SOCIAL EUROPE

Information technology and social change in Spain and Portugal

SUPPLEMENT 1/87

COMMISSION OF THE EUROPEAN COMMUNITIES

DIRECTORATE GENERAL FOR EMPLOYMENT, SOCIAL AFFAIRS AND EDUCATION

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EDITORIAL

This Supplement is entirely devoted to the social aspects of technological development in Spain and Portugal. It is the first time that the new Member States of the Community are covered in the surveys that SOCIAL EUROPE publishes regularly on the social implications of new technologies. In view of the specificity of the technological situation in the two countries, and of the social environment and problems peculiar to each of them, we thought it would be preferable to provide a background description of the socio-economic structure of the information technology sectors in Spain and Portugal, as a preliminary knowledge to the monitoring of ongoing changes. This is the purpose of this Supplement, which is consequently broader in scope than our usual reporting on new technology and social change.

Some common features characterize the information technology sectors in Spain and Portugal, besides the obvious differences due to the size and different composition of the manufacturing sector in the two countries. They can be related to the fact that both countries are relative latecomers in technological development, and that technology has largely been imported in the past, or introduced by multinational firms. Moreover, both countries are facing at the same time the problem of catching up with new technologies, and the problem of restructuring a large sector of mature industries. The coexistence of these two problems is probably more acute than in other European countries, due to the long period of isolation which both the Spanish and Portuguese economies have experienced in the past.

Similarly, in the social field, labour market regulations and institutions are relatively new in both countries, due to the fundamental changes in their political structures, and yet are already facing the problems brought about by massive unemployment and by the necessary shifts of the workforce from mature to more advanced industries.

In the last few years, both countries have introduced a number of Research & Development and industrial programmes specifically addressed to the information technology sector, which present several similarities with ongoing programmes in the other Member States. In the social field, it appears from the texts presented here that the research and analysis of the social consequences of new technologies has so far received more attention in Spain, while in Portugal research has focused mostly on technical aspects. Collective negotiations on the introduction of new technologies are reported to be at a very initial stage; nevertheless, the positions developed by the two sides of industry and the claims put forward by the trade unions present a number of similarities with what is going on in the other European countries.

The reports presented in this Supplement provide a background description of government policies, the positions of employers and unions, the social implications, and sectoral experiences in information technology. On each aspect, the present situation is put into perspective by a short description of the recent historical developments. Some references to the general institutional framework, e.g. as concerns labour market institutions and legislation, are also provided, in order to help the understanding of the specific problems arising in the new technology sectors.

SOCIAL EUROPE hopes that this Supplement will provide a small contribution to a better knowledge of the social situation in Spain and Portugal, and some useful references for those concerned with the social implications of technological change in other countries.

Jean DEGIMBE

INFORMATION TECHNOLOGY AND SOCIAL CHANGE IN SPAIN*

I. INTRODUCTION

This first report on the situation with regard to the introduction of new information technologies in Spain and their repercussions on employment and general working conditions in that country concentrates on those more general aspects which might be considered most representative of the Spanish experience.

Spain's recent entry into the European Economic Community and the relative lack of familiarity with the circumstances and peculiarities of the situation in Spain - brought about by Spain's lengthy isolation - make it necessary to make the social and institutional context quite clear. Thus, in each section we shall make such references to history and institutions as we consider necessary for a better understanding of the situation.

The remarkable degree of industrialization achieved in the sixties ("the Spanish economic miracle") was based on both large-scale input of foreign capital, mainly from North America, which, apart from direct investment, brought with it new technologies and managerial techniques, and on the survival of a deeply ingrained protectionism in various fields and enterprises controlled by national capital. All this took place in a social and political framework whose mainstay was an authoritarian State that controlled the extent of the changes and developments that occurred at that time.

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In Spain, the financial crisis of the mid-seventies had to be faced by an economy suffering from great tensions and structural difficulties resulting from the changing bases of the political and institutional system.

From the point of view of this report, it is of interest to underline two essential features of the present economic and social structure in Spain: on the one hand, very great technological dependence, and, as a result, great disparities between different sectors and different companies in the same sector, from the point of view of levels of technology, organization and working conditions; on the other hand, the peculiarities of the system of labour relations in Spain, marked by forty years when political and trade union freedoms were extremely restricted.

The incorporation of new technologies and the social response to technological change were decisively influenced by these socio-economic conditions.

II. GOVERNMENT POLICIES

II.1. Promotion of R&D and Industrial Policy

II.1.1. General Framework of Innovation Policy in the Sixties and Seventies

II.1.1.1. Introduction

Although a well-known fact, it is still worth remembering how late Spain began its industrialization process and how much science and technology were out of step with it. Indeed, when many European countries were in the middle of the industrial era in the 19th century, the said process in Spain only constituted a minor precarious feature, of an economy that was predominantly agricultural. At the same time, Spanish science was following a pattern of development that, despite occasional flashes and moments of brilliance, was also generally behind and increasingly more and more out of tune with the needs of the country.

When, at the end of the 19th century, international economic changes began to impose a more outward-looking economy, the Spanish economy began to seal itself off in such a way that even the attempts at economic liberalism of several years earlier were nipped in the bud. This protectionism took place at the same time as the loss of the remaining colonies and as the rise of economic nationalism which was to mark the history of Spain in the first half of the 20th century.

During the nationalistic phase, there were major attempts to industrialize the country, with definite aims of replacing imports and protecting the national market, a policy that was to be favoured by international and internal crises such as the two world wars, the great depression and the Spanish Civil War.

From the point of view of scientific and technological development, the overall situation did not change substantially, especially with regard to the lack of contact between science and production. Thus, it could only fall back on foreign technology and technologists to carry out more ambitious industrial projects[1], as any national capacity for innovation was extremely limited.

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1 See J. BRAÑA, M. BUESA and J. MOLERO: "El Estado y el cambio tecnológico en la industrialización tardía: un analisis del caso español". Fondo de cultura Económica, Madrid, 1984.

II.1.1.2. Fast development and technological policy

This historical framework gives us some insight into the problematical technological situation in Spain when, in the sixties, unprecedented economic expansion and a rapid process of industrialization were taking place. On the one hand, the situation as regards science and technology was to deteriorate and, on the other, the need to bring in technology from outside in order to facilitate growth, the speed of which could not be compared to that of almost any other European country, was to become much greater. Let us consider this in greater detail.

As far as the general picture of science and technology is concerned, the characteristics which most clearly defined it were a considerable lack of resources and all-round disorganization. The lack of resources is clearly illustrated by the fact that, in Spain, between 0.2 and 0.3% of th GNP was assigned to R&D in the second half of the sixties, when international bodies were recommending that the percentage should be over 1%. It is not surprising that the OECD classified Spain in the group of countries belonging to the organization which had a weak R&D programme and a low level of research, placing the country in the same bracket as Greece, Ireland and Portugal[2].

There is great evidence of the lack of organization, viz:

i) a general lack of planning or coordination;
ii) an excessive proliferation of bodies or centres with the right to make decisions on R&D policies;
iii) excessive bureaucracy and inefficiency in public research centres;
iv) poor research and out-of-date organization in the universities;
v) absence of contacts between public research centres, the universities and firms;
vi) very limited attention to science and technology in the State Budget.

2 See OECD."Profiles des ressources consacrées à la recherche et au développement experimental dans la zone OECD, 1963-1971". Paris, 1975.

Consequently, it is not surprising that the OECD put forward the need for a substantial change in Spanish science policy since the conclusions they came to on studying it were extremely disheartening[3].

The Spanish Administration took practically no effective measures to deal with this situation. Indeed, in the three development plans that were drawn up (1964-1967, 1968-1971, 1972-1975), the concern for science policy never went beyond good intentions, and, in some cases, a good diagnosis of the situation, but, when it came down to real priorities, in terms of budget allocation, the situation showed that there was a clear lack of political resolve to deal with the problem[4].

This discouraging panorama did not look any brighter from the point of view of R&D activities developed by companies. The situation can be summarized as follows[5]:

i) very few companies had R&D programmes;
ii) the companies possessed little equipment;
iii) a very small proportion of sales related to R&D;
vi) expenditure on R&D was more or less limited to a very few companies in each sector;
v) very little stimulus and official means of support were in evidence;
vi) there was an absence of risk-capital companies;
vii) there were massive imports of foreign technology.

Such a precarious situation was the result of the type of development which had been prevalent in Spain in the first half of the twentieth century. However, it did not seem to be consistent with the economic and industrial level that the country was gradually reaching - a fact that was systematically pointed out by scholars, international bodies and even by some members of the Administration.

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3 The report is OECD, "Politicas nacionales de la ciencia: España", 1971. On this subject see also the work of J.F. LOBO, "Politica científica y desarrollo económico, 1959-1979", Información Comercial Española, n° 552, pp 35-46, August, 1979.

4 See J.F. LOBO, IDEM, pp 39-42.

5 See J. MOLERO:"Tecnología e industrialización", Pirámide, Madrid, 1982, and BRAÑA, BUESA and MOLERO, op. cit., 1984.

The first measures directed at promoting technological innovation in companies were a result of this concern. In the sixties, the policy instruments for promoting increased company efforts at innovation were set up, namely, the Research Associations (Asociaciones de Investigación) and the "Fondo Nacional para el Desarrollo de la Investigación Científica" - FNDIC.

The Research Associations were created in 1961 with the purpose of "fostering the development of research in industry which could lead to an improvement in production and technoloy" (introductory section of Decree 1765/1961). The said associations were to be formed by companies working in the same field of activity and who were interested in joint development of scientific and technical research programmes. The State was to support these Associations by subsidies of up to 50% of the expenditure programmed and by giving tax relief for a period of between three and ten years.

In 1983 there were thirty of these associations covering very diverse branches and fields of activity[6] and each one of them included a very large number of companies from the same sector.

To mark the twenty-fifth anniversary of the foundation of the "Consejo Superior de Investigación Científica" - SCIC, the "Fondo Nacional para el Desarrollo de la Investigación Científica" - FNDIC was created in 196C which initially had the specific task of providing special resources for public research centres and private non-profit-making centres.

However, the interesting thing here is the fact that, as time went on, the FNDIC was also to become responsible for financing R&D activities in companies. Indeed, in 1968, the idea of "Concerted Plans" was introduced, according to which R&D projects in companies would be financed and these "Concerted Plans" would become a source of encouragement, inasmuch as they offered financing on good terms, and, in certain circumstances, the credit granted could become a subsidy.

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6 CAICYT: Memoria 1983, Dirección General de Politica Científica, Madrid, 1985.

Since then, these plans have been modified and, in theory, they are now an important means of promoting company R&D. In practice, however, there are a number of factors which have substantially undermined the effectiveness of the said instrument, the principal examples being:

1. a limited amount of money in the FNDIC, which meant that, although a large part of this money[7] was given over to the Concerted Plans, up until 1980 it was never more than PTA 800 million a year;
2. a lack of a system of priorities for the allocation of these resources;
3. very little follow-up of the results of research carried out.

In view of the foregoing, it seems clear that the situation as regards technological innovation in the period of the greatest expansion of the Spanish economy was quite precarious and that a systematic policy that tried to deal once and for all with this major structural defect in Spanish industrialization did not exist. Taking all this into account, it is not surprising, then, that technological innovation has been achieved by importing a very large quantity of technological equipment and services from abroad.

This is not really the place to explain the variety of means by which foreign technology was incorporated, since it is an extremely complex matter and it would require very complex treatment. We will basically refer to some factors connected with the importing of unincorporated technology, but, first, we would like to make one or two points[8].

Firstly, a large part of this technology arrived in Spain in the form of machinery and equipment that was imported hurriedly because of the needs of industrialization and because there was no way in which national industry could adequately satisfy the demand.

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7 There are no figures available for the breakdown of money between the various activities of the "Fondo Nacional para el Desarrollo de la Investigación Científica", so that the part that corresponds to the Concerted Plans fluctuates very much from year to year. For a study on the subject, see: FNDIC, "Memorias Anuales", Presidencia del Gobierno, Madrid, different years. An analysis of all this can be found in MOLERO, op. cit., pp 77-82, 1982.

8 A summary of this process and some statistical information can be found in MOLERO, "Foreign Technology in the Spanish economy: an analysis of the recent evolution", Research Policy, Vol. 12, nº 5, 1983. For foreign investment, the book by J. MUÑOZ, S. ROLDAN and A. SERRANO,"La internacionalización del capital en España", Edicusa, Madrid, 1978, is essential.

The other basic fact was the growing presence of foreign capital that monopolized top positions in the most dynamic branches of Spanish industry, such as chemicals, motors, rubber and plastics, glass, important areas of the food and drink industry, etc. Over and above the other important consequences that this had for the Spanish economy, it is important to emphasize the arrival of technological kow-how via foreign companies, which was to lead to the well-known arguments as to the positive and negative effects of these investments.

The principal mechanisms for acquiring unincorporated technology were technological transfer contracts. To illustrate the problems associated with these, we should refer to what could be called the direct and indirect contracting costs. For direct cost we can simply look at the growth in dollars of technological payments to other countries:

Technological payments made to foreign countries by the Spanish economy.
(millions of dollars)

Year	Payment
1960	19.1
1962	23.4
1964	56.1
1966	96.9
1968	101.2
1970	133.8
1972	199.6
1974	313.8
1976	468.5
1978	398.0
1980	617.7
1982	706.0
1984	849.0

Source: Balance of Payments

By sector, the payments were heaviest in food, chemicals, electrical machinery, vehicles, electricity, etc., i.e. in those sectors which have had a dynamic role of special importance in Spanish industrial expansion.

Although direct payments constituted a major problem, there is no doubt that the costs associated with the conditions under which technology was acquired and which could fall under the heading "restrictive clauses" in the contracts was an even greater problem.

In this situation, the attitude of the Spanish authorities was of general permissiveness until 1973 when, following the example of some Latin American countries and some less developed European countries, a system for controlling the technological transfer contracts was set up[9].

The legal framework was established in Decree 2.343/1973, the Directive of 5 December 1973 from the Ministry of Industry, which amplified the previous Decree and the Directive of 30 July 1981, which amended the former.

A "Registro de Contratos de Transferencia de Tecnología" (Register of Technological Transfer Contracts) was created as the basis of control since the acceptance of the registration of a contract in the "Registro" was at the discretion of the Administration, according to the clauses it contained.

This policy was criticised for various reasons, such as the red tape involved and the excessive "power of discretion" of the Administration. However, the interesting thing here is the fact that it has not fulfilled its objectives which were, according to Article 9 of the 1973 decree, to obtain "a clearer view of the market for the acquisition of foreign technology" and to use the information acquired to direct national research programmes "towards the objectives of complementing and perfecting technology in line with the technology which is being purchased"[10].

