiaries; the same distinction is logically valid for business in the EC by third country companies. This distinction corresponds approximately to the EC's international notions of "services" business and "establishments", respectively.

Data are available only for EC 10; the data source is the balance of payments accounts and data are divided into transport insurance and non-merchandise insurance.

- Transport insurance; insurance of movable property while in transit; as UK figures for this item are included in the item "non-merchandise insurance", the balance for transport insurance might differ considerably.

According to these figures, there is a permanent deficit with the rest of the world; moreover, single deficits are recorded with regard to each country or reporting area; the USA is by far our largest trading partner, accounting for - on average over the years recorded - about 41% of the Community's exports and about 37% of its imports.

Table VII includes UK flows of transport insurance; to a considerable extent, they may correspond to net rather than

**Table VI**  
**Insurance on Transport, 1979-84 (1)**

| (Million ECU)  | Credits    | Debits       | Balance     |
|----------------|------------|--------------|-------------|
| 1979           | 605        | 769          | -164        |
| 1980           | 678        | 918          | -240        |
| 1981           | 857        | 1 089        | -232        |
| 1982           | 985        | 1 215        | -230        |
| 1983           | 1 054      | 1 342        | -288        |
| 1984           | 1 279      | 1 627        | -348        |
| <b>Average</b> | <b>910</b> | <b>1 160</b> | <b>-250</b> |

(1) EC 10: excluding Spain and Portugal.

Source: Eurostat, *The European Community External Trade in Services*, 1986.

**Table VII**  
**Non-Merchandise Insurance, 1979-84 (1)**

| (Million ECU)  | Credits      | Debits       | Balance    |
|----------------|--------------|--------------|------------|
| 1979           | 1 683        | 936          | 747        |
| 1980           | 1 585        | 1 048        | 537        |
| 1981           | 2 631        | 1 641        | 990        |
| 1982           | 2 761        | 1 814        | 947        |
| 1983           | 2 845        | 2 027        | 818        |
| 1984           | 3 144        | 2 451        | 693        |
| <b>Average</b> | <b>2 441</b> | <b>1 653</b> | <b>788</b> |

(1) EC 10: excluding Spain and Portugal.

Source: Eurostat, *The European Community External Trade in Services*, 1986.

gross flows, thus understating the overall importance of trade flows in this sector.

For transport insurance, the USA is the EC's main trading partner (taking an average of 56.8% of our exports and providing 39.1% of our imports, thus leaving an average positive balance near to the average total surplus).

A breakdown between classes of insurance and between Member States is not fully reliable; according to the data available the UK has the largest trade in insurance; in 1985 its net insurance surplus with the rest of the world (no exclusion of EC is possible) was 5 633.5 million ECU; the second biggest exporter in the EC was Germany, whose exports totalled 1 706.9 million ECU (net flows not available).

In terms of foreign involvement in insurance markets, the situation differs considerably from country to country. In 1984, total foreign market share in the US market was only 5%; in Japan, for non-life insurance this figure was 2.9% and for life insurance even lower at only 1% (1981). These two countries together represented 67.7% of the world market in 1985. In 1984, the market share of non-European insurers in Europe was 24%.

Data on the number of foreign companies operating in the EC and EC companies working in third countries need to be interpreted with care. A high number of foreign companies or establishments does not imply a correspondingly high foreign market share: for instance, in France 39.3% of the number of insurance companies are foreign but they hold only 9.4% of the French market. Conversely, there is a low percentage (17%) of foreign companies and establishments in the UK which, however, underwrite a significant chunk of UK insurance policies (13% of life premiums in 1985). The UK is the Member State with the lowest presence of other EC companies (37%) by comparison with the total number of foreign companies. Similarly, a high numerical proportion of EC companies does not mean a comparable presence in terms of market share; a case in point is Greece where, despite the fact that 80% of the foreign companies are from other

Member States, a single American insurer received more than 40% of the life premiums in 1985.

The UK is the Member State with the strongest presence abroad; the business written by overseas subsidiaries of UK companies amounted to 15 423.4 million ECU in 1985, well ahead of any other Member State.

### *Trends in Member States*

The insurance markets in the EC are fairly concentrated. For life insurance, in four out of the nine Member States for which data are available, the 10 leading companies share more than 90% of the market. In only one Member State is the market share of the top 10 companies below 50%.

Non-life insurance shows less concentration; in two of the 10 Member States for which data are available, the 10 largest companies write more than 80% of the business, and in five the market share of the 10 biggest companies is under 50%.

With regard to reinsurance, data are only available for Germany, where the top 10 companies hold a share of 71.6%; one of them (Munich RE, the world's biggest reinsurer) has 36.7%. Reinsurance business is presumably more concentrated than other types of insurance, mainly due to the nature of the risks covered which requires a larger size of company.

### *Main European Firms*

Most of the leading individual insurers (leaving aside the British companies) are German and French. The Spanish,

**Table VIII**  
**Leading Groups of Insurers in the EC, 1984**

|     |                                    | Premiums<br>Country (million ECU) |
|-----|------------------------------------|-----------------------------------|
| 1.  | Allianz Worldwide                  | D 7.349                           |
| 2.  | Nationale Nederlanden              | NL 5.879                          |
| 3.  | Generali Group                     | I 5.321                           |
| 4.  | Commercial Unions Ass.             | UK 5.041                          |
| 5.  | Royal Insurance Plc                | UK 5.019                          |
| 6.  | Münchener Rückversicherung         | D 4.660                           |
| 7.  | UAP                                | F 4.160                           |
| 8.  | Sun Alliance & London Insurance    | UK 3.873                          |
| 9.  | General Fire and Life Assurance Cy | UK 3.553                          |
| 10. | Guardian Royal Exchange            | UK 3.444                          |
| 11. | A.G.F.                             | F 3.245                           |
| 12. | Aegon Insurance Group              | NL 3.164                          |

Source: *Investir*, January 1986.

Greek and Portuguese leading companies are very small; in non-life insurance Allianz's income is almost 150 times that of the leading Portuguese insurer. However, reorganization and concentration is taking place in these three Member States. For instance, in Spain the leading company (Union y el Fénix) received, in 1987, an estimated 285 million ECU in non-life business, and 790.5 million ECU in life insurance, without taking into account the life business performed by a single savings bank mainly in single premiums (in 1987 La Caixa received an estimated 4 280 million ECU).

In 1987, Allianz's overall premium income in all branches of insurance, including reinsurance, was 12 367.2 million ECU; of this 4 444.4 (32%) came from outside Germany.

The criterion of legal form is relevant in the insurance sector because of the presence in the market, sometimes quite important, of companies based on the mutual principle. Data on the breakdown of the number of companies according to their legal form exist for some countries; for others, the data available concern the market held by each kind of company.

From Table IX it appears that mutuals are especially important in Germany, Spain, France, and the Netherlands.

**Table IX**  
**Distribution of Companies According to Legal Form**

| % total number<br>of companies | Limited | Mutual | Cooperative | Others<br>(1) |
|--------------------------------|---------|--------|-------------|---------------|
| Belgium                        | 45.0    | 7.7    | 2.7         | 44.6          |
| Italy                          | 89.9    | 8.0    | 1.3         |               |
| Netherlands                    | 77.9    | 22.0   |             |               |

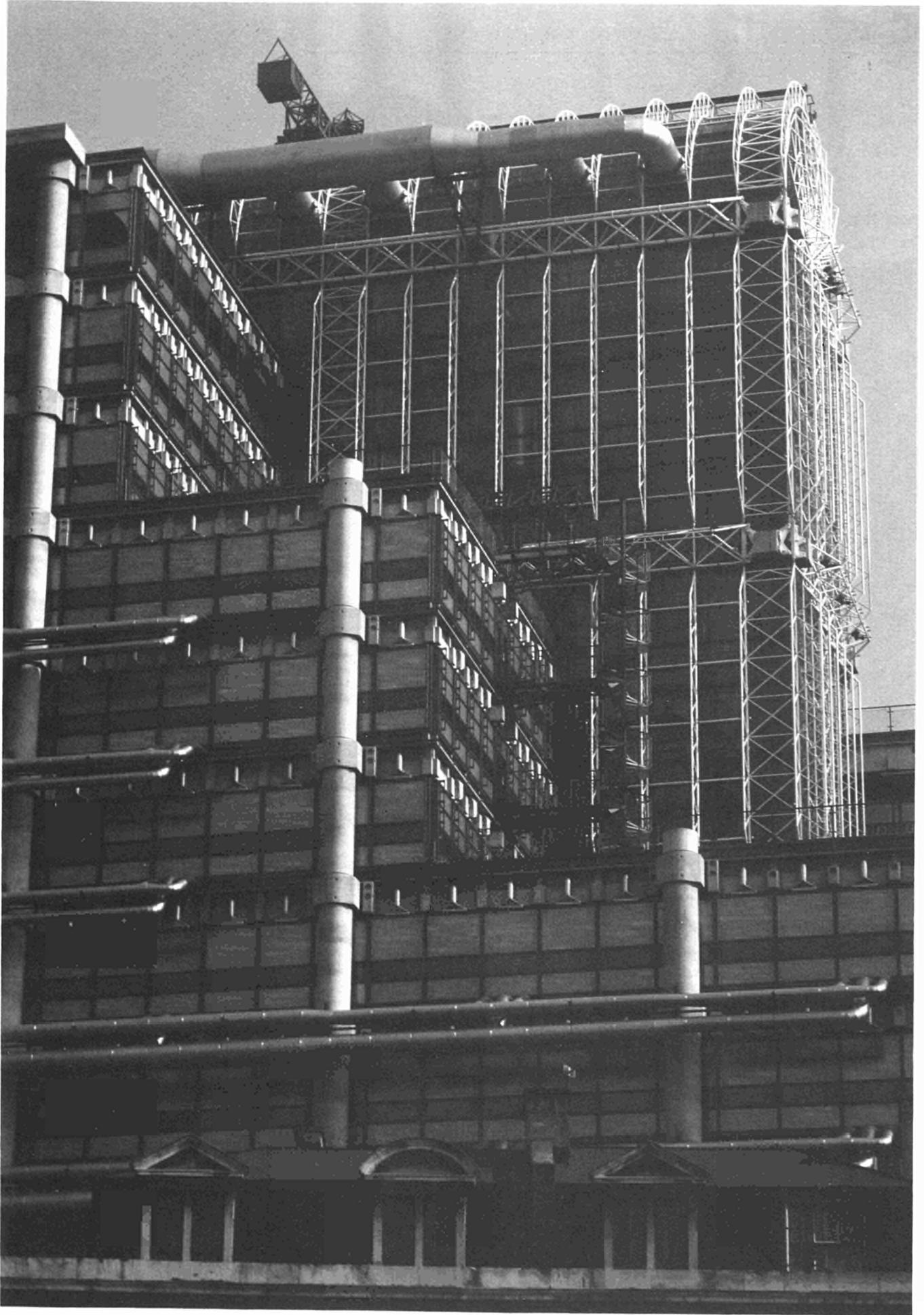
(1) Foreign.

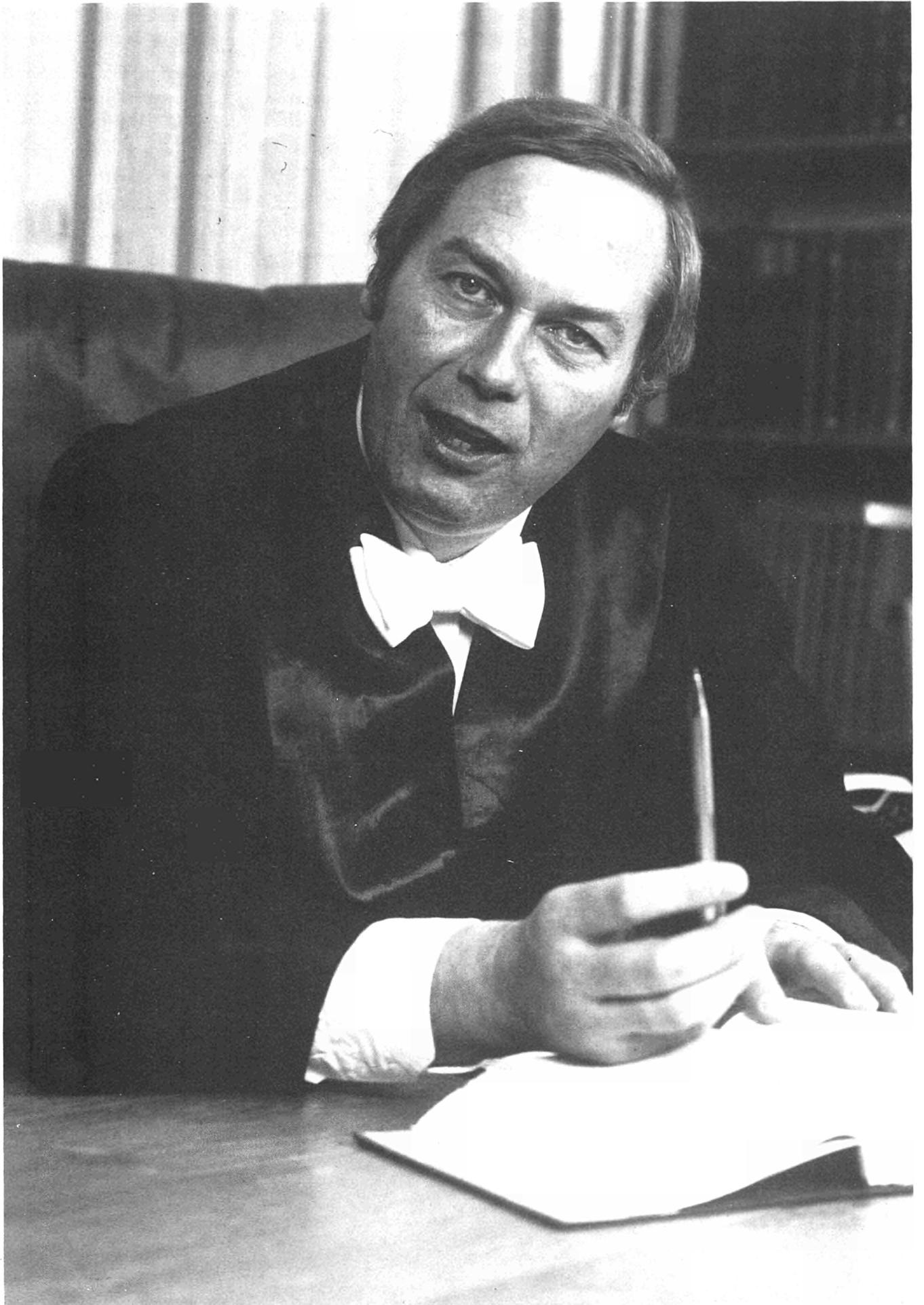
Source: *The Leading European Insurers*.

| % market share | Limited | Mutual | Others |
|----------------|---------|--------|--------|
| Denmark        | 69.3    | 16.8   | 13.9   |
| Germany        | 62.3    | 27.8   | 9.0    |
| Spain          | 63.1    | 33.4   | 3.4    |
| France         | 32.9    | 27.3   | 40.1   |

Source: *The Leading European Insurers*.

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## LEGAL SERVICES

(NACE 835)

*Lawyers provide highly specialized services to virtually all persons and bodies in public and private life. In view of the highly responsible tasks carried out by lawyers, the profession is compulsorily organized on a national level in each Member State. Lawyers are also frequently called upon to provide legal advice; however, legal advice is also provided by other professions such as fiscal advisers, chartered accountants, patent agents, etc. It is to be expected that the profession will be extensively consulted in the next few years about the legal aspects of the EC Commission's harmonization programme for the achievement of the internal market.*

This attempt to describe the current situation of the lawyer's profession in the EC Member States is based mainly on information obtained from the 12 national delegations of the Council of the Bars and Law Societies of the European Community (CCBE). Where statistics are not available, the most common situation, these delegations have made estimates, except where it appeared to them to be impossible.

The term "lawyer" means, except where otherwise specified, any person permitted to exercise the profession under one or other of the various designations listed in Directive 77/249 of 22 March 1977 on the freedom of lawyers to provide services.

### Current Situation

Everyone, every day, makes acts with legal consequences. For example, if an individual is employed he has an employment contract; if he decides to have his house repaired, a commercial contract, and so on. An individual is responsible if, through his acts, he causes a car accident.

In order to establish the extent of someone's rights and obligations, professional legal assistance is required. The professional can advise, draft a contract, give an opinion on difficulties which may arise, reconcile positions and draft the compromise to which the parties have agreed.

The multiplication of laws and rules and the increasing complexity of legal problems is such that recourse to a lawyer is useful, if not indispensable.

If attempts to reconcile the parties fail, the individual will be obliged to go to law. After studying the case, the lawyer will draft a summons indicating briefly the facts and legal means

on which the action is based, draft submissions or memoranda to develop the means and reply to the adversary's arguments, and plead before the relevant court.

If a person is accused of a criminal act, only a lawyer may defend him during the prosecution process and subsequently before the criminal court.

Certain of these activities are so important and bring them so close to a public service that the State reserves them in principle to an organized profession. To this effect, either the State creates the organization (as is the case in 10 Member States) or else it recognizes them officially (United Kingdom and Ireland).

Thus legal clients are both informed and protected. Informed because, through the professional body whose membership is compulsory for lawyers, they know whom to contact. Protected because a service, whether well or badly performed, cannot be changed once rendered - unlike a product which can be replaced if defective. As the service cannot be controlled, only the person who renders it can, and this control is therefore the main task of the professional body in most Member States. These bodies, which are called "Ordre des Avocats", Law Society, "Rechtsanwaltskammer", etc. have considerable powers, which are sometimes exercised under the control of the judicial authorities. The justification for these powers is the necessity to guarantee to the lawyer, as both counsel and defender, the complete independence from public authorities which is indispensable.

These bodies control both access to the profession and the conditions under which it functions. They maintain respect for professional rules such as those for professional secrecy or legal privilege; exercise disciplinary powers, sometimes implying the right of exclusion; possess certain regulatory powers; in most cases organize the free advisory service; deal with lawyers' training, particularly that of trainees; and generally in the public interest ensure the correct exercise of lawyers' activities, the dignity of the profession and the respect of rules on incompatibility with the exercise of other activities (Article 4 (4) of the Directive of 22 March 1977).

### Professional Training

In most countries, a period of in-house training is obligatory, varying from a year and a half in Greece and Portugal to three years (Belgium, Denmark, Luxembourg and the Nether-

lands). Usually, this period includes the requirement to follow courses (Belgium, France, Ireland and the Netherlands) and to take examinations (Belgium, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal and the UK). Member States have different requirements regarding the time that trainees must devote to these activities. In Belgium, this can be estimated at around 120 hours per year. The same holds for the Netherlands.

### *Other Professions Within the Legal Sector*

Certain of the legal profession's activities are also undertaken by other self-employed persons, as their main occupation.

Some of these professions, such as "conseil juridique" (in France), "Rechtsbeistand" (in Germany), public notary and "huissier", are exclusively legal in nature. Others have a wider remit. Patent agents and advisers, tax experts, accountants and land surveyors are examples.

Some professions, such as those whose sole object is to "represent" parties legally, are in the process of disappearing. They exist in Spain; in France only for the "avoués à la Cour d'appel"; and in Portugal for minor cases.

A few of these professions are legally organized and controlled internally and externally in the same way as lawyers. This is the case in France for "notaires", "avoués", "huissiers" and "conseils juridiques"; in Germany for "Steuerberater", "Wirtschaftsprüfer" and "Rechtsbeistände" (who are controlled by the "Land" or "Amtsgericht" Director; in Belgium for "notaires", "experts comptables" and "réviseurs d'entreprise"; in the Netherlands for public notaries, "huissiers" and accountants; and in Italy for public notaries and accountants.

As a matter of principle, foreign lawyers not registered at the bars and law societies in the country of permanent residence are subject to the rules of their original bars and law societies.

Some legal services usually provided by lawyers are occasionally provided by others as a secondary activity. Banks, savings banks and estate agents draft non-registered legal acts, notably in Belgium, Denmark, Ireland, Luxembourg, the Netherlands and the United Kingdom. They also provide legal advice, as do certain categories of persons enumerated below.

### *Scope of Activities*

In the 12 Member States, lawyers participate in the judicial system as the qualified body to assure the rights of defence: they deal or may deal with written and oral procedures before all jurisdictions. However, their extra-judicial role tends to increasingly require a greater share of their time.

The scope of the solicitor's activity in the United Kingdom and Ireland is much wider. To a certain extent this is also true of lawyers in Denmark.

### *Judicial Representation*

When a person either does not wish to be or cannot be present in person before a court, he must be legally represented. In Belgium, Denmark, Greece, Italy and the United Kingdom this is undertaken by lawyers. In the other Member States, other persons also undertake this task, notably the "avoués à la Cour d'appel" in France; the "solicitadores" for the smaller cases in Portugal; the "procuradores" in Spain; fiscal advisers before fiscal jurisdictions in Germany and the Netherlands; the legal advisers in Germany; "huissiers" and legal advisers before lower jurisdictions in the Netherlands; chartered accountants and patent agents before administrative tribunals in Ireland; and those exercising power of attorney or "agrés judiciaires" before lower jurisdictions in Luxembourg, although this profession is in the process of extinction.

Trade union representatives represent parties before employment tribunals in Belgium, Germany, Spain (in the case of collective disputes), Ireland, Luxembourg, the Netherlands and the United Kingdom. They do so, however, as employees of their trade union and not as an independent activity. The same is true of public officials before the Council of State, notably in Belgium.

### *Legal Defence*

The person who represents the plaintiff before a tribunal is not always the same as the person who pleads. In France, for example, the "avoué à la Cour d'appel" represents his client legally, notably when signing the conclusions prepared by the lawyer and containing the written summary of legal submissions, but it is the lawyer who pleads. Lawyers have, in principle, a monopoly over pleading as a participant in a legal process.

In certain Member States, however, members of certain professional categories plead before certain tribunals. They are:

- fiscal advisers (Steuerberater) before fiscal jurisdictions in Germany, the Netherlands and the United Kingdom (accountants in tax matters)
- legal advisers (Rechtsbeistände) in Germany
- "huissiers" and legal advisers before lower jurisdictions in the Netherlands, and in France before the tribunal on agricultural leases
- solicitadores for trials of lesser significance in Portugal
- chartered accountants before administrative tribunals in Ireland
- patent agents for certain actions on patents in Ireland and the United Kingdom
- land surveyors before certain tribunals in the United Kingdom

- those with powers of attorney or "agrés judiciaires" before lower jurisdictions in Luxembourg.

In France, other persons frequently plead before certain jurisdictions. Thus, any person in possession of the requisite power can plead before commercial tribunals. The same applies in the Netherlands for lower or administrative jurisdictions.

Trade union representatives plead before employment jurisdictions as employees of their union in Belgium, Denmark, Spain (for collective disputes), France, Luxembourg, the Netherlands and the United Kingdom. This is therefore not their main occupation. The same applies to members of agricultural organizations pleading before the tribunal on agricultural leases in France or public officials pleading before the Council of State in Belgium.

Before certain higher jurisdictions only a certain category of lawyers is allowed to plead. For example, barristers in England, Wales and Ireland; advocates in Scotland; "Rechtsanwälte" to the "Bundesgerichtshof" in Germany, "avocats à la cour de cassation" for civil cases in Belgium; "avocats à la cour de cassation" before the "Cour de Cassation" and the "Conseil d'Etat" in France; and lawyers to the Court of Appeal before this jurisdiction in Greece.

### *Drafting of Private and Authenticated Acts*

In the majority of Member States, "notaries public" exercise an independent and autonomous profession, which is, moreover, a quasi-public office (Belgium, Germany, Greece, France, Italy, Luxembourg and the Netherlands) or a public one (Portugal).

"Notaries public" receive certified acts, but may also draft any non-registered act.

In the United Kingdom, most notaries are at the same time solicitors, although in London there are a few notaries who are not. In this country, as in Ireland and Denmark, the concept of certified acts has no equivalent. Nevertheless, drafting of acts and contracts on titles to property is in general reserved to lawyers, although in England and Wales they may also be drafted by licensed conveyancers.

Apart from in Greece, lawyers do not have the exclusive right to draw up non-registered acts. In no Member State does this depend on any autonomous profession other than lawyers. In France, however, a draft law will modify this situation, and in Italy non-registered acts are also drafted by accountants (dottori commercialisti and ragionieri).

### *Legal Advice*

Because of its importance for the legal client, certain countries, in the public interest, reserve legal advice to lawyers.

This is the case in Denmark, where only lawyers are allowed to have a legal advice office, Spain (law of 1 July 1985), Greece and Germany. In Denmark, lawyers are allowed to advertise, within certain limits.

In Italy, a preliminary draft professional law attributes to lawyers a monopoly of advice, except for those areas covered by public notaries and accountants. The same is true for Luxembourg, where the draft reform of the statute of lawyer provides for this monopoly under certain conditions, without prejudice to the dispositions covering "notaries public" and auditors.

Apart from lawyers, the following persons provide legal advice as their main activity:

- fiscal advisers in Germany and the Netherlands
- "Rechtsbeistände" in Germany
- legal advisers in France (although the unification of this profession with that of lawyer is under discussion) and in the Netherlands
- foreign lawyers not specifically admitted, in Belgium, France, Ireland, the Netherlands and the United Kingdom
- foreign lawyers admitted in another Member State, in Germany, Belgium and the Netherlands
- "notaries public" in Belgium, Greece, France, Luxembourg and the Netherlands.