It is difficult to sum up all the reasons for the ineffectiveness of the policy adopted but we believe that two general factors were decisive: on the one had, the fact that the information held in the "Registro" was not used to discover the characteristics of the

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9 The background to this policy is covered in M. BUESA: "El marco institucional de la importación de tecnología en España: un analisis del registro de contratos de transferencia de tecnología", ESTE. Estudios Empresariales, nº 60, 1985.

10 M. BUESA, op. cit., p. 7, 1985.

technology imported, and, on the other, its subsequent assessment[11]. Moreover, there was a striking lack of contact between the institutions in charge of innovation policy and those who were to give some direction to the acquisition of foreign technology.

II.1.2. Recent economic changes and reconsideration of the policy for the promotion of technological innovation

The profound socio-economic changes which have taken place in the international economy since 1973 have had a greater impact on Spain than on the more advanced Western European countries, due as much to Spain's economic peculiarities - a less consolidated industrial structure, specialization in sectors which are in recession, great energy dependence, etc. - as to its political and social situation, which is the product of a different political régime, and the changes of all kinds that this has brought about.

The most important consideration as regards industrial policy is the need to adapt to the new reality of economic recession, and membership of the European Economic Community. Thus, despite the fact that there was a long delay in the adoption of adjustment measures, the priority objective has been industrial restructuring aimed at adjusting production capacity to international markets, bearing in mind the fact that Spain has become a member of the EEC.

Within this reality of great industrial crisis, the problems of Spain's technological dependence become doubly clear: on the one hand, it is obvious that one of the reasons for Spain being in a worse situation during the recession is precisely its weak technological situation, since its companies have not been so prepared to face competition. On the other hand, the new industrial prospects that are appearing as possible ways out of the recession in more advanced countries mean that there is inevitably a generalized incorporation of technological progress in the productive system and, here again, the situation in Spain is in no way suited for such a delicate change.

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11 Practically the only use of the "Registro" at a public level was the publication of very brief information in the journal of the Ministry of Industry and Energy: "Economía Industrial".

In this context, what direction does the policy of promotion of company innovation take? There are two very important factors: national promotion, with the creation of the "Centro para el Desarrollo Tecnológico e Industrial" - CDTI and the increase in imports of foreign technology. Only recently has there been a more active policy of promotion of new technolcgies, to which we shall return at the end of this section.

The creation of the "Centro para el Desarrollo Tecnológico e Industrial" - CDTI in 1977 was an important milestone in the establishment of a more coherent State policy to cope with the serious problem of Spain's backwardness from the point of view of innovation. Indeed, the all-round ineffectiveness of the previous indecisive policies had resulted in a need to define promotion policy more clearly and to find a more effective instrument of action. Thus, in collaboration with the World Bank, the CDTI was set up with the following principal aims:

1. to encourage and promote technological development in Spanish industrial production;
2. with this end in view, to perform the following tasks:
   i) to determine in which processes and products there was room for innovation and technological development;
   ii) to control work and studies relating to research, development and engineering which correspond to the projects necessary for establishing specifications and the acquisition of prototypes for the processes and products mentioned above;
   iii) to promote industrial development of technologies that have been developed at the company's own initiative or by other public or private centres[12].

From the outset, the CDTI had a clearly specialized mission since it concentrated on the technological development of products and processes, without moving into other fields of investigation. The means of support that this entity offers industry to help it reach its objectives are:

1. financial participation in Industrial Innovation projects;
2. financing so that foreign technology can be absorbed;

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12 CDTI: "Como actua el CDTI", Leaflet CA-1, Madrid, 1979.

3. investigation of public and private markets with a view to promoting national technologies;
4. promotion of technological innovation of common interest to one sector;
5. participation in special programmes of strategic interest;
6. participation in market studies and technological forecasting;
7. programmes designed to make small and medium-sized enterprises more dynamic in technological terms;
8. exploitation of patents, innovations and technologies;
9. regional technological support programmes;
10. information and documentation services.

As we can see, this is a long list of possibilities and objectives which give the CDTI a somewhat novel character in comparison with similar international projects. Moreover, a predominance of medium-sized projects aimed at smaller enterprises can be appreciated in the general lines of the CDTI. We should mention the fact that, during the initial stage of its activity, the CDTI supported information-technology-related activities, although no more so than other activities, such as the building of machinery and equipment[13]. More recently, and as technology has become more important, the CDTI has also increased the support given to this type of technology.

As far as buying foreign technology is concerned, it is increasing substantially in every respect[14]. Indeed, imported equipment is increasingly covering the national demand for capital goods; two thirds of the total, in fact. Direct foreign investment has grown steadily while there has been a decrease in local investment in production. Lastly, transfer contracts continue to increase at a high annual rate, reaching more than 700 annual registrations in the eighties and late seventies, compared to 600 a year in the first half of the seventies and about 350 a year in the sixties.

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13 According to the report covering the period 1978-1981, the area of projects most relevant to our study is that of the manufacture of electronic equipment (20% of the projects put forward fell into this group) and the construction of electrical machinery and equipment (8% of projects). See CDTI: "Memoria 1981 de carácter extraordinario", Madrid, 1982.

14 J. MOLERO provides a detailed analysis of this phenomenon and some revealing data on the subject. 1983.

Although there is no specific policy to this end, there has been a spontaneous response in that, in a climate that is very favourable to new foreign investments, foreign technology has been sought as much in relatively new sectors (electronics, banking, etc.) as in sectors that were already dominated by foreign interests (cars, electrical machinery, etc.).

The internal and external contexts are very complex and the technological challenge that faces Spanish companies is reaching a point of no return, since people are becoming aware of the fact that a qualitative change in the situation inevitably depends on considerable progress as regards this substantial parameter of the Spanish production system.

There is no doubt that there is an especially sensitive attitude towards these questions in society at large and within the political classes, and a new idea of the role of the policy of promoting technological innovation is beginning to emerge; this applies more generally to the role of progressive technologies in defining a new type of industry that can compete in a difficult international context, which, in the case of Spain, is very closely identified with Spain's accession to the EEC and with the need to abandon traditional mechanisms of economic protection.

II.1.3. More recent activities in the field of innovation promotion

While those previously mentioned continue to exist, in recent years new instruments have been created and/or old instruments reshaped, as a result of the increasing awareness that we mentioned. Action can be divided into two stages: the first stage when the increase in partial or sectorial measures was fundamental, and the second more recent stage of more all-round action in the promotion of R&D in connection with the re-industrialization policy.

Because the picture is complex and, on occasion, confused, in this report we shall restrict our attention to the most dominant features and areas.

II.1.3.1. Partial actions in the field of innovation policy

One of the first lines of action consisted in modifying certain legal instruments that constituted obstacles for those companies wishing to take on R&D tasks. In this connection, we would particularly emphasize the areas of taxation and financing.

With regard to taxation, it should be born in mind that the starting point was a system that did not provide any incentive for companies to carry out their own R&D programmes and encouraged the importing of technology[15]. This situation was initially addressed by the introduction of a new company tax (Law 61/78 and directive, February 1979) which established similar treatment for companies own innovations and for the import of technological know-how. The 1983 law on restructuring confirmed and extended such favourable treatment of companies' own efforts at innovation.

The financial angle is considered in nearly all the instruments of promotion. Special reference can be made to the encouragement that they wish to give to risk-capital companies, which are in fact not very numerous in Spain. The most specific action was the creation of the "Empresa Nacional de Innovación" (National Innovation Board), in which companies with technological bases participate. More recently other measures have been put forward, such as a specific stock-market system for these companies.

Amongst the reform measures for existing instruments, it is worth mentioning the attempt at establishing guidelines for priorities which was one of the activities of the "Comisión Asesora de Investigación Científica y Técnica" - CAICYT (Advisory Commission for Scientific and Technical Research). Indeed, by means of a resolution of 28 May 1981, the State Secretariat for Universities and Research set up the "Special Programme for Research and Development" (Programa Especial de Investigación y Desarrollo) - (BOE 29th June 1981), which was defined as "a coordinated and systematized set of technological research and development projects with a common end".

15 See J. MOLERO, op. cit., 1982.

The projects which form part of the "Special Programme for Research and Development" would have the degree of preference that is indicated by the Interministerial Programming Committee (Comité Interministerial de Programación) in receiving aid, subsidies and credit, which would be managed by the CAICYT, and in the procurement of funds from the budgets of those Ministries that proposed the Special Programme or became involved in it.

Of those which have come into operation, the most important from the point of view of this report is Microelectronics.

Moreover, new instruments have appeared which are trying to make the situation in previously rather neglected areas more dynamic. Examples of what we are referring to are the "Ley de Reforma Universitaria" - LRU and the "Plan Electrónico e Informático" - PEIN.

The importance of university reform is still difficult to assess, but it almost certainly sees research and the universities' role in research from a new angle.

The PEIN has a very important place within the measures that affect the different sectors.

One of the four basic objectives of the PEIN is "a gradual reduction in the degree of companies' technological dependence on foreign firms by increasing the spread of technology within the country"[16].

In order to fulfil its objectives, the PEIN is divided by sector into general action and eight plans for subsectors (Microelectronics, Consumer Electronics, Electronics for Defence, Industrial Electronics, Electronic Components, Telecommunications, Computer Science and Electromedicine) and four horizontal actions (Research and Development, Technological Diffusion, Industrial Implantation and Public Purchasing). We will now briefly explain the first two actions of the latter group.

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16 c.f. Medium-term Economic Programme 1983-86. "Plan Electrónico e Informático Nacional", Ministry of Industry and Energy, Madrid, p. 6.

R&D in the PEIN

Conviction about the importance of the matter led the planners to devote special attention to intensifying efforts in the field of technology "by encouraging the transfer of the most advanced technologies and taking measures to increase expenditure on R&D in such a way that will allow us to be situated at a reasonable distance from the countries that are in possession of the most advanced technology in the sector of electronics"[17].

To this end, the following measures were drawn up:

i) provision of incentives for company R&D (favourable treatment with regard to taxation, subordination of State aid to the prior existence of R&D plans).

ii) increased allowances in the budget for R&D in the electronics sector ("Comisión Asesora de Investigación Científica y Técnica" - CAICYT, Advisory Committee on Electronics and Computer Science; "Centro para el Desarrollo Tecnológico e Industrial" - CDTI, Centre for Technological and Industrial Development);

iii) planning of specific measures: a national centre of microelectronics;

iv) adoption of a policy of public purchasing for the promotion of prototypes.

Technological Diffusion

In view of the difficulties encountered by many companies in gaining access to technological information, it was decided that a "Red Integrada de Servicios de Electrónica" - REDINSER (Integrated Network of Electronic Services), should be set up to provide companies with access to these techniques.

This network should develop the following services and activities:

a) Subsidized development of systems and products.

b) CAD/CAM Programme.

c) Custom and Semicustom Programme.

d) Robotics Programme.

e) Information and Documentation Services.

f) Training and Information activities.

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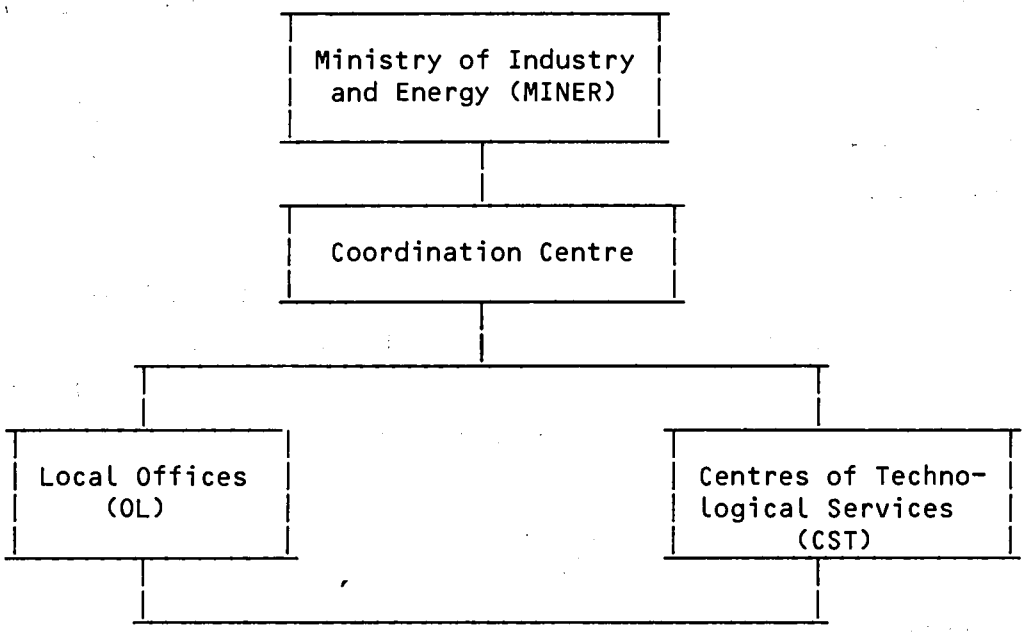
17 Idem (FN 16), p. 128.

The network's basic working structure will be as follows:



More recently a more all-round approach to the State R & D promotion policy has emerged. Three factors can be considered fundamental in this respect: the policy of industrial promotion and reindustrialization, the Law on the Promotion and General Coordination of Scientific and Technological Research (Ley de Fomento y Coordinación General de la Investigación Científica y Técnica) and participation in international research programmes.

Law 27/1984 on Restructuring and Reindustrialization (Ley sobre Reconversión y Reindustrialización - BOE 28th July 1984) was the instrument that marked a turning point in industrial policy, and, implicitly, in the way of viewing technological policy. The important thing was that it was directed at trying to establish a new framework for industrial promotion of a type that is conductive to industrial recovery, once the main objectives of the adjustment policy previously undertaken are reached.

Some of the measures it advocates relate to taxation and financing, but the greatest innovation lines is the fact that it devotes special attention to the promotion of technological innovation, laying stress on the reorganization of the "Centro para el Desarrollo Tecnológico e Industrial" - CDTI, which becomes a public body in order to make its

legal basis more suited to the type of activities it will be performing. In this new phase, the CDTI will pay greater attention to projects relating to information technology. In point of fact, in 1984, 29 out of 89 projects approved (32.58%) were in the Electronics-Computer Science sphere and received PTA 1,609 million (39.69%) of the total of PTA 4,054 million that the CDTI had allocated to the set of projects passed[18].

This line of action was made more concrete in the White Paper on Industrial Promotion (Libro Blanco de la Promoción Industrial - Ministerio de Industria y Energía, Madrid, 1986). The idea is to make three basic aims compatible: the promotion and development of new firms, modernization and technological renovation and a greater integration of Spanish industry in international markets. Table II.1. shows the principal measures that are contemplated; the plans for the development of the PEIN in the field of information technologies are included.