The following persons provide legal advice as a secondary activity:

- accountants - on fiscal and commercial law - in Germany (Wirtschaftsprüfer, vereidigte Buchprüfer). Italy, the Netherlands and the United Kingdom, and in France provided that such advice is directly connected with their accountancy work
- patent agents or advisers in Germany, France and the United Kingdom
- surveyors in the United Kingdom
- university professors in Belgium, France and Portugal (jurisconsultos)
- "huissiers" in France and the Netherlands.

Anybody, including those without any legal qualification, can provide legal advice for payment, notably in Belgium, Denmark, France, Ireland, Italy, Luxembourg, the Netherlands and the United Kingdom.

Some lawyers' activities are mainly directed towards other countries or Community law. Their numbers can only be estimated: around 100 in Belgium; around 20 in Denmark; around 50 in Spain; between 500 and 1 000 in France; around 200 in the Netherlands. In Greece, there are "very few", in the

United Kingdom and Italy they are mainly found in the "large offices", in Portugal there are "certain lawyers" and at least half of the total number of lawyers in Luxembourg.

The number of times that lawyers from each Member State have pleaded before the European Court of Justice between 1970 and 15 July 1988 is shown in Table I.

**Table I**  
**Number of Representations**

|                |     |
|----------------|-----|
| Belgium        | 747 |
| Denmark        | 49  |
| Germany        | 875 |
| Greece         | 41  |
| Spain          | 6   |
| France         | 353 |
| Ireland        | 81  |
| Italy          | 338 |
| Luxembourg     | 247 |
| Netherlands    | 251 |
| Portugal       | 1   |
| United Kingdom | 318 |

Source: CCBE.

### *Structure of the Profession*

A law office may consist of a single lawyer, a lawyer with associates or a group of lawyers. By group is meant any form by which lawyers are grouped, such as firms, often called associations, companies, professional firms or, as in France, groups sharing the same building with shared expenses; in France, for example, lawyers may establish a holding com-

pany which owns buildings, furniture, books and machines used by their group (Article 36, Law of 29 November 1966).

In the Community, there are more than 15 000 groups of lawyers. A breakdown is provided in Table II.

Groups of lawyers including persons exercising another profession are groups which include, besides domestic lawyers, lawyers of foreign bars and law societies and non-lawyers.

In the majority of Member States, lawyers do not or may not enter into groups with persons exercising another profession. In Spain such groups exist but are rare. In the Netherlands they involve around 300 lawyers. In Germany, lawyers are permitted to form a firm with patent agents, fiscal advisers and accountants.

Concerning groups with lawyers from foreign bars or law societies, these are permitted in the Netherlands and Belgium; in December 1987, there were between 45 and 50 foreign lawyers, without a diploma in Belgian law, registered at the Brussels bar on a special list, known as the B list. In Denmark, Ireland, Luxembourg, and the United Kingdom, there are none. In Italy and Greece, they are forbidden. In France, theoretically there are none but probably in practice there may be a few in Paris. Similarly, there are few in Spain. In the Algarve, there are a few English solicitors in association with Portuguese lawyers. Prior to the judgment of the Constitutional Court on 14 July 1987, firms with foreign lawyers were not permitted in Germany.

A certain number of lawyers practise mainly as associates or employees of other lawyers. For example, this is the case in Belgium, for between one third and one half of lawyers; in Denmark, for around 250 lawyers; in Greece, for around 1 000 lawyers; in the Netherlands, for around 2 200 lawyers

**Table II**

|                | <b>Number of groups of lawyers</b>   | <b>Individual practice</b> |
|----------------|--|----------------------------|
| Belgium        | 150 groups, of which 99 in Brussels (grouping 2 500 to 3 000 lawyers)        | 5 000 to 5 500             |
| Denmark        | N/A  | around 500                 |
| Germany        | 7 255 "Sozietäten" plus an unknown number of "Bürogemeinschaften" (1.1.1987) | N/A                        |
| Greece         | (Group practice authorized only since 1986) Officially none                  | 19 000                     |
| Spain          | Around 100, of which 40 to 50 in Madrid                                      | great majority             |
| France         | Around 1 000 civil or professional firms or associations                     | around 5 000               |
| Ireland        | Barristers: 0 (obligation to practise alone)<br>Solicitors: around 1 250     | 700<br>around 350          |
| Italy          | N/A  | the majority               |
| Luxembourg     | 46   | around 55                  |
| Netherlands    | 1 014 groups (4 474 lawyers)   | 886                        |
| Portugal       | 32 civil firms   | the majority               |
| United Kingdom | Solicitors: around 4 050 partnerships  | 5 370                      |

Source: CCBE.

of which 1 000 associates and 1 200 trainees; in the United Kingdom, for around 14 250 solicitors.

Strictly speaking, there are no lawyers practising as employees in Belgium, France, Italy and Portugal. In the United Kingdom and Ireland, barristers have no associates.

Lawyers may be hired under an employment contract by firms or public administrations only in certain Member States: specifically, in the United Kingdom and Ireland (barristers and solicitors), Germany (Syndikusanwälte), Spain, Italy, the Netherlands and Portugal.

### *Employment Trends*

To be a lawyer, it is obligatory to be registered at a bar or law society. Registration may, however, cover very different situations. It may cover a traditional practising lawyer, whether full or part-time, as a lawyer or associate of a lawyer, or, in those Member States where it is permitted, as the employee of other lawyers. It may also cover, where permitted, a full or part-time occupation as employee of a public administration or firm (in-house lawyers). Lastly, registration may remain even when practice is limited or non-existent.

The total number of registered lawyers in the EC is around 300 000; the breakdown by Member State is shown in Table III.

A certain number of registered lawyers exercise another profession or practise little or not at all. They are estimated to represent: in Belgium, 5% of the total; in the United Kingdom, 10%; in the Netherlands, from 2% to 5%; in Denmark, around 400 (13%); in Italy, around 15 000 (28%). A certain number of lawyers are employees of a public administration or firm (in-house lawyers). They are estimated to number:

**Table III**  
**Registered Lawyers by Member State (1)**

|                              |   |
|------------------------------|---|
| Belgium                      | 8 000   |
| Denmark                      | 3 000   |
| Germany (at 1.1.1988)        | 51 953  |
| Greece                       | around 20 000   |
| Spain (at 31.12.1986)        | 61 045  |
| France                       | around 17 000   |
| Ireland                      | barristers 700<br>solicitors 3 255                      |
| Italy                        | around 53 000   |
| Luxembourg (at 13.4.1988)    | 323   |
| Netherlands                  | 5 360   |
| Portugal                     | 7 214   |
| United Kingdom (at 1.1.1988) | around 59 000<br>barristers, advocates or<br>solicitors |

(1) Latest available data.  
Source: CCBE.

in Germany, around 12 000 and in the United Kingdom, around 4 000.

A number of lawyers of foreign nationality are registered at the bars and law societies of each Member State. They are lawyers of foreign nationality registered with the professional organization in the same way as domestic lawyers, and those registered at the bar or law society as a foreign lawyer on a special list such as that at Brussels. For certain countries no distinction can be made. Thus, in Spain, there are 419, in Italy "very few", in the Netherlands between five and 10, in Portugal a few lawyers from former Portuguese colonies and an English solicitor.

In the first category, there are around 20 in Belgium, around 20 in Luxembourg and Greece, very few in Denmark and France.

In the second category, there are none in Denmark, France and Greece, and around 50 in Belgium, mainly established in Brussels. In Germany, it appears that there are several foreign lawyers' offices; there is one in Frankfurt, with 11 partners and seven associates, all American lawyers and, with one exception, registered at the Frankfurt bar.

There are also a number of lawyers of foreign nationality permanently established in a Member State without being registered. In the United Kingdom, there are at least 450, mainly from the United States; in France, around 300; in Belgium, around 100; and in Germany, there are some, although it is not possible to estimate their number. In other Member States, there are very few: around eight in Denmark; between five and 10 in Luxembourg; around 15 in the Netherlands and Ireland, where they work for solicitors. In Italy, there are a few, mostly American, mainly established in Rome and Milan.

The average number of employees per lawyer, whether or not legally trained, is around one in Belgium, Spain and Portugal; around three in Denmark; around 2.6 for solicitors in the United Kingdom; between one and two in the Netherlands and Luxembourg. In Ireland, there are one per "practising solicitor", and less than one per barrister. It appears that these figures relate more to secretaries and administrative personnel than to legally trained employees. This is the case for the Netherlands and Portugal, but not necessarily for all countries.

In France, the number of employees in lawyers' offices is 24 000. Employers, whether individual lawyers or groups of lawyers are 8 000 in number, and 80 offices employ more than 10 employees. Personnel has doubled over the last 10 years.

The number of persons working in solicitors' offices in England and Wales who have legal training of some kind is estimated at 30 000.

Combining the figures for the numbers of employees per lawyer with those estimated for the number of lawyers actually

practising, total EC employment in lawyers' offices is estimated at 645 000 (255 000 lawyers and 390 000 employees).

### *Turnover*

Gross annual income per lawyer is total receipts from clients as fees and charges before VAT, minus those sums destined to third parties (adversaries, "huissiers", experts, etc.) or received from third parties for a client.

Statistics are only available for England and Wales, compiled by the Law Society for Solicitors.

Gross annual income for lawyers is estimated as:

- in Italy, around 33 000 ECU
- in Belgium (trainees included), between 30 200 ECU and 34 850 ECU. For the lawyer of less than 30 years of age, between 20 900 ECU and 27 900 ECU. For the lawyer between 30 and 60 years of age, between 46 500 ECU and 55 750 ECU
- in the Netherlands, 64 000 ECU, and 34 000 ECU for salaried lawyers
- in Germany, 29 000 ECU for lawyers with five years' experience; no data are available for other lawyers
- in the United Kingdom, 82 000 ECU for solicitors in 1985-86, including salaried solicitors (Annual Statistical Report 1987); for partners it would appear that 125 000 ECU is the average.

Net annual income is estimated as:

- in Greece, 3 523 ECU
- in Luxembourg, 28 000 ECU, but this evaluation made in April 1985 by the Centre for the Study of population, poverty and socio-economic policy covers all the liberal professions.

Professional expenses represent between 30% and 50% of gross income for a lawyer. To obtain the figure for gross in-

come, the net income figure should be multiplied by a factor of 1.5 to 2, which gives 7 000 ECU and 56 000 ECU for Greece and Luxembourg, respectively.

In France, lawyers declared a collective income of 570 million ECU in 1986. However, a significant number of lawyers made no return either because they did not actually practise (for example lawyers elected to Parliament), because income was declared jointly with their spouses, or for other reasons. Average net income was therefore around 42 000 ECU. Since it appears that costs vary between 40% and 50% of receipts, gross income can be estimated as 80 000 ECU.

Total gross income received by lawyers is estimated at:

280 million ECU in Belgium; 300 to 350 million ECU in Denmark; 4 330 million ECU in Germany; 70 million ECU in Greece; 540 million ECU in the Netherlands. No information is available for other Member States.

With the exception of Germany, for which the figure for gross income per lawyer appears very low, the estimates for total gross income received by lawyers and those derived by combining gross income per lawyer with the number of lawyers practising are consistent. Combining the two sets of data, and estimating for those countries for which no data on gross income are available at all, the best estimate that can be made for total gross income in the Community is around 14 billion ECU.

### **Forecast**

For those countries for which information is available, gross income increased in 1988, or, in the case of Denmark, stagnated. It is probable that gross income will continue to grow over the coming years, particularly for services supplied to business.

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# ACCOUNTANCY SERVICES

(NACE 836)

Accountants have evolved from being mere statutory auditors and accountants, through to being financial advisers, to becoming advisers in many other areas of government and business services. In this latter capacity, the profession touches particularly upon management consultancy. This extension into other areas has considerably augmented overall turnover for the profession.

Accountants engage in a wide range of activities in public practice, industry, commerce and government services. Due to differences between countries in the way in which accountancy and accountants are both regulated and organized, it is difficult to define a common scope. For instance, of those professional bodies which are members of the Fédération des Experts Comptables Européens (FEE), the umbrella body for the accountancy profession in Europe, some confine their membership to accountants in public practice whilst other organizations do not require their members to work or to have worked in public practice.

However, for the purposes of this description, the sector is defined as consisting of those firms and individuals in practice as public accountants, providing accountancy services (in the widest sense - see below) to clients, both individual and corporate, in the public and private sector. This excludes non-professional staff and non-accountant professionals working in public accounting firms. A distinction is therefore drawn between the accountancy profession and the accountancy services sector.

## Employment Trends

In the Community, a total of 265 000 persons are members of a professional accountancy body. In some Member States, membership of a professional body is confined to those individuals actually working in public practice. This explains why the number of accountants per 1 000 inhabitants varies so much between individual Member States. The UK and Ireland have traditionally had a high number of accountants, many of whom move into other activities or work outside their home country. In Italy, which also has a proportionately high number of accountants, the profession is involved in a wide range of activities, one of which is legal advice. In Germany, a separate body of tax advisers exists which has 35 000 members.

## Elements of Accountancy Services

As explained later, in certain Member States regulatory constraints may impose limitations on the provision of accountancy services - either in general or to certain categories of clients. However, it is possible to identify several broad categories of service across the entire range of services provided in the Community. These areas are as follows:

- accounting
- auditing
- taxation advice
- management consultancy

Table I  
Employment in Accountancy Services, 1988

|                    | Members of professional bodies | Accountants working in public practice | % of total members | Accountants per 1 000 inhabitants |
|--------------------|--------------------------------|--|--------------------|-----------------------------------|
| Belgium            | 7 879                          | 3 879                                  | 49                 | 0.39                              |
| Denmark            | 2 346                          | 1 950                                  | 83                 | 0.38                              |
| Germany            | 4 786                          | 4 786                                  | 100                | 0.08                              |
| Greece             | 700                            | 640                                    | 91                 | 0.06                              |
| Spain              | 4 100                          | 1 924                                  | 47                 | 0.05                              |
| France             | 19 739                         | 19 739                                 | 100                | 0.36                              |
| Ireland (1)        | 6 200                          | 3 100                                  | 50                 | 0.88                              |
| Italy              | 46 000                         | 28 000                                 | 61                 | 0.49                              |
| Luxembourg         | 317                            | 230                                    | 73                 | 0.63                              |
| Netherlands        | 6 000                          | 2 500                                  | 42                 | 0.17                              |
| Portugal           | 460                            | 377                                    | 82                 | 0.37                              |
| United Kingdom (2) | 166 792                        | 49 471                                 | 30                 | 0.88                              |
| <b>Total</b>       | <b>265 319</b>                 | <b>116 596</b>                         | <b>44</b>          | <b>0.36</b>                       |

(1) Including Northern Ireland.

(2) Excluding Northern Ireland.

Source: FEE.

- insolvency
- trustee and administration work
- other services.

### *Accounting*

Assistance and advice is provided to clients on the organization and design of accounting systems, the keeping of accounting records and the preparation of financial statements, whether required by law or for other reasons. The nature of the services can vary from basic bookkeeping for small or unsophisticated clients to detailed advice on the application of accounting principles and standards for sophisticated clients.

### *Auditing*

Under Community law, many companies are required to have their annual financial statements audited, whereby a properly approved auditor or firm of auditors is required to express an opinion as to whether the financial statements give a true and fair view of the results of the company's activities and of their financial position, and whether they comply with the relevant legal provisions. The purpose of this independent, external audit is to lend credibility to financial information and thereby to enhance the effectiveness of economic decisions made on the basis of this information. In addition, many companies and other entities not subject to the statutory audit requirement voluntarily request contractual audits, given the benefits which accrue from this service. Finally, there is a growing demand for audit-related services, which involve the issuance of special-purpose reports and opinions or the application of certain defined procedures.

### *Taxation Advice*

In this area, services can be broadly categorized as relating to tax planning or tax compliance, the former consisting of advice on the application of taxation law and the latter relating to the preparation and presentation of the various returns and declarations required by law, and assistance to clients in their dealings with the relevant authorities.

### *Management Consultancy*

Given the broad and comprehensive nature of their education, training and experience, accountants can contribute a considerable body of information and guidance to clients in a wide range of areas; these may include general financial and business advice, the management of financial systems, internal controls, information technology, strategic planning, mergers and acquisitions, marketing, production, personnel, executive search, and personal financial planning. There is a very clear trend towards expanding the range of services pro-

vided; in many countries, management consultancy units of accountancy firms are the largest consultancy organizations. This leads to difficulties in drawing a clear dividing line between the accountancy services and management consultancy sectors. More information on the latter sector is provided in Chapter 30 under "Management Consultancy".

### *Insolvency*

Accountants are either the leading or significant providers of insolvency services in those countries where they are permitted by law to act in this capacity. This can be in the capacity of liquidator, receiver, administrator or a similar function to companies or individuals in financial difficulties or as adviser to other professionals acting in these capacities. Clients may also turn to accountants for advice before financial difficulties reach a critical stage. In many cases, therefore, this area of practice is known as "insolvency and corporate recovery".

### *Trustee and Administration Work*

In certain countries, accountants frequently act in a fiduciary capacity for clients, handling investments and similar financial arrangements.

### *Other*

Legislation in many Member States authorizes certain accountants to perform statutorily defined functions such as representing clients before certain administrative and other tribunals, and/or issuing certain declarations and reports.

### *Regulatory Environment*

In general, governments exercise influence on the accountancy services sector via the regulatory framework. Two kinds of regulations can be distinguished.

The first relates to the services provided by the sector. All Member States have a statutory audit requirement, and many also require the involvement of suitably qualified accountants in the expression of opinions or issuing of reports in other circumstances. Furthermore, many accountancy services relate to the provision of advice and assistance with regard to laws and regulations on taxation, insolvency, company law, etc. Certain countries impose limitations on the range or combination of services which can be provided to particular clients.

The second category of regulations directly affects the providers of accountancy services by establishing requirements for the education, training, qualification and professional conduct of accountants and accountancy firms. In many cases there are also further licensing requirements for specialized areas of practice.

Frequently, governments delegate many of their powers of regulation to self-regulating professional bodies which are responsible for enforcing the rules applicable to their members. The extent of this delegation and self-regulation varies from country to country, reflecting differences in tradition and legal background.

Government regulations can also have an influence on the organization and structure of accountancy firms, and can limit the forms of legal entity which can be used by accounting firms.

It should be noted that Community legislation, particularly in the area of company law, is achieving a greater degree of harmonization of laws and regulations which have an impact on the accountancy services sector.

### *Structure of the Sector*

Given the wide range of activities encompassed by the accounting services sector, and the number and variety of its clients, there is considerable variety in the scale and organization of the accounting services provision.

National requirements, both governmental and self-regulatory, influence whether providers may be natural persons (individuals and partnerships) or legal persons (e.g. limited liability companies). They also affect the ownership and other control of firms in the sector, and can prohibit or permit the involvement of members of other professions in such firms.

The size of services providers also varies considerably, responding to different client needs. Small firms, or even indi-

vidual accountants, can enjoy success by identifying appropriate market niches, in terms of either location or services provided. At the other end of the scale are major firms, employing several thousand staff, with international networks (either regional or worldwide). The links between practices in different countries can vary from common partnerships across borders to loose affiliations involving no profit-sharing arrangements. Such large firms seek to provide a full range of accountancy services to a wide spectrum of clients, including large transnational corporations with operations on an international scale.

Within the sector, there is a trend towards growth of firms through mergers; this partly reflects a desire to provide more comprehensive service to clients, in terms of both geographical coverage and the nature of services provided. It is also a means of ensuring that adequate funds are available to support the continually increasing investment required in training and personnel development, introducing advanced information technology, and remaining innovative in the development of new services. This, in turn, is a reflection of growing competition between providers within the sector seeking both to increase the cost-effectiveness and efficiency with which traditional services are provided and to diversify into more rapidly expanding areas of practice.

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# MANAGEMENT CONSULTANCY

(NACE 839.1)

*The total turnover of EC management consultancies in 1987 is estimated at 3 630 million ECU. The sector employs an estimated 50 000 persons of whom around three quarters are consultants. Demand for management consultancy services has continued to expand, against the background of 1992 and of the increasing internationalization of markets.*

Management consultancy is considered here as a specific professional service, the best definition of which is probably that given by Larry Greiner and Robert Metzger: "management consulting is an advisory service contracted for and provided to organizations by specifically trained and qualified persons who assist - in an objective and independent manner - the client's organization to identify management problems; analyse such problems, recommend solutions to these problems, and help - when requested - in the implementation of solutions".

Management consultancy is nowadays a profession with a very high degree of technical competence and professional expertise.

## Current Situation

Management consultancy is a rapidly growing business. This growth is shown, for example, in figures produced by the Management Consultancies Association MCA (UK) which groups 29 of the largest consultancy firms who have 65% of the business in the UK. Its members' fee income increased by 36% in 1986, amounting to 340 million ECU, and by 32% in 1987 to nearly 425 million ECU - almost four times the 1981 figure of 112 million ECU.

Currently, the European Federation of Management Consultants (FEACO) comprises 15 national associations representing 46% of the total management consultancy market in Europe.

Available data and information are by no means comprehensive; however, using government statistical information, data from the trade associations of management consultancy in each country through their European umbrella organization FEACO, and various studies on the sector, it is possible to provide an indication of the current situation of the EC management consultancy sector (excluding Greece for which no information is available).

Business conditions are good compared with 1986; qualified "substantially better" in the Netherlands and the UK, and "moderately better" in the nine remaining countries. The de-

mand for management consultancy reflects a variety of factors:

- economic developments
- central staff reductions in government and many companies resulting in a requirement for outside advice
- the increasing need for information, in order to improve efficiency and competitiveness
- internationalization and the perspective of the 1992 single European market.

**Table I**  
**Turnover and Employment, 1987 (1)**

|                                  |             |
|----------------------------------|-------------|
| Estimated turnover (million ECU) | 3 629       |
| Consultancies                    | 1 800-2 300 |
| Consultants                      | 40 095      |

(1) EC 10: excluding Luxembourg and Greece; estimates by FEACO: Members of FEACO represent approximately 46% of management consultancy in the EC.

Source: FEACO.

## Employment

The total number of personnel may be estimated at nearly 50 000, with the ratio of support staff to consultants being at around 1:3.

In FEACO consultancies, the consultants belong to three main categories: senior consultants with 10 or more years' experience (accounting for around 40%), consultants with more than 3 years' experience (30%), and university graduates/junior consultants (also around 30%). The proportion of women consultants is still very low.

It is quite impossible to estimate the number of part-time consultants, which sometimes depends on the legal status of the firms and on fiscal factors.

The average estimated annual turnover per consultant (approximately 95 331 ECU) may seem very high, but FEACO consultancies (EC) figures show big differences between this sector and other consultants.

## International Competition

With a few exceptions FEACO consultancies serve clients abroad through their national offices. Such services exports account for: Belgium: 28%, France, the Netherlands and

Italy: 16%, UK: 13%, Germany: 12%, Spain: 8%, Denmark: 7% of total turnover. "Export" estimates for Canadian, American and Japanese consultancies having a similar profile to FEACO consultancies, are respectively 5%, 3% and 7%.

European consultancies have only a few subsidiaries abroad - even in Europe - whereas American firms have for a long time established networks in Europe and all over the world, through offices, subsidiaries or partnerships.

The European management consultancy sector is in fact mainly national, each company employing primarily local consultants. However, some consultancies operate in Europe at the multinational level:

- American-based firms; the "Big 8" - Arthur Andersen, Ernst & Whinney, KPMG, Coopers and Lybrand, Price Waterhouse, Deloitte Haskins & Sells, Touche Ross, and Arthur Young
- Anglo-American international consulting firms such as ADL, MacKinsey, BCG, Hay, PA
- European firms which have established subsidiaries or are members of an international network (mainly West European), such as, Bossard Consultants, Kienbaum, Hartmark of the European Association of Consulting (ACE); and Eurequip, Roland Berger, Atkins Planning, of The International Group (TIG).

The most favoured areas of activities in FEACO consultancies across the EC are information technology, general management, production, human resources and finance.

### *Industry Structure*

Estimates of the number of EC consultancies range from 1 800 to 2 300 employing more than 38 000 consultants. Approximately 33% of these consultancies have one to 10 consultants, 34% have 11 to 50, 21% 51 to 200, and 13% have over 200 consultants.

The European management consultancy sector has good earnings prospects. This will favour the growing entry of other professions with less favourable prospects, notably accountants. Europe is already affected by mergers and acquisitions of management consulting firms by American accounting firms seeking to increase their revenue per professional. In the USA during the four year period from 1982 to 1986, management consulting revenues for the "Big 8" accounting firms more than doubled, growing from USD 690 million (704 million ECU) to more than 1.5 billion (1.52 billion ECU). This tendency will not be so strong in Europe, as the relationship between accountancy and management consultancy is still open.

In some EC Member States (Belgium, France and Italy), government regulations require that auditors should not render non-auditing services to their clients, and the accountants are obliged to create separate legal entities to carry out consultancy services. There is no such barrier preventing the software companies from entering the management consultancy sector. They will continue to seek opportunities for acquisition of consultancies (mainly small and medium-sized companies), looking for new entries through strategic and production management. Other professions such as banks, law firms and advertising agencies continue to enter the consultancy sector for the same profitability reasons.

On the other hand, European management consultancies have to adapt themselves to the new competitive environment, the result of the progressive but rapid European and international globalization of the market. This is likely to result in management consultancies enlarging their own range of services and acquiring interests in activities close to consultancy such as recruiting, head-hunting, out-placement, public relations, communication, advertising, market research. In the same way, management consultancies are likely to move into the legal field.

All these trends, a growing market, good profitability, other professions entering the market, and broadening of management consultancy areas, will probably encourage some groups to build entities in which clients might buy consultancy services, advertising, legal services, insurance or financial advice. Although this trend has already begun, cultural and linguistic diversity in Europe will probably prevent it from spreading rapidly. However, the tendency to increased concentration is very strong and is expected to continue. Only large firms can afford to recruit, train and invest in the senior consultants demanded by their clients.