The recent Law on the Promotion and General Coordination of Scientific and Technological Research constitutes a principal component of the new strategy. In fact, as indicated above, one of the basic problems at the institutional level was the lack of a legal framework and of all-round coordination and planning instruments. The new law, however, is intended to remedy this shortcoming by the following means:

1. establishment of a National Research Plan (Plan Nacional de Investigación) and the corresponding plans for different sectors, in which the existing programmes should be incorporated;
2. creation of a General Council to coordinate the activities of the State and the Autonomous Communities;
3. creation of an Advisory Council whose job will be to report to the Interministerial Committee on socio-economic needs and the recommendations of the Scientific Community;
4. creation of the Interministerial Committee for Science and Technology as the entity responsible for the planning, coordination and follow-up of the National Plan;

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18 As is pointed out later, the re-organization of the CDTI had been anticipated in a decree in the last three months of 1983, although it was only finally decided on by Law 27/1984. For CDTI's activities in 1984, see "Informe Anual sobre la Industria Española 1984"; MINER, Madrid, 1985, pp 76-80.

TABLE II.1. INDUSTRIAL PROMOTION POLICY - OBJECTIVES AND PRINCIPAL MEASURES PLANNED

1.Promotion and development of new companies	2. Modernization and technological renovation		3. Integration of industry in international markets
	2.1. Innovation and incorporation of new technologies	2.2. Energy efficiency	
1.New forms of industrial financing (Risk-Capital Companies and Parallel Markets in the Stock Exchange) 2.Services to companies (System of Company Information, Subcontracts etc.) 3.Transformation of the IMPI 4.Simplification of administrative procedures	1.Direct aid to companies for R&D (CDTI,OCIS,etc.) 2.Promotion programmes by sector (PEIN, PAUTA, PROA) 3.R&D programmes by sector (New Materials, Biotechnology, Pharmaceuticals, Energy,etc) 4.Mature sector modernization 5.Coordination of Science and Technology System (Science Law) 6.Industrial Quality System	1.E&D Policy (1) - Transformation IDAE - Subsidies for E&D investment - Drafting of E&D plans (Exploitation of mini hydro-electric power stations, Rural Energy Development, Energy Resources Exploitation). 2.Rationalization of Energy Sector - Creation of REDESA - Creation of ENRESA - Vertical integration of energy subsectors - Transformation of the JEN	1.Instruments to promote exports 2.Encouraging foreign investment through technology transfers 3.Participation in international technical cooperation programmes 4.Promotion of invisibles

(1) E&D = Exploitation and Development.

5. reorganization of Public Research Bodies so as to bring their work more closely into line with the needs of the economy and make them operate with greater flexibility[19].

As a result of the law, many institutions, such as the CAICYT, which will be dismantled and integrated into the Standing Committee of the Interministerial Committee for Science and Technology, will be reorganized. Thus, some time will be needed before the real effects of this law can be assessed.

Finally, we must mention participation in international research programmes. Quite obviously, this is not a new subject, but the fact that Spain has recently joined the European Community has reinforced this participation and there is more incentive to carry out cooperative research. In this sense, Spain's current participation in programmes such as Airbus, the European Space Agency, European Organization for Nuclear Research, or some COST activities, will increase with its participation in other programmes, such as JET, ESPRIT, FAST, COMETT, BRITE, RACE and the Biotechnology Programme.

In many cases the Community programmes coincide very closely with the national programmes previously mentioned. In other cases, steps are being taken to encourage such coincidence, (e.g. National Plan for Nuclear Fusion).

The expectations created by this new framework are undoubtedly great, and both the Science Law and the New Policy on Promotion are trying to respond to this new framework.

Finally, we must not forget that Spain is involved in other areas of technological cooperation whose newly defined status and coordination with the areas previously mentioned is important. Examples of particular interest here are: compensation programmes for the purchase of arms, especially from the USA, which define the possibilities of technology transfer to Spanish firms; and scientific-technological cooperation with South America.

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19 See the text of the "Ley de Fomento y Coordinación General de la Investigación Científica Tecnica" (Law on the Promotion and General Coordination of Scientific and Technological Research) in the "Boletín Oficial del Estado", 18 April 1986.

The latter includes the "Programa de Ciencia y Tecnologia para el Desarrollo: V Centenario - CYTED-D" (Science and Technology Programme of Development - V Centenary). This programme, which deals with areas regarded as of special interest, includes electronics and applied computer science, which incorporate sub-areas such as "digital communication systems" and "flexible manufacturing systems".

II.2. Industrial Policy

II.2.1. Introduction

In the process of industrialization in Spain, the State has traditionally played an important role as the driving force in the creation of new activities aimed at change and in the amplification and diversification of existing activities, so that, either by supporting private enterprise or through the collaboration of public undertakings, much of the growth of the Spanish economy can be attributed to industrial policy from the forties to the present day[20].

From 1963 to the early eighties, this policy was implemented by means of a series of tax and financial arrangements, such as subsidies, official credit at low interest rates and long repayment periods, granted to selected concerns which undertook to carry out the plans drawn up by the public authorities. With this end in view, various laws were passed; their statutory development led to the establishment of a complex framework of industrial policy instruments which encompassed both the regions and the sectors (see Table II.2.) and favoured large scale State activity in the field of promoting industrial investment.

However, these policies were, on the whole, designed to fulfil goals of industrial promotion, and were therefore not suitable for tackling the complex problems posed by industrial restructuring in Spain in the late seventies. For this reason, after a period of indecision during which aid was granted to a small group of enterprises having to contend with serious financial crises, in 1980 the Sectoral Restructuring Plans (Planes de Reconversión Sectorial) began to be applied; later, in 1981 and 1983, various Decrees were adopted as a means of channeling State action in this area.

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20 For a detailed analysis of this subject over the period 1973-1977, see BRAÑA, BUESA and MOLERO, op. cit, second part, 1981.

TABLE II.2. INDUSTRIAL POLICY INSTRUMENTS IN SPAIN
(1963 - 1986)

LEGISLATION	SECTORAL POLICY INSTRUMENTS	REGIONAL POLICY INSTRUMENTS
Law 152/1963 of 2 December	Priority Interest Industries	Areas of Priority Industrial Location.
	Agricultural Industries of Priority Interest.	Areas of Priority Agricultural Industries Location. Estates for Priority Industrial Location. Territorial Industrialization Plans. Craft Protection Areas. Large Areas of Industrial Expansion.
Law 194/1963 of 28 December	Concerted Action.	Poles of Promotion. Poles of Development.
Various specific decrees	Sectoral Restructuring Plans.	
Law 38/1972 of 22 December	Protection of the Environment (Air).	
Law 29/1972 of 22 July	Farmers' Groups.	
Decree 9/1981 of 5 June	Industrial Restructuring Plans.	
Decree 8/1983 of 30 November	Industrial Restructuring Plans.	Areas of Urgent Restructuring.
Law 50/1985 of 23 December		Promotable Areas (*)

Source: our own elaboration
(*) This revokes all previous instruments.

Thus, since 1980, restructuring has been the dominant component of Spanish industrial policy, to such an extent that other promotion policies, with the exception of regional policies, have been gradually abandoned, with the single exception of the introducting of the PEIN in 1984.

For this reason and given the aims of this report, this chapter will concentrate on the study of the Industrial Restructuring Plans (Planes de Reconversión Industrial) on the one hand, and on the development of the PEIN on the other; it will try to explain, in both cases, the objectives, implementation and principal results achieved.

II.2.2. The Policy of Industrial Restructuring

The circumstances surrounding the development of the Spanish economy after the onset of the world recession - expecially after 1975 - had a very negative effect on some industrial sectors, which experienced heavy falls in demand on national and foreign markets; this happened at the same time as a substantial increase in costs and in the level of debts contracted by the principal companies in those sectors, placing the latter in very serious financial difficulties, with increasingly great losses.

We shall not embark on any detailed analysis of the factors that explain the intensity of the industrial recession in Spain, but we can summarize them so that the policies for restructuring industry that were adopted in an attempt to solve the problem are suitably put into context. In this respect, we feel that the following factors are particularly relevant:

i) Firstly, the structure of the production system was extremely unbalanced as regards machinery and equipment, and those intermediate goods that were technologically highly complex or required raw materials that the country simply did not possess. The continued operation on the system therefore depended on imports of these products. At the same time the situation implied a lack of the type of internal control of industrial activities that is fundamental to technological progress.

ii) In connection with the above, it must be said that, compared with the most advanced European countries, Spain is overspecialized in industries such as iron and steel, shipbuilding, textiles, clothing and footwear, which have experienced substantial decreases in world demand. On the other hand, it is underspecialized in those industries which have withstood the impact of the recession, such as chemicals, - especially organic chemistry - automatic and electrical machinery and electronics[21].

iii) Thirdly, the traditionally heavy dependence of Spanish industrial enterprises on credit from private banks must be taken into account. The liberalization of credit activity, which began in 1974, led to a great increase in the number of branch offices of banks and to fierce competition between banks to attract resources, which had its effect in a sudden rise in passive types of interest. The combined effect of these two factors put pressure on costs which affected the rise in interest rates, which was more than 10 points between 1976 and 1980. This rise meant that the increase in costs was passed on by the banks to those firms that were using credit, so that the latter found themselves in a situation where, from 1978 until 1982, their average profitability was less than the cost of borrowed capital[22].

iv) Finally, there was the political and social crisis surounding the beginning of the economic recession. More precisely, Spain was coming to the end of the political system set up by Franco in 1939; the system had been increasingly contested within Spain since 1970, and even more so since 1973. When Franco died in November 1975, a long period of political uncertainty began with growing social conflict until an adequate consensus was reached on the shaping of a new democratic political system; this found final expression in the Constitution adopted in December 1978. Nevertheless, the climate of uncertainty prevailed, albeit to a lesser degree, until the beginning of the eighties.

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21 See ESADE, "La industria española ante la CEE", Ed. Instituto de Estudios Económicos, Madrid, 1979; C. COURLET, Quel avenir pour l'Europe du Sud. Analyse des relations économiques et industrielles entre la France, l'Italie, l'Espagne et de leur zone de contact. Ed. Institut de Recherche Economique et de Planification, Grenoble University, 1979. See J. BRAÑA, M. BUESA and J. MOLERO: "La estructura productiva de la economía española y la integración a la Comunidad Económica Europea", El Trimestre Económico, nº 191, July-September, Mexico, 1981.

22 See A. TORRERO, "Tendencias del sistema financiero español", Ed. H. Blume, Madrid, 1982; and A. CUERVO, "Analisis económico-financiero de la empresa española", "Papeles de Economía Española", nº 3, Madrid, 1980.

It was in this context that various economic phenomena relevant to the explanation of the industrial recession took place: a rise in wage costs, which remained very intense until 1978 and subsequently diminished, more especially from 1981 when a clear freeze on real wages was recorded; a fall in investment, which, between 1975 and 1979, recorded negative rates of growth, as they did also between 1982 and 1984; a stagnation of the Gross National Product from 1976 and a decrease in per capita income, which depressed national demand.

Although the economic recession affected most industrial activities, there were a number which were particularly hard hit, with the following results:

1. a drastic fall in demand;
2. a steep rise in costs;
3. serious financial imbalances in firms caused by the cumulative growth of their accountable losses;
4. a rapid process of technological obsolence as a result of failure to adapt to the innovations introduced in other countries;
5. as a result of the foregoing, the emergence of a large surplus of production capacity.

Moreover, in some particular cases, such as iron and steel, there was the additional fact that investment made before 1973 matured at the same time as the fall in national demand occurred.

In these circumstances, the Government initially decided to provide special help to prevent the sudden bankruptcy of some companies. This scheme of individual subsidies was soon called into question, since the absence of any reference to specific sectors meant that the aid could not be used in order to redefine the country's strategies for specialization and industrial organization. Thus, since 1980, the restructuring policy has been modified on a more sectoral basis; this was negotiated between the principal parties involved (business, unions and public authorities). On this basis, the electrical household appliances and special steels sectors were restructured in 1980 and the integrated iron and steel sector in 1981.

However, the instrumental techniques available to the State for the purpose of such restructuring were not the most appropriate, since, until then, the objective of industrial policy legislation had been to promote industry. Moreover, the experience acquired in 1980 showed the need for legislation that would facilitate State action, thereby providing the public authorities and companies with suitable instruments for the restructuring process.

Royal Decree 9/1981 on industrial restructuring was adopted on 5 June 1981 and remained in force until 31 December 1982; its contents can be summarized as follows:

i) Firstly, the Decree enabled the authorities to pass sectoral restructuring plans which the corresponding companies could adopt and, thereby, qualify for the aid shown in Table II.3. The contents of the plans had to have been previously negotiated by the employers' associations of the corresponding sector, the unions and the authorities, although the plans could be approved without meeting this requirement in exceptional cases.

ii) In order to facilitate the restructuring process, the Decree introduced various types of aid for companies, as shown in Table II.3. Moreover, it enabled the companies affected to set up restructuring companies; their purpose was to manage the restructuring process, in the knowledge that they would qualify for the tax relief measures indicated in Table II.3. And, lastly, the legislation established an exceptional system of labour relations, which enabled companies undergoing restructuring temporarily to suspend employment contracts and to dismiss or relocate staff. To compensate for the negative effect of these measures on the workers, it was laid down that workers could obtain aid for early retirement when they were over sixty, greater compensation for dismissal that was higher than under the ordinary labour legislation, and unemployment benefit for a period six-month longer than the normal one[23].

iii) Lastly, the Decree created an Executive Committee for each restructuring plan to manage and control its execution.

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23 This means that unemployment benefit is paid over a period of 24 rather than 18 months.

TABLE II.3. STATE AID FOR INDUSTRIAL RESTRUCTURING UNDER ROYAL DECREE 9/1981 OF 5 JUNE

AID TO RESTRUCTURING COMPANIES	AID TO FIRMS UNDERGOING RESTRUCTURING
Tax relief	Tax relief
- 99% Tax on transfer of assets and Registered Judicial Acts	- 99% Tax on transfer of assets and registered Judicial Acts
- 99% Local Taxes	- 99% General Tax on commercial operations, Customs Duties and Compensatory subsidies for Import Duties on capital goods.
- 99% Company Tax	- Unrestricted depreciation of assets affected by restructuring
- 99% General Tax on commercial operations between the Company and its members	- Special Deductions in Company Tax
	Financial benefits
	- Official Credit and ICO bonds for up to 70% of investment
	- Subsidies of up to 20% of investment
	Other benefits
	- Postponement of tax and Social Security constributions for up to 6 years
	- Speeding up of formalities for company mergers or splits

Source: our own elaboration

Under this legislation, eleven sectors were declared to be in the process of restructuring; 169 companies took advantage of the facilities available, so that a total of PTA 86,763,800 were injected into them in various forms of public aid before December 1982. These companies shed some 7,616 jobs as a result of the decrease in their production capacity, as can be seen in Table II.4.