The European management sector is likely to follow the American pattern: in 1984 only five management consulting firms recorded revenues over USD 100 million (127 million ECU) and only about 60 additional firms recorded revenue over USD 5 million (6.3 million ECU), whereas in 1987 the five became 15 and the 60 still remained 60.

However, the small consultancies will not disappear. The growing domination of the big firms will offer the smaller ones new opportunities in the market, particularly in new areas of activity (information technology, human resources, logistics) and outside the big cities. This will allow independent consultants, part-time consultants and small groups of partners to strengthen their position. In some countries, governmental efforts to promote the use of consultancy in the small and medium-sized firms will play the same role. Such schemes have already existed for several years in France, Germany, the Netherlands and the UK, and will probably spread to the rest of the Community.

## Trends in Member States

Management consultancy business has been growing in all Member States; in some countries, such as the UK and the Netherlands, business was particularly buoyant in 1987.

**Table II**  
**Breakdown by Member State, 1987**

| (Million ECU)  | Consultants | Turnover |
|----------------|-------------|----------|
| Belgium        | 967         | 87.7     |
| Denmark        | 775         | 58.4     |
| Germany        | 15 454      | 1 092.5  |
| Spain          | 3 075       | 84.5     |
| France         | 3 875       | 331.5    |
| Ireland (1)    | 701         | 50.7     |
| Italy          | 4 675       | 385.4    |
| Netherlands    | 1 923       | 139.7    |
| Portugal (1)   | 1 939       | 141.0    |
| United Kingdom | 6 710       | 349.7    |

(1) Estimates by FEACO.  
Source: FEACO.

Management consultancies in Germany contributed around 40% of the sectors' estimated total EC turnover. In FEACO consultancies, estimated average turnover per consultant employed is highest in Germany at 140 000 ECU, followed by the Netherlands and Italy (130 000 ECU), UK (117 000 ECU), Belgium and France (114 000 ECU) and Denmark (102 000 ECU).

FEACO management consultancies in some Member States have particular speciality areas; the Netherlands appears to have considerable activity in strategic planning, whereas Ger-

many, France and the UK are more involved in information technology. Areas of activity in FEACO consultancies by Member State are indicated in Table III.

## Forecast and Outlook

Information and views from FEACO, its national member associations and forecasting agencies all indicate that the European management consultancy sector will continue to be one of the fastest growing sectors of the European economy.

The pace of change will continue to accelerate, and this will be enhanced by the internationalization of different markets and the increasing complexity of the economy, in which industry and services are increasingly inter-linked. Generally higher levels of competition in the economy will encourage companies to seek assistance from consultancies to maintain their competitive edge.

New, important work will come from the public sector in all EC countries and from the Community itself - as is already the case - at least to advise on structure, goals and organization.

As a result, the outlook for management consultancy in 1988 compared with 1987, is considered "moderately better" by all FEACO consultancies and the forecast demand for consultancy services, with the perspective of 1992, is estimated to grow at a rate of 15% per year.

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**Table III**  
**Areas of Practice**

| (%)   | Belgium | Denmark | France | Germany | Italy | Netherlands | Spain | United Kingdom |
|---|---------|---------|--------|---------|-------|-------------|-------|----------------|
| Strategy  | 9       | 31      | 18     | 15      | 17    | 31          | 10    | 15             |
| Technology                                      | 12      | 10      | 24     | 35      | 7     | 10          | 17    | 15             |
| Financial consulting                            | 8       | 8       | 5      | 3       | 4     | 8           | 8     | 15             |
| General management                              | 25      | -       | 20     | 12      | 18    | -           | 6     | 7              |
| Government administration                       | 10      | 18      | -      | 7       | 1     | 18          | 5     | 15             |
| Executive search recruitment                    | 4       | -       | -      | 5       | 8     | -           | 15    | 4              |
| Human resources (including management training) | 2       | 14      | 12     | 4       | 12    | 14          | 10    | 4              |
| Production                                      | 10      | 11      | 14     | 5       | 19    | 11          | 13    | 12             |
| Marketing                                       | 4       | 8       | 5      | 3       | 11    | 5           | 8     | 7              |
| Research & development                          | 4       | -       | -      | 3       | 1     | -           | 1     | 2              |
| Specialized services                            | 12      | -       | -      | 7       | 1     | -           | 5     | 3              |
| Other   | -       | -       | 2      | 1       | 1     | 3           | 2     | 1              |

Source: FEACO.

# ARCHITECTS

(NACE 837)

*The slump in building activity in the early 1980s resulted in very unfavourable employment and turnover conditions for the profession during that period. Although building activity has picked up moderately in some Member States, employment and turnover levels have not yet recovered to pre-1980 levels.*

The architect is required to bring together many apparently different professional abilities: in addition to an ongoing appreciation of totally new construction methods, the architect needs to understand and know how to manage restoration projects, preservation and upkeep of both historically and technically built-up areas, interior decoration, organization, landscape architecture, preservation of the environment, training and research, design, etc. Historically and geographically, these tasks have developed in different ways in the Member States of the EC.

The functions of the architect are:

- to master drafting techniques; to be able to execute construction programmes and to explain them to the builder
- to possess specialized knowledge of building techniques and physics
- to be aware of and apply both general and specific legislation and regulations to the projects on order.

The task of the architect involves reconciling the interests - often conflicting - of the world of construction and real estate, and the cultural and artistic requirements of the user and of society in general.

Table I shows total numbers of qualified architects and students of architecture per country, plus the number of architects per million inhabitants.

The so-called professional specialization with regard to the different types of construction is necessarily based upon general knowledge; however, most specializations are only of a temporary nature in view of the rapid evolution taking place in the profession. The specialized involvement of various kinds of "technicians", both in the planning and the execution phases of a project, is often wrongly classified as a specialization. In many cases the architect, in his capacity of "overall coordinator", will have to rely to an increasing degree on the counsel and studies of these semi-specialists.

The architect's impact on the economic aspects of a construction project is considerable. He has to ensure that the building is attractive, the design is well suited to the surroundings, it functions well on all levels, it is completed inside a reasonable budget and that the occupants have a general feeling of well-being.

Besides these general requirements, the architect is faced with a number of other factors:

- architectural "trends"
- financial and technical aspects of new construction methods and techniques, new building materials or changed production methods for existing materials
- energy and material saving methods
- renewed interest in the past and in the existing cultural heritage
- a critical approach by society and the individual to the modification of built-up areas.

Within these constraints, the profession is changing constantly; the architectural field has become so complex that it is now necessary for the architect to adapt and re-train continuously.

## Current Situation

The fundamental role of the architectural profession is similar in all Member States. However, architects operate under different circumstances in each Member State and these circumstances are mainly determined by the following three factors:

- the existing legislation with regard to construction
- the professional training required to qualify as an architect

Table I (1)

|             | Number of architects | Number of students | Architects per million inhabitants |
|-------------|----------------------|--------------------|------------------------------------|
| Belgium     | 5 940                | 3 400              | 600                                |
| Denmark     | 4 900                | 2 270              | 961                                |
| Germany     | 60 424               | 29 823             | 985                                |
| Greece      | 9 500                | 1 000              | 990                                |
| Spain       | 10 391               | 13 586             | 275                                |
| France      | 20 081               | 16 200             | 373                                |
| Ireland     | 1 200                | 475                | 324                                |
| Italy       | 65 000               | 66 000             | 1 136                              |
| Luxembourg  | 125                  | 50                 | 347                                |
| Netherlands | 2 500                | 3 000              | 176                                |
| UK          | 27 575               | 7 259              | 493                                |

(1) 1983.

Source: CLAEU.

- the way in which projects are realized within built-up areas (legislation, structure and capabilities of builders, climate, population density, degree of industrialization of the area, etc.).

As far as technical aspects are concerned, training varies considerably in the different Member States and regions of the Community. The cultural and educational background is clearly different as well, with a more technical bias in Germany, Spain and Greece, a more artistic basis in France and Italy, a cultural-historic foundation in the insular Member States and a more practice-oriented one in Belgium, Denmark and the Netherlands. Training and teaching methods are varied and are currently under discussion both at a national and international level. It is clear that the training period, entry qualifications for admission to the profession, and existence of continuous education, represent significant areas of difference between Member States.

The influence of the administrative authorities on these factors is also very unequal. Whereas in some Member States they are entirely a matter for the administration, in other countries they have historically developed as a matter of concern only to the profession itself.

Finally, the exercise of the profession is subject to very different regulations in the Member States: at one end of the scale the profession is completely regulated, whereas at the other, protection of the title of architect hardly exists. This means that the architect's role is difficult to compare.

Another important aspect of professional practice is the notion of professional conduct and deontology, which may vary from very lax standards to very stringent and complex regulations which sometimes extend to the personal conduct of the individual professional. In some Member States, entry to the profession is linked to the compulsory membership of a professional association as well as to a continuous education programme.

### *Regulatory Environment*

Since the subject of building legislation is so wide, only the most important points are mentioned. These are:

- a 10-year liability period in those countries with a legal system based on the Napoleonic Code (France, Belgium, Luxembourg, Italy)
- the possibility of appointing various experts on behalf of litigating parties in the Anglo-Saxon countries
- the existence of compulsory insurance (France, Belgium)
- locally-inspired customs, legislation and regulations (e.g. concerning earthquakes in Greece)
- the procedure used for obtaining a building licence

- limitation on and specification of building methods and/or materials.

With regard to the two final points, regulations are very different. Whereas in some countries and/or regions there are few restrictions, others have such strict rules that a project has to be fully specified, including form, choice of materials, contents and external aspects. Historically important sites and regions generally possess relatively clear guidelines, but some countries only have "recommendations" concerning application and/or choice of materials. The laws on quality, materials usage, norms and margins allowed in building techniques are totally different from country to country. The availability of materials is regionally determined and certain materials can be made available in other regions only at enormous expense. Materials are also climatically linked to certain areas and can sometimes only be transferred to other areas at great cost.

### *Trends in each Member State*

As the current situation of the architectural profession is very different in the Member States, recent trends in each are discussed separately below.

In Belgium, demand for architectural services has increased slightly given stabilization of demand in the building sector (although order levels are still only 70% of their 1980 level). The building trade is continuing to suffer from a shortage of skilled labour. Some concern exists regarding unequal legislation due the progress of federalization. Entry to the architectural profession is subject to regulation; 20% of professionals are under 32. Security of employment has stabilized to some degree and VAT on fees has been modified to 17%. There has been an important reduction in training centres with closure of four establishments.

The architectural profession in Denmark has seen a large increase in the registration of new professionals (50% since 1977) leading to a decrease in average age to 33. However, unemployment is still high amongst the younger professionals at 7-8%. Activity in the building sector is low but has recently stabilized. A significant number of architects are employed in related professions.

Germany has seen a stabilization of new registrations in the profession. Demand in the sector has stabilized but the number of orders for large projects is decreasing.

Building activity in Greece is running at low levels; this is especially the case for small family homes and the further equipment of such establishments. The profession is better organized since the accession of Greece to the EC.

In Spain, there is an important concentration of building firms around densely populated areas but this has meant decreased activity in the less populated areas. In general, build-

ing activity is showing a declining trend with strong competition in the sector. There has been a stabilization of entries to the profession.

The architectural profession in France is now regulated since the enactment of new legislation. However, there are many inadequately qualified members of the profession. The registration statistics show the entrance of many new professionals which has lowered the average age of members. Building activity in the economy continues to be depressed but there is a strong tendency towards renovation.

In Ireland, building activity has almost halted. Partly as a result of this, young (and some older) professionals have emigrated to the USA, the UK or even Africa.

There has been an increase in number of registrations in the Italian profession; however, a large number of architects are employed in other capacities (not always related to the profession). New building activity is very limited; there is a preference for renovation, especially in historic areas. A large increase in building costs has also had an influence on building activity.

In Luxembourg, enactment of a law regulating access to the profession is expected. Architects suffer from insufficient job security. The building sector has seen a stabilization of orders but it is continuing to experience a shortage of skilled labour.

Registration law and protection of professional title have come into force in the Netherlands and this is expected to bring improved standards in the profession. 50% of architects are under 50. The profession offers reasonable job stability, especially in densely populated areas where demand for architectural services is relatively steady. Demand in the building sector is expected to stabilize.

In Portugal, new legislation is expected to clarify the status of the profession. However, building activity is currently running at low levels.

The architectural profession in the UK has experienced stabilization of new registrations. There is strong demand for qualified professionals by the established profession, and the supply shortage is being filled by architects from Ireland. In the building sector there has been a strong increase in property prices.

### *Current Trends*

There is a strong trend towards the development of more commercially oriented activities. In view of the long and difficult training for the profession, there is a general feeling that the architect's remuneration, in relation to his responsibilities, is far too low. To avoid this situation, many youngsters seek job security through employee status. The established architect's only income is the professional fee, usually a percentage of the building costs. Depending on the

country, area, and type of project, this percentage varies from 5% to 12%, and from a low percentage in a slumping economy to a "normal" one in a booming economy. 50% of established architects earn less than the average income.

The trend towards computerization of drafting techniques seems to have levelled off.

Given higher numbers of individuals in the profession, an increase in new customers needs to be ensured; this poses the deontological problem of "advertising" the profession.

The increased tendency to take even small points of litigation to the courtroom and the eagerness of the courts in encouraging these steps has led to increased insurance costs and, in some Member States, to the introduction of compulsory insurance coverage (France and Belgium). The question is whether this trend will lead to both a total halt in experimental building projects (hampering architectural development) and the most dynamic representatives leaving the profession for fear of being unable to find sufficient insurance coverage.

A general trend exists towards abandoning large-scale modern architecture for projects with a more traditional character, execution of which is guaranteed by thorough professional experience and a choice of high-quality building materials. Both these characteristics are scarce and expensive, making the projects more cost and effort-intensive.

The work of the architect has a considerable impact on other aspects of economy and environment, particularly with regard to the following:

- the choice of materials for a project
- the decision with regard to the execution technique
- the decision concerning technical equipment of the projected building
- the choice of site and harmonization with the existing surroundings
- security
- the qualitative character, both physically and aesthetically, of the building as an enrichment or an impoverishment of the cultural heritage.

### **Outlook**

The influence of each architectural project on the overall cost and execution period of a building project, together with the conception of a project, are the determining factors in the creation or the preservation of cultural heritage.

An increasing number of architectural tasks appear to be carried out by non-architects as existing tasks are becoming so complex that they require specialization.

In the Community in general, little change is expected over the next decade, in spite of the adoption of the new architects Regulation. On a worldwide scale, a slight slowdown is expected to take place for large international offices in the previously rapidly expanding markets of developing countries; a levelling-off in prestigious projects is forecast. European architects will need to fight to maintain their position or gain an increased share of a weakening world market.

The less complex projects in local markets outside the Community are expected to be taken over, to an increasing extent, by locally or internationally trained locals, utilizing traditional designs. International cooperation will be of limited duration and probably linked to specific projects, with each partner making an individual contribution.

The choice of materials and techniques will lead to more diversified projects, thereby weakening the monopoly position of certain industries and/or countries. In the Community as a whole, especially after 1992, a rapid change is expected to take place in the use of previously well-established materials and techniques in certain areas.

Solid, up-to-date training of the "European architect" needs to be implemented, together with that of all other building technicians, in order to promote overall building activities.

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# CONSULTING ENGINEERING SERVICES

(NACE 837)

*The market for technical consultancy and more specifically engineering consultancy has expanded relatively rapidly over the last several years. The prospect of the single market has already provided some impetus to cross-border flows of these consultancy services. The value of technical and engineering consultancy services in the European Community is estimated at over nine billion ECU in 1987. Together these sectors employ more than 155 000 persons in the Community.*

## Current Situation

Consulting firms have been faced with a threefold development:

- geographical diversification
- the increase in the complexity of contracts and the sophistication of services
- changing demand involving increased responsibilities.

This development has been particularly noticeable in sectors where strategy is based on the availability of special processes, such as chemical, petrochemical, nuclear, non-ferrous metal, sea-drilling and pipe-laying as well as for large infrastructural projects, e.g. the Channel tunnel.

Technical consulting firms, supplying all the services to advise, conceive, study, control the construction of, and operate industrial units, have also developed. These firms, whose work includes financial know-how of an operation and whose responsibility may include the production and commercial-

ization of the product, practise general engineering contracting. Their role as advisers and developers is essential to the definition of their work.

CEBI (European Committee of Consulting Firms) was created in 1971 with the aim of uniting national representative associations of consulting firms in the European Community. Member firms carry out their work in different sectors:

- technical, industrial, architectural design
- economic studies and advice on organization, management, administration, training and recruitment
- agricultural and environmental studies
- computer services and advice.

They may be employed by business organizations ranging from private partnerships to nationalized industries.

CEDIC (European Committee of Consulting Engineers of the Common Market) embraces the representative national associations of independent consulting engineers of the Member States in the European Community.

CEDIC represents about 6 000 consulting engineers and their firms which have over 60 000 employees. Membership of CEBI and CEDIC is estimated to cover approximately 85% of the consultancy sector in the Community.

The activity of CEDIC members is generally less export-oriented than that of the CEBI members although this varies from State to State.

## Market Structure

The structure of the world market is characterized by:

- the heterogeneity of the distribution of markets, linked to discriminating factors (geographical zone, the presence or not of energy resources)
- the concentration of world activity in companies based in the developed countries.

The structure of these companies' activities is a function of their heterogeneity (export ratios, turn-key contracts, "cost-fees" contracts).

The breakdown of the world market for engineering consultancy shows that the markets in the developed countries represent 57% of the total; North America, 46%; Western Europe, 8.5%; and Japan, 2.5%. These are the countries from

**Table I**  
**EC Technical and Engineering**  
**Consultancy Sector, 1987**

|                              | Consultants (1) | Consulting engineers (2) |
|------------------------------|-----------------|--------------------------|
| Firms                        | 949             | 5 635                    |
| Staff                        | 127 930         | 63 156                   |
| Average staff/firm           | 134             | 11                       |
| Total turnover (million ECU) | 7 504           | 3 498                    |
| Exports (million ECU)        | 2 732           | 850                      |
| Exports/turnover (%)         | 36              | 24                       |
| Turnover/capital (%)         | 59              | 55                       |

(1) CEBI members. EC 9: excluding Ireland, Luxembourg and Portugal.  
(2) CEDIC members. EC 9: excluding Greece, Italy and Portugal.  
Source : CEBI/CEDIC.

which the world's main technical and engineering consultancy firms originate.

The American market open to professional engineering consultancy is five to six times larger than the Community market.

Export markets are of a similar magnitude but with very different characteristics. They are at present concentrated in the Middle East (13%), the Far East (12%), Eastern Europe (8%) and Africa (2%).

The structure of the European market is characterized by the fact that the intra-EC market exchanges for engineering consultancy services do not exceed 4%. The single market will enlarge the competition and lead to a better flow of exchange and a different share of the market.

### Market Shares

The market breakdown among consulting firms indicates that nearly all (96%) of consultancy activity is spread among firms in the developed countries; American and European shares are of a similar magnitude. The export/domestic ratio for American firms compared with that for European firms is inverted; the American firms carry out 90% of their activities on their home market while the European firms, without a sufficient domestic market due to the competitive factor of public in-house engineering, carry out over 33% of their activities outside the EC.

The characteristics of the export markets call for a "business knowledge" in the complete sense of the term, which is very different from that needed for the domestic markets of the developed countries. Nearly all export activities by American

firms are carried out by the top 20 firms; a similar trend exists in Europe.

### Trends in Member States

This type of consultancy exists in all Member States to a greater or lesser extent. However, significant differences in the characteristics of these consultancy companies are observable amongst the EC countries.

The UK technical and engineering consultancy sector accounts for 20% of such EC consultancy firms, 35% of employees in the sector, and around one-third of total turnover. In terms of employment, the highest average size of firm is in Italy and Spain. However, the highest average turnover per employee is recorded by French consultants followed by Belgium, both being countries in which the average employment level in technical and engineering consultancy companies is much lower.

The largest exporter of these consultancy services in absolute terms is the UK, although exports by Italian companies represent a higher overall percentage of turnover at 50% compared with 33% for the UK. Denmark, Spain, Greece, Ireland and Luxembourg export a relatively small share of their consultancy services.

Over 66% of EC employment in engineering consultancy companies is accounted for by the UK and Germany, which together make up 69% of total turnover in the sector. The UK companies are the most export-oriented in the EC, with exports representing around one-third of turnover. Apart from the Netherlands, whose exports total 109 million ECU accounting for 25% of turnover, consulting engineers in other

**Table II**  
**Breakdown of Technical and Engineering Consultancy Sector by Member State, 1987 (1)**

| (Million ECU)  | Firms | Staff<br>(1 000) | Total<br>turnover | Export<br>turnover |
|----------------|-------|------------------|-------------------|--------------------|
| Belgium        | 110   | 3.4              | 235               | 71                 |
| Denmark        | 566   | 9.2              | 375               | 75                 |
| Germany        | 2 790 | 25.2             | 1 530             | 518                |
| Greece (2)     | 98    | 2.0              | 50                | 4                  |
| Spain          | 124   | 10.6             | 531               | 51                 |
| France         | 867   | 20.8             | 1 600             | 514                |
| Ireland (3)    | 217   | 0.8              | 35                | 5                  |
| Italy (2)      | 124   | 21.0             | 1 250             | 625                |
| Luxembourg (3) | 27    | 0.2              | 13                | 1                  |
| Netherlands    | 140   | 8.0              | 435               | 109                |
| United Kingdom | 1 256 | 55.0             | 3 025             | 1 000              |

(1) EC 11: excluding Portugal. Consultancy and consulting engineers. Some overlap between the two sectors occurs but the statistics have been adapted accordingly.

(2) Consultancy only.

(3) Consulting engineers only.

Source : CEBI/CEDIC.

Member States tend to be relatively domestically-oriented. In employment terms, the average size of an EC company is relatively small, employing 11 staff; however, in the Netherlands and the UK, the average size of company is considerably larger, employing 57 and 28 staff, respectively. Turnover per employee is, on average, highest in Germany followed by France, Belgium and the UK, the latter two having the same levels of per capita turnover.

**Table III**  
**Top International Design Firms by Member State**

|                | Top 100   | Top 200   |
|----------------|-----------|-----------|
| Belgium        | 2         | 2         |
| Denmark        | 3         | 3         |
| Germany        | 13        | 21        |
| Greece         | -         | 1         |
| Spain          | -         | 3         |
| France         | 8         | 15        |
| Italy          | 1         | 6         |
| Netherlands    | 6         | 8         |
| United Kingdom | 19        | 26        |
| <b>Total</b>   | <b>52</b> | <b>85</b> |

Source: Engineering News Record.

Table III indicates the number of EC-based design companies (covering architects, architect-engineers, consulting engineers, engineer-architects, soils or geotechnical engineers and planners) in the top international 100 and the top international 200.

## Outlook

The technical and engineering consulting market is linked to macroeconomic capacities including GDP, energy demand, demography, resources. Macroeconomic data as well as interviews with directors of a number of firms indicate that future developments will provide a profitable consultancy market for the next 10 years.

CEBI: Comité Européen des Bureaux d'Ingénierie/European Committee of Consulting Firms

CEDIC: Comité Européen des Ingénieurs-Conseils du Marché Commun/European Committee of the Consulting Engineers of the Common Market

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# CONSTRUCTION ECONOMISTS

(NACE 837)

*The role of the construction economist is essentially the costing and valuation of construction projects in both the public and private sector. Over recent years, the responsibilities of the construction economist have broadened partly due to the increased complexity, particularly of large-scale projects. Demand for the services of construction economists is closely connected to the general level of building activity within the economy.*

The construction economist - known as the quantity surveyor in many countries - is a professionally qualified expert whose role is to safeguard the financial interests of the client so that overall value is achieved over the anticipated life of a construction project.

The construction economist or quantity surveyor may function in a variety of different fields including building construction, civil and structural engineering, mechanical building and engineering services, petrochemicals, cost and production engineering, planning and urban development, landscaping and interior design. A major part of his work consists of the costing and valuation of projects and involves working closely beside the architect, engineer, town planner, or interior designer.

The client may be an individual, an organization or a public body. The work extends from advising on the economic and financial implications of the initial functional concept for a construction project, through project design and cost management of the construction programme, to the commissioning of the completed project, financial settlement, subsequent property portfolio management and life cycle cost management.

Construction economists have a major role to play in the preparation of contract documentation and will advise on the use of appropriate contract conditions; they also prepare and issue tender documents and evaluate the tenders received.

## Current Situation

Construction economics is directed towards the efficient use of resources, from the costing and valuation of a single project to the financial direction of a national building programme. Through their experience of the financial management of construction projects, construction economists also act as project managers. In this capacity, they coordinate the work of the construction team and are responsible for overall control of the project.

Construction economists act, either as consultants or as in-house executives, for a wide spectrum of owner and client organizations, both of a national and international nature. Principal users of the construction economist's services, either as consultants or employees, are:

- industrial and commercial companies
- banks and financial institutions
- multinational corporations
- international funding and development agencies
- petrochemical companies
- building, civil engineering and marine contractors
- mechanical services contractors
- national and local government organizations
- mineral extraction companies
- property developers
- professional planning, design and construction consortia
- property owners and managers.

## Current Trends

The development of the profession in the Member States has not been uniform. For example, in Spain and the United Kingdom, with the number of construction economists well in excess of 15 000 in each country, the profession is a distinct and well-recognized discipline, whereas in Denmark - with only 60 construction economists - the profession is in its infancy.

In those countries where the profession has historically no separate identity, the cost control and value management functions have been carried out by architects, engineers or contractors; but as the complexity and cost of modern construction projects increase so does the demand for the expertise of the construction economist. This demand is leading to the development of this expertise into a separate, professional specialization in those countries where it does not already exist. Again, to take Denmark as an example, the Danish Association of Practising Architects (PAR) has established a new PAR chapter (PAR building economists) to reflect this development.

The total number of construction economists within the European Community is in excess of 50 000. Table I shows the distribution of the profession amongst those Member States from which data are available.

**Table I**  
Number of Construction Economists

|              |               |
|--------------|---------------|
| Denmark      | 60            |
| Spain        | 16 000        |
| France       | 6 100         |
| Ireland      | 360           |
| Netherlands  | 5 400         |
| Portugal     | 2 000         |
| UK           | 20 500        |
| <b>Total</b> | <b>50 420</b> |

Source: CEEC.

In most Member States, the construction economist works within the private sector, the majority in private practice firms. However, in some countries, notably the Netherlands and Spain, a substantial majority work as employees within contracting organizations. In all countries a smaller number of construction economists work for the public sector.

**Table II**  
Breakdown of the Profession by Employment

| (%)            | Private sector   |                          | Public sector |
|----------------|------------------|--------------------------|---------------|
|                | Private practice | Contractor organizations |               |
| Denmark        | 67               | 17                       | 16            |
| Spain          | 37               | 41                       | 22            |
| France         | 87               | 8                        | 5             |
| Ireland        | 73               | 15                       | 12            |
| Netherlands    | 27               | 70                       | 3             |
| United Kingdom | 59               | 19                       | 22            |

Source: CEEC.

The total number of independent private practice firms within the EC Member States vary from 25 in Denmark to 3 000 in Spain. The average number of qualified staff within such firms is, on average, less than 10 except in the UK, where the average is 20. However, particularly in the UK, there are a number of firms of construction economists with a total worldwide staff in excess of 100, and in some instances in excess of 500.

### Services Provided

The consultant construction economist works within both the public and private sector in all areas of activity. Whilst the main outlet for the services of the construction economist lies in the national construction markets, there is an involvement in engineering projects domestically and in all projects in foreign markets. Table IV shows the distribution of workload of the construction economist in private practice.

**Table III**  
Independent Private Practices  
of Construction Economists

|             | Total number of firms | Average size |
|-------------|-----------------------|--------------|
| Denmark     | 25                    | 5.0          |
| Spain       | 3 000                 | 5.0          |
| France      | 1 500                 | 3.5          |
| Ireland     | 110                   | 8.0          |
| Netherlands | 60                    | 2.5          |
| UK          | 1 600                 | 20.0         |

Source: CEEC.

In most EC Member States, the construction economist is appointed by and responsible to the building owner or employer. However, in France, it is more usual for the construction economist to be appointed by the architect or engineer to the project; in Portugal appointment is by the contractor.

### Turnover

As with many other service industries, no comprehensive or accurate records are available regarding the fee earning capacity of the profession of construction economists within the European Community as a whole. However, figures are available for four Member States, and these provide a relatively accurate national assessment. Data for 1987 are as follows (million ECU): UK, 295; Denmark, 98; Ireland, 25; Portugal, 25.

To arrive at an assessment of income achieved by the profession through overseas contracts is even more problematic. Table IV gives an indication of involvement by the profession in overseas contracts. The two Member States with the greatest overseas activity, i.e. Denmark and the UK, have estimated that overseas earnings by the profession for 1987 were 12 million and 76 million ECU, respectively.

The fee income of the profession is, in many instances, linked to the total cost of the construction project as the fee charged is based on a percentage of that cost. This percentage varies between 1.5% in Portugal to 3.5% in Denmark. Competition on professional fees for the construction economist is permissible in all Member States except Spain, where published fee scales are mandatory.

### Outlook

The earning capacity of construction economists is inevitably dictated, to some extent, by overall activity in the construction industry within the Member States. In recent years - for example in the United Kingdom - there has been a particularly high level of construction activity creating a correspondingly high demand for the services of the construction

Table IV

| (%)               | Denmark    | Spain      | France     | Ireland    | Netherlands | UK         |
|-------------------|------------|------------|------------|------------|-------------|------------|
| Public Sector     | 33         | 70         | 45         | 60         | 30          | 40         |
| Private Sector    | 67         | 30         | 55         | 40         | 70          | 60         |
|                   | <b>100</b> | <b>100</b> | <b>100</b> | <b>100</b> | <b>100</b>  | <b>100</b> |
| Building          | 80         | 80         | 98         | 95         | 70          | 75         |
| Civil Engineering | 20         | 20         | 2          | 5          | 30          | 25         |
|                   | <b>100</b> | <b>100</b> | <b>100</b> | <b>100</b> | <b>100</b>  | <b>100</b> |
| National          | 80-90      | 90         | 92         | 95         | 92          | 80-90      |
| International     | 10-20      | 10         | 8          | 5          | 8           | 10-20      |
|                   | <b>100</b> | <b>100</b> | <b>100</b> | <b>100</b> | <b>100</b>  | <b>100</b> |

Source: CEEC.

economist. Such activity is determined by the economic and political climate.

The profession is continuing to expand its activities beyond the traditional building industry into civil engineering and heavy engineering. Within the building industry, the profession is involved in those areas of work which will assume increasing importance, for example, rehabilitation and particularly inner city regeneration. This often includes carrying out a cost/benefit analysis in which the state of the existing building and its expected life after rehabilitation have to be weighed against the cost of rehabilitation work.

In response to client demands, the profession is also developing its range of services beyond building economics and cost control towards the complete management and coordination of projects. The use of computers has freed the con-

struction economist to develop his management skills and, for example, to act as management consultants to major client organizations offering high-level strategic advice on the utilization of property or construction investments. There is also a growing awareness of the importance of the costs of buildings in use, and the construction economist has developed financial techniques to ascertain the total cost of the building asset over its operating life - a service increasingly sought by clients. The CEEC is keen to see the establishment of a European building cost data bank as part of the development of the Community information service market.

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## ADVERTISING, DIRECT MARKETING AND SALES PROMOTION

(NACE 838)

### ADVERTISING

*Advertising is one of the growth industries in the Community. In recent years expenditure on advertising has expanded rapidly. This is partly due to the more strongly competitive environment in EC industry generally, a trend which is likely to be further enhanced by the drive towards unification of the single European market. The advertising business has been strongly affected by technological developments, particularly in telecommunications and the print media. Specialized sectors of the industry such as direct marketing and sales promotion have similarly experienced a strong expansion in business.*

#### *Functions of the Advertising Industry*

Advertising is the persuasive process by which users of goods, services or ideas are found through communications media. It is a key element of marketing, which is the strategic planning function whereby products are developed, made acceptable and available to users, and sold to them at a profit. In short, "marketing" means salesmanship via media. The five main media are print, television, radio, cinema and outdoors.

The major players in the advertising business are: the media who sell to their audiences; the advertisers who buy access to these audiences in order to sell their products; the advertising agencies that bring buyers and sellers together, providing the vital, creative link for the production of persuasive, cost effective advertising.

Advertising agencies in the EC are normally remunerated by 15% of the value of media space and time purchased. Extra fees are usually charged to cover the wide range of services that agencies offer in addition to media advertising, and to compensate for small budgets.

#### **Current Situation**

In 1986, approximately 28 billion ECU was spent on advertising in EC countries, around 65% of which was spent on print media, 24% on television and 5% on radio. This compares with respective shares of 69%, 20% and 5% in 1981.

Total EC advertising expenditure in 1986 represented 0.84% of the EC gross domestic product; this compares with a US figure of 1.65% and a Japanese figure (excluding outdoor and cinema advertising) of 0.70%. In the EC, advertising agencies account for just under 15% of total advertising expenditure, therefore representing in the region of 0.1% of GDP.

The factors influencing the size and growth of the advertising business are many and varied, but include principally the rate of growth in consumers' expenditure, the level of company profits, per capita GDP, the degree of import penetration, the availability of commercial media and the intensity of competition in the economy.

Considerable differences exist between countries, in terms of levels of advertising expenditure. These stem from both definitional problems and the influence of the different factors listed above. Over the period 1980 to 1986, real advertising expenditure grew an average 32.3% across the EC countries. This average conceals sharp differences between Member States, ranging from Spain with a growth rate of 94.8% to Ireland at 1.8%. The overall EC figure compares with a growth rate over the same period of 39.1% for the USA and 15.7% for Japan (the Japanese figures do not include outdoor and cinema advertising).

There are three major problems in comparing advertising expenditure data in different countries. Firstly, some countries use volume-based statistics to estimate expenditure. Other countries use survey-based figures which are based on asking media companies and agencies for actual expenditure data. Secondly, media coverage is not always comprehensive. Cinema expenditure in Portugal for example, is not available, whilst measurement of print media, in particular, may be limited. Thirdly, elements in the total cost of advertising to advertisers, including the cost of producing the commercials and the cost of paying commission to advertising agencies, are not consistently included. Although estimates can be attempted, the figures in Table I represent the published figures for the industry without any such estimates. A fourth factor to consider when compiling advertising expenditure statistics is the inclusion of money spent on classified advertising in newspapers and magazines. This consists of small, generally pre-paid advertisements placed directly by individuals and companies in pages devoted to

**Table I**  
**Advertising Expenditure (1) - 1986**

| <b>(Million ECU)</b> |               |
|----------------------|---------------|
| Belgium/Luxembourg   | 633           |
| Denmark (2)          | 664           |
| Germany              | 6 825         |
| Greece (2)           | 172           |
| Spain                | 2 306         |
| France               | 4 508         |
| Ireland (2)          | 159           |
| Italy (2)            | 3 089         |
| Netherlands          | 1 749         |
| Portugal (2)         | 99            |
| UK                   | 7 620         |
| <b>EC total</b>      | <b>27 824</b> |
| USA                  |               |
| Japan (3)            | 14 078        |
| EFTA (4)             | 4 638         |
| <b>EC &amp; EFTA</b> | <b>32 462</b> |

(1) These figures have not been adjusted to account for different methods of compilation and are therefore not fully comparable.

(2) Excludes classified advertising.

(3) Excludes outdoor.

(4) Excludes Iceland.

Source: European Advertising Tripartite, January 1988.

this advertising. It is generally "classified" under headings such as "houses", "cars" etc.

Apart from economic developments, which of necessity will affect the advertising industry, important influences on the future of the business will include changes in government regulations and progress in communications technology.

Restrictions (some legal and some voluntary) differ from country to country. However, essentially they deal with limitations on product promotion, methods of advertising and media usage. The main product categories covered by such regulations are tobacco, alcoholic drinks, medicine and drugs, and sanitary products. All the EC countries ban or restrict the advertising of some of these products and in some countries, for example the UK, advertising of all of these products is regulated.

Technological change has been affecting all media. In the print medium, newspapers are now able to print simultaneously in several geographical locations via satellite transmission of pages from a single publishing centre. Examples of this include the *Financial Times*, which prints in London, Frankfurt and New York, and the *International Herald Tribune* which prints all around the globe. Newer entrants include the European edition of *The Wall Street Journal* and *USA Today*, both of which now print in Europe.

As well as the growth of multi-centre printing operations, the market for magazines is very international with publications such as *The Economist*, *Stem*, *Paris Match*, *Fortune* and *L'Equipe* available in several countries outside their country of origin.

In the television medium, the development of satellites has already influenced government attitudes regarding their own national channels and should have an even more profound effect in the 1990s as direct broadcast satellites make their mark. At present, low-powered communications satellites broadcast a number of television channels across most of Europe, but can only be received via very large reception dishes. In practice this means that signals are picked up by cable companies and relayed direct to subscribers. From 1988 onwards, it is expected that medium and high-powered satellites will broadcast direct to individual household dishes measuring between 35cm and 85cm in diameter, depending on the household's geographical location and the power of the satellite. Up to 30 new television channels could be directly available to households by 1990, many of which will also be available to advertisers wanting to reach potential consumers.

### *Industry Structure*

The three principal agents in advertising are the advertisers, the media and the advertising agencies.

Advertisers come from most sectors of the economy, i.e. consumer goods, retailers and from within the business community. No comprehensive or even comparable figures exist

**Table II**  
**Satellite Launch Programme**

| <b>Year</b> | <b>Satellite</b> | <b>Number of TV channels</b> | <b>Power</b> | <b>Country</b> |
|-------------|------------------|------------------------------|--------------|----------------|
| 1988        | TDF1             | 4                            | High         | France         |
| 1988        | Astra            | 16                           | Medium       | Luxembourg     |
| 1988        | Tele X           | 2                            | High         | Nor/Swe/Fin    |
| 1989        | Olympus          | 2                            | High         | Italy/EBU      |
| 1989        | BSB              | 3                            | High         | UK             |
| 1990        | TV Sat 2 (1)     | 3                            | High         | Germany        |

(1) TV Sat 1 failed in orbit, November 1987.

Source: ESA.

on how advertising expenditures are split between the major product areas, although food and drink, retail and automobile advertising are important in all markets.

The processes involved in creating and executing an advertisement begin at the planning stage, involving the identification of target consumers through market research. A creative concept is then decided on and executed via electronic or printed advertisements. This is followed by a campaign planned by media specialists with the space or time purchased from the media companies. These processes are usually all handled within a full-service advertising agency although they may also be handled by specialists in one or other of the disciplines. Media buying in particular is sometimes placed with specialists; in Germany such specialists are estimated to represent 45% of advertising billings in 1987. In France the equivalent figure in 1986 was around 50% and in the UK 12%.

Other suppliers to the industry include companies providing specialist services such as photography, audiovisual and printing services. Many of these industries are very fragmented.

Advertising agencies are effectively divided into two types:

- large, multinational agencies and agency groups
- small to medium-sized agencies mainly operating in domestic markets.

Both groups in Europe are represented by the European Association of Advertising Agencies. The aggregate membership represents about 1 500 agencies and their combined billings amount to 17 billion ECU. There are no significant barriers to entry for starting an advertising agency, although

expansion has often been achieved through acquisition rather than internal growth. Alternative services such as direct marketing and sales promotion have generally been growing more rapidly than the mainstream advertising media. The larger agencies are often involved in some or all of these other service lines; for example, Saatchi & Saatchi are involved in advertising, direct marketing, sales promotion, public relations, design, market research and management consultancy.

Advertisers are often bigger than the advertising agencies and have a very large number of agencies from which to choose. Measures of advertising "effectiveness" are, however, very under-developed, and rarely used as part of the decision-making process involved in choosing an advertising agency. Often, key people in agencies will be a significant factor in a prospective advertiser's decision, and there may be other, more subjective factors involved. On the other hand, once an agency becomes incumbent, i.e. holding the account, the costs involved in switching agencies - depending on the nature of the account - can be high.

### *Top Advertisers and Advertising Agencies in the EC*

The following table shows a number of advertisers with headquarters in Europe. The ranking is not absolute since some of the total investments listed here are based on typical budgets in selected countries, rather than being a complete review of every market in the world. The chart is a guideline to deducing which European companies spent the most on advertising internationally in 1986. For context, the last column shows the percentage of their budget invested in the USA.

**Table III**  
**Leading European Advertisers**

| Europe-based multinational companies | Product lines              | Total advertising investment (1 000 ECU) | % spent in USA |
|--------------------------------------|----------------------------|--|----------------|
| Unilever                             | Soaps, foods, toiletries   | 1 134 348                                | 46.6           |
| Nestlé                               | Food                       | 559 224                                  | 55.5           |
| Volkswagen                           | Automobiles                | 307 882                                  | 50.2           |
| Siemens                              | Electronics                | 215 317                                  | 1.4            |
| Renault                              | Automobiles                | 199 288                                  | N/A            |
| Fiat                                 | Automobiles                | 193 322                                  | 0.3            |
| Henkel                               | Household products         | 169 263                                  | 0.0            |
| Philips                              | Electronics                | 145 549                                  | 55.9           |
| Cadbury, Schweppes                   | Confectionery, soft drinks | 140 870                                  | 43.2           |
| UK Government                        | Government                 | 126 430                                  | 4.0            |
| Peugeot                              | Automobiles                | 108 679                                  | 6.5            |
| C & A Brenninkmeyer                  | Retailer                   | 97 131                                   | 0.0            |
| Hanson Trust                         | Retailer                   | 88 402                                   | 23.7           |
| Ferrero                              | Confectionery              | 85 638                                   | 0.0            |
| Guinness                             | Brewer                     | 78 021                                   | 14.7           |

Source: Advertising Age.

**Table IV**  
**Top Advertising Agencies in the EC**

| (Million ECU) |                                     | Gross income | Billings |
|---------------|-------------------------------------|--------------|----------|
| 1.            | Saatchi & Saatchi Advertising (UK)  | 94.0         | 626.4    |
| 2.            | Publicis Conseil (France)           | 73.9         | 479.9    |
| 3.            | Belier (France)                     | 73.8         | 492.4    |
| 4.            | Roux, Seguela, Cayzac & Goudard (F) | 50.6         | 334.0    |
| 5.            | J. Walter Thompson (UK)             | 42.5         | 283.3    |
| 6.            | DFS Dorland (UK)                    | 42.5         | 283.5    |
| 7.            | McCann Erickson (UK)                | 39.6         | 264.1    |
| 8.            | HDM (France)                        | 38.5         | 256.8    |
| 9.            | Young & Rubicam (UK)                | 38.2         | 255.2    |
| 10.           | Team/BBDO, Dusseldorf (Germany)     | 35.6         | 237.5    |

Source: Crain Communications, 1987.

Advertising agencies often define their turnover or "billings" in terms of the amount of money they spend with the media on behalf of clients and of which they receive a proportion in the form of a commission or fixed fee. It is not possible to quote true turnover figures - known as gross income in the advertising industry - with any degree of accuracy from, for example, company reports because agencies often include figures from activities other than main media advertising, and figures are rarely reported by country. For these reasons, the following tables are based on agencies' own unaudited claims for gross income, and may in some cases be exaggerated due to the battle for market leadership in the industry.

### Employment

Although comprehensive figures are not generally available on employment, it is possible to assemble data from the top agency tables published each year. These give some data on employment in the major companies, although in a frag-

**Table V**  
**Employment in Major Agencies**

|                 | Leading agencies | Exclusions (1) | Total employees |
|-----------------|------------------|----------------|-----------------|
| Belgium/Lux.    | Top 26           | 0              | 1 422           |
| Denmark         | Top 20           | 0              | 1 061           |
| Germany         | Top 48           | 0              | 6 156           |
| Greece          | Top 22           | 0              | 760             |
| Spain           | Top 38           | 1              | 2 211           |
| France          | Top 39           | 2              | 7 597           |
| Ireland         | Top 12           | 0              | 480             |
| Italy           | Top 35           | 2              | 3 001           |
| Netherlands     | Top 35           | 3              | 2 098           |
| Portugal        | Top 14           | 0              | 695             |
| UK              | Top 58           | 6              | 11 291          |
| <b>Total EC</b> |                  | <b>14</b>      | <b>36 772</b>   |

(1) Leading agencies whose employment figures are excluded from these totals.

Source: EAAA.

mented industry such as advertising there are often a large number of small agencies with only a small number of staff employed in each.

### Major Trends in Member States

A key issue for the advertising industry is media availability especially with regard to television.

In the UK, the media are relatively deregulated with seven minutes advertising time per hour allowed on the three commercial networks, and nine minutes per hour on its 46 local, commercial radio stations.

In Germany, on the other hand, the two major television channels each take a total of only 20 minutes of advertising per day (advertising is not permitted on Sundays and public holidays), less than one fifth of that permitted in the UK.

Italy, which has experienced one of the fastest growth rates in advertising during the 1980s, effectively deregulated its commercial television in the late 1970s, thereby increasing the availability of advertising time dramatically; television's share of the market has grown from 26% in 1980 to 49% of total advertising in 1986.

Greece has shown rapid growth due partly to the new political and economic freedoms of the 1980s not present under the previous regime. Spain has also enjoyed spectacular economic progress following the relaxation of political and economic restrictions.

Other developments in Member States in terms of increased availability of commercial media are mainly in the area of television, which has been seen by many national governments as potentially suffering in the face of competition from foreign satellite channels.

In Belgium, after many years in which the Luxembourg channel, RTL, was the only real commercial outlet for television advertisers (reaching 80% of the country), new commercial channels in Wallonia and Flanders have been licensed by the government. Satellite television channels such as Sky and Super Channel, both based in London, have also been allowed access to Belgian homes in certain areas of the country.

Prospective developments in Denmark include availability of domestic commercial television for the first time in October 1988; it has already started (October 1987) in one region covering 15% of the country's households. In 1985 a law was passed permitting large cable networks to relay foreign satellite signals and in 1987 further legislation permitted direct reception by small cable systems covering, for example, blocks of flats.

Recent developments in France have included the launching of two new commercial terrestrial channels (La Cinq and M6) and the privatization of TF-1 (the main channel). Rules on advertising time have been relaxed considerably.

Similarly, in 1987 television advertising time in the UK was extended to 7 minutes per hour for off-peak periods and 7 1/2 minutes in peak time (approximately 18:00-23:00 hours). New national commercial radio stations are expected to be launched in 1990 and later.

In Germany, a government funded programme is in progress aimed at enabling more than 80% of households to receive cable television by the mid-1990s; private reception of satellite signals was permitted in 1985. Unused frequencies are being allocated to reach up to 40% of TV households via new private commercial networks, particularly Sat-1 and RTL-Plus, which allow up to 12 minutes of advertising per hour, compared with just 20 minutes a day on the major public service channels.

The Netherlands launched a third television channel in April 1988 financed by extra advertising on existing channels. Ireland also expects to introduce a third television channel to be run independently of current State-run channels.

In Greece, legislation was passed in June 1987 allowing limited privatization of local audiovisual media.

For both Spain and Portugal, plans are being considered to launch new commercial television channels by the end of this decade.

In Italy, legislation in January 1988 removed government regulation of newspaper cover prices, leaving owners with more freedom over commercial policies.

## Outlook

Growth in the advertising industry is closely linked to general economic conditions and particularly the trend in consumer spending. Over the short to medium term, the industry will benefit from steady economic growth within the EC and also more rapid development in some of the southern European Member States; over the 1980s, growth in advertising expenditure in Greece, Spain and Portugal has markedly outpaced growth elsewhere in the Community.

Nevertheless, competition amongst the advertising agencies will continue to be intense as the struggle for market leader-

ship continues. The following table shows how operating margins for the big international groups have been falling in recent years. Saatchi & Saatchi and J. Walter Thompson are British-owned, whilst the others are based in the USA.

## DIRECT MARKETING

Direct marketing is the branch of marketing whereby companies establish a direct relationship with their customers, via two-way dialogue. It is an interactive system that uses one or more advertising media to effect a measurable response and/or transaction at any location. It embraces all communications media designed to create an interactive relationship with an individual retailer, business customer, and consumer or contributor. It can be distinguished from advertising, which communicates messages indirectly through commercial media, and which does not establish direct relations with named customers at the outset.

Direct marketing is also called "Database marketing", since it enables the marketer to know the identity of every individual inquirer or customer, what efforts have been directed towards each of these persons/companies, and what responses have been received. The "customer file" may be linked to the accounting and inventory files, and overlaid with or enhanced by external information such as demographic, socio-economic or psychographic data about individuals or neighbourhoods, or the business characteristics of establishments.

The European Direct Marketing Association divides direct marketing into print direct marketing, "telemarketing" and "new technologies". Print direct marketing includes direct mail sent through the post, circulars and leaflets delivered by hand to homes and businesses, and direct response advertisements placed in print media such as newspapers and magazines.

Telemarketing, whereby the telephone is used to establish a link with customers, is often used at an early stage of the direct marketing process to build up customer lists prior to mailings or visits by salesmen, but also in the final stages to follow up requests for more information or to place orders. New technologies include videotex, whereby computer ter-

Table VI  
Advertising Agencies - Operating Margins 1980-86 (1)

| Agency            | 1980 | 1981 | 1982 | 1983 | 1984 | 1985 | 1986 |
|-------------------|------|------|------|------|------|------|------|
| Saatchi & Saatchi | 19.3 | 17.8 | 12.4 | 19.9 | 11.7 | 10.3 | 11.9 |
| Interpubic        | 9.9  | 8.1  | 8.2  | 9.1  | 9.1  | 9.2  | 9.1  |
| Omnicom           | N/A  | N/A  | N/A  | 10.2 | 11.1 | 9.3  | 8.1  |
| JWT               | 6.2  | 3.1  | 3.2  | 7.8  | 7.5  | 7.0  | 3.4  |
| Ogilvy & Mather   | 12.1 | 11.8 | 11.0 | 10.3 | 11.2 | 9.1  | 8.1  |

(1) These figures cover all countries including those outside Europe, in which the agencies operate.  
Source: EAAA.

minals linked by telephone lines can be used as a communications vehicle by marketers, either to consumers or to businesses linked to a system.

There are three main problems involved in measuring and comparing direct marketing expenditures in different countries. The first is that organizations simply do not exist in every EC country to measure, promote or even define the industry, although post offices in many countries have made estimates for direct mail, and telephone companies can estimate the use of the telephone for marketing. Secondly, direct response advertising through main communications media such as television, newspapers and magazines is not usually treated separately to non-direct response advertising when total incomes from advertising are measured, and therefore cannot be produced separately from total advertising investment figures through these media. Thirdly, the companies involved in bringing the marketers and the direct marketing media together operate in different areas and at different levels within the industry.

### Current Situation

Figures on total market size in each country usually only cover the direct mail sector, which is measurable at least partly through the national postal administrations' monitoring of the volume of direct mail items through the post.