However, in spite of the aid granted, the results obtained in most sectors were negligible and the assessment made by the authorities responsible for the restructuring policy negative. Thus, with the exception of special steels, semiprocessed copper products and textiles, the MINER indicated that, as a result of inadequate planning, implementation and control, the policy applied up to the end of 1982 "did not serve to redirect productive resources from declining sectors to production lines with good prospects; neither did it result in any

serious internal restructuring of each sector, being limited to the improvement of the financial and labour situation of the firms affected by the restructuring plans"[24].

The awareness that the restructuring policy had failed coincided with a change of government in the latter months of 1982 and in 1983, with a certain accentuation of the problems of these sectors whose situation was already critical. The new Socialist government therefore decided to give new life to the restructuring policy by speeding up the necessary adjustments to production and employment, especially in iron and steel, electrical appliances and shipbuilding, which the previous policy had hardly affected.

For this reason, a new legal instrument had to be drawn up on the basis of which the appropriate measures could be taken. The new instrument took the form of Royal Decree 8/1983 of 30th November: its contents were much more far-reaching than those of its forerunner, as much from the instrumental point of view as from the point of view of establishing entities to monitor and supervise the restructuring plans. Its principal features were as follows:

i) Firstly, it established a process for the design and approval of restructuring plans that was similar to that which existed under the previous decree, but, in this case, there was more room for initiative on the part of the public authorities.

ii) Secondly, supervisory Committees, with representatives of the authorities, employers' organizations and unions who had endorsed the plan, were set up to manage the public resources allocated to restructuring.

iii) Thirdly, it regulated the nature and aims of the Restructuring Companies, of which companies in the sector affected had to be members in order to qualify for State aid. Tax relief equivalent to that provided for in Decree 9/1981 was introduced for these Companies (see Table II.3.).

iv) Fourthly, besides the aid already mentioned in Table II.3., the following schemes were introduced for companies undergoing restructuring:

- lower interst rates on the types credit available to private companies;

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24 See MINER, "Libro Blanco de la reindustrialización", p. 220, Madrid, 1983a.

TABLE II.4. SECTORS WHICH TOOK ADVANTAGE OF INDUSTRIAL RESTRUCTURING INCENTIVES BEFORE 31/12/1982

SECTOR	No. of companies	Importance of companies (in %)		Financial Aid Granted (PTA 10^6)			Jobs lost	Assessment of Plans (2)
		Production	Jobs	Subsidies	Official Credit	ICO Bonds		
Electric. household appliances	14 (1)	n.d.	92	6,499.2	-	5,714.0	3,454	Negative
Special steels	7	60	60	5,000.0	-	2,000.0	1,204	Positive
Common steels	6	52	27	3,200.0	5,300.0	-	n.d.	Negative
Integrated iron and steels	3	100	100	10,000.0	5,000.0	-	n.d.	Negative
Elec.Equipm.for automob. ind.	2	100	100	1,085.0	1,565.0	4,585.0	1,979	Negative
Semiprocessed copper products	3	n.d.	86	1,126.6	-	4,000.0	979	Positive
Heavy forging for automob.ind.	2	80	n.d.	500.0	1,250.0	-	n.d.	Negative
Shipbuilding	2	n.d.	n.d.	626.0	500.0	1,500.0	n.d.	Negative
Electronic components	12	n.d.	n.d.	9,110.0	14,175.0	1,828.0	n.d.	Positive
Textiles	118 (3)	n.d.	n.d.	-	-	-	-	Negative
Footwear (4)	-	-	-	-	-	-	-	
TOTAL	169			37,146.8	27,790.0	19,627.0	7,616.0	

Source: our own elaboration on the basis of data from the MINER.

Notes: (1) Belonging to four company groups.
(2) Assessment made by the MINER (1983a).
(3) Until 30/9/1982.
(4) No company is mentioned, since the study of applications submitted did not begin until January 1983.
n.d. : No data available.

- participatory loans from private banks;
- tax relief for research and technological development;
- exclusion of agreements between companies that did not affect prices from the prohibitions on collusive practices contained in Law 110/1963 on the suppression of practices having a restrictive effect on competition.

v) Special rules on labour relations similar to those which had existed under the previous Decree were introduced to compensate for the adverse effects on workers caused by restructuring. However, it provided an innovation in the form of the Employment Promotion Funds (Fondos de Promoción de Empleo) which, financed with redundancy payments were set up to improve protection for the unemployed (in terms of both coverage and length of time) and vocational training and grant premiums to companies hiring workers belonging to the Funds.

vi) Lastly, the "Zonas de Urgente Reindustrialización" - ZUR (Urgent Reindustrialization Areas) were set up as instruments for promoting industry on a geographical basis, where companies making investment which created employment could obtain subsidies and tax relief.

With all these implements and, especially, with the political determination to step up the process of restructuring, the Government redrafted the plans of the latter months of 1983 and did its utmost to ensure their execution by the companies involved. There were a number of industrial disputes led by the workers affected by the restructuring operations. From the sectoral point of view, we should point out that the restructuring policy continued to affect the same sectors as in the previous period up to the end of 1982, and the only additional sector to be affected was that of fertilizers. In order to assess costs and results, we will now analyze the main factors affecting to labour adjustments, investment, State aid and the situation of companies.

As indicated earlier, one of the main problems to be solved was that of over-manning, particularly in relation to the market's capacity for absorption. As can be seen from Table II.5., overmanning in the more than 500 companies that took advantage of the restructuring plans was calculated at nearly 64,000 workers, i.e. 23.7% of the workforce when the plans were first implemented. By March 1985 - the last date for which we have complete figures - the reduction in workforce had

TABLE II.5. RESULTS AND FORECASTS OF INDUSTRIAL RESTRUCTURING POLICY: ADJUSTMENT OF EMPLOYMENT

SECTOR	No. of companies affected	A. Workforce beginning of restructuring (1)	B. Work-force at 31/3/1985	C=A-B	C/A (in %)	D. Workforce forecast at end of restructuring	E=A-D	E/A (in %)
Electric. household appliances	18	23,491	15,913	7,578	32.3	12,734	10,757	45.8
Special steels	11	13,744	10,143	3,061	26.2	6,919	6,825	49.7
Common steels	n.d.	14,409	12,297	2,112 (2)	14.7	11,597	2,812	19.5
Integrated iron and steel	3	42,837	33,495	9,342	21.8	26,069	16,768	39.1
Electric. equipm. automob.ind.	2	6,720	5,586	1,134	16.9	5,378	1,342	20.0
Semiprocessed copper products	4	4,503	3,611	892	19.8	3,533	970	21.5
Heavy forging for automob.ind.	2	1,010	970	40	3.9	970	40	3.9
Shipbuilding:- Big shipyards	2	24,321	15,915	8,406	34.6	15,915	8,406	34.6
- Small shipyards	24	16,121	10,679	5,442	33.8	10,679	5,442	33.8
Electronic components	17	3,697	3,298	399	10.8	2,923	774	20.9
Textiles	430	85,710	80,267	5,443	6.4	79,700	6,010	7.0
Footwear	n.d.	32,925	30,114	2,811 (2)	8.5	29,220	3,705	11.3
TOTAL:	513	269,488	222,288	47,200	17.5	205,637	63,851	23.7

Source: Own elaboration from MINER data (1985) and O. FANJUL and F. MARAVALL (1984)

Notes: (1) At 31/12/1981, except in Integrated Iron and Steel, Special Steels and Electrical Household Appliances, which were calculated at 31/12/1980; and Shipbuilding which was calculated at 30/6/1984.
(2) At 31/12/1984
n.d. No data available

affected 47,200 people, thereby fulfilling objectives by 74%. The sectors most seriously affected were those of electrical appliances, special steels, integrated iron and steel and shipbuilding, although, in absolute terms, the reduction in the textile sector was also significant.

Besides the destructive aspect with regard to jobs, the aim of the restructuring plans was through investment, to improve the situation as regards production and technological innovation in the companies concerned. However, by March 1985, only a third of the PTA 344,110 million forecast investment had actually materialized, which implies a considerable delay in the adjustment of production capacity and employment. In this respect, the sectors which lie furthest behind are those of electrical appliances, integrated iron and steel, shipbuilding and electronic components, while, in the cases of semiprocessed copper products, heavy forging and textiles, the execution of investment plans is very advanced. In the other sectors, - with the exception of common steels and footwear, for which we have no data - nearly 50% of investment has been made.

A programme of State aid was set up to finance these investments, in addition to sorting out the companies' financial problems and making it easier to reduce production capacity. The cost directly assumed by the State was very high, substantially more than a billion pesetas. 40% of this amount had been distributed before the end of 1984, with the remainder to be distributed between 1985 and 1987. Nearly 70% of these resources is accounted for by loans, bonds, extension of capital and recovery of losses which were carried out and forecast by the "Instituto Nacional de Industria" - INI for iron and steel[25] and shipbuilding[26] companies in its industrial group. This means that a large part of the State's financial effort was concentrated in the public enterprise sector, especially bearing in mind that, besides the INI resources already mentioned, about 55% of subsidies, credits and

25 These are "Ensideas" and "Altos Hornos del Mediterráneo", which account for nearly 70% of sales in the sector.

26 These are "Astilleros Españoles" and "Astilleros y Talleres del Noroeste" in the subsector of big shipyards, which account for 100% of production capacity; and another five companies in the subsector of small and medium-sized shipyards, which account for about 15% of sales in the subsector.

bonds from the "Instituto de Crédito Oficial" - ICO - in the iron and steel, shipbuilding and textile sectors was directed at public enterprise[27].

In line with what we have just said, the integrated iron and steel and shipbuilding sectors accounted for more than 85% of State aid, the remainder being distributed among the other sectors.

A provisional overview of the results obtained by the restructuring policy from the point of view of the operation of the concerns involved is provided by Table II.6., which - with the exception of the footwear industry for which there are no data available - gives the figures by sector for invoicing, exports, staff costs, financing costs, productivity and cash-flow for companies undergoing restructuring. As can be seen in all the sectors, except for shipbuilding, the figures for invoicing and exports show a growth that seems to forecast the fulfilment of the objectives laid down by the plans for 1987 and 1990.

As far as staff costs are concerned, the reduction in staff has generally favoured a decrease in the ratio of labour costs to total sales, although some sectors continue to present very high costs which are a long way off the forecasts. This is the case as regards big shipyards, electronic components and semiprocessed copper products.

Finance costs have decreased in relative importance, which denotes a considerable progress in the sorting out of the financial difficulties of undertakings and, thus, one of their main problems.

Productivity has gone up in all sectors except shipbuilding, and come quite near to the proposed objectives. However, integrated iron and steel - as well as shipbuilding - is still a long way from the aims proposed in the restructuring plan for 1990.

Finally, the results of firms, measured in terms of cash-flow, show a distinct improvement in all sectors, except shipbuilding and integrated iron and steel.

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27 On this last point, see L. ALBENTOSA, "La política de ajuste aplazade: reconversión industrial", Información Comercial Española, nº 617-618, January-February 1985, p. 182.

TABLE II.6. BASIC VARIABLES OF THE SECTORS UNDERGOING RESTRUCTURING - EVOLUTION AND OBJECTIVES

Sector	Evolution				Objectives		
	1981	1982	1983	1984	1985	1987	1990
			INVOICING (millions of pesetas)				
Integrated iron & steel	202,608	235,855	262,701	301,955			522,914
Shipbuilding (big)	58,444	82,373	77,161	37,231		147,694	
Shipbuilding (small & medium)	48,013	60,424	n.d.	28,000		74,500	
Special steels	41,880	54,431	58,868	65,862		80,684	
Common steels	67,594	n.d.	n.d.	113,182			
Electrical household appliances	72,342	89,450	96,935	110,351		122,000	
Electrical Equipment Automobile Industry	22,431	24,989	29,306	33,701	40,968		
Electronic Components	9,828	10,224	12,817	14,693			
Semiprocessed Copper Products	10,077	11,681	12,310	12,830	16,958		
Heavy Forging for Printing	4,506	4,802	6,123	7,007			
Textiles	317,125	n.d.	n.d.	416,874			
			EXPORTS (millions of pesetas)				
Integrated iron & steel	65,381	58,145	80,060	93,444			113,699
Shipbuilding (big)	23,341	55,682	63,847	30,521		68,489	
Shipbuilding (small & medium)	-	-	-	-			
Special steels	17,188	24,751	29,086	33,712		39,318	
Common steels	32,384	-	-	64,088			
Electrical household appliances	19,722	20,202	21,317	24,317		30,000	
Electrical Equipment Automobil Industry	5,943	7,026	8,270	11,591	14.843		
Electronic Components	3,385	3,710	5,749	8,166			
Semiprocessed Copper Products	1,062	1,117	1,189	1,624	1,503		
Heavy Forging for Printing	936	1,188	9,692	16,033	1,503		
Textiles	33,789	n.d.	n.d.	54,328			

TABLE II.6. (cont.)

Sector	Evolution				Objectives		
	1981	1982	1983	1984	1985	1987	1990
STAFF COSTS (in % of invoicing)							
Shipbuilding (big)	54.5	40.6	55.3	85.4		36.9	
Shipbuilding (small)	38.4	34.5	n.d.	18.2		16.9	
Integrated steel	32.2	30.1	28.8	25.7			16.2
Special steels	36.4	26.5	25.7	22.6			16.4
Common steels	19.4	n.d.	n.d.	13.6			
Electrical household appliances	30.0	26.05	29.9	24.4		17.2	
Electrical Equipment Automobile Industry	44.2	41.3	27.5	33.7	29.5		
Electronic Components	47.3	46.7	41.6	n.d.			
Heavy Forging for Printing	29.9	30.2	23.5	20.6			
Semiprocessed Copper Products	67.0	58.0	56.0	56.0	24.0		
Textiles	31.1	n.d.	n.d.	29.0			
FINANCIAL COSTS (in % of invoicing)							
Shipbuilding (big)	18.8	17.6	23.3	40.1		7.5	
Shipbuilding (small & medium)	9.4	8.4	n.d.	17.1		4.7	
Integrated iron & steel	17.9	20.2	13.9	16.1		7.5	10.1
Special steels	8.5	5.0	4.4	4.1		4.0	
Common steels	11.3	n.d.	n.d.	9.7			
Electrical household appliances	11.6	9.8	9.5	7.5		6.0	
Electrical Equipment Automobile Industry	11.5	16.1	8.2	5.9	6.1		
Electronic Components	12.1	11.3	9.8	n.d.			
Heavy Forging for Printing	14.6	14.1	11.2	9.3			
Semiprocessed Copper Products	32.0	22.0	24.0	24.0	22.0		
Textiles	7.0	n.d.	n.d.	8.0			

TABLE II.6. (cont.)