It is difficult to distinguish production costs in this industry since much of the expenditure includes the costs of paper and printing, as well as postage itself - the latter represented 31% of direct mail expenditure in the UK in 1986. Compared with advertising through the mass media, where production costs

represent around 5% of total expenditure in print media and 12% on television, the communication costs of direct mail are relatively low.

The USA is generally considered to account for more than 60% of the total worldwide market for direct marketing services, although in the absence of comprehensive figures from most countries this is only a tentative estimate.

### Growth Trends

Media availability is a significant influence which helps to explain differences between countries *vis-à-vis* use of direct mail techniques. In countries such as Denmark, Sweden and Norway, where no commercial television existed in 1986, and in Germany, Belgium and the Netherlands, where availability is very limited, direct marketing tends to be more important than in countries such as Spain, Greece, Italy and the UK, where television is a significant advertising medium. By contrast, the USA and Japan, as very mature advertising markets, have to deal with the problems of "clutter" in the main advertising media and the problems for marketers of reaching their target audiences with a minimum of wastage. Direct marketing has assumed relatively great importance in these countries.

Another reason why companies have increasingly turned to direct marketing in recent years is the steep increase in media costs in the major media.

A fourth factor, also linked to developments in major media, is increasing fragmentation. As more and more magazines, newspapers, television stations and radio stations are launched each year, the ability of marketers to reach large numbers of people cost-effectively is lessened. Direct marketing

**Table VII**  
Growth in Direct Mail Expenditures, 1982-86

| Country/region | Direct mail<br>1986 v 1982 (%) | Advertising<br>expenditures<br>1986 v 1982 (%) |
|----------------|--------------------------------|--|
| Belgium        | +41.2                          | +58.6  |
| Denmark        | +75.0                          | +60.3  |
| Germany        | +31.2                          | +21.5  |
| Greece         | N/A                            | +162.2   |
| Spain          | N/A                            | +123.1   |
| France         | +61.5                          | +71.9  |
| Ireland        | +198.9                         | +57.7  |
| Italy          | N/A                            | +117.1   |
| Luxembourg     | N/A                            | (incl. with Belgium)                           |
| Netherlands    | +72.9                          | +29.6  |
| Portugal       | +11.2                          | +236.5   |
| UK             | +39.0                          | +63.7  |
| USA            | +66.1                          | +52.0  |
| Japan          | +14.0                          | +16.8  |

Sources: Services postaux européens, April 1987; European Advertising Tripartite (advertising expenditures).

**Table VIII**  
Index of Estimated Growth in Media Costs, 1980-86

| (1980=100)         | Television | Consumer price<br>inflation |
|--------------------|------------|-----------------------------|
| Belgium/Luxembourg | 235.0      | 142.6                       |
| Denmark            | N/A        | 154.2                       |
| Germany            | 127.9      | 120.0                       |
| Greece             | 549.1      | 335.1                       |
| Spain              | 227.8      | 198.1                       |
| France             | 168.1      | 163.5                       |
| Ireland            | 161.9      | 186.3                       |
| Italy              | 226.4      | 207.2                       |
| Netherlands        | N/A        | 123.2                       |
| Portugal           | 404.6      | 326.5                       |
| UK                 | 188.0      | 148.4                       |
| USA                | 162.6      | 134.0                       |
| Japan              | 99.0       | 115.1                       |

Source: Saatchi & Saatchi.

offers them an alternative means of reaching their prospective customers.

Finally, progress in computer technology has enabled customer lists and details, and all the abundance of information collected during direct marketing campaigns, to be stored and classified more easily and efficiently, making direct marketing a more viable proposition for many companies.

Developments in the industry over the next few years will be influenced mainly by changes in technology and by companies' attitudes to direct marketing as part of their overall marketing mix.

The attitude of governments in the areas of confidentiality and consumer protection will also be important. The growth of media opportunities throughout Europe may help to slow increases in the cost of advertising, while the increase in the number of media vehicles will undoubtedly help to increase specific targeting opportunities in the main consumer media. On the other hand, direct marketing is clearly in a major growth phase, with cost and precision targeting amongst the key factors in its growth. One of the reasons for this is that mass marketers are looking at the medium more seriously.

One significant development is the progress of direct marketing's newest medium i.e. interactive television. The growth of fibre optic cable networks, of videotex (two-way communication via television sets connected to the telephone line) and thus of home shopping and home banking, amongst other things, will all be important for the future of the industry.

The issue of laws and regulations affecting the industry arises due to problems of confidentiality and personal privacy which are seen by many as threatened by the existence of large numbers of computerized mailing lists. The pattern of response from the direct marketing industry has generally been to urge self-regulation, permitting the industry itself to set up programmes that will work to the benefit of the consumer. Most of these laws and regulations are in a state of flux as the industry is only at the early stages of development. The way in which they are tackled will be an important influence in the future, as the industry matures.

### *Industry Structure*

Apart from the companies using direct marketing services - which cover most sectors of industry, from those selling highly specialized goods and services directly to other companies all the way to retailers selling goods through mail order - the direct marketing industry itself can be segmented into a number of areas.

- Mailing houses provide list-broking services, often helping with addressing, labelling, inserting leaflets into envelopes

or brochures, processing orders and redeeming coupons. Many also help with other production functions such as storage and provision of materials including envelopes and leaflets.

- Computer bureaux are used for such functions as helping to classify and segment either lists or general population data into categories. Word processing (of letters and envelopes) and postcoding as well as printing facilities tailor-made to client requirements are often on offer from computer bureaux.
- The telemarketing aspect of the direct response process may be used at various stages of a promotion.
- Agency direct marketing services primarily cover the areas of consultancy, planning and creative work, using outside mailing houses and computer bureaux as and when necessary. Some companies combine one or more of these functions.

The agency services market is fragmented, tending to be dominated by advertising agency subsidiaries, indicating the degree to which advertising and direct marketing are related.

Aside from these functional divisions, the industry can be broken down into three types of companies: business specialists, consumer specialists and non-specialists, who operate either in both sectors or in other parts of the industry such as list broking or computer bureaux.

The shortage of trained skilled people is the only impediment for a company wishing to enter the direct marketing industry. In many countries, the market is still underdeveloped, with many traditional advertisers still reluctant to embrace the direct marketing concept.

The bargaining power of buyers of direct marketing services is increased both by the fragmentation in the industry and by the simplicity with which the results of any campaign can be measured. Suppliers of services, such as computer bureaux and mailing houses, are largely commodity businesses and have little bargaining power; on the other hand, experienced staff are in very short supply and can demand high compensation packages.

### *Employment*

Very little company information is available on this sector of the EC advertising industry. The UK Direct Mail Producers' Association listed 4 592 employees amongst its members in 1987, giving a total of approximately 300 000-350 000 items mailed per employee in the country. If this measure of productivity were projected across other EC countries for which volume data are available (assuming productivity to be equal in all countries), total employment in the industry is likely to be between 25 000 and 30 000.

## SALES PROMOTION

Sales promotion is the management of the physical context in which the consumer encounters a product, in order to maximize sales. It is concerned with location, timing, physical environment, merchandising, added value, pricing and other circumstances conducive to the sale of a product. It is not only about direct communication with the consumer, but also communication with trade and sales force as the people most directly responsible for creating the right buying context. Sales promotion "pushes" the product to the consumer; media advertising "pulls" the purchaser to the brand/product. Promotions are an important marketing tool for obtaining scarce shelf-space and in-store support from retailers.

The major participants in the industry - apart from the marketers themselves - are the sales promotion consultancies. The range of services offered by these consultancies varies from the simple supply of sales promotion strategy advice to the provision of a full range of communications, graphic design, new concepts, finished artwork and photography services.

A recent survey by the Institute of Sales Promotion in the UK found that activities such as trade competitions, consumer coupons, special promotional packs, cash refunds and gift vouchers are widely thought of as "sales promotion" activities. The survey also found wide (but far from general) agreement that activities such as door-to-door distributors, short-term trade discounts, free sampling, special sizes and trading stamps should equally be counted as sales promotion. But the survey also found considerable disagreement on whether or not activities such as point-of-sale material, sports sponsorship, public relations activity in support of a promotion or catalogues and price lists should be defined as sales promotion.

### Current Situation

Although no authoritative data are available for the EC market as a whole, it is widely believed that the sales promotion market, broadly defined, is worth approximately the same as the advertising market, valued at approximately 28 billion ECU in 1986. Industry observers estimate growth rates to have been of the order of 15-20% per annum in Europe over the last few years.

As is the case for all forms of marketing outside mainstream media advertising, the very high cost increases experienced by advertisers using television and print media has led many marketers to turn to other forms of marketing such as direct marketing and sales promotion. Secondly, the increasing pressure on companies to achieve short-term results has prompted a move into areas such as sales promotion which offer immediate, measurable returns on money invested. Coupons, rebates and pricing discounts all come under this

heading. Deregulation in a number of industries such as airlines and financial services, as well as increasing competition generally, has stimulated the need for competitive incentives in order to build market share.

The movement of large agency groups such as Young & Rubicam, Saatchi & Saatchi and J. Walter Thompson into sales promotion has given the industry a greater degree of respectability in the marketing community. The real benefits will come as these groups introduce new clients to sales promotion as a marketing tool. With the largest advertising agency groups now involved in sales promotion, links between direct marketing and sponsorship, as well as with advertising itself, are likely to continue growing.

Examples of the synergy between these different forms of marketing include the use of customer lists culled from entries to a promotional competition for direct mailings, or the giving away of prizes in the form of trips to sponsored sports events or concerts. An integrated marketing package will encompass all these different activities.

### Industry Structure

In general, sales promotion consultancies are structured to deal with all aspects of a sales promotion campaign through creative and account management teams. Creative teams devise and create a campaign, whereas planning and implementation as well as coordination of the campaign with the client is carried out by account management. Specialized services such as print, production, graphics, design and photography are either undertaken "in-house" if the consultancy is large enough or, more commonly, sub-contracted out to other companies.

Consultancies operate on one or other of three payment methods: retainer fees, project/*ad hoc* fees and commission on supplying premiums and other services. Fees are usually paid in two stages, the first for the advice on proposed promotional strategies to solve clients' marketing problems, and the second for organizing and executing those proposals.

The entry of the large advertising agency groups into the sales promotion market has emphasized the dividing line between the large, often multinational consultancies, and the smaller local companies. The larger consultancies are increasingly linking up with other elements in the marketing mix such as direct marketing and sponsorship in order to devise and implement integrated marketing campaigns, often in several countries. The barriers to entry for new entrants to the industry are therefore considerable if they want to become major players in the industry, providing advertising, direct marketing and sponsorship services.

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# MARKET RESEARCH

(NACE 839.1)

*Expenditure on market research in the EC has grown at a rapid pace over the last four years, recording an average annual growth rate of around 10%. This is against a background of increasingly competitive consumer markets and general expansion in information-related sectors. The growth trend is expected to continue, supported by technological advances and with the focus of the industry becoming increasingly transnational.*

Market research is the foundation upon which governments, advertising agencies, the media, and industrial and commercial companies base many of their decisions.

The key organizations in this sector are the market research companies, which provide expert advice to a range of clients including governments, large multinational companies universities and media owners. Market research companies are normally remunerated on a fee basis.

## Current Situation

Worldwide expenditure on market research for 1987 is estimated at 3.7 billion ECU, with EC countries and the USA sharing three quarters of this total on a roughly equal basis.

**Table I**  
**Estimated Market Research Expenditure**

| (Million ECU)      | 1983       | 1986         | 1987         |
|--------------------|------------|--------------|--------------|
| Belgium            | 19         | 28           | 46           |
| Denmark            | 12         | 17           | 18           |
| Germany            | 242        | 330          | 346          |
| Greece             | 3          | 5            | 6            |
| Spain              | 26         | 38           | 57           |
| France             | 177        | 218          | 257          |
| Ireland            | N/A        | N/A          | 9            |
| Italy              | 82         | 152          | 165          |
| Luxembourg         | N/A        | N/A          | 1            |
| Netherlands        | 49         | 83           | 95           |
| Portugal           | N/A        | N/A          | 6            |
| United Kingdom     | 222        | 350          | 357          |
| <b>EC total</b>    | <b>831</b> | <b>1 222</b> | <b>1 363</b> |
| Other Europe       | N/A        | N/A          | 154          |
| USA                | 1 379      | 1 829        | 1 409        |
| Japan              | N/A        | 264          | 329          |
| Other              | N/A        | N/A          | 450          |
| <b>World total</b> | <b>N/A</b> | <b>N/A</b>   | <b>3 705</b> |

Sources: ESOMAR, Advertising Age, European Research 1986.

In several countries, market research associations collect expenditure data for the industry. These cover association members together with estimates for the remainder of the commercially available market. The European Society for Opinion and Marketing Research (ESOMAR), the industry's international professional body, has recently introduced a formal mechanism for collecting such expenditure data annually and presenting it on a comparable international basis.

Market research as a business service originated from the provision of information to manufacturers of consumer products who were subject to severe competitive pressures. These pressures were made more acute by expansion in the use of modern advertising and promotional techniques through press, radio and television. Companies operating in mass consumer markets could not maintain direct contact with the thousands or even millions of people buying their products; research developed to bridge this gap, providing manufacturers with accurate information about consumer reaction to the products available in the market place.

From its beginnings in the United States, the use of research soon developed in Western Europe, especially during the 1960s and 1970s when the range of consumer products on the market expanded and increased opportunities arose for product promotion due to the introduction of commercial television in a number of countries. Since then the growth in research has come about mainly through a steady expansion in different fields of human activity where the techniques of research can make an important contribution. Originally, research techniques were applied to industrial products for which the number of buyers were usually fewer but the buying decisions they made and the reasons underlying them were of great importance; however, there has also been rapid growth in the application of research techniques to service industries including travel and leisure, banking, insurance and many others.

At the same time, there has also been rapid growth in the use of survey techniques to measure public opinion on political and social issues. Public opinion polls now provide a major channel of communication between members of the public and those occupying positions of authority in government and public institutions. There has also been substantial growth in the use of research by local government bodies and by many other groups concerned with public and social issues of all kinds.

While research applications have been expanding, there have also been important developments in data collection techniques, data processing and storage; these have helped to ensure that the real costs of carrying out research have

remained relatively low in comparison with the high cost of developing and promoting goods and services.

The importance of market research has surged in the EC countries as competitive pressures in many markets has intensified, and successful market entry has become progressively difficult. Table II provides examples of brand competition in a number of product markets compared with 10 years ago. Launching a brand onto a market without adequate market research can be a very expensive mistake.

**Table II**  
**Number of Brands for Some Products in the UK**

| Product           | 1976 | 1986 |
|-------------------|------|------|
| Fruit squash      | 21   | 40   |
| Baked beans       | 20   | 39   |
| Washing-up liquid | 22   | 30   |
| Instant coffee    | 14   | 52   |
| Tea bags          | 8    | 51   |
| Packet tea        | 19   | 45   |

Source: AGB/TCA.

Technological advance will continue to be an important factor in the future of market research since it helps to stabilize the high costs of many market research projects through more efficient storage and processing facilities. Improved communications should also contribute to a greater standardization of market research techniques and methodology, between different countries. This, in turn, will help to stimulate the rapid growth in international market research, such as that conducted across several countries for one project, e.g. the launch or re-launch of a pan-European brand, or analysis of readership patterns for international publications.

As markets across Europe become increasingly competitive in preparation for the removal of intra-EC trade barriers in 1992, the battle for market share and for retailers' limited shelf-space will continue to intensify. In an increasingly crowded and complex marketplace, companies will need to monitor consumer behaviour very closely in order to be prepared for changes in tastes and habits. Launching a new brand without careful preparation and research will continue to be very difficult; the premium on a careful programme of market research before launch is likely to be maintained.

The trend towards the development of "marketing information supermarkets" is expected to accelerate worldwide, with these enterprises offering services ranging from low margin field and data compilation work, through to elaborate and expensive consultancy projects.

This "one-stop shopping" concept is similar to developments which have taken place in the advertising and financial services markets. It is enhanced by the entry of advertising agency groups into the market, for example, WPP, Saatchi & Saatchi and the Ogilvy Group.

## Market Trends

The latest information available on the breakdown of market research clients was conducted by ESOMAR in 1983. It was found that, in Western Europe as a whole, some 9% of market research expenditure was accounted for by government. A further 9% was estimated to have come from non-domestic companies; 6% from advertising agencies; and a further 20% from food and drink companies. The media are also important clients.

More recent information from several countries is available but not in a form that permits a pan-EC presentation. However, the AMSO (Association of Market Survey Organizations) profile of consumer research by type would probably be very close to that for the EC as a whole.

**Table III**  
**Nature of Consumer Research**

|  | (%)        |
|--|------------|
| Product development/usage/attitudes/satisfaction | 33         |
| Advertising development/monitoring               | 22         |
| Market measurement                               | 20         |
| Media measurement                                | 10         |
| Other  | 15         |
| <b>All consumer research</b>                     | <b>100</b> |

Source: AMSO.

Within the market, there are two main types of research:

- quantitative (statistical sampling and analysis of behaviour, recorded through completion of questionnaires)
- qualitative (analysis of subjective feelings and attitudes undertaken by a researcher, generally through discussing the views of a small group of people).

Qualitative analysis accounts for by far the smaller proportion of research and tends to be used in specialized cases such as in the evaluation of new products and advertisements.

The two main methods of working are the production of syndicated research and of customized/*ad hoc* work. The advantage of the former is that, once the costs of completing a survey are absorbed, further sales revenue consists almost entirely of profit. The profitability of customized work is mainly dependent on the relative skills of the negotiators and the availability of alternative services.

## Industry Structure

The two main types of firms in the market research arena are the large multinational research conglomerates based in the USA and the EC and smaller local companies without international capabilities. Table IV lists the top worldwide com-

panies, of which four are European. In addition, the three largest research chains, Gallup, INRA and IRIS, all have their coordination centre in Europe.

**Table IV**  
**Top Worldwide Companies, 1987**

|    |                        | Estimated<br>revenue<br>(million ECU) | Number of<br>countries<br>represented | Country of<br>ownership |
|----|------------------------|---------------------------------------|---------------------------------------|-------------------------|
| 1  | A.C. Nielsen           | 605                                   | 27                                    | USA                     |
| 2  | Arbitron/SAMI/Burke    | 251                                   | 2                                     | USA                     |
| 3  | IMS International      | 235                                   | 43                                    | USA/UK                  |
| 4  | AGB                    | 138                                   | 21                                    | UK                      |
| 5  | IRI                    | 84                                    | 4                                     | USA                     |
| 6  | Research International | 71                                    | 20                                    | UK/USA                  |
| 7  | GfK                    | 65                                    | 13                                    | FRG                     |
| 8  | Infratest/Burke        | 58                                    | 6                                     | FRG                     |
| 9  | Video Research         | 49                                    | 1                                     | Japan                   |
| 10 | Westat                 | 48                                    | 1                                     | USA                     |

Sources: ESOMAR, Advertising Age.

A spate of mergers and acquisitions in the USA in the early 1980s created a situation where the market research industry is now largely owned by very big non-research organizations involved in media such as Dun & Bradstreet which, through A.C. Nielsen and IMS, controls nearly 23% of worldwide market research expenditure. The new marketing information firms taking shape in the USA and preparing to enter European countries through US subsidiaries are expected to provide services ranging from customized/*ad hoc* research and syndicated research through to database management, modelling and consultancy. The 15 largest market research

companies are estimated to have accounted for approximately 45% of the world market in 1986 and are expected to account for 50% by 1990 through continued growth and acquisition policies.

The large international companies which are already strong in many European markets may come to dominate the growing market for international market research, the use of which is increasingly common in industries such as automobiles, airlines, computers and luxury goods, as well as in media research. As markets become increasingly European rather than national, this trend will accelerate. The increase in the importance of global and pan-European brands as well as in transnational marketing generally, will ensure the continued success of these large international companies.

As these large diversified groupings emerge, the major capital investment needed to buy exclusivity and stay abreast of new technological developments will be an effective deterrent to would-be entrants to the market research industry. However, the barriers to entry in a number of market research sectors are low and will remain so; these sectors include qualitative research, product testing, mix testing, etc., areas in which executives can easily split off from established research companies and enter the market themselves as a new competitor.

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# PUBLIC RELATIONS

(NACE 839.1)

*In recent years, the use of public relations (PR) services has grown rapidly in the service sector since a growing number of companies view this as an effective means of influencing opinion and have incorporated it into their corporate strategy. As the market has expanded, PR consultancies themselves have improved their expertise and professionalism and anticipate an increase in their market share.*

The purpose of PR is to project a favourable impression of a person, product, company or organization to those sections of the public whose attitudes and opinions are seen as needing to be influenced or altered. Companies may want to project a favourable image of themselves, of their employees or of their industry; they may also want to put forward their point of view about a proposed legislative change, about a mishap over one of their products (such as an air disaster) or they may wish to inform certain key people of an imminent product launch. The objective of PR is to win public confidence and public approval.

PR involves communication with a variety of individuals and organizations, including politicians and government officials seeking views on legislative or other public issues, the general public, or editors and journalists who may provide opportunities to reach many more people.

The major organizations in the PR business are the companies that manage their public relations in systematic ways - often using in-house departments or people - and the PR consultancies who manage the function for them.

There are no official figures on market size for any EC country, nor for the USA and Japan, although one agency group estimated that the worldwide market was worth around 2.4 billion ECU in 1986, of which the USA represented 49% (1.18 billion ECU) and the UK and Japan 241 million ECU each. These can only be tentative estimates due to the difficulties of measuring the size of this market.

## Current Situation

The "end product" of PR activity is not easily evaluated. Whether it is measured in terms of media coverage for a company's plans, political action which helps an industry or company or simply a rise in its share price, PR is not a service that can be precisely valued. Measures of the total size of the industry by country cannot include the substantial amount of PR activity undertaken in-house, and so must rely on the fee income earned by PR consultancies.

Most PR consultancies are either private companies with no incentive or requirement to release revenue figures, or public companies too small to have such a requirement placed on them by law. Advertising agency groups, which have moved into PR in recent years, generally do not identify PR fee income separately from other income sources in their financial statements.

Despite the lack of accurate data on the historical growth of the industry, the number of PR companies has increased rapidly in recent years, as has their size. Much of the growth has come from companies employing a specialist PR consultancy (where once they would have handled their own PR) due to the growing complexity of the business.

External factors fuelling this growth have included the cost-effectiveness of PR when compared both with other media and with the costs of public relations "mistakes". When an aircraft crashes, a ship sinks or an industrial plant is burned down, critical and uninformed coverage in the media can cause heavy loss of business; lack of preparation for such disasters and confusion when they occur, can cause difficulties in relation to communication with journalists and the public and can lead to inaccurate coverage.

The growing importance of PR as a strategic planning tool has also been a key factor in industry growth. For many companies, one of the functions of PR consultancy has been provision of advice on the preparation of contingency plans to deal with crises. Establishing a dialogue with parliamentary and government officials in the early stages of a legislative bill is also important so that company views on the potential consequences of such legislation are taken into account; such contacts may also keep companies informed of government thinking on their industry in general.

A third factor influencing recent growth in the industry has been restrictions on advertising and the costs of reaching small numbers of key opinion-formers and decision-makers through mainstream media channels, as well as the advantages of more personal contact for the relay of often complex and detailed information.

Fourthly, as the number of media vehicles increases (magazines, free newspapers, sponsorship opportunities, cable television, etc.), opportunities for influencing people's opinions have also expanded, enhancing the need for PR experts with wide knowledge and experience to ensure that every possible avenue for promoting a company's image is explored. The type of people employed has expanded to include lawyers and bankers as well as ex-journalists, and this has meant the introduction of a degree of professionalism

and expertise necessary to meet the new challenges of PR. In the financial area in particular, increased deregulation and takeover activity has emphasized the need for professional handling of PR, since the smallest rumour may prompt a sudden drop in share prices.

Internal factors influencing the growth of PR consultancies are largely bound up with their ability to meet these external challenges. Issue and crisis management are of growing importance in the industry as are areas such as internal communications with employees, publicity for new products, investor relations and corporate image.

As with all other marketing services, basic company economics, profit levels and increasing competition in many countries are all general factors supporting the growth in PR consultancy work.

### *New Developments in the Industry*

One of the most important but least quantifiable influences on the growth of PR consultancies is their general image. The difficulty of measuring performance in the industry is one factor; the number of column inches filled in newspapers and magazines for example may be measurable, but the quality of the coverage is less easy to quantify. PR consultancies failing to achieve target levels of media coverage may be criticized. More generally, complaints against the industry include a perceived lack of understanding of companies' products, market, strategy and even politics. The next few years are expected to see the continuing attraction of marketing, financial and legal professionals into an industry traditionally dominated by ex-journalists, which should improve the industry's image and increase its effectiveness.

A survey carried out in early 1988 in the UK by *Marketing Week* magazine, found that around half of all companies questioned ran their own in-house PR operation, with larger companies in particular most likely to possess such a department. A much greater proportion of middle-ranking companies (i.e. turnover between 7 million ECU and 75 million ECU) employed outside consultancies. Most of these companies expected significant increases in their PR investments over the next year, ensuring rapid growth for the consultancies.

Part of the reasons for the move away from in-house operations into professional consultancies has been the growing interest of large advertising agency groups in PR, and the inclusion of PR services as part of a "package" of marketing services for existing and new clients. The J. Walter Thompson group for example, have bought Hill & Knowlton, and Young & Rubicam purchased Burson-Marsteller; more recently, Saatchi & Saatchi bought the Rowland Company Worldwide.

The trend towards corporate restructuring, which has been evident in the USA, has also become apparent in Europe;

companies are moving towards less centralized management structures, with the central public relations function either devolved to the divisions or dispensed with altogether, to be replaced by the more cost-effective use of consultancies.