Sector	Evolution				Objectives		
	1981	1982	1983	1984	1985	1987	1990
PRODUCTIVITY (Invoicing/Employment, in millions of pesetas)							
Shipbuilding (big)	1.93	3.5	3.1	2.3		9.2	
Shipbuilding (small & medium)	3	3.4	n.d.	1.7		6.9	
Integrated iron & steel	5.1	6.1	7.3	9.2			20.0
Special steels	3.6	6.5	7.2	8.7		16.6	
Common steels	4.4	n.d.	n.d.	7.9			
Electrical household appliances	3.2	4.3	5.5	6.9		9.5	
Electrical Equipment Automobile Industry	3.1	3.3	4.6	6.0	7.6		
Electronic Components	3.0	3.1	4.1	4.4	5.1		
Heavy Forging for Printing	3.8	3.7	5.9	7.2			
Semiprocessed Copper Products	2.2	2.7	3.0	3.5	4.9		
Textiles	n.d.	n.d.	n.d.	n.d.			
CASH-FLOW (before subsidies and tax, in millions of pesetas)							
Shipbuilding (big)	-23,972	-22,669	-50,135	-45,483		8,238	
Shipbuilding (small & medium)	- 3,300	- 5,500	n.d.	- 5,950		4,260	
Integrated iron & steel	-35,258	-32,446	-38,020	-35,997			52,787
Special steels	- 4,815	- 1,340	- 1,381	- 938		4,800	
Common steels	- 5,842	n.d.	n.d.	- 4,230			
Electrical household appliances	- 6,649	- 2,978	- 3,046	- 3,299		4,200	
Electrical Equipment Automobile Industry	- 4,449	- 4,857	- 2,596	- 1,022		1,791	
Electronic Components	n.d.	- 1,222	- 11	835			
Heavy Forging for Printing	- 420	- 529	- 64	351			
Semiprocessed Copper Products	- 2,713	- 1,849	- 981	- 232	2,749		
Textiles	8,528	n.d.	n.d.	25,944.4			

Source: MINER (1985), op. cit.
n.d. : no data available

Consequently, from the point of view of companies, there would seem to have been an improvement in the main parameters that define the operation and results of restructured enterprises. This assessment holds true for all sectors, except shipbuilding and integrated iron and steel, which, despite having received the major part of State aid, and having made drastic adjustments in employment, continue to exhibit similar problems to those affecting them at the outset. This explains why, at the time of writing this report, a new amendment to the restructuring plans has been announced; it will imply new and more forceful job reductions which could affect 10,000 workers in integrated iron and steel and 6,000 workers in shipbuilding[28].

One last subject of interest here is that of company mergers which have taken place parallel to the execution of the restructuring plans. In this sense, the Industrial Restructuring Companies (Sociedades de Reconversión Industrial) have played a fundamental role, but the mergers that have taken place in some sectors are not unimportant. To make this phenomenon easier to understand we have compiled Table II.7., which includes all the basic data on Restructuring Companies and on the mergers that have taken place to date. As can be seen, in all the sectors indicated, a high degree of concentration and centralization of the decision-making capacity has been attained, one way or another. If we bear in mind that, on the other hand, in the sectors of integrated iron and steel and shipbuilding (big shipyards), the INI controls respectively 70% and 100% of the market through its companies, the phenomenon mentioned can be seen to occur in the majority of the restructured sectors, except common steels, electronic components, textiles and footwear.

On the previous pages we stated that the second statutory measure relating to restructuring - Decree 8/1983 - created an implement for the promotion of industry on a geographical basis - the ZUR - whose aim was to facilitate State aid for industrial initiatives which generated employment in the regions most affected by restructuring.

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28 According to the union "Comisiones Obreras", another 10,000 workers in naval shipyards should be added to this figure. See "Cinco Días", of 20 May 1986.

TABLE II.7. INDUSTRIAL RESTRUCTURING COMPANIES AND OTHER FORMS OF GROUPING IN THE SECTORS AFFECTED BY THE POLICY OF INDUSTRIAL RESTRUCTURING

SECTOR	RESTRUCTURING COMPANIES AND OTHER GROUPS	BASIC DATA
Electrical household appliances	Grupo Vasco de Electrodomesticos, S.A. (GRUVESA)	Set up in 1985, it includes the Ulgor, Fagor Clima, Fabrelac and Mayc companies. In the medium-term, provision is made for the pooling of the assets of these companies in GRUVESA. It manufactures refrigerators, cookers, ovens, washing-machines, dishwashers and gas water heaters. It employs 21% of the workers in this sector.
	Balay, Safel Reconversión (BSR)	Set up in 1985, it groups together Safin, Inelsa and Corcho. Also provides for pooling of assets in BSR. It produces refrigerators, freezers, cookers, ovens, washing-machines, dishwahers and gas water heaters. It employs 28% of the workers in sector.
Special steels	ACERIALES, S.A.	Set up in 1980. Groups together S.A. Echevarría, Pedro Orbegozo y Cia, S.A., Aceros de Llodio, Babcock & Wilcox, Olarra, Aceros de Irura and Fundiciones Echevarría. These seven companies account for 60% of production capacity in the sector. It controls other groups set up as a result of restructuring, like ACENOR and ACEGUISA, thus controlling 90% of market. It has branches specialized in internal commerce (Aceros Finos Reunidos, S.A.) exports (CAVEXSA), purchase of raw materials (Materias Primas Siderúrgicas, S.A.), technological research and engineering (INSERIALES) and industrial promotion (DENAL, S.A.).

TABLE II.7. (cont.)

SECTOR	RESTRUCTURING COMPANIES AND OTHER GROUPS	BASIC DATA
Electrical equipment for automob. industry	Merger of FEMSA and Robert Bosch Española	These two companies - Femsa and Robert Bosch Española - are subsidiaries of the German multinational firm Robert Bosch. As a result of the 1984 the merger, whole sector is controlled by one company.
Semiprocessed copper products	IBERCOBRE, S.A.	Constituted in 1981, it groups together SECEM, Pradera Hermanos, EARLE and SIA Santa Bárbara. Accounts for 68% of employment in the sector.
Heavy forging for automob. industry	IBERFORJA, S.A.	Set up in 1983, it includes La Farga Casanova, S.A. and Forjas de Galicia, S.A. Controls 80% of production capacity in the sector.
Shipbuilding	SORENA, S.A.	Set up in 1983 to coordinate the restructuring of the subsector of medium-sized and small shipyards. It distributes production quotas, makes contracting arrangements, distributes State aid, centralizes marketing and carries out R & D activities.
	Merger of Naval Gijón and Astilleros del Nervión.	n.d.

Source: Own elaboration from data from MINER (1983a) (1985, op. cit.) and the journal "Economía Industrial", N° 245

n.d.: no data available

The immediate background to the creation of this instrument of industrial policy was when Sagunto was declared an Area of Priority Industrial Location (Zona de Preferente Localización Industrial) in September 1983, with a view to promoting the creation of new industries to compensate for the loss of jobs provoked by the dismantling of part of the iron and steel company Altos Hornos del Mediterráneo.

The experience in Sagunto was positive as far as the generation of employment was concerned, since, in the space of eighteen months, 42 industrial projects were promoted and 1,253 workers were employed, thus absorbing around 50% of the unemployment caused by the restructuring of iron and steel. Moreover, the industrial structure of the area has become more diversified, although it should be pointed out that the majority of the projects involve small enterprises operating in traditional sectors[29].

The experience in Sagunto was the inspiration for the creation of the ZUR. In the first half of 1985 this instrument of industrial policy was applied to the following regions: Asturias, Cádiz, Barcelona, Galicia (El Ferrol and Vigo), Madrid and Vizcaya (River Nervión basin). The choice of these areas is logical if we bear in mind that around 85% of the jobs lost through restructuring were in those areas[30].

The industrial promotion activities were set in motion in the ZUR's fairly quickly, so that, by the end of 1985, 104 projects calculated to generate 3,286 jobs had been approved (see Table II.8.). Very little information has been published about these projects. However, the number of jobs forecast will still be very low in proportion to the jobs lost in the restructuring process - according to the figures, only 5%.

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29 For more details on these projects, see the news section of the magazine "Economía Industrial", nº 240, November-December 1984.

30 On this subject see O. FANJUL and F. MARAVALL "¿A qué ritmo avanza la reconversión industrial en España?", Papeles de Economía Española, nº 21, Madrid, 1984.

TABLE II.8. PROJECTS APPROVED IN THE "ZONAS DE URGENTE REINDUSTRIALIZACION" AT 30/11/1985

ZUR	No. of Projects	Investment (millions pts)	Jobs forecast
Asturias	26	3,000	517
Barcelona	-	-	-
Cádiz	10	1,433	213
Galicia	47	7,550	1,561
Madrid	13	4,265	737
Nervión	8	4,178	258
Total:	104	20,426	3,286

Source: MINER

2.3. "Plan Electrónico e Informático Nacional - PEIN"

The second industrial policy analyzed in this report is that of the industrial promotion of the electronics sector implemented by the Spanish Government since 1984, through the application of the PEIN. In the following pages we shall discuss the objectives and implementation of this plan, as well as the results obtained up until April 1986. However, it is perhaps advisable first to provide a brief description of the Spanish electronics sector.

Table II.9. provides a summary view of the overall situation of the Spanish electronics industry. As the table shows, production in this sector has grown strikingly in recent years, especially for export. Between 1979 and 1984, production in current pesetas[31] rose by 80%; this growth was accounted for largely by the subsector of electronics for professional use in which production rose by by 150% and that of electronic components in which production increased by 70%, since consumer electronics remained the same. These production figures show, in short, the approach to production peculiar to each subsector. The Spanish consumer electronics industry concentrates mainly on the manufacture of colour television sets - which represent nearly 90% of total out-put - and some audio products, since the production of videos

31 It has not been possible to deflate the figures, due to inadequate coverage of this sector by the industrial price index elaborated by the "Instituto Nacional de Estadística" - INE (National Statistical Institute).

TABLE II.9. BASIC DATA ON THE SPANISH ELECTRONICS INDUSTRY. 1979-1984

(in millions of pesetas)

YEAR	PRODUCTION				IMPORTS				EXPORTS			
	TOTAL	Consumer Electron	Components	Profess. Electron	TOTAL	Consumer Electron	Components	Profess. Electron	TOTAL	Consumer Electron	Componens	Profess. Electron
1979	170,151	65,931	28,121	76,099	136,892	10,803	29,693	96,396	33,043	1,624	6,606	24,813
%	100.0	38.7	16.5	44.7	100.0	7.9	21.7	70.4	100.0	4.9	20.0	75.1
1980	172,629	68,205	25,118	79,306	163,100	22,074	34,644	106,382	36,825	2,224	6,846	27,755
%	100.0	39.5	14.6	45.9	100.0	13.5	21.2	65.2	100.0	6.0	18.6	75.4
1981	196,190	68,979	28,041	99,170	196,588	27,848	39,760	128.980	43,425	1,338	7,092	34,995
%	100.0	35.2	14.3	50.5	100.0	14.2	20.2	65.6	100.0	3.1	16.3	80.6
1982	232,727	76,330	35,276	121,121	243,409	42,850	47,599	152,960	50,557	1,064	10,837	38,656
%	100.0	32.8	15.2	52.0	100.0	17.6	19.6	62.8	100.0	2.1	21.4	76.5
1983	247,449	72,557	43,432	131,460	307,059	65,610	57,469	183,980	55,663	2,396	14,917	38,350
%	100.0	29.3	17.6	53.1	100.0	21.4	18.7	59.9	100.0	4.3	26.8	68.9
1984	303,717	64,169	48,665	190,883	454,131	63,110	66,180	324,841	116,261	4,540	19,009	92,712
%	100.0	21.1	16.0	62.9	100.0	13.9	14.6	71.5	100.0	3.9	16.4	79.7

Source: ANIEL and own elaboration

and other items did not exist until the end of 1984. In the components subsector, the manufacture of passive components predominates, which accounts for around 75% of total figures and which consists chiefly of TV tubes, with scant production of integrated circuits and discreet components and no production of microelectronic components. In the subsector of electronics for professional use, the production of telecommunications equipment predominates, accounting for about 45% of total output and covering about 80 % of internal demand, along with computer material, which accounts for 40% of output, although, in this case, it barely satisfies 3% of internal demand; defence equipment accounts for another 10% of production but there is hardly any manufacturer of electromedical equipment or industrial and instrumentation electronics[32].

These lines of production determined the trend in the foreign trade figures (see Table II.9.) which show that imports increased by 230% in the period under consideration, mainly as a result of the great increase in demand for consumer products and electronics for professional use; it also shows how exports rose by 250%; in this case, the patterns of the different subsectors are more homogeneous, in spite of higher growth of products for professional use.

From the preceding data, it is possible to arrive at the indices shown in Table II.10., from which one can trace the course of specialization in the electronics industry more accurately by considering the extent to which the national market is covered and how far the industry is orientated towards foreign markets. These indices show a gradual "de-specialization" in the electronics industry which affects the three subsectors under consideration, although it is more acute in consumer electronics and electronics for professional use. This tendency towards less specialization is the result of the contrasting evolution of rates of internal coherence and the indices of export orientation, so that while the former decreased, the latter rose, especially towards the end of the period.

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32 See the analysis by the "Comite del Plan Nacional de la Industria Electronica" (Committee on the National Plan for the Electronics Industry), "Directrices para la elaboración de un Plan Nacional de la Industria Electrónica", MINER, Madrid, 1983, pp. 75-96.

TABLE II.10. SPECIALIZATION INDEX, RATE OF INTERNAL COHERENCE, AND INDEX OF EXPORT ORIENTATION IN THE SPANISH ELECTRONICS INDUSTRY 1979 - 1984

	ELECTRONICS SECTOR			CONSUMER ELECTRONICS			COMPONENTS			PROFESSIONAL ELECTRONICS		
YEAR	SI	RIC	IEO	SI	RIC	IOE	SI	RIC	IOE	SI	RIC	IEO
1979	0.62	0.50	0.19	0.88	0.86	0.02	0.55	0.42	0.23	0.52	0.35	0.33
1980	0.58	0.45	0.21	0.77	0.75	0.03	0.47	0.35	0.27	0.50	0.33	0.35
1981	0.56	0.44	0.22	0.72	0.71	0.02	0.46	0.35	0.25	0.51	0.33	0.35
1982	0.55	0.43	0.22	0.65	0.64	0.01	0.49	0.34	0.31	0.51	0.35	0.32
1983	0.50	0.38	0.22	0.53	0.52	0.03	0.51	0.33	0.34	0.47	0.34	0.29
1984	0.47	0.29	0.38	0.52	0.49	0.07	0.51	0.31	0.39	0.45	0.23	0.49

Source: our own elaboration

Definitions: Specialization Index: $SI = \frac{P}{P + I - E}$, where P = Production; I = Imports; E = Exports.

Through a simple transformation, we find that $SI = \frac{P - E}{P + I - E} : (1 - \frac{E}{P}) = \frac{RIC}{1 - IEO}$

Rate of Internal Coherence: $RIC = \frac{P - E}{P + I - E}$

Index of Export Orientation: $IEO = \frac{E}{P}$

Consequently, we could state that, before the PEIN was implemented, the situation of the electronics sector was characterized by a gradual loss of control over the domestic market and a growing orientation towards foreign markets, which implied increasing import dependence to satisfy internal demand, while in some subsectors enclaves of production were established, oriented towards the needs of foreign markets.

This production situation is complemented by a technological situation which, according to the report by the Committee on the National Plan for the Electronics Industry (Plan Nacional de la Industria Electrónica), could be described as "precarious and heavily dependent on foreign countries"[33]; thus, besides the fact that there is a great lack of resources in the most advanced fields of electronics - microelectronics, computer hardware, systems of industrial automation, laser, etc[34] - a substantial part of production is performed using imported technology[35].

This is the context within which the PEIN should be situated; the Plan was approved by the Government in February 1984 with the following principal objectives:

a) to increase the demand and consumption of electronic and computer products;
b) to obtain comparatively much greater increases in the value of national production in order to steadily satisfy domestic demand more and more with Spanish products;
c) to obtain substantial increases in exports;
d) to secure a gradual reduction in companies' technological dependence on foreign firms by increasing production of technology within the country[36].

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33 Idem (FN 32), p. 94.
34 Data on this subject can be found in M. CASTELLS, et al., "Nuevas Tecnologías, Economía y Sociedad en España", Alianza Editorial, Madrid, 1986, Vol. 1.
35 For example, according to data from the employers' organization in the capital goods industry, more than 90% of the production of components and electronics for professional use relies on foreign technology. In a like manner, the MINER obtains a ratio of more than 75% in its surveys of large enterprises for the years 1980 and 1981.
36 cf. Ministry of Economy and Taxation, "Programa Económico a Medio Plazo 1984/1987. Vol. 3: "Políticas sectoriales". Madrid, 1985, p 148.

Moreover, these four objectives were contained in a more general directive, stating that Spain aims at "the proper integration of its activities within the international market": this can be interpreted as the intention to support both foreign and national undertakings whose "industrial activities are internationally competitive" with State aid[37]. This implies that the PEIN is not conceived from a nationalistic point of view stressing internal control of the resources involved, but rather as a means of attracting the industrial activities of transnational companies of the sector to Spain, as well as promoting some national companies.

It is important to mention that the execution of this directive in terms of industrial projects has mainly taken place through subsidiaries of transnational companies that have recently set up in Spain or were already in operation and, only in a more secondary manner, through national companies.

The first three objectives quoted are expressed in quantitative terms in the PEIN (Table II.11., this Table was compiled by the planners)[38].

The table shows how both apparent consumption and imports will increase by 70%, exports by 310%, and production by 130%, which seems to be consistent with the objectives mentioned. However, according to these forecasts, the second of these will hardly be valid, since, as can be seen from the calculations for the rates of internal coherence, the degree of coverage of the national market with domestic products will only increase overall by one percentage point, as a result of a decrease in the ratio for television sets and electronic components, despite the increase recorded for other areas of production.

This general increase in the rates of internal coherence (with the exceptions indicated), together with a substantial increase in exports, also general, except in the case of defence and navigation, will lead to a rise in the indices of specialization in all fields except

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37 Idem (FN 36), p. 148.

38 Note that the 1982 data are slightly different from the data used earlier - which came from the employers' organizations of the sector ANIEL - since the planners included some additional activities, especially in relation to industrial applications.

TABLE II.11. PEIN. MEDIUM-TERM VIEW OF THE ELECTRONICS SECTOR. 1982 - 1987
(Thousands of millions of pesetas in 1982)

SUBSECTORS	Production		Import		Export		Appar.Consum.		SI		RIC		IEO	
	1982	1987	1982	1987	1982	1987	1982	1987	1982	1987	1982	1987	1982	1987
1. CONSUMER ELECTRONICS	76.3	133.0	48.8	72.0	1.0	40.0	124.1	165.0	0.61	0.81	0.61	0.56	0.01	0.30
Audio	5.6	12.0	16.5	13.0	0.8	5.0	21.3	20.0	0.26	0.60	0.23	0.35	0.14	0.42
Television	70.7	75.0	2.6	13.0	0.2	25.0	73.1	63.0	0.97	1.19	0.96	0.79	-	0.33
Video	-	38.0	23.7	24.0	-	10.0	23.7	52.0	-	0.73	-	0.53	-	0.26
Other products	-	8.0	6.0	22.0	-	-	6.0	30.0	-	0.27	-	0.27	-	-
2. ELECTRONICS FOR PROFESSIONAL USE	133.6	352.7	185.7	276.0	42.2	162.2	277.1	465.8	0.48	0.78	0.33	0.41	0.32	0.46
Telecom-RTV	73.0	108.8	22.4	24.0	14.3	27.0	81.1	105.0	0.90	1.04	0.72	0.77	0.20	0.25
Defence & Navigation	5.0	15.0	26.8	28.5	1.2	3.5	30.6	40.0	0.16	0.38	0.12	0.29	0.24	0.23
Industrial applic.	20.3	55.4	27.2	40.4	4.0	12.7	43.5	83.2	0.47	0.67	0.38	0.52	0.20	0.23
Electromedicine	3.1	15.5	12.6	14.1	1.3	7.0	14.4	22.6	0.22	0.69	0.13	0.38	0.42	0.45
Computers, etc.	32.2	158.0	96.7	169.0	21.4	112.0	107.5	215.0	0.30	0.73	0.10	0.21	0.66	0.71
3. ELECTRONIC COMPONENTS	35.2	69.5	47.6	124.9	10.8	22.3	72.0	172.2	0.49	0.40	0.34	0.27	0.31	0.32
4. TOTAL	245.1	555.2	282.1	472.9	54.0	224.5	473.2	803.0	0.52	0.69	0.40	0.41.	0.22	0.40

Source: Ministry of the Economy and Taxation: Programa Económica a Medio Plazo, 1984-1987; and own elaboration.

N.B. For the definitions of SI, RIC and IEO, see Table II.10.

components. All this implies that changes are forecast in the nature of the various activities in the sector, which are moving towards a lower, although still sizeable degree of foreign dependence.

Moreover, the PEIN forecasts point towards a substantial change in the proportion of the overall figure for production, foreign trade and general consumption accounted for by different electronic activities. Thus, video and other consumer products, defence and navigation, industrial applications, electromedicial equipment and especially computer equipment will increase in relative importance, compared with other products, particularly television sets and telecommunications equipment, whose importance will drop. For their part, imports will also experience great changes, mainly due to the relative increase in the proportion accounted for by components, and, to a lesser extent, television sets and other consumer products. Thus, the relative importance of exports of computers, electromedical products and various consumer products will increase as that of other products, especially telecommunications equipment and components, diminishes.

Thus, in summary, the forecasts of the Plan point towards an intensification of activity in all production lines belonging to the professional subsector, with the exception of telecommunications-Spanish broadcasting equipment, and more intensive production of the most modern products (video equipment and others) from the general consumer subsector; this will mean greater export orientation - with the odd exception - inasmuch as import dependence for supplies of components will increase.

Owing to the lack of sufficient data it is at present impossible to assess these PEIN forecasts in the light of the real situation. However, the forecasts do not reflect the pattern followed by the sector up until 1984, except with regard to exports, as can be seen from Tables II.9. and II.10. - a pattern which, moreover, continued to be followed by the entire sector in 1985[39].

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39 More precisely, according to data published by ANIEL (see "Cinco Días", 2nd April 1986), production in 1985 reached 344,450 million pesetas, exports 119,210 million and imports 554,960 million. This gives the following ratios for that year: SI = 0.44, RIC = 0.29, IEO = 0.35.

To fulfil the objectives mentioned, the PEIN provides for the application of a number of very diverse instrumental techniques of industrial policy which can be summarized as follows:

i) promotion of industrial investment through tax relief, official credit and subsidies;
ii) support for R&D activities in public centres and private enterprise through tax relief, subsidies and State contributions to risk-capital;
iii) creation of information services in companies;
iv) public procurement programmes to promote new activities and technologies, including the contracting of prototypes;
v) standardization and type-approval;
vi) vocational training programmes;
vii) support for export activities by means of tax relief, official credit and subsidies to companies who invest abroad;
viii) creation of a public microelectronics research centre;
ix) policy of protection and import quotas.

A large part of the measures provided for have not been carried out because of unviability in the context of Spain's new membership of the EEC - this is the case of tax relief for investment or import duties - or because of a lack of sufficient political determination to amend current Spanish legislation, e.g. the Law on State Contracts (Ley de Contratos del Estado) which would have to be modified in order to plan public procurement programmes. Moreover, some of the activities that have been initiated, such as those relating to type-approval of computer equipment and television sets, have met with strong opposition from the companies that produce or import them.

However, we should mention the following measures, which have been carried out[40]:

i) the setting up of the "Red Integrada de Servicios de Electrónica" - REDINSER in 1984 with the purpose of providing companies with information on the use of electronic and computer technologies (microelectronics, CAD/CAM, robotics, etc.); by mid-1985 REDINSER had opened service centres in Barcelona, Pamplona and Madrid;

40 See MINER, op. cit., 1985, pp. 74-76.

ii) in 1984 a Diagnosis Programme (Programa de Diagnosis) managed by ADAMICRO was set in motion to advise companies on the use of microprocessors in industry;

iii) CDTI promotion of R&D projects. In 1984, 29 projects were approved with a budget of PTA 4,398 million and with CDTI contributing PTA 1,609 million;

iv) creation in 1985 of the National Microelectronics Centre (Centro Nacional de Microelectrónica), a public research body with a budget of PTA 4,000 million. Work is already under way in temporary accomodation, pending the completion of permanent premises.

v) Promotion of 47 industrial projects, with provision for investment of over PTA 111,000 million foreseen.

A summary of these projects, by subsector and by type of firm involved can be found in Table II.12. In this respect, we should point out that, since the majority of projects proposed in the PEIN are still being drawn up, the table has been compiled using different sources.

The Table together with more detailed information on the projects call forth the following comments:

i) In the first place the action envisaged is quantitatively important, both because of the number of projects and the volume of investment, and because of the scale of production expected from the projects compared with the size of the Spanish electronics subsector. Indeed, if the forecasts were to come true, the output of the companies concerned would be 1.5 times greater than the current output of the electronics sector as a whole, and exports would be 2.3 times higher than present Spanish electronics exports.

ii) The PEIN's preferential treatment of electronics for professional use is clear, and within this, there is a preference for computer products and telecommunications and, to a lesser extent, for some types of components and consumer products.

iii) Thirdly, the importance of the projects of multinational companies emerges clearly, so much so that, in practice, the PEIN appears to promote the penetration of foreign companies into the Spanish electronics industry. Despite incompleteness, the data in

TABLE II.12. INDUSTRIAL PROJECTS WITHIN THE FRAMEWORK OF PEIN
SUMMARY (%)

	Forecast Investment	Forecast Production	Forecast Exports	Export as % of Production
Consumer electronics	3.27	9.92	6.71	37%
- multinational firms	3.27	9.92	6.71	37%
- national firms	-	-	-	-
Professional electronics	55.08	77.97	78.11	54%
- multinational firms	50.15	74.71	76.37	55%
- national firms	4.93	3.26	1.74	29%
Components and other products	41.65	12.11	15.18	68%
- multinational firms	34.77	11.11	14.70	72%
- national firms	6.88	1.00	0.48	26%
TOTAL	100.00	100.00	100.00	54%
- Multinational firms	88.19	95.74	97.78	55%
- National firms	11.81	4.26	2.22	28%

Source: Own elaboration based on data published by MINER and from the companies involved.
Notes : The forecasts refer to 1987.

Table II.12. show participation by such companies in more than 88% of forecast investment, 95% of forecast production and 97% of exports.

This predominance of multinational firms in the PEIN must be seen against the background of the differing degree of importance of foreign and national companies in the various subsectors and their commercial orientation. In fact, there is no company based on national capital operating in consumer electronics; all projects correspond to subsidiaries of multinational firms whose main activity is video assembly, an activity that until the arrival of five foreign companies, was non-existent in Spain. In the subsector of electronics for professional use, multinational subsidiaries dominate the field of computer science, electromedical equipment, and telecommunications while national firms concentrate on electronics for defence and industrial applications. And, although both types of company operate in the components subsector, the multinational companies dominate the field of microelectronics.

As far as commercial differences are concerned, national firms are more orientated towards the internal market, although they will also achieve significant export figures, while multinational subsidiaries are more orientated towards external markets, especially in the components and professional electronics subsectors.

The commercial orientation of foreign companies towards the export market is the result of their specialized production of limited ranges of products - in some cases, of a single product - and, consequently, of their dissociation from the needs of the internal market. For this reason, despite the investment that it is encouraging, in its forecasts the PEIN estimates that 60% of internal demand will still be covered by imports in 1987. This raises doubts as to the practicality of the PEIN, both as regards its role as the driving force behind the growth of the Spanish economy and above all, as regards its capacity to promote the diffusion of new electronic technologies in the Spanish industrial network.

Moreover, an assessment of the technology used in projects of multinational firms indicates that the type of technology transferred to Spanish subsidiaries have been predominantly of little strategic

importance. There are, however, a few projects in which both the transfer process and the strategic importance of the transferred technology have received a positive assessment[41].

To sum up, we cannot deny the major influence that the PEIN will have on the future shape of the electronics sector, even though this future is doubtful as far as its beneficial effects on the industrial network and the technological development of Spanish economy are concerned.

II.3. Labour Law and the System of Labour Relations

In order to understand the emergency of the new labour laws and the changes in the system of labour relations over the period 1977-1986, brief reference will be made to a starting point immediately before the shaping of democratic rights and freedoms in Spain.