Events in the financial sector, including deregulation, privatization, takeovers and stock market movements, are likely to continue to demand that careful attention be paid to the preparation for, and handling of, unexpected crises and disasters. The complexities of rapid legislative and institutional changes have placed PR consultancies in a more important position as key interlocutors between companies and parliamentary and government officials, on matters ranging from new investment laws to fiscal policy.

Developments in the media and in the technology of communication also demand increasing attention to the presentation of a corporate image. One example of this is the sharp increase in the number of new magazines, including titles with small circulation but covering specialist areas of industry or consumer interest. Although the circulation may be limited, a specialist magazine can be the key publication covering a particular industry and may therefore be read by all the relevant opinion-formers. In such a rapidly changing environment PR consultancies need to be aware of such wide-ranging developments.

The technology of communication is rapidly improving, with the advent of satellite television, cable, videotext and videoconferencing. Deadlines are now much tighter, as journalists key stories directly into a terminal, where they can be edited and printed within a much briefer space of time than was possible 10 years ago.

One of the alternatives to some forms of PR is corporate advertising, a key growth area in recent years in several EC countries. This has been used more as a complementary strategy rather than in competition with the use of PR. Only a limited amount of information can be conveyed in a general advertisement, whether electronic or printed; PR consultancies are able to concentrate on imparting more detailed and relevant information to members of key target groups, with the knowledge that the climate of public opinion is more favourable towards a particular issue.

### *Industry Structure*

Public relations activities can be segmented in three ways. Firstly, categories of PR, such as financial, corporate image, new product launches or employee relations, demand different areas of expertise in the communication of the message. Secondly, companies may use PR consultancies only for crisis management support, such as when an air disaster or an outbreak of food poisoning occurs. Such support will probably be paid for on a fee basis. This contrasts with the situation in which companies are prepared to pay their consultancies a

"retainer" in order to ensure that crises are dealt with smoothly through prepared contingency plans. This usually involves building up good relationships with key people in the media and other relevant organizations. Thirdly, there are a large number of different target audiences that may need to be kept informed about a company's activities, and with whom it may be necessary to establish a favourable image. The media, parliament, local and central government officials, shareholders, the financial community and employees are the most obvious of these, but there are also consumer action groups, the local community, trade unions, international organizations, suppliers and trade associations with which it is essential to maintain good relations.

These types of subject area and target audience segmentation do not generally correspond with ways in which PR consultancies can be divided and distinguished from each other in any systematic manner, although specialist consultancies in, for example, employee relations do exist. However, the categories indicate the wide range of areas in which companies must expect to have a public relations strategy, and which PR consultancies need to understand.

In the Saatchi & Saatchi Company annual report for 1986, five distinct areas of PR were identified:

- marketing public relations involves the creation of market-building programmes designed to communicate the values and benefits of specific brands and services, and to complement advertising campaigns
- corporate public affairs includes counsel on the impact of new business or marketing strategies, mergers and acquisitions, divestitures and restructuring, changes in corporate identity and labour negotiation
- corporate communications involves the development and communication of the appropriate corporate message primarily to the financial and business communities

- community relations, especially important in the USA, is an area where programmes are developed to demonstrate corporate concerns about health, safety or educational issues
- issue management involves assisting corporations and organizations in shaping public opinion on national issues, or in responding to crises.

In the USA, the market leaders in the PR industry are owned by advertising agencies which have international networks and regional spread. Outside the USA, locally-based companies dominate. A key factor in the development of EC markets will therefore be the extent to which these large groups continue to expand.

Entry into local markets is relatively easy, with little need for significant capital investment; people are the key asset. On the other hand, the barriers to building an international network of consultancies are much greater given the nature of the industry. "Good" acquisition candidates are difficult to find in such a small, fragmented industry, and key people may be reluctant to work for a large organization once they have owned and run their own business.

The main alternative service from the point of view of PR consultancies is in-house PR operation; to some extent, advertising and direct marketing are also alternatives in certain circumstances.

Since the market is generally underdeveloped in EC countries, clients are often resistant to paying the sort of commercial fee rates acceptable in the USA. This is likely to change as the industry develops and as the large agency groups become more dominant organizations.

As with other marketing services, the key resource of the PR industry is staff. Employees often leave and take clients with them. One response to this by smaller companies is to offer equity or partnership in the company.

**Table I**  
**Top Worldwide Companies**

|    | Country/Agency         | Fee income 1986<br>(Million ECU) | Number of<br>employees | Number of<br>countries<br>represented |     |
|----|------------------------|----------------------------------|------------------------|---------------------------------------|-----|
| 1  | Hill & Knowlton        | UK/WPP                           | 101.8                  | 1 800                                 | 20  |
| 2  | Burson-Marsteller      | USA/Y&R                          | 101.6                  | 1 875                                 | 21  |
| 3  | Shandwick Group        | UK                               | 38.3                   | N/A                                   | N/A |
| 4  | Ogilvy & Mather        | USA/O&M                          | 31.5                   | 640                                   | 23  |
| 5  | The Rowland Co         | UK/Saatchi                       | 26.4                   | 300                                   | 5   |
| 6  | Manning, Selvage & Lee | USA/DMB&B                        | 22.0                   | 334                                   | 11  |
| 7  | Daniel J. Edelman      | USA                              | 21.6                   | 431                                   | 8   |
| 8  | Doremus Porter Novelli | USA/Omnicom                      | 21.2                   | 289                                   | 4   |
| 9  | Fleishman-Hillard      | USA                              | 18.7                   | 223                                   | 10  |
| 10 | Ketchum PR             | USA/Ketchum                      | 18.0                   | 234                                   | 10  |

Source: Industry estimates.

**Table II**  
**Major PR Companies (1)**

|    |   | Income (1986)<br>(million ECU) | Employees | Country |
|----|---|--------------------------------|-----------|---------|
| 1  | Shandwick Group   | 19.64                          | 417       | UK      |
| 2  | Charles Barker Group  | 10.66                          | 191       | UK      |
| 3  | Burson-Marsteller   | 10.51                          | 169       | UK      |
| 4  | Valin Pollen International                                  | 8.03                           | 167       | UK      |
| 5  | Dewe Rogerson   | 6.95                           | 136       | UK      |
| 6  | Hill & Knowlton   | 6.85                           | 141       | UK      |
| 7  | The Grayling Group  | 6.17                           | 102       | UK      |
| 8  | Streets Financial Strategy                                  | 4.88                           | 65        | UK      |
| 9  | Daniel J. Edelman   | 4.80                           | 95        | UK      |
| 10 | ABC Presse-Information GmbH                                 | 4.11                           | 65        | D       |
| 11 | Countrywide Communications                                  | 3.75                           | 75        | UK      |
| 12 | Leipziger und Partner Public Relations                      | 3.58                           | 65        | D       |
| 13 | Perspective et Animation                                    | 3.41                           | 81        | F       |
| 14 | Actis   | 2.72                           | 40        | F       |
| 15 | CPM   | 2.72                           | 48        | F       |
| 16 | Conti Public Relations GmbH                                 | 2.63                           | 32        | D       |
| 17 | Hill & Knowlton   | 2.49                           | 37        | D       |
| 18 | Burson-Marsteller GmbH                                      | 2.46                           | 44        | D       |
| 19 | PR5 Public Relations Systems                                | 2.26                           | 32        | D       |
| 20 | L'Agence Groupe 7   | 2.21                           | 30        | F       |
| 21 | Id Dialogue Conseil   | 2.06                           | 36        | F       |
| 22 | Information et Entreprise                                   | 1.81                           | 30        | F       |
| 23 | Lutz Bohme Beratungsgesellschaft für Public Relations GmbH  | 1.81                           | 21        | D       |
| 24 | Profil PR & AV Agentur für Public Relations und Audiovision | 1.78                           | 16        | D       |
| 25 | HW Public Relations Horst Wurm GmbH                         | 1.78                           | 30        | D       |
| 26 | Burson Marsteller   | 1.76                           | 31        | F       |
| 27 | Promo 2000  | 1.72                           | 41        | F       |
| 28 | MS&L International PR                                       | 1.69                           | 29        | D       |
| 29 | Corolle   | 1.22                           | 15        | F       |
| 30 | Hill & Knowlton   | 1.18                           | 20        | F       |

(1) EC 3: Germany, France and the United Kingdom.

Sources: Germany: Industry estimates; France: Stratégies; United Kingdom: PR World, June 1987.

### *Main European Firms*

Some of the major PR companies in the EC are listed in Table II.

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## CONTRACT CLEANING SERVICES

(NACE 501.5, 921, 923)

*"Contract cleaning services" is one of the lesser known sectors of the service industry. It represents a market of some 12 billion ECU in the Community and is experiencing rapidly expanding demand in most Member States. Around two million workers are employed in the sector. Cleaning has become the business of specialists with increasingly sophisticated technical and organizational skills based on computers and with recourse to more efficient equipment and cleaning products.*

The service activity dealt with in this chapter consists mainly of the cleaning, by specialized firms, of the inside and outside of buildings of all kinds, whether used for industrial or commercial purposes, for offices or by public authorities (schools, hospitals, etc.). Closely linked services such as cleaning of furniture, of effects (textiles), of public spaces, tidying around buildings and general sanitation services are also included but not activities such as gardening and painting.

Contract cleaning broadly corresponds to section 92 of the NACE classification defined as "Cleaning Services" such as window cleaning, chimney sweeping and units specialized in cleaning industrial, commercial and government premises. Most large firms in the sector also sell some of the services which come under NACE 921 covering sanitary services (refuse disposal, disinfection, fumigation, trash and waste collection, restoration after calamities, etc.). Cleaning (but not restoration) of exterior walls of buildings classified under 501.5 is also covered as well as hire of clean towels and industrial clothing (NACE 981). On the other hand, personal services such as those offered by laundries and launderettes, dry cleaning, pressing and dyeing of clothing are not normally part of the activities of contract cleaning firms and are therefore not covered.

### Current Situation

Some firms have specialized market niches and larger companies tend to set up separate divisions to cover specific services such as those rendered to nuclear plants, semi-conductor manufacturers (rooms with controlled dust levels), etc.

The demand for cleaning services grows only slowly and is not cyclical although the overall level of economic activity

will have some effect on total demand. Among the factors that influence this demand are rising standards of living with a related emphasis on quality of life, changes in methods of production (e.g. in relation to pollutive activities) and consumption (throw away packaging), changes in occupational patterns (shifts from manual to white collar jobs), improvement in the quality of buildings and the ease of cleaning, improvements in cleaning technology, labour costs, etc.

Even if total requirements of cleaning only expand slowly, the demand for the services of general contract cleaning businesses has been growing, mainly due to the increasing contracting out of this service away from less productive in-house cleaning i.e. cleaning done by directly recruited part-time or full-time labour. Currently, in the more advanced economies, companies and even public authorities in search of improved cost efficiency increasingly contract out their cleaning services to specialists.

### Consumption Trends

The total EC market contracted out to cleaning firms is estimated at some 12 billion ECU, with each of the larger Member States accounting for some two billion ECU, except for the UK where it seems to be lower (one billion ECU). The growth in demand for these services has been rapid, but recently the pace of progress has slowed in some Member States. In Germany, the turnover of contract cleaning firms quadrupled between 1970 and 1986; in France the rise has been 6 to 10% per annum. In Belgium, after a long period of rapid growth, in recent years there has been some stabilization in the market, partly due to cost-cutting policies of client firms. No figures are available for other Member States such as Italy or Spain, but available indications show a rapidly expanding demand.

Cleaning firms now account for over 40% of the total cleaning market in Belgium and France - compared with 25% in 1970 - with widely ranging percentages for the various market segments. In France, contract cleaning covers 82% of the market for large retailers, two-thirds of real estate, transportation, financial establishments and food industries, and about half of the hospitals. Of total demand, about half is accounted for by commercial and administrative premises. In the UK, private contractors cover something like 20% to 30% of the total market.

The major clients of this service industry are the public authorities at all levels, which use contract cleaning firms for their buildings and equipment such as schools and universities, hospitals, airports, museums and cultural centres, railway coaches, etc. Other important customers are industrial, commercial and service companies. In the economically more advanced Member States (with the exception of the UK) a large part of the cleaning market of such activities is already contracted out; in the other Member States there is still much greater scope for the expansion of the activities of cleaning firms since in-house cleaning remains the rule at present. In Spain, for instance, only 10% of hospitals, shopping centres and administrative entities resort to outside help for their cleaning. The British Institute of Cleaning Science has estimated that in the UK, roughly one-third of the total demand for cleaning comes from the private sector and two-thirds from the public sector. Private contractors are estimated to cover over half of the private market but a much smaller proportion of the public sector market. The situation has been changing over the last few years as the UK Government has obliged some of the public authorities to tender for cleaning and related activities such as refuse collection, ground maintenance and laundering (eg. in hospitals). In Belgium, public authorities of various kinds represent about 40% of the contract cleaning market.

### Major Structural and Geographic Features

The cleaning service industry is characterized by a few very large companies, mostly multinational groups, some medium-sized companies and a vast number of small firms. This partly atomistic structure is probably due to the fact that entry into the business is relatively easy and requires little capital.

In the northern part of the Community, including France, there has been a trend towards concentration mostly through acquisitions, less frequently through mergers. In the south (Italy, Spain, Portugal, Greece), large firms are still few, but

an evolution is taking place. Although in the Community overall, the vast majority of firms are still small, there is a tendency towards reorganization and polarization: the number of medium-sized firms seem to be diminishing, whilst the number of small and large firms is increasing.

In France, two-thirds of the firms employ less than six workers, one-fourth between six to 50, and one-tenth over 50 workers, with a few companies employing over 1 000 workers. The largest firm (ONET) has 24 000 employees working on cleaning jobs inside the country. Small enterprises, although numerous, only cover a small part of the total market. The number of firms (and artisan entrepreneurs) is still rising (70% over the last 10 years). In the UK the situation is similar. The four largest companies account for close to half the domestic market. The 10 largest, together employ over 100 000 persons, i.e. almost half of the total workforce in the sector; one group (OCS) has over 35 000 employees in the UK. In the Netherlands, six large firms cover almost three-quarters of the market; while in Belgium, roughly half of the workforce in the sector is employed by fewer than 10 companies with five firms sharing over half of the market.

In Italy and Spain the concentration process is less advanced and the number of firms still rising. Close to 90% of the contract cleaning enterprises in Italy are small or medium-sized, and mostly family owned; less than 50 companies employ over 200 workers. In Spain there are even fewer large firms.

Large cleaning companies are increasingly multinational with business outside the national market representing a significant part of their sales and profits. Since cleaning has to take place *in situ*, there is no scope for cross-border trade in contract cleaning and the activity therefore takes place through foreign establishments. In the UK, for example, Hawley Group Ltd, the largest cleaning firm, was acquired by the US group ADT in 1987. At the time of this acquisition, the British group derived 80% of its sales from overseas and a large part of its profits from North America.

Table I  
Cleaning Services in Member States - 1986

| Country     | Estimated Turnover (million ECU) | Total Number of Employees | Estimated Part-time Employees | Estimated Number of Cleaning Companies (incorporated firms) | Artisans (estimated) |
|-------------|----------------------------------|---------------------------|-------------------------------|---|----------------------|
| Belgium     | 300                              | 43 000                    | 21 500                        | 60  | N/A                  |
| Germany     | 2 200                            | 405 000                   | 30 000                        | 1 700   | N/A                  |
| Spain       | (1) 1 825                        | 160 000                   | N/A                           | 400   | N/A                  |
| France      | 2 230                            | 170 000                   | 74 800                        | 2 150   | 4 560                |
| Italy       | 2 000                            | 400 000                   | N/A                           | N/A   | 9 000                |
| Netherlands | N/A                              | N/A                       | N/A                           | 200   | N/A                  |
| UK          | 900                              | 265 000                   | N/A                           | N/A   | (2) 3 700            |

(1) Only interior cleaning, waste disposal excluded.

(2) Only firms above the mandatory VAT registration threshold.

Source: ESIF.

Large companies have been diversifying into additional associate services in order to make best use of their technical and organizational expertise but with the correlative danger of a loss of direct contact with the client. Multi-services for buildings, as they are called, include security services, energy-saving services, building repairs and even building transformation ranging from the renewal of walls, ceilings and ground covering to carpet refurbishing and applied software for cleaning. General Office Maintenance (GOM), active in Benelux countries in cleaning and a host of other related services, is adding a specialized unit for building transformation and renovation, providing all that is necessary to modernize buildings (but not painting) through its "Breijer Construct" subsidiary. Another subsidiary, Teleguard, manufactures electronic custodial services providing building security equipment.

**Table II**  
**Major Firms in the Community**

|             |  |
|-------------|--|
| Belgium     | -Cemstobel (+ Roeske)<br>-ISS Servisystem Belgium<br>-TSI (Temco, Euroclean, Oneg, Perlav, Asso)                 |
| Denmark     | -ISS   |
| Germany     | -Pipenbrock<br>-Pedus  |
| Spain       | -Taski<br>-Johnson   |
| France      | -Onet<br>-Abilis<br>-General Service France<br>-Entreprises Ferrovieres  |
| Luxembourg  | -Pedus   |
| Netherlands | -Hodon (Cemsto + De Zon + Kord, etc.)<br>-Hago<br>-GOM (General Office Maintenance)                              |
| UK          | -OCS Group Ltd.<br>-ADT (Hawley Group including Pritchard Services Ltd, Provincial Home Countries and Mediclean) |

Source: ESIF.

International Service Systems (ISS) from Denmark, probably the largest cleaning company in the world, is active all over Western Europe and in the Western hemisphere. With 83 000 employees and 53 subsidiaries (not all in cleaning), spread across 15 countries, it is constantly extending the range of its activities. Its overall turnover comprises one-third in Denmark, one-third in the rest of Western Europe, and the remainder in the US and Brazil. The German company Pedus cleans offices in Brazil and provides city cleaning in Saudi Arabia and the Gulf States. In Belgium the top five companies are multinational (Dutch, Danish, American and French).

As many firms are involved in a range of activities going well beyond cleaning, company data, where available, often do not distinguish those related to cleaning proper, even when they

furnish some disaggregation of results. This segmentation, depending on the convenience of the firms, can vary from year to year.

### *Cost Structure*

Approximately four-fifths of the total costs of cleaning firms represent wages. The rest comprises cleaning products, machines, transportation equipment (vehicles), administrative costs - including telecommunications, computers - and profits (a net 1% to 4% of turnover). Equipment and purchase costs of outside services represent some 10% of turnover. Next to cost of office premises, the other heavier outlays are vehicles, cleaners and scrubber-polishers and computers with specialized software for managerial and accounting purposes.

Contract cleaning is not capital intensive and the return on capital seems to be well above the industrial average. However, profit margins are low and under pressure because of intensifying competition.

### *Management and Technology*

Contract cleaning, at least the cleaning performed by larger companies, has become a specialist business with recourse to sophisticated work patterns and techniques and modern equipment and cleaning products.

The input of equipment (macro-brushes, injection/extraction machines), of more efficient cleaning products, "cleaning friendly" interior design and building construction patterns (new materials, more glass), is helping productivity. Robotization has begun and is expected to continue in future.

Productivity expressed in terms of m<sup>2</sup> cleaned per man/hour has been improving in recent years. According to some industry figures, performance for office cleaning in well-run businesses has gone up from some 100 m<sup>2</sup> per hour in the early 1970s to over 230 m<sup>2</sup> in recent years and up to 500 m<sup>2</sup> in specialized markets.

In France, a commission on the improvement of labour conditions has drafted a complete system of classification and labelling of cleaning products, a glossary of cleaning terms, and a handbook on vacuum cleaning. The modern requirements of cleaning in the construction of buildings were taken care of in a 1987 guidebook on recommendations for architects. The Danish firm ISS has created special interior designs which are easy to clean.

Competition has stimulated productivity; however, in some cases, it has unleashed a descending spiral of price and quality, with firms occasionally wanting to get a foothold in a market by quoting very low prices. To help monitor quality, the "Dutch Federation for Cleaning Research" has set up objective criteria to measure the quality of cleaning. Rigorous

measurements of a scientific character are applied for some cleaning jobs, e.g. in computer rooms, chips and compact disc production facilities and surgery rooms in hospitals.

### *Employment Trends*

With four-fifths of costs representing wages, cleaning is a labour intensive activity. Employment in this business service sector of the Community, estimated at some two million jobs, is rising rapidly in most Member States. In France, for example, employment increased by 50% over the last 10 years; however, in Belgium, growth was only 11% over the last six years, with a rapid increase in the proportion of part-time workers with relatively few working hours per week.

Increased employment mostly reflects the increased contracting out of formerly in-house cleaning (including the public sector). Thus total employment in cleaning activities has certainly not risen as much as employment in contract cleaning firms. With higher productivity and a slowly rising volume of cleaning, overall employment appears to be almost static. However, the shift to contract cleaning has been transferring workers out of the parallel economy into the formal one with an ensuing reduction in official unemployment and improvement in social conditions. There is a greater resort to contract cleaning in the economically more advanced regions of the Community, because externalization of services in general has proceeded faster. In Belgium and Spain, less than half of the employees are part-time workers; in Germany and Italy, this figure is close to three-quarters and in the UK four-fifths. In Germany, part-time workers mostly work 10 hours or less per week since this is the threshold below which workers are exempted from social security and income taxation, with employers paying 10.7% for tax and social security. In the UK, half of the part-time female employees work less than 16 hours per week. Again, this is the threshold below which various social benefits do not accrue. On the whole, wherever possible cleaning firms prefer to employ full-time workers because this tends to lower administrative costs, to reduce turnover of personnel and to improve the quality of the work.

Most part-time workers are female, over 90% in the UK, 75% in Germany and Italy and 70% in Belgium. In France 60% of the employees are female, with wide regional variations (50% in the Paris area, but over 80% in the Auvergne). In some Member States, there is a tendency for the number of male workers to increase, in particular for night work and specialized assignments (for example refuse collection).

The cleaning service industry employs some 60% of foreign workers in France and about 40% in Belgium; in the Netherlands this figure is close to 10%. There are of course wide regional variations. For example in Belgium, in the Brussels region some 70% of the workers are immigrants compared with only 5% in the Flanders region.

Managers, professional and clerical staff including supervisors can be estimated to represent some 2 to 4% of employment in contract cleaning firms.

### *Social Conditions and Salaries*

Even if not the lowest paid category of workers, cleaning is amongst the poorly remunerated occupations. Measured on an hourly basis, part-time work tends to be paid rather less than full-time work. Part-time cleaners also tend to work fewer hours than part-time workers in general. Sometimes also these part-time workers do not work enough to be eligible for all social benefits so that their comparative real income is even lower. Female workers tend to earn less.

In Germany, Belgium, France and Italy, social conventions are negotiated between employers and labour unions. In Germany, this is done on a regional basis, with wage levels varying according to regions, e.g. higher in Bavaria than in Saarland. Wages are about 4.7 ECU (10 DM) per hour for interior cleaning, whilst specialist cleaners earn around 40% more. Belgian hourly wage rates are lower than in Germany, but with double wages for the holiday period and a yearly extra month salary in many firms, the overall income of workers is higher in Belgium. 90% of workers are affiliated to labour unions. In France the conventions have set up a national classification of types of jobs which takes into account levels of qualification, minimum salaries, periodic adjustments, etc. Actual salary levels above the minimum are freely negotiated within individual firms. In 1986, a guarantee of job tenure for the majority of the workforce was negotiated in cases of take-overs of cleaning firms; this constitutes a barrier to take-overs. In Italy the social conventions are also regional and various types of cleaning tasks have been categorized.

Most of the contract cleaning is done in the evening or in the early morning. Offices of public authorities or of private companies where working hours start relatively late, can be cleaned in the early morning hours. Hospitals are cleaned during the day; for factories the situation varies.

### *Training and Education*

As in all service industries, human resources are the key element and the most decisive competitive asset. Large companies are therefore devoting effort and resources to training and educating their employees, both the actual cleaners and the managerial and operational executives. In a number of Member States this is done in collaboration with the public authorities (France and the Netherlands), or with the assistance of national cleaners' federations (Belgium). Germany has well-known schemes for apprenticeship; in addition, organized training courses lead to a degree allowing graduates to set up contract cleaning firms. In France, the national federation of cleaning firms has set up the "Institut National

de l'Hygiène et du Nettoyage Industriel" (INHNI), which collects a levy of 1.7% on salaries and organizes training and education in collaboration with the Ministry of Education. There are several curricula which lead to various types of officially recognized qualifications as well as schemes for periodic improvement of these qualifications. In Denmark, the company ISS has created a special institute for training through lectures, seminars and conferences. In Italy and Spain, as yet there is no official or systematically organized training.

## Outlook

Contract cleaning is a dynamic service industry which can be expected to continue to grow rapidly. Even in the economically more advanced Member States, only slightly above one-third of the general cleaning work is at present being

contracted out, thus leaving plenty of scope for further expansion, particularly in the public sector. The net job creating effects are not likely to be substantial but workers joining cleaning firms may thereby be brought into the formal economy.

Among the difficulties which contract cleaning firms encounter in their operations, the most frequently mentioned are: high turnover of personnel, shortage of qualified workers in urban areas, heavy tax regimes and social regulations. As the quality of actual cleaning performance is not easy to assess, there is a tendency towards fierce price competition with adverse consequences on quality of cleaning and profit margins.