Until 1977 labour relations had been characterized by the absence of political and union rights and freedoms since the Spanish Civil War. The right of assembly and association was not recognized, and, therefore, employers' associations, workers' unions and free political parties did not exist. All these were replaced by what were known as the "vertical unions" (Sindicatos verticales) - a union organization to which all management and workers had to belong -, and a line of corporative representation (family, township and union) that constituted the one-party "Spanish Parliament" (Cortes Españolas)[42]. Neither was there any right to strike or to demonstrate. In this framework, working conditions in different fields of production were directly imposed by the State, in this case, via the Ministry of Labour, in the shape of "Work Regulations" (Reglamentaciones de Trabajo). It was only in 1958-1960, with the Law on Collective Agreements (1958) and the economic liberalization resulting from the measures of the 1959 "Stabilization Plan" (Plan de Estabilización), that the system for determining working conditions became more

41 See M. CASTELLS, et al., op. cit., 1986, p. 487.

42 For a better understanding of the Spanish political system during the Franco era, see the work of J. SOLE-TURA "Introducción al régimen político español", Ed. Ariel, Barcelona, 1971. With regard to the role of the "vertical union" in the State apparatus of Franco, see C. IGLESIAS SELGAS, "El sindicalismo español", Ed. Doncel, Madrid, 1974; M. LUDEVID, "Cuarenta anos de sindicato vertical", Ed. Laia, Barcelona, 1975; and M.A. APARICIO, "El sindicalismo vertical y la formación del estado franquista", Eunibar, Barcelona, 1980.

flexible. But, in fact, this flexibility merely paved the way for rather more agile wage adjustments which would encourage greater productivity and broaden the national market. Since the politico-institutional framework remained unchanged, and, consequently, lacked the different social forces with the channels and instruments that such forces require, it cannot really be said that working conditions were fixed by means of collective agreements.

Moreover, the weakness of the production base in Spain generated increasing tension and imbalances, which only served to intensify the already high degree of State involvement in the fixing of working conditions. The "sui generis" collective agreements were almost exclusively restricted to the area of wages, while other working conditions continued to be laid down by the "Work Regulations"[43].

The death of Franco at the end of 1975, marked the beginning of a period of transition from this system of labour relations, which was indissolubly linked to the politico-institutional framework, towards a system based on the independence of the parties involved. The uncertainties as to the shape of the politico-institutional framework, accentuated by the feeling of insecurity caused by the world-wide economic recession, made the transition period particularly delicate and complex. The first two years, 1976 and 1977, were characterized by a relaxed attitude towards the increasing in social pressures and by a lack of any new legal channels for mediating social conflict. These pressures found expression mainly in workers' traditional claims for political and union freedoms, and for wage increases as a means of social levelling. The relaxed attitude towards these claims resulted in political parties and union organizations coming out into the open and in a very large increase in wages.

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43 A detailed analysis of the evolution of the system of labour relations in Spain during the period 1939-1975 can be found in the book by J.L. MALO DE MOLINA and A. SERRANO, "Salarios y mercado de trabajo en España", Ed. Blume, Madrid, 1979. Among the books published outside Spain by foreign authors, we would mention F. WITNEY, "Labor policy and practice in Spain", Praeger, New York, 1966; J. AMSDEN, "Collective bargaining and class conflict in Spain", London, 1972; and the various reports of the ILO on Spain published under the title "La situación laboral y sindical en España", Geneva, 1970 et seg.

In the early months of 1977, the majority of the political parties which were to form part of the Spanish parliamentary spectrum after the first democratic elections in June 1977 were legalized. The trade union organizations were legalized some time later, as from May 1977.

In the economic field, the basic imbalances in the Spanish economy (inflation, deficit in the balance of payments, etc.) were exacerbated, due to the absence of an economic policy that could cope with them. It was only at the end of 1977 that an agreement signed by all the political parties that had obtained parliamentary representation in the first democractic elections in 1977 was reached. This agreement, known as the "Moncloa Pacts" (Pactos de la Moncloa) was based on a programme of short, medium and long-term economic reform[44].

The Moncloa Pacts had some very important immediate effects which, in the early months of 1978, were felt both in a clear improvement in the basic imbalances in the Spanish economy (a check in the rise of inflation, which had been more than 25% of annual growth, and an improvement in the balance of payments) and in a greater degree of social stability[45].

However, once this position has been reached, the programme of economic reform did not go any further or any deeper, and Government and parliamentary efforts were then directed mainly towards the consolidation of the democratic system. The main result of this was the fact that the Spanish Constitution, the cornerstone of the democratic edifice, was passed in December 1978.

The period between 1976 and 1986, with its very different phases and vicissitudes, was characterized by: the establishment of the democratic system in law, laid down in the Constitution of 1978, which, in the field of labour relations, was most clearly expressed in the Workers'

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44 See official publication: "Los Pactos de la Moncloa". Complete text of the Agreement on the Programme of Economic Reorganisation and Reform and of the Agreement on the Programme of Legislation and political action. "Servicio Central de Publicaciones de la Secretaría General Técnica de la Presidencia del Gobierno", Madrid, 1977.

45 See "Los Pactos de la Moncloa. Cumplimiento del Programa de saneamiento y reforma de la economía" 2 vols. "Publicaciones de la Secretaría General de la Presidencia del Gobierno", Madrid, 1978. See also, "Los Pactos de la Moncloa. Cumplimiento del programa de actuación jurídica y política (27 octubre 1977 - 27 enero 1978", "Publicaciones de la Secretaría General de la Presidencia del Gobierno", Madrid, 1978.

Statute (Estatuto de Trabajadores) passed in March 1980[46] and the gradual establishment of an economic policy that revolved around the industrial restructuring of principal undertakings and sectors, with a view to becoming more competitive on the world market and completing the process of adaptation implied by accession to the EEC.

The economic policy followed during this period has been based on wage moderation and on gradually making the labour market more flexible. In the main, implementation has taken the form of Framework Agreements (Acuerdos Marco) between employers' associations and the union organizations at State level. The Government participated directly in some of these agreements and provided encouragement for their settlement. Only in those cases where no final agreement was reached did the Government fix limits on pay increases. These and the main agreements are summarized in Table II.13.

These agreements were made more coherent through collective bargaining. The collective agreements fixed wage increases which, have at least remained within the limits laid down in the general agreements or guidelines for each year. The content of the agreements has been very limited. Only the reduction of the working day, together with wages, appears in the majority of agreements[47]. Matters such as union rights, productivity and absenteeism are coverd less frequently and, in a great many cases, amount to no more than simple statements of intent, rather than being of any practical value.

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46 See Law 8/1980 of 10 March 1980 on the Workers' Statute in the "Gaceta de Madrid", of 14 March 1980. This law was subsequently developed and amplified by various other staturory measures, amongst which we would mention the Basic Employment Law (Ley Básica de Empleo) of 8 October 1980 (Gaceta de Madrid, 17 October 1980). For an analysis of labour legislation and its execution, see the series of articles in the "Revista de Política Social", n° 137, January-March 1983, a special issue on the situation of Labour Law in the light of the Constitution and the Workers' Statute, published in Madrid by the "Centro de Estudios Constitucionales"; and the book which deals with the First Symposium of the Faculty of Law, "El Derecho del Trabajo y de la Seguridad Social ante la crisis económia" Faculty of Law, Complutense University, Madrid, 1984.

47 The average working day accepted in the agreements in the last four years has been:

1982 - 1877.3 hours per year
1983 - 1845.2 hours per year
1984 - 1798.0 hours per year
1985 - 1814.0 hours per year.

TABLE II.13. GENERAL AGREEMENTS AT STATE LEVEL, WAGE INCREASES FIXED BY SUCH AGREEMENTS AND AVERAGE WAGE GROWTH IN COLLECTIVE AGREEMENTS

YEAR	Type of agreement and signing parties	Wage increases	Wage growth in collective agreements (1)
1979	No agreement was reached. The Government fixed a wage increase by decree.	11 - 14%	14.1%
1980	Acuerdo Marco Interconfederal (AMI) (Framework Interconfederate Ageement) Length: 2 years. CEOE and UGT (2)	13 - 16%	15.3%
1981	Idem	11 - 15%	13.2%
1982	Acuerdo Nacional de Empleo (ANE) (National Employment Agreement) CEOE, UGT, CCOO and Government.	9 - 11%	12.0%
1983	Acuerdo Interconfederal (AI) (Interconfederate Agreement) CEOE, UGT and CCOO.	9.5 - 12.5%	11.4%
1984	No agreement. The Government issued a decree, fixing wage rises for the Public Sector at 6.5%	-	7.7%
1985	Acuerdo Económico y Social (AES) (Economic and Social Agreement) Length: 2 years. CEOE and UGT	5.5 - 7.5%	7.4%
1986	Idem	7.2 - 8.6%	8.2% (3)

Source: Own elaboration.
Notes : (1) Data provided by the Ministry of Labour and Social Security.
(2) For the meaning of initials see further for references to employers' and workers' organizations.
(3) Data up to 31 March, 1986.

Parallel to collective bargaining, a more flexible approach towards dismissal and towards the formulae for labour-recruitment was adopted by means of legislation extending the conditions and procedures relating to dismissal and employment. In many cases, the legislation came into being as a result of the implementation of programmes and measures to promote employment which sought to encourage the creation of jobs through the introduction of new clauses for temporary and part-time contracts[48].

Moreover, the laws and decrees governing industrial restructuring provide for the adoption of exceptional labour measures in the respective restructuring plans, in regard as much to wages as to staff adjustments and the geographical and job mobility of the workforce.

The main outcome of this process as a whole in social terms has been a very steep rise in unemployment. Between 1976 and 1986, the number of employed people fell by two million, while the unemployment figure rose by nearly two and a half million (unemployment rates increasing from 4% of the active population to more than 21%), giving a figure of nearly three million people unemployed in the last three months of 1985. Nearly 50% of the total number of people out of work are young people of between 16 and 24, who, in the majority of cases, are in search of their first job. Unemployment benefit covers 34.6% of the unemployed registered with the Labour Exchanges (Oficinas de Desempleo)[49].

Together with open unemployment, numerous precarious jobs coexist, as much within the formal economy (temporary contracts, wages below the level warranted by the skills of the workers concerned, etc.) as in the informal or underground economy. A more complete picture of the situation of the population of working age (16 and over) is obtained when account is taken of those groups that are not included statistically in the labour market and are classified as "inactive".

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48 See the publication of the "Instituto de la Pequeña y Mediana Empresa Industrial", "Formas de contratación laboral". "Características y legislación aplicable", MINER, Madrid, 1985.

49 Data on the active population in employment and the unemployed active population can be found in the "Boletín de Estadísticas Laborales" produced monthly by the Ministry of Labour. The primary sources are the "Encuesta de Población Activa", published every three months by the "Instituto Nacional de Estadística" and, for data on registered unemployment, "Coyuntura del mercado de trabajo" in the monthly publication of the "Instituto Nacional de Empleo" (Ministry of Labour and Social Security).

In the inactive group, besides retired people, invalids and the disabled, there are more than two million students, seven million housewives and about a hundred thousand people who are "available for work" but who do not seek employment[50].

A high percentage of the categories mentioned conceal situations of sub-employment or simply an inability to enter the labour market owing to a lack of job opportunities.

This state of affairs has given rise to very great social tension and imbalances: an increase in juvenile deliquency and petty crime, poverty and marginalisation[51]. However, it is obvious that many other factors that are not strictly connected with labour also contribute to these tensions and unbalances. Moreover, since this affects sections of the population that have little capacity for organization and social response, it does not pose any real threat to social and political stability, at least in the short term. If we look at the figures for labour disputes, we see that, despite the great conflicts generated by the attempts to adjust staff as a result of industrial restructuring, the number of disputes has fallen since 1980, although there was a small "outbreak" in 1984[52].

To complete this picture of the system of Spanish labour relations we briefly mention the main employers' and workers' organizations.

The first initiatives towards the formation of autonomous employers' organizations were taken in the period 1975-1977, based on the embryonic organizations which had been operating during the Franco era. In June 1977, the majority of these large employers' organizations joined together to form the "Confederación Española de Organizaciones Empresariales" - CEOE (Spanish Confederation of Employers' Organizations). Its role as spokesman for top Spanish management was consolidated in 1978-1980 when it was joined by the only employers'

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50 Data comes from the same sources as (49). We should perhaps mention that compulsory schooling in Spain ends at the age of 14 and that the legal age for retirement in the general social security system is 65, both for men and for women.

51 See, amongst others, the report sponsored by "Cáritas Española", "Pobreza y marginación" in the journal, "Documentación Social", No. 56-57, July-December 1984.

52 Data on labour disputes can be found in the "Boletín de Estadísticas Laborales" which is published monthly by the Ministry of Labour.

association that had significant presence at State level, the "Confederación Española de la Pequeña y Mediana Empresa" - CEPYME (Spanish Confederation of Small and Medium-sized Enterprises). Side by side with the CEOE as the representative of all employers, there were other employers' associations of a different nature, normally associations for discussion and study; e.g. the "Círculo de Empresarios" (Employers' Circle), the "Asociación para el Progreso de la Dirección" (Association for Managerial Progress), the Chambers of Commerce, the Cercle d'Economie, etc. Although they were members of the CEOE, some managerial organizations carried quite a lot of weight at the sectoral and geographical level, such as the Bank Management Association and the "Confederación de Industrias del Metal" - CONFIMETAL (Confederation of Metal Industries).

Two major nation-wide unions, the "Confederación Sindical de Comisiones Obreras" (Union Confederation of Workers' Committees) - commonly known by its initials CCOO - and the "Union General de Trabajadores" - UGT (General Workers' Union) acquired a new importance within the workers' union movements; other workers' organizations existed alongside these which carried weight in some regions or areas, such as the "Sindicato de Trabajadores Vascos" - ELA-STV (Union of Basque Workers), or in specific sectors, such as the "Sindicato Libre de la Marina Mercante" - SLMM (Free Union of the Merchant Navy) or the "Sindicato Profesional de Pilotos de Lineas Aéreas" - SEPLA (Professional Union of Airline Pilots). On a national level, other unions continue to exist, albeit in a much more limited form, such as the "Unión Sindical Obrera" - USO (Workers' Trade Union) and the "Confederación Nacional de Trabajo" - CNT (National Confederation of Labour); the latter is at present a minority union and has split into two independent groups, although it has a long historical tradition.

II.4. Health and Safety

In this field Government policy has hardly progressed. The need to ensure safety and hygiene at work is recognized in Article 40, paragraph 2, of the Spanish Constitution, and some general principles and obligations are laid down in Article 19 of the "Estatuto de Trabajadores" (Workers Statute). However, there are no specific references to health problems that could be derived from the introduction of new information technologies. The regulations for the

setting up, composition and terms of reference of the "Comités de Seguridad e Higiene en el Trabajo" (Committees for Safety and Hygiene at Work) have not been brought up to date since 1971.