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# SECURITY SERVICES

(NACE 839.3)

*Security services have, over a relatively short time span, developed into a profession with broad scope and multiple specialization, servicing a rapidly growing and developing market. A rising crime rate, increased vandalism and terrorism, coupled with the stronger emphasis on security arrangements from insurance companies, is boosting demand in this sector. Theft losses from commercial premises and house burglaries are projected to grow at a rate of over 10% a year in most of the Community Member States.*

In addition to the social factors at play, the increasing complexity of production and information processes and that of company organization has stimulated the quest for greater protection of industrial and commercial property and personnel against various hazards such as fire, flooding, etc. Concurrently, the widening use of computers to record, store, analyse and transmit data has given rise to growing concern about the security of data. This trend has been further stimulated by the enactment of privacy legislation in most Member States of the Community.

Next to adequate controls on access and protection against criminal interference, the emphasis is progressively extending to a continuous control of vital activities of firms through surveillance of the functioning of technical installations and production processes and provision for rapid intervention in calamities to limit damage. The introduction of electronic apparatus has been constantly broadening the area for security activity, which has thus become integrated into the normal course of business operations.

Whilst advances in technology have been helping to fight crime, as soon as a new security technology is found, criminals attempt to circumvent it so that the spiral continues. Notwithstanding the progress in the use of electronic security devices and in communication, the quality of security services continues to depend largely on the quality and integrity of personnel. This in turn requires exacting selection processes, training and supervision.

The clients of the security services industry can be divided into three broad categories:

- household/residential
- public/institutional
- commercial, including industry and services.

Up to a decade ago, many of these clients were providing security in-house; now, however, they are increasingly contracting out the security function to firms which have the

experience, equipment and trained personnel. This ensures professionalism, helps to control costs, and avoids recruitment, training, supervision and overstaffing problems. It also helps companies to comply with public regulations where they exist and to meet insurance company requirements.

## Current Situation

Overall the security service market in the Community can be estimated at some nine billion ECU and the industry employs approximately 300 000 people. The underlying trend is one of continued expansion almost independently of general economic development. At present, the growth of this service sector can be estimated at about 8% per year in real terms.

## Main Types of Services

There are a large number and variety of security services, each of which responds to particular client needs.

Traditional forms of security services are the installation of locks and safes; the provision of surveillance guard patrols; and store detective services. The main areas of protection are against theft, water damage, vandalism, arson and many other kinds of hazards. The manned service concerns mainly administrative and commercial buildings and plant facilities but it also extends to the provision of security at public gatherings or sport events and of bodyguards for the protection of persons.

From activities such as armoured car transportation of cash and valuables such as fine art, security companies have branched out into supplying various services to banks including counting and packaging of banknotes and coins, and security of air and sea transport.

In addition to the above "manned" security services, security and safety are increasingly ensured through recourse to a host of electric, electronic and other devices. This equipment competes with manned services in the same market. However, it calls for installation, maintenance, operation, surveillance and thereby stimulates employment. In addition, all these services not only help to control the access to buildings and fire and water hazards, but are also used to monitor the service functions in buildings such as heating and ventilation and industrial processes (refrigeration temperature). A number of such systems are described below.

Access control, intruder detection and fire alarm systems with closed-circuit TV (CCTV) and perimeter lights are offered with appropriate software to drive them. Access con-

trol devices consist of modular solutions ranging from cheap single-access systems to networks of numerous gates, all monitored and controlled by a host computer which simultaneously collects and analyses management data and monitors building services.

The larger security companies have set up central alarm communications stations which allow them to monitor and respond to alarms in their clients' buildings whose premises are equipped with devices designed to detect or react to various hazards, intrusions, environmental conditions or industrial operations. Each device is connected by telephone line to the central station which is permanently staffed. Links with mobile surveillance units, local police or fire units help to accelerate intervention. Some such stations have over 40 000 connections.

Retail stores are being equipped by security firms with material to prevent shoplifting, back-door and staff theft. Retailers are spending heavily on services such as CCTV and electronic article surveillance (EAS), by which magnetic or radio transmission security tags are affixed to goods. This sector is now growing at over 20% per year in most Member States.

So-called social alarms are being installed with the help of local authorities and social services to serve as emergency communication for the elderly and the sick in the event of accident, sudden worsening of health, etc. This is a rather recent development which is expected to spread in future due to the ageing of the population and the need to contain rising hospitalization costs by developing home care.

The most recent and sophisticated area of security service is data security, which aims at protecting data on electronic files or during transmission - including electronic movement of funds throughout the network - against "hacking" (i.e. unauthorized access) and fraud. The protective devices against computer crime range from the most simple "ignition key systems", coding and control of access to computer and storage premises against intruders, to sophisticated data encryption systems with special software, anti-radiation and radio-interference, call-back telecom systems. Some firms such as Analytical Instruments of Cambridge specialize in preventing unauthorized access through, for example, the development of entrance codes and signature checking systems. Others specialize in the safe storage of computer tapes.

Some security companies carry out sweeps of premises for firms concerned about bugs leaking sensitive information. These companies also sell secure telephone systems.

Whilst all security firms naturally offer advice on security matters in the course of their business, some firms specialize in counselling services with respect to the design of security systems, both procedural and physical, even at the stage of planning buildings of plants (in the UK, Control Risks

Prevention Services). Others offer "full protection packages" to business travellers, with information on risks (e.g. kidnaping) in different parts of the world as well as bodyguards and security awareness courses for executives (Shield International, UK; and Interseco, Netherlands). There are also companies specializing in consultancy on data security (the French company Matra, and in the UK, Guardata and the Racal-Chubb Group).

### *Regulatory Environment*

In a number of Member States, very strict rules govern the establishment and operation of security firms. Where such public regulations exist (Belgium, Denmark, Germany, Spain, France and the Netherlands), the Ministry of the Interior is responsible for their administration. The UK has opted for self-regulation of the industry rather than seeking control through legislation: private organizations such as the BSIA (British Security Industry Association) exercise regulatory functions under their own codes of conduct and standards with procedures for vetting and monitoring their members. In Greece, Portugal and Luxembourg no specific regulations apply to the operations of security companies.

At the international level, several multilateral organizations - in addition to promoting the collective interests of their members - aim at maintaining standards of competence and probity in the security industry. The Ligue Internationale de Sociétés de Surveillance is the oldest and most representative of these organizations.

Since it is recognized that in modern societies governments cannot provide total protection against crime, individuals as well as private businesses and organizations have been encouraged to take sensible precautions to protect property and prevent losses. Conversely, the growth of the security service industry has induced the police forces of some Member States, hard pressed by rising crime and shortage of manpower, to relinquish some services which they previously offered to their citizens. For example, whereas originally intruder alarms were mostly connected directly to police stations, some Member States have decided not to allow this any longer. Hence the role of the private sector in providing security has been enhanced.

### *Links with Other Service Industries*

Insurance companies play a key role in the security industry, mainly by linking policy coverage and premium levels to the observance of specified conditions and standards. They advise their clients on the best course of action to prevent and limit loss or damage. Before writing certain policies, insurance companies now often stipulate that their clients take (and act on), advice from security consultants. Most insurers insist on a prescribed level of data security before insuring against com-

puter crime. Notwithstanding the close interlink between security and insurance premium, only very few insurance companies seem to have financial interests in the security service industry. One example is Assurances Générales de France which has a stake in the French company SPS.

Few security service companies - mostly only the older ones - have diversified into other services such as cleaning (notably of bank vaults, museums), and courier services. Group 4 Securitas International is one example; this company has courier services and cleaning activities in Belgium, Greece, Ireland and Portugal. It is much more common for other services to expand into the security business. The security company ISS (Denmark) diversified from cleaning into security and building management systems, which together now represent some 15% of its turnover; ADIA (Switzerland) diversified from temporary services into security; and Randon of the Randstad/Vedior Group (Netherlands) expanded beyond both cleaning and temporary labour into the security business.

### *Cost Structure*

Cost structures of security service firms vary according to the type of service provided. In the sector of guard personnel, over 90% of total costs are connected to labour (salaries and social charges). For armoured car transport, the breakdown is roughly 25% for vehicles, security and safety equipment, 10% for insurance and 60% for personnel. Costs of ensuring security of data are mostly related to hardware and software (access controls, security software and encryption devices).

In the economically more advanced Member States, average turnover per employee occupied in the more traditional security activities is around 20 000 to 25 000 ECU per year. Even if salaries for guards and patrolling personnel are rather modest in terms of overall wage scales in these Member States, they still seem to be higher than, for example, in the USA. The well-run European firms have attempted to improve their competitiveness through organizational and managerial skills which may place them ahead of their counterparts in the rest of the world.

### *Employment Trends*

The quality and integrity of the personnel engaged in the security services industry are naturally of paramount importance for ensuring effective security. Reputable companies therefore exhaustively check the history of prospective employees, whether destined for manned services or for installing and servicing security devices. Under the British BSIA vetting system for example, employment background is checked back for a full 20 years, or since leaving school, and applicants must give authorization to check all records.

Manned security services make up a large proportion of employment in the security service sector. However, since this is usually only part of companies' activities, this employment cannot be isolated from overall numbers. Similarly, it is not always possible to avoid the inclusion of some manufacturing employment which occurs alongside security service activities. With these reservations in mind employment in the security services industry of the Community can be estimated at roughly 300 000.

Work conditions such as salaries, social benefits and duration of work are negotiated periodically between labour representatives and national federations of security businesses or, where such federations do not exist, with major companies

**Table I**  
**Main Security Companies by Member State**

|                |   | Employees |
|----------------|---|-----------|
| Belgium        | Group 4 Securitas                                 | 2 700     |
|                | GMIC  | 1 500     |
|                | Intergarde  | 1 400     |
|                | Monitor   | 1 000     |
| Denmark        | ISS   | 2 200     |
|                | Group 4 Securitas                                 | 150       |
| Germany        | Nieder-Saksisches Wach- und Schliess-Gesellschaft | 5 000     |
|                | Münchener Wach- und Schliess-Gesellschaft         | 5 000     |
|                | Westdeutsches Wach- und Schliess-Gesellschaft     | 2 500     |
|                |   |           |
| Greece         | Group 4 Securitas                                 | 400       |
| Spain          | Esabe   | 5 000     |
|                | Prosegur  | 4 000     |
|                | Prosesa   | 3 300     |
|                | Group 4 Securitas                                 | 1 500     |
| France         | SPS   | 8 000     |
|                | SQI   | 6 500     |
|                | ACDS  | 2 000     |
|                | Brinks  | 1 500     |
| Ireland        | Securicor Ireland                                 | 1 000     |
|                | Group 4 Securitas                                 | 500       |
| Italy          | Citadini dell'Ordine                              | N/A       |
|                | Fidelitas   | N/A       |
|                | Brinks Securmark                                  | N/A       |
| Luxembourg     | Group 4 Securitas                                 | 370       |
|                | Securicor   | 350       |
| Netherlands    | NVD   | 2 000     |
|                | Securop   | 800       |
|                | Randon  | 600       |
|                | VNV   | 430       |
|                | Group 4 Securitas                                 | 250       |
|                | Others  | 900       |
| Portugal       | Group 4 Securitas                                 | 2 700     |
|                | Ronda   | 1 600     |
|                | Sonasa  | 1 000     |
| United Kingdom | Group 4 Securitas                                 | 5 800     |
|                | Securicor   | 5 000     |
|                | Others  | 10 000    |

Source: LISS.

which set the pattern for the national security service industry. Such nation-wide conventions are negotiated in all Member States except Greece.

### *Industry Structure*

Inside the Community, the leading firm present in practically all the Member States is Group 4 Securitas based in the Netherlands. It employs almost 10 000 people in 17 countries around the world. Security companies in the EC appear in Table I.

### **Forecast and Outlook**

The increased need for protection of property - in the widest sense of the word - will provide steady growth for companies in the security business. It is a rapidly growing and developing field, which has evolved a long way from the simple installa-

tion of locks to the provision of sophisticated, high value-added services using advanced electronic and other devices. Notwithstanding modernization, the manned services of guarding, patrolling, and transportation of funds remain a characteristic of the security business which continues to be labour-intensive and dependent on the quality and integrity of the personnel employed.

Community firms maintain a strong position in home markets and a few have managed to gain a significant presence in world markets, mostly through direct foreign investment. Foreign firms only play a small part in the EC security service market but are strong in certain product lines (e.g. Japan for cheap CCTVs and the USA with pattern-recognition systems).

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# TEMPORARY WORK SERVICES

(NACE 839.3)

*Demand for temporary services has expanded rapidly over the last five years. Temporary work businesses (TWBs) play an important role in providing temporary workers to a wide range of organizations in the public and private sector. In addition to the general expansion of activity, there has been diversification in the occupations of workers available from TWBs, extending to professionals and specialized skill areas. The health of the industry is dependent on brisk activity in the economy generally; the forecast is for a continued increase in demand for temporary workers and ongoing development of the services provided by TWBs.*

This industry, which has emerged relatively recently, has turned itself not only into the main tool for helping businesses fill temporary shortages in their workforce both in the white and blue collar sectors, but also - since temporary workers often find permanent employment through their temporary assignment - into personnel recruitment advisers.

## Current Situation

During the past four decades, temporary work service has moved from virtually a cottage industry to a significant instrument for labour management in private enterprises. Although now widely practised in most of the Community and elsewhere in the developed world, two Member States, Italy and Greece, still do not formally allow such temporary work businesses to operate. In Spain and Portugal they are only tolerated.

The essential characteristics of this service is that temporary work businesses (TWBs), functioning on a profit-making basis, hire temporary workers and put them at the disposal of a third party to do temporary work. It is the "temp business" which assumes the normal role of employer for the workers concerned. Such a triangular relationship distinguishes interim work business from limited duration work contracts or from casual labour, which operate in a strictly bilateral worker-user framework.

Temporary work in the narrow sense serves a complementary, but key social and economic role in the labour markets of the countries where it is permitted. It has been growing rapidly in recent years and has become an efficient instrument for flexible personnel management. On the whole it tends to primarily attract those from the younger age group and from amongst the more entrepreneurial groups.

Originally, such temporary work service developed in the context of an overall labour shortage with the TWBs helping to bring "hidden" manpower into the labour market. It was mainly, if not exclusively, used as a stoppage to replace absent workers, to cope with a momentary extra workload or specialist task or to respond to a temporary activity not justifying the recruitment of permanent staff. It also provided jobs for those who did not seek to enter the permanent manpower market. Indeed, some workers are in no position to take on permanent work because they are only temporarily available; others prefer temporary work for the freedom and diversity which it offers.

In addition to the traditional pattern described above, the phenomenon of growing unemployment has meant a gradual growth in the numbers of jobless workers resorting to TWBs to find a temporary occupation often with the expectation of finding permanent positions at a later stage. The role of the TWBs thus shifted to one of finding jobs. It is now estimated that on average well over one-third of temporary workers find permanent jobs as a result of temporary contracts, but the actual proportion varies widely from Member State to Member State. This trend has been stimulated by the massive restructuring of the European economy which has been accompanied by the rapid introduction of new technologies, thus forcing workers to change jobs more frequently. Furthermore, the ageing of the European workforce and the increase in the female component of the working population have been associated with a greater desire for more flexible and temporary working arrangements.

On the user's side, the recourse to TWBs has been increasingly motivated by a desire to obtain personnel immediately, when such workers cannot quickly be found or when permanent use of such workers is not yet ensured. User firms which resort to temporary labour and end up recruiting permanent workers thereby benefit from the personnel selection process used by the TWBs, which specialize in searching, interviewing and selecting temporary workers.

As user firms often need personnel with special skills, the TWBs have organized themselves to provide such skilled workers. These include managerial staff, informatics personnel (computer and data processing), office automation specialists, accountants, linguistic and health services and even nuclear specialists; and in the blue collar sector, mechanics, electrical and engineering graduates, etc. Many TWBs may specialize in the supply of workers with particular skills; this tends to offer higher margin business. TWBs have also turned to training and education in response to market demand.

## Current Trends

Since the end of the last global recession, the world's temporary employment market has experienced a phenomenal rate of growth, averaging 20% annually in the last few years. For 1987 the value of the world market for temporary services is estimated to have reached over 24 billion ECU.

Notwithstanding its growth, temporary work offered by specialized firms continues to serve only a complementary role in the labour markets of the countries where it is permitted. Whether as a proportion of the total number of salaried workers or wage earners, or as a share of the population of working age, the number of workers recruited by temporary work firms is not high. Attempts to estimate the number of such workers within the EC Member States which formally allow such service activities set this figure at between 0.4% and just above 2% of the civilian work population, with a general tendency for this percentage to increase. In no Member State does this at present constitute a sizable minority.

The "Confédération internationale des entreprises de travail temporaire" (CIETT) measures the activity of the temporary business service in terms of average numbers of temporary workers per day during a given year. The data in Table I have been collected by CIETT through its national federations and associate member firms or taken from other recent sources. The figures relate to 1987, except where otherwise stated.

**Table I**

|                | Average number of temporary workers/day, 1987 | Share of active population (%) |
|----------------|---|--------------------------------|
| Belgium        | 18 500  | 0.4                            |
| Denmark        | 1 000   | N/A                            |
| Germany        | 80 000  | 0.3                            |
| Spain          | 5 000   | N/A                            |
| France         | 175 000                                       | 1.2                            |
| Ireland        | (1) 1 200                                     | N/A                            |
| Netherlands    | 100 000                                       | 2.0                            |
| United Kingdom | 500 000                                       | 0.3                            |
| USA            | N/A   | 0.5                            |

(1) 1986.  
Source: CIETT.

Evidently, numbers of workers actually on assignment with clients each day, conceal much higher numbers of workers involved in temporary work, as workers are employed by TWBs for only a limited number of weeks. Thus the average numbers of temporary workers per day on assignment have to be multiplied by a factor of between 5 and 7 to arrive at the numbers of persons involved every year in temporary work. These show the social dimension of this type of employment.

Recently the activities of TWBs have been growing strongly both in terms of numbers of local establishments created by

temporary-work firms and numbers of workers on assignment. The multiplication of local establishments provides a better service for client firms and facilitates the local recruitment of temporary workers. It is estimated that in the Netherlands, more than 70% of all businesses use temporary help every year on a more or less regular basis. In France, after a decline of over 50% during a period of three years, the market for temporary workers has increased by 20% annually over the last three years.

**Table II**  
**Temporary Work Businesses, 1987**

|                | Number of establishments | Trend  |
|----------------|--------------------------|--------|
| Belgium        | 278                      | up     |
| Denmark        | 85                       | down   |
| Germany        | 1 397                    | up     |
| Spain          | 100                      | up     |
| France         | 30250                    | up     |
| Ireland        | (1) 30                   | N/A    |
| Luxembourg     | 3                        | N/A    |
| Netherlands    | 1 000                    | static |
| Portugal       | 3                        | N/A    |
| United Kingdom | 7 500                    | up     |
| USA            | (1) 7 200                | up     |

(1) 1986.  
Sources: CIETT, national federations and companies.

The workload of TWBs fluctuates; economic recession and full employment tend to reduce their turnover, which seems to develop best in a climate of moderate or brisk economic activity in general. Some Member States such as the Netherlands use the volume of temporary as one parameter for forecasting the business cycle.

In some Member States such as Germany and Denmark, national regulation of TWBs is rigorous, hence TWBs play a relatively smaller role in these countries.

## Major Structural and Geographic Features

The structure of firms in temporary work services takes two forms. On the one hand, there are many small or medium-sized firms that have developed over the last four decades or so, whilst on the other, major international groups have been built up through mergers and acquisitions. In many markets, companies operate at the local level and like small or medium enterprises, with regional offices spread across the countries in which they operate.

With its acquisition in 1987 of Manpower - American multinational TWB with subsidiaries all over the world - Blue Arrow of the UK became the largest TWB in the world with establishments in more than 30 countries worldwide (including Japan). The second largest group is Kelly from the USA

and third position is taken by ADIA, a Swiss based group with subsidiaries in most Member States. In the Community less than two-thirds of the market is accounted for by such internationally oriented groups.

In Belgium a State agency, T Interim, operates basically along the same lines as private firms except that it is expected to only charge at cost. In the Netherlands, START, originally a private foundation under the control of the Ministry of Labour and aiming at placing workers with a difficult profile, is now covering all job seekers. In most places its offices cooperate with the public labour exchanges and benefit from reduced social security charges. In the other Member States, the public labour exchanges only function as intermediaries, simply putting employer and applicant in touch with each other. They are thus not active in the TWBs as defined in this study.

The market for temporary employment has shown synergies with other services, particularly in the case of the larger groups. Diversification has been spreading into security, contract cleaning and maintenance services, as well as linguistic services. Such activities frequently take place outside regular working hours and entail short-term assignments with a need for quality assurance. The Dutch groups Randstad and Vindex, through their affiliates Hodon, Cemsto and Cemstobel, Korrekt and Randon, have been particularly active in offering such an array of services. In some Member States such as Belgium, France, the Netherlands and Denmark, the TWBs themselves are not allowed to enter into such complementary activities and are thus compelled to set up separate legal entities.

It is difficult to generalize about cost structures of TWBs which vary between Member States and firms. As an indicative figure, it is estimated that the wages of both temporary workers and permanent workers employed by the TWBs, represent between 80 and 90% of their turnover. Some 80% of the bills paid by user firms serve to cover the costs of wages and social security contributions of the temporary workers.

The clients of TWBs are to be found across the spectrum of economic activity and within the public sector. Recourse by temporary-work users seems to be linked essentially to the personnel management style of individual user firms and not so much to their size, type of activity or location. In all countries, but particularly in France, large companies are major clients for TWBs. In Germany, many firms such as those in the metallic and chemical sectors requiring skilled manpower, have recourse to TWBs. In most countries, service industries such as banking and insurance are important clients of TWBs. In the UK the public authorities use TWBs extensively.

The areas of growth in demand generally correspond to those in which employment is generally rising, such as communications, informatics, office automation, robotics, leisure

activities, assistance to the elderly, etc. Large temporary construction sites such as the Channel tunnel, high speed railways, or large road building programmes offer particularly interesting markets.

In a number of Member States such as France and the UK, about one percent of temporary workers accomplish their assignment abroad. In the Netherlands this is constrained by regulations. Foreign assignments are to be found with oil firms (drilling platforms), health care activities (e.g. in the Middle East), courier services, etc.

### *Employment Trends*

Temporary workers are to be found in almost every type of employment, ranging from the professions (doctors, teachers, etc.) to unskilled manual workers. The proportions of each group within the temporary workforce vary from country to country: whereas in Germany and Belgium the majority are manual workers, in the UK 75% are white-collar workers; in France unskilled personnel represents 20% of the temporary workers; 40% are administrative workers and 60% are in industrial occupations and building and construction. In general, growth is faster in the services sector. The call for temporary help is focusing increasingly on a generally higher level of qualification in nearly all markets.

In terms of the sex of the workers, this also varies from country to country. Four-fifths of the temporary workforce in Germany are male workers, two-thirds in Belgium, in France 60%, in the Netherlands 55% and in the UK this figure is no more than one-third. Overall, the participation of men is increasing.

About two thirds of the temporary workforce are under 30.

Salaries and wages of temporary workers on the whole, follow those of equivalent permanent workers in the same occupations. Some Member States set a minimum by law (Belgium), others prescribe specific pay and salary levels (Netherlands) or equivalence with similar permanent jobs. France imposed in addition a built-in bonus to compensate for job insecurity; equivalent social advantages are also compulsory.

In Member States which do not regulate salary levels of temporary workers, differences with salaries of permanent employees depend on the conditions of the labour market; precise comparisons are difficult. Salary levels in permanent occupations generally represent only part of the total cost due to variations in supplementary benefits. The salaries which TWBs must offer in order to attract temporaries are determined by supply and demand to a greater extent than in other labour markets.

For the user firm, the hourly cost of temporary labour may at times be somewhat higher than that of permanent workers,

but since temporary labour is only resorted to for short, well-defined periods or for specific tasks, the cost is borne only for effectively supplied hours of labour. The alternatives, i.e. overtime or permanent reserve of extra manpower, would be more expensive. TWBs bear the cost of recruitment, selection, pay-rolling, statutory social security insurance and the formalities of contract, etc. Moreover, temporary workers must be paid by the TWBs sometime before its invoice is paid (and even if it is not paid) by the user firm. On the other hand, the user owes no payment for illness, accidents, etc. which are covered by social security.

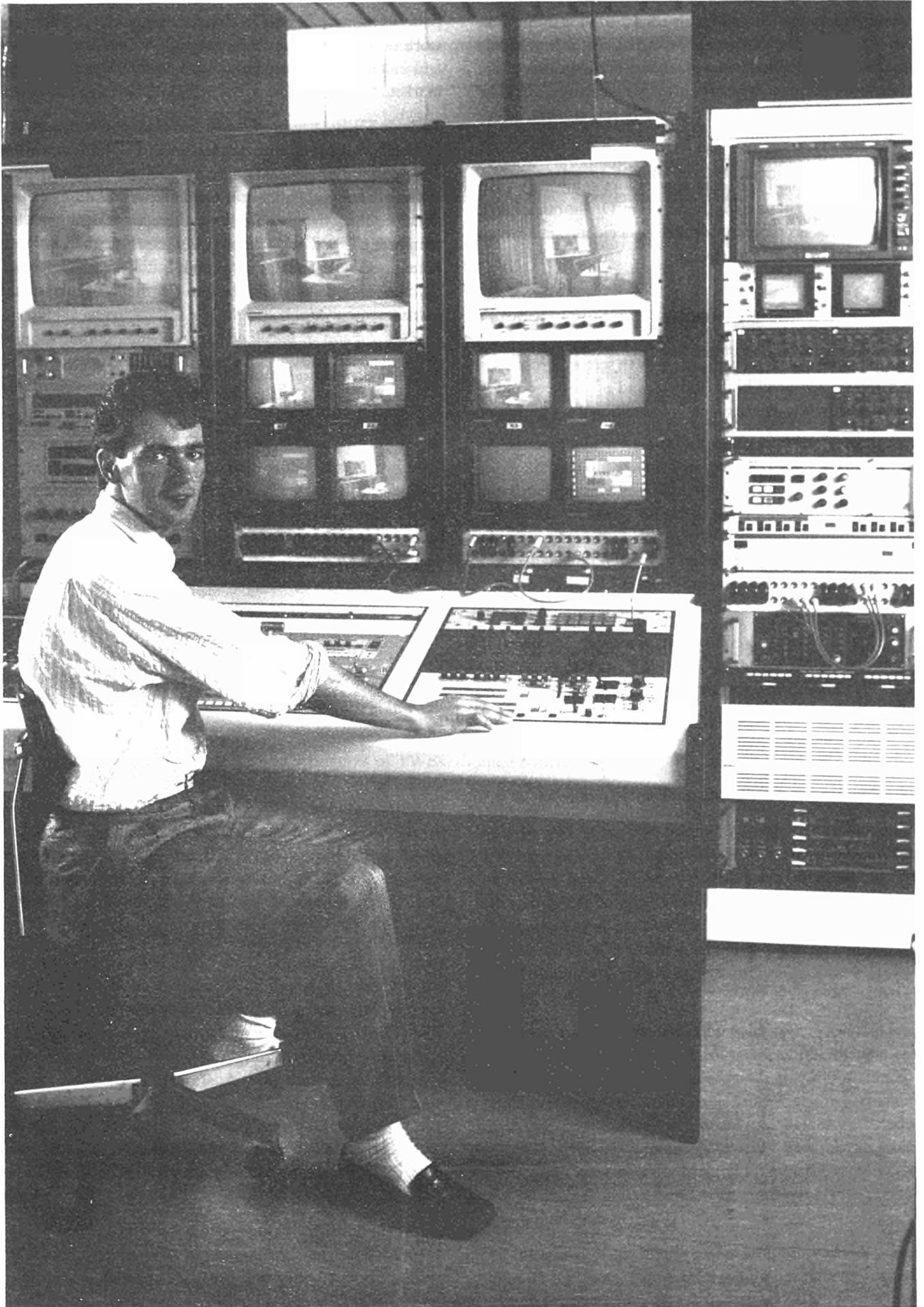
### **Forecast**

The temporary work business is a growth sector. It responds to a recognized need both of firms and of workers and is stimulated by the replacement of traditional employment

patterns by more flexible working arrangements. Temporary work services improve the competitiveness of the economy and enhance the transparency and discipline of the labour market.

Today's TWBs are adapting to the changing needs of the market by becoming more professional. They are improving and accelerating their response to the demand of users, extending the range of qualifications and specialization on offer and deepening their training and education programmes for temporary as well as permanent workers. For small and medium-sized users, temporary work businesses have sometimes even become advisers in the field of personnel recruitment.

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## AUDIOVISUAL SERVICES

(NACE 971, 972, 973, 974)

*The sector is undergoing major change as a result of the advent of cable TV and direct TV broadcast by satellite; however, these new technologies are not taking off as quickly as originally foreseen. In most countries, the sector is still highly regulated, especially with regard to the introduction of advertising on TV and radio. Cinema production has suffered from the popularity of TV and home recording, and is State-subsidized in many countries.*

Audiovisual services are defined as services provided for remuneration in the form of pictures and/or sound sequences. All such services are included regardless of type of usage or content. This covers material to be used by one or more individuals or corporate bodies for private, semi-commercial or commercial services, and whether they have, for example, cultural, educational, scientific, advertising or entertainment content.

### Current Situation

There are four elements to the audiovisual sector: the product, the distributive media, the producers and the clients. Within these elements there are a number of categories.

The product consists of TV programmes, feature films, advertising and training films. These may be of a cultural, educational, scientific or entertainment nature.

The producers may be public broadcasting corporations, private broadcasting companies, independent film makers or feature film companies.

Traditional media are broadcast television, broadcast radio and cinema; newly developed ones are cable originated and retransmitted, satellite transmitted, and direct broadcast by satellite (DBS). Traditional media developments are video cassette recorders, teletext and text data base. Clients are households, enterprises, public bodies and non-commercial organizations.

Clearly there are close relationships between many of the elements of audiovisual services. In many instances the broadcasting company is also responsible for the production of films, thus TV companies make films for broadcast; they also commission films from independent producers, make films

in cooperation with other companies and buy films from feature film makers. Similarly feature film makers often own cinemas and distribute films.

### Regulatory Environment

Within the EC there is heavy government regulation (as well as other forms of involvement) of the audiovisual sector. In most EC countries, broadcasting evolved exclusively under government monopoly control. All the EC Member States except Luxembourg retain at least one publicly owned broadcasting corporation directly or indirectly under government control and funded by licence fee revenue and/or advertising. In some countries (such as Belgium and Denmark) there is still reservation about the incursion of any commercial interests into the sector.

Government regulation takes the form of intervention in a variety of areas; programme content and the setting of standards (e.g. the promotion of "civic values"), although this may be indirect as in the UK; programme scheduling; and advertising standards and scheduling. Governments are also responsible for licensing broadcasters, allocating broadcast frequencies etc.

In the new areas of satellite and cable broadcasting, final regulatory frameworks have not yet been established. Many governments are anxious not to relinquish their traditional monopoly. Important issues of control are raised especially in the field of satellite broadcasting, where national boundaries can be crossed with relative ease. It is unlikely that a stable regulatory framework will emerge in the near future.

A similar state of affairs exists for cable TV. PTTs are generally monopoly suppliers of cable networks and broadcasters are either licensed by government or under public control.

Government is also heavily involved in the European cinema industry. In most Member States governments offer subsidies (in the form of loans, grants or tax incentives to investors) to the domestic film industry, usually on condition of a major local content in all aspects of production.

The "add-on" part of the audiovisual sector is less regulated. Teletext services are generally provided by existing broadcasters. Regulation in the VCR sector has been mainly in the field of restrictions on the imports of hardware from Japan, but the issue of programme pirating is also being addressed

by governments (particularly in Germany, the Netherlands and the UK, where the problem is most acute).

The central purpose of government regulation in the sector is to retain control over broadcasting content and standards (generally promoting cultural, informative and educational programmes) and also to preserve national cultural input (hence the degree of support for domestic feature film production in most countries). However, there is considerable recognition of the role of commercial broadcasters in supplying the primarily entertainment orientated demands of the consumer, even in the traditionally reserved countries such as Belgium, and there is some deregulation in progress (such as the privatization of TF1 in France in 1987).

### *Current Trends*

New developments are apparent in three areas:

- new technology particularly affecting distribution media
- new product innovation
- the changing regulatory framework.

These three developments are closely interlinked. Cable transmission and re-transmission and direct broadcast by satellite have widened the scope for broadcasting, including cross-border broadcasting. This has also led to the development of new "products" such as single purpose channels (e.g. music only channels). The new media sector has still not come of age and its ultimate influence on the audiovisual sector, although undoubtedly significant, is yet to be seen. Other new products related to traditional media include videotext and text data bases which are likely to be developed with enhanced graphics and interactive facilities. The video cassette (and disc) recorder/player is also a relatively recent development which has led to opportunities not just in the home entertainment market, but also in marketing, direct sales fields and the training sector.

The extent of take-up of the new media varies in different parts of the EC; Belgium and the Netherlands have a high degree of cable penetration; France, Germany and the United Kingdom are developing cable networks (although not at the rate once foreseen). Elsewhere there is no significant cable penetration. There are a few satellite-to-cable networks, notably Sky Channel, Super Channel, RTL-Plus and Music Box. Services can be funded by consumer subscription or advertising revenue (or a mixture). The sector is, however, still at an early stage of development.

Direct broadcast by satellite is still at a developmental stage. In the United Kingdom, British Satellite Broadcasting (BSB) has been awarded a contract by the IBA. TDF-1 is the proposed direct broadcast satellite for France but may have German participation. Germany will be transmitting from another satellite, TV-SAT. Within Luxembourg, a private company

**Table I**  
**Broadcasting Revenue, 1983**

| (Million ECU)  | Advertising revenue | Licence fees | Total revenue |
|----------------|---------------------|--------------|---------------|
| Belgium        | 39                  | 212          | 251           |
| Denmark        | N/A                 | 174          | 174           |
| Germany        | 647                 | 1 599        | 2 246         |
| Greece         | 70                  | N/A          | 70            |
| Spain          | 28                  | N/A          | 28            |
| France         | 603                 | 791          | 1 395         |
| Ireland        | 43                  | 38           | 81            |
| Italy          | 727                 | N/A          | 727           |
| Netherlands    | 88                  | 217          | 305           |
| Portugal       | 28                  | 28           | 56            |
| United Kingdom | 1 414               | 1 010        | 2 423         |
| <b>Total</b>   | <b>3 687</b>        | <b>4 069</b> | <b>7 756</b>  |

Source: New Media in Europe (1986).

has been established to lease transponders on a medium-powered satellite ASTRA, to provide a DBS service.

Pay-TV can operate for both cable and DBS services. Currently Canal-Plus in France and Film-Net in the Netherlands are the only two examples of pay-TV channels.

### *Turnover*

The largest audiovisual markets in the EC are Germany, the UK, France and Italy. Total broadcasting revenue figures (consisting of advertising revenue plus licence fee receipts) are shown in Table I. The figures exclude government subsidies to the broadcasting sector.

Estimated cinema revenue (box office receipts plus advertising revenue, but excluding government subsidies) are shown in Table II.

### *Employment Trends*

The employment figures in Table III relate only to employment by the TV broadcasting corporations in each country

**Table II**  
**Cinema Revenue, 1982**

| (Million ECU)  | Box office receipts | Cinema advertising | Total |
|----------------|---------------------|--------------------|-------|
| Belgium        | 43.4                | 2.4                | 45.8  |
| Germany        | 227.1               | 45.3               | 272.4 |
| Spain          | 381.3               | 4.1                | 385.4 |
| France         | 643.1               | 43.4               | 686.5 |
| Italy          | 701.6               | 11.0               | 712.6 |
| Netherlands    | 51.1                | 3.2                | 54.3  |
| Portugal       | 66.6                | N/A                | 66.6  |
| United Kingdom | 249.1               | 26.6               | 275.7 |

Source: Economist Informatics report.

**Table III**  
**Employment in Audiovisual Services**

|              |        |                |
|--------------|--------|----------------|
| Belgium      | (1981) | 5 214          |
| Germany      | (1983) | 27 036         |
| France       | (1985) | 17 771         |
| Italy        | (1982) | 15 042         |
| Netherlands  | (1983) | 5 855          |
| UK           | (1983) | 47 647         |
| <b>Total</b> |        | <b>118 565</b> |

Source: Economist Informatics report.

and do not include employment in independent film organizations, the feature film and cinema industry, and the new media.

### *Factors Behind Production Trends*

Audiovisual services are dominated by expenditure on broadcast television. There is some information available for Belgium, Germany, the Netherlands and the United Kingdom relating to programme content (although the extent to which this represents supply regulations rather than consumer demand patterns is not known). Figures are given in Table IV.

Figures for consumers' expenditure by each type of medium are not readily available and would be of limited significance, given the level of government subsidy and generally high degree of government regulation in the sector.

### *Television*

There is a considerable disparity between EC Member States in the television viewing hours per head, and therefore likely to be scope for growth in some countries at least. Household television penetration is over 90% in all EC countries and therefore unlikely to be a major determinant of future growth, although there are sharp differences in penetration rates for colour television (ranging from 14% in Portugal and Greece to 80% and over in Germany and the Netherlands). A major determinant of growth in this area appears to be programme content. In countries in which broadcasting is under

**Table IV**  
**TV Broadcasts By Programme Category (1)**

|                 | (%) |
|-----------------|-----|
| Entertainment   | 41  |
| Information     | 18  |
| Current affairs | 15  |
| Sport           | 16  |
| Other           | 10  |

(1) Figures relate to Belgium, Germany, the Netherlands and the UK.  
Source: PMM.

exclusive government control, viewing rates are lower than in States with well developed commercial broadcasting sectors and a greater proportion of entertainment transmissions. An important determinant of future growth is therefore likely to be the progress towards deregulation and commercialization of television broadcasting.

In terms of productivity, the major issue is production cost in relation to market size. There is an increasing trend towards co-production between national broadcasting organizations and also between other film makers. The effect of this is to share production costs, take advantage of tax incentives in more than one country and to expand the potential market for a broadcast, thus reducing unit costs. Other factors leading to improved growth and productivity include competition from other broadcast media, alternative leisure pursuits (in the household consumer market) other advertising media (in the corporate market). Increased size of the commercial sector will also lead to competition between broadcasters. In the UK one example of the effects of such competition is the change in working practices amongst outside broadcast teams.

### *New Media*

Growth in demand for new media broadcasting i.e. DBS, cable, etc. is not as great as initially foreseen. The situation is somewhat circular in that a certain threshold of demand and penetration of cable or receiver is required in order for costs to fall. Until this happens demand is inhibited, and low demand means that revenue from consumers and advertisers is restricted. Thus factors currently inhibiting growth are the high initial investment required and a long pay-back period, combined with a slower than anticipated take-off in demand. The supply of funds for initial investment is also limited by the uncertainty over which distribution media will ultimately predominate. Technological improvements and competition will ensure the ultimate growth of the sector but as yet it remains in its infancy.

### *Traditional Media Add-ons*

Between 1979 and 1984 many EC Member States experienced growth in video cassette recorder (VCR) sales of 100% per annum. The United Kingdom, Germany, the Netherlands and Italy all have penetration rates in excess of 20% and some are markedly higher. Clearly the market for video-distributed broadcasts is dependent on VCR penetration. The greatest use to which videos are put is for "time-shifting" television broadcasts; the growth in demand is strongest in States with large numbers of channels and high viewing rates. Demand for pre-recorded film (mainly from the US) is greatest in countries with unpopular domestic broadcasts. Given the need for relatively expensive hardware purchase on the part of the consumer, demand is also determined by levels of national income (demand being greatest in Germany, the Netherlands and the

United Kingdom), the exception being Ireland, which, in common with the United Kingdom, has a well developed rental market. There is also a link between VCR demand and colour television penetration and evidence that growth in the video market may be slowing as the VCR market becomes saturated. The growth of other television add-ons, such as teletext and other text data bases, is essentially not a "stand alone" demand and is linked to the replacement television market in which the necessary technology is incorporated.

## *Cinema*

Cinema is an industry which is at best stagnant and in some Member States gradually declining. The main cause of this 30-year trend is the development of television and more recently video. A trend exists towards European co-production in film making to reduce costs and expand the potential market.

## *Market Structure*

There is very little information available about the market composition of audiovisual services. By far the largest demand for television broadcasts comes from the private consumer, although there is some demand from both the schools and higher education market. Television broadcast advertising might also be aimed at the commercial market. Teletext is likely to have a much wider market, encompassing all types of information consumers. Similarly, video broadcast has a wider range of applications in the corporate and public sector, for example for training purposes. Satellite and cable broadcasts are mainly aimed at the private leisure market but other applications may emerge as the sector develops.

### **Belgium**

Television broadcasting is divided into Flemish and French speaking language groups with separate organizations, each operating two national channels. Broadcasting is under government monopoly control, although Belgian viewers have access to nine foreign stations. TV advertising has been approved in principle for both language areas and some advertising is already shown on the French speaking channels. Commercial channels are planned for the near future. There is a slow acceptance of commercial satellite broadcasting, whilst cable penetration, which stands at 90% of households, is the highest in the EC.

The principal markets for Belgian producers of both cinema and television are in Europe, with 99% of all production bought by European distribution and broadcasters. The remaining 1% is exported to the rest of the world.

### **Denmark**

Radio and television broadcasting is under the monopoly control of a public corporation, although in 1986 it was decided to introduce a second, partly commercial channel financed

mainly by advertising revenue. There is general dissatisfaction with the quality of Danish broadcasting (despite a licence fee amongst the highest in the EC). Growth of cable and satellite television is slow, although over 50% of homes have access to cable. Strong pressure exists from commercial organizations to allow greater access to the Danish market.

Danish producers sell 88% of their cinema productions and 95% of TV production in Europe; 1% is exported to the US and Canada and 4% to the rest of the world.

### **Germany**

German broadcasting is under the control of regional governments via Radio and Television Boards and Programme Advisory Boards. Funding is mainly by licence fee with some commercial advertising. New media are under the tight control of Deutsche Bundespost and cable and satellite penetration is low with only around 5% of viewers connected to cable networks. The devolution of control to the 11 *Länder* has hampered agreement on satellite transmission.

German cinema and TV production is mainly sold to European distributors and broadcasters. 82% of all production is sold in Europe, 9% to the US and Canada and another 9% to the rest of the world.

### **Greece**

The two national channels in Greece are under direct government control. Broadcasting has a high foreign content and many viewers prefer to access foreign broadcasts where possible.

The producers in Greece sell 97% of cinema productions in Europe; 1% is sold in US and Canada and 2% in the rest of the world. Virtually all Greek television production is sold in the European market.

### **Spain**

There are two national TV channels in Spain, run by a State-owned organization. Most funding is by advertising (around 90%), with some contribution from the State budget. Plans exist for three new channels. Spain could prove to be an important market for satellite broadcasters as it possesses a large expatriate community, particularly of German and British origin.

No figures are available regarding the source of income from various markets for Spanish cinema production. Spanish television producers realize 47% of their overall income from European markets, 13% from the US and Canada and 40% from the rest of the world.

### **France**

Until the privatization of TF1, French broadcasting was under monopoly ministerial control. The trend is now towards greater liberalization with decentralized programm-

ing (there are five national television channels). Funding is through licensing and advertising. There is also a network of regional and local radio stations (both public and commercial). France has one of the lowest cable penetration rates in the EC and despite national plans and local "experiments", progress continues to be slow.

Producers in France sell 51% of their cinema production to Europe, 18% to the US and Canada and 31% to the rest of the world. Production for television is largely exported; only 25% is sold to European broadcasters, 11% to the US and Canada and 64% to the rest of the world.

### Ireland

Irish broadcasting is under the control of a semi-State organization, Radio Telefis Eireann, and is funded by a combination of licence fee and advertising revenue. Commercial television and television advertising is limited in terms of content and time. In 1986 some progress towards liberalization took place to meet the demands of cable and satellite operators. Ireland has the fourth highest degree of cable penetration in Europe (55% of all households).

All cinema and television production in Ireland is sold in the European market.

### Italy

Italy has a combination of State-owned and private TV broadcasters. Private television is the most deregulated in the EC. Funding is through licence fee and advertising. The wide availability of conventional TV channels has inhibited the growth of new media in Italy.

Italy is a major exporter of cinema and television production. The breakdown of sources of total income in Table V illustrates this position.

**Table V**  
**% of Total Income of Italian Producers**

|        | Europe | US & Canada | Rest of the world |
|--------|--------|-------------|-------------------|
| Cinema | 34     | 25          | 41                |
| TV     | 60     | 27          | 13                |

Source: PMM.

### Luxembourg

Luxembourg has a fully-fledged commercial TV and radio broadcasting sector. It also has very high cable penetration and therefore represents only a small market for satellite broadcasters.

### Netherlands

Broadcasting is under the control of a government department, but access to airtime is granted to specific groups of the

population under certain conditions. There are three national channels, although numerous foreign channels are available. Funding is mainly by licence fee, advertising providing only around 12% of revenue. However, commercial radio and a commercial TV channel are planned. A high degree of cable penetration exists and a pay-TV network, Film-Net.

The Dutch producers export some productions; 5% of all income from cinema productions is from the US and Canada. All other income comes from the European market.

### Portugal

Portuguese TV broadcasting is still under State monopoly and there is only one national channel. Cable penetration and satellite receiving facilities are at a low level. Funding is by licence fee and advertising revenue.

No information is available regarding source of income from Portuguese productions.

### United Kingdom

In the UK, there are four channels operated by two national broadcasting organizations, two commercial channels (organized on a regular basis by forming a national network) and one public corporation with two channels. Companies are required by law to educate, entertain and inform. The public corporation channels (BBC1 and BBC2) are funded through licence fees, and the commercial channels ITV and Channel 4 through advertising (Channel 4 is wholly financed by a levy on ITV receipts). The regulatory framework for cable development is relatively liberal with 20 pay cable franchises granted. Fewer than half are currently operating and there are doubts about the viability of large-scale networks. Satellite reception is also relatively unregulated and the "home satellite" and hotel market has grown strongly. Currently, it is primarily restricted to the cable market and a DBS service providing three channels is at the planning stage. UK producer income is shown in Table VI.

**Table VI**  
**% of Total Income of UK Producers**

|        | Europe | US & Canada | Rest of the world |
|--------|--------|-------------|-------------------|
| Cinema | 24     | 53          | 23                |
| TV     | 21     | 56          | 23                |

Source: PMM.

### Internationalization

Programmes are generally provided abroad by direct sale to a foreign broadcaster or else by co-production with a foreign broadcaster. There are few examples of broadcasting organizations establishing themselves abroad because of the degree of regulation in most countries. DBS offers the ability

to transmit programmes across borders directly and may become an important means of international broadcasting on a large scale in the future.

The trend amongst European programme makers is to co-produce programmes with other national broadcasters in order to share the costs and broaden the market for their output.

The most lucrative markets outside the EC are the USA and Canada. The only EC countries which have found a significant market outside the EC for their programmes are the United Kingdom, France, Italy and Spain.

European broadcasters import a substantial portion of programmes from outside the EC, mainly from America, but also from Australia and Canada. Table VIII gives an indication of the composition by origin of material broadcast by the major European TV channels.

For fiction programmes, the proportion of imports is very much higher, typically only around 20% being produced domestically, and up to 50% of programmes imported from the United States.

### *Relationship with the USA and Japan*

Broadcasting in the United States is much more commercially orientated than in the EC and broadcast media are far less re-

stricted than in the latter. Cable and satellite are also at a much more advanced stage after considerable growth in the 1970s. The market now appears to have reached saturation point with emphasis being placed on increasing audience size within existing networks (of which there are around 5 750). Television viewing, measured by average hours viewed per head per day, is higher in the US than in any of the EC States.

Broadcasting in Japan is highly regulated. The broadcasting and satellite environment is, however, more stable than in Europe because of a lower degree of political involvement. There have been difficulties in the relationship between the EC and Japan in the field of hardware (particularly VCRs) following accusations of dumping.

## Forecast and Outlook

In the field of conventional broadcasting new opportunities are opening up as the trend towards deregulation and commercialization gradually continues. In some cases, however, there are doubts as to whether advertising revenue will be able to sustain new stations, particularly for single country broadcasters. The difficulty facing a new investor (particularly if foreign content of programming is limited) is in developing a large market, thus stimulating advertising revenue and reducing unit costs.

**Table VII**  
**Principal Markets of EC Producers**

| (% of total income) |        | Europe | USA & Canada | Rest of the world |
|---------------------|--------|--------|--------------|-------------------|
| Belgium             | Cinema | 99     | -            | 1                 |
|                     | TV     | 99     | -            | 1                 |
| Denmark             | Cinema | 99     | -            | 1                 |
|                     | TV     | 95     | 1            | 4                 |
| Germany             | Cinema | 82     | 9            | 9                 |
|                     | TV     | 82     | 9            | 9                 |
| Greece              | Cinema | 97     | 1            | 2                 |
|                     | TV     | 100    | -            | -                 |
| Spain               | Cinema | N/A    | N/A          | N/A               |
|                     | TV     | 47     | 13           | 40                |
| France              | Cinema | 51     | 18           | 31                |
|                     | TV     | 25     | 11           | 64                |
| Ireland             | Cinema | 100    | -            | -                 |
|                     | TV     | 100    | -            | -                 |
| Italy               | Cinema | 34     | 25           | 41                |
|                     | TV     | 60     | 27           | 13                |
| Netherlands         | Cinema | 95     | 5            | -                 |
|                     | TV     | 99     | -            | 1                 |
| Portugal            | Cinema | N/A    | N/A          | N/A               |
|                     | TV     | N/A    | N/A          | N/A               |
| United Kingdom      | Cinema | 24     | 53           | 23                |
|                     | TV     | 21     | 56           | 23                |

Source: European Institute for the Media.

**Table VIII**  
**Country of Origin of Première Programmes**

| (% of total transmissions) |           | Domestic | Other EC | US   | Other |
|----------------------------|-----------|----------|----------|------|-------|
| Belgium                    | RTBF      | 81.7     | 11.6     | 5.4  | 1.3   |
| Germany                    | ARD       | 73.0     | N/A      | N/A  | N/A   |
|                            | SAT-1     | 50.7     | N/A      | 21.0 | N/A   |
|                            | ZDF       | 67.7     | N/A      | N/A  | N/A   |
|                            | DR        | 60.1     | 27.0     | 11.3 | 1.6   |
|                            | Music Box | 10.0     | 60.0     | 30.0 | -     |
| Italy                      | RA1       | 80.1     | 6.9      | 12.0 | 1.0   |
| Luxembourg                 | RTL-Plus  | 48.6     | N/A      | N/A  | N/A   |
| United Kingdom             | BBC1      | 72.0     | N/A      | 24.0 | N/A   |
|                            | BBC2      | 86.0     | N/A      | 9.0  | N/A   |
|                            | ITV       | 80.5     | 5.7      | 13.8 | N/A   |
|                            | Channel 4 | 73.0     | 5.0      | 12.0 | 10.0  |

Source: European Institute for the Media.

In the field of new media the situation is similar but with considerably greater uncertainty. Initial investment is high and pay-back periods long, and demand in Europe has not taken off as rapidly as expected. Despite the relative success of certain companies, some, such as Sky Channel, are reporting heavy losses and there have been failures as well as mergers

in other parts of the market (such as World Public News in Belgium).

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