II.5. Education and Vocational Training

The inadequacy of the education system compared with the needs of the economic system has become more pronounced in recent years. The mismatch between the structure of supply from the education system and the structure of qualifications required by the production apparatus is a problem that affects not only Spain. The situation cannot merely be blamed on the fact that hurried technological change has caused the requirements of the production system and the training opportunities offered by the education system to fall out of step. The truth is that the current technological revolution has clearly revealed the traditional rigidity of the education system.

Hitherto, Government policy in Spain has focused on: teaching pupils experimental use of computers in some schools, the introduction of special computer science courses in the Administration and Commerce branch of technical school training and, at University level, the establishment of various "University Schools" (Escuelas Universitarias) - where students follow three-year courses - and Faculties of Computer Science.

The vocational training provided by the "Instituto Nacional de Empleo" - INEM (National Employment Institute), includes courses on "Computer Science for Managers", "Microprocessors", "Computer Science for Management" and "Programmers".

II.6. Civil Liberties

The protection of individual liberties against the possible abuses arising from the use of new information technologies has been a matter for public debates and lectures, but virtually no legislation has yet been passed in this connection. The protection of privacy from abusive interference is enshrined in Article 18, paragraph 4, of the Constitution. There is, however, no law that specifically regulates the subject.

III. SOCIAL GROUPS

III.1. Attitude of employers

The main employers organizations, and, in particular, the "Confederación Española de Organizaciones Empresariales" - CEOE (Spanish Confederation of Employers' Organizations) have made it quite clear how important it is to introduce new technologies in industry as the only means of maintaining and improving the level of competitiveness of the Spanish economy on the world market.

The introduction of new technologies has become a question of principle and management has the task of making people aware of this need. Spanish employers consider that the major obstacle to the modernization of the Spanish production apparatus is the rigidity of the Spanish labour market. If industrial restructuring is to go ahead and Spain is effectively to undergo re-industrialization, more drastic wage moderation is essential, fixing the rates of wage increases at about the same percentages as in EEC countries[53], while dismissal costs must be reduced and greater flexibility introduced as regards the types of employment contracts.

Only a more flexible labour market will make it possible to overcome the obstacles to industrial restructuring. There will be fewer job losses if the system of dismissal and contracting can be liberalized.

According to the Spanish employers' organizations, the challenge to modernize companies by incorporating new information technologies can only be met, if in the context of a more flexibile labour market, the labour force becomes more mobile, and accepts the change in working conditions, which the advent of new technologies would imply.

III.2. Attitude of Union Organizations

The main Unions (Unión General de Trabajadores, Comisiones Obreras, Unión Sindical Obrera and the Sindicato de Trabajadores Vascos) have shown their acceptance of the need for new technologies, as the only way of ensuring the competitiveness of the Spanish production system, and, consequently, of increasing employment.

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53 See statements made by José Ma. Cuevas, President of the CEOE, in the economic journal, "Cinco Días", Madrid, 6 June, 1986.

This initially favourable position with regard to technical modernization is, however, subject to many precisions. The introduction of new technologies must be negotiated beforehand with the Unions and compensatory measures must be worked out, especially in the areas of worker-training and the length of the working day.

Concern about the lack of plans to train staff to use the new technologies has been particularly strong in the Unions and Workers' Committees in the motor and banking sectors. Training is believed to be limited to maintenance work and operating terminals, which, in the long run, would lead to an increase in unskilled work.

Another cause for concern is related to the problem of workers' health. In working with monitor screens, an increasing number of workers have suffered eye complaints and back problems. Attention has also been drawn to mental saturation, and to the computer-based productivity checks on workers. These stressful situations and deterioration in health are causing an increase in absenteeism.

Except in newly-formed companies, it has been observed that voluntary redundancies are making for an ageing workforce. Older workers, who normally have greater difficulty in adapting to work with new technologies, are reluctant to leave their jobs. This is only partly offset by people entering early retirement.

The main focus of all union strategy is the problem of unemployment. Generally speaking, there is agreement on the need to implement social protection measures and extend unemployment benefits and other social measures. The various Unions also agree in supporting an investment promotion policy and a reduction of the working day as a means of generating employment.

The main differences concern the plans for industrial restructuring, the approach to sectors in crisis and ways of making the labour market more flexible. While the UGT shows a generally more relaxed attitude, seeking to negotiate compensatory measures for cuts in staff through institutional channels, CCOO adopts an essentially defensive attitude, by trying to hold back the restructuring of staff, at least for as long as no definite undertakings to create alternative jobs have been made. This difference of approach is also to seen with regard to programmes

to promote employment based on part-time and temporary contracts. CCOO believes that, unless these programmes are part of a general job-creation strategy, they could simply lead to a high turnover of temporary workers, rather than to the creation of new jobs. Without taking into account other political considerations, these differing approaches have resulted in the absence of the CCOO from the signature of the most recent agreements undersigned by the CEOE and the UGT for the two-year period 1985-1986 (the Socio-Economic Agreement - "Acuerdo Económico Social", better known by its initials, AES).

III.3. Collective Agreements and Labour Disputes

There is no general agreement about the introduction of new technologies between employers and Unions. In the last agreement (AES - 1985-1986) there was only a general reference to the willingness of parties to support technological modernization as a way of improving productivity.

At sector level, there are a few clauses in the plans for sectors undergoing restructuring which refer to the introduction of new technologies, but do no more than commit the employers to making investment and developing retraining courses for workers. Many of these sectoral restructuring plans, especially in shipbuilding and iron and steel, have been opposed by the Unions, especially CCOO, which, as we indicated earlier, maintains a much more radically defensive position.

At company level , the most notewothy agreement to date was that signed by the management and workers of the newspaper, "El Pais"[54]. Under this agreement, not only were more modern information technologies to be introduced for the production of the paper, but also new methods of work organization and job evaluation were agreed upon. Unlike other agreements of a similar nature on papers such as the London "Times" or the New York papers in 1979, all this took place without any strikes.

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54 "El Pais. Acta final de la negociación del protocolo de acuerdo sobre renovación tecnológica", Madrid, 25 February 1981.

We might also mention the proposals for an agreement on new technologies in the "Banco Popular", which were drawn up by a UGT working committee from the said bank[55]. The proposals include the need for a commitment to negotiate all the stages and aspects of the introduction of new technologies, the setting up of a committee to monitor the application of the agreement, the furnishing by the company of information concerning the plans for technological improvement to the said committee, and other clauses relating to the protection against access to and use of personal data, the safeguarding of jobs and training and working conditions.

IV. RESEARCH AND STUDIES

IV.1. Diffusion and introduction of new information technology

In the last few years, numerous studies have been conducted on the subject of the introduction of new technologies in Spain. The most recent and most ambitious of these was carried out by Manuel Castells assisted by a team from the "Cabinet Ministry's Technical Group". It was published under the title "Nuevas Tecnologías, Economía y Sociedad en España"[56].

The study is divided into two main parts: the first part consists of analyses of the principal sectors that produce new technologies and the extent of their development in Spain; the second part, which refers to the effects of the new technologies on the Spanish socio-economic structure, makes a more probing analysis by means of studies of different sectors (cars, banking, defence industry and everday life). The study ends with a reflection on the social and institutional framework within which the policy of technological innovation is developing in Spain.

Although it is not possible to give a comprehensive summary of the results, we can mention some of the main facts and assessments made in the study as far as new information technologies are concerned.

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55 UGT Union Section of the "Banco Popular Español", "Bases para un acuerdo sobre Nuevas Tecnologías en el Banco Popular" in J. MANZANARES (editor), "Trabajo y Nuevas Tecnologías", FUNDESCO, Madrid, 1985, pp. 213-219.

56 See M. CASTELLS, A. BARRERA, P. CASAL, C. CASTAÑO, P. ESCARIO, J. MELERO and J. NADAL; "Nuevas Tecnologías, Economía y Sociedad en España", Foreword by Felipe González, Alianza Editorial, Madrid, 1986, 2 vols. An abridged version of the same work has been published in one volume, under the title "El desafío tecnológico. España y las nuevas tecnologías", Alianza Editorial, Madrid, 1986.

National production appears very limited, and even in those sectors which are more developed (mainly telecommunications), it is connected to multinational groups. These limitations are even greater in the field of pure and applied research.

In contrast with this limited supply, there is a relatively high demand. Table IV.1., taken from the said publication, provides a picture of the intermediate consumption of information technologies in the different sectors of production in the Spanish economy. Nevertheless, the value of the data is extremely limited since, in some cases, they refer to 1975, when the process of introduction of new technologies had not yet begun, and the most recent data relate to 1983.

Finally, we observe a disturbing lack of coherence between different public institutions, and, above all, between the latter and the private organizations or enterprises and society as a whole.

IV.2. Employment

Perhaps because it is one of the most contentious problems, the effects of new technologies on employment has been the subject of many studies, although these tend to be theoretical[57].

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57 One of the pioneer publications was "Nuevas Tecnologías y Empleo", a special issue of the journal "Revista del Institutó de Estudios Economicos" n° 1, Madrid, 1981, which draws on a selection of papers given at the International Symposium on New Technologies and Employment (Bonn, March 1981) and at the Vth Scientific Forum (Cologne, January 1981), both sponsored by the German Economics Institute in Cologne. It also includes a selection of reports on microelectronics and computer science published by the European Communities. Another issue (n° 2, 1982) of the same journal is entitled "Política de innovación tecnológica" and includes texts from the OECD and Eurostat. Another publication of interest is the issue of "Cuadernos CDTI" of May 1982 on "Innovación industrial y empleo". Besides general and theoretical information, it provides some data on the Spanish situation.
A number of symposia on technological change and employment held in November-December 1982 by the "Fundación Empresa Pública" of the "Instituto Nacional de Industria" - INI provided material for the publication entitled "Tecnología y Empleo", compiled and introduced by Carmela Martín and Luis R. Romero, "Fundación Empresa Pública", Madrid, 1983. The book contains the papers and reports presented at the said symposia. It starts from a theoretical assessment of the relationship between technical change and employment. The other chapters analyze various more concrete aspects of this relationship, with reference to the case of Spain.

TABLE IV.1. INDICATORS OF THE TECHNOLOGICAL LEVEL OF DIFFERENT SECTORS OF ACTIVITY

	Intermediate Consumption in Communications (millions pts) 1975	Intermediate Consumption of Computers&Electron. Mater. (% of total) 1975	Expense in data transmission (pts per employee) 1983
1. Agricultural production	273.00	0.06	18.70
2. Stockfarming	87.00	0.06	18.70
3. Agricultural and Livestock Services	7.00	0.06	18.70
4. Restocking of game	2.00	0.02	18.70
5. Forestry	11.00	0.00	18.70
6. Fisheries	91.00	0.00	18.70
7. Extrac.preparation & agglomeration of solid fuels	53.00	0.00	3,305.90
8. Oil and natural gas extraction	2.00	0.00	3,305.90
9. Oil refining	128.00	0.73	3,831.10
10. Extraction & processing of radioactive ores	1.00	0.00	3,305.90
11. Production; electricity, gas, water	275.00	5.49	3,305.90
12. Water collection and supply	28.00	0.12	3,305.90
13. Extraction and preparation of metallic ores	33.00	0.02	3,305.90
14. Metal production and processing	43.00	2.60	1,120.10
15. Extraction of non-metallic ores	90.00	0.06	3,305.90
16. Industry, production of non-metallic ores	359.00	0.10	1,120.10
17. Chemical Industry	891.00	2.77	3,831.10
18. Manufacture of metal products	364.00	0.39	1,120.10
19. Manufacture of machinery & mechanical equipment	150.00	3.68	1,659.90
20. Manufacture of machines & computers	21.00	2.81	39,997.70
21. Manufacture of electrical machinery & equipment	269.00	5.27	1,659.90
22. Manufacture of electrical equipment	169.00	0.00	5,606.40
23. Manufacture of cars and accessories	243.00	14.02	1,243.60
24. Shipbuilding	217.00	8.34	1,243.60
25. Manufacture of other transport material	53.00	3.32	1,243.60
26. Manufacture of precision instruments	26.00	0.53	3,059.70
27. Food industry	426.00	0.28	153.90
28. Other food, drinks and tobacco	316.00	0.41	153.90
29. Textile industry	252.00	0.26	153.90

TABLE IV.1. (cont.)

30. Leather industry	92.00	0.00	153.90
31. Clothing and footwear industry	400.00	0.00	153.90
32. Wood, cork and furniture industry	267.00	0.24	153.90
33. Paper and graphics industry	202.00	0.12	153.90
34. Rubber and plastics	202.00	0.16	3,831.10
35. Other manufacturing industries	52.00	0.06	153.90
36. Construction	1,106.00	7.37	182.40
37. Wholesale trade	3,338.00	0.79	247.00
38. Product recovery	59.00	0.00	247.00
39. Agents	743.00	0.08	247.00
40. Retail trade	3,287.00	0.47	247.00
41. Restaurants and cafes	2,752.00	0.28	284.20
42. Hotel business	-	0.16	284.20
43. Repairs	87.00	8.42	33.80
44. Rail transport	255.00	0.28	1,697.70
45. Other land transport	1,282.00	0.04	1,697.70
46. Maritime transport	1,200.00	0.06	1,697.70
47. Air transport	880.00	0.02	1,697.70
48. Transport related activities	445.00.	0.14	1,697.70
49. Communications	1,596.00	13.14	12,746.70
50. Financial institutions	4,712.00	1.55	66,026.90
51. Insurance	500.00	0.59	66,026.90
52. Activities auxiliary to banking and finance	367.00	0.08	66,026.90
53. Services to companies	1,212.00	0.14	1,605.50
54. Letting of personal properties	43.00	1.69	1,605.50
55. Letting of real estate	246.00	0.00	1,605.50
56. Public, Defence, Social Administration	5,655.00	6.98	2,970.90
57. Street cleaning services	282.00	0.02	2,970.90
58. Education and research	309.00	0.16	195.40
59. Health and veterinary services	264.00	5.19	161.60
60. Social services	-	0.02	161.60
61. Recreational and cultural services	-	0.26	195.40
62. Personal services	-	0.04	33.80
63. Domestic services	0.00	0.00	33.80
64. Diplomatic represents & international bodies	-	0.00	-

Source: M. CASTELLS et al, "Nuevas Tecnologías, Economía y Sociedad en Espana", Vol. 2., op. cit., pp 509 and 510.

The most recent data at our disposal are those to be found in the study mentioned above[58]. The main conclusions to be drawn regarding the relationship between technology and employment are summarized in Table IV.2. Although jobs are being lost in all areas of activity, the higher the technological level, the less negative is the trend of employment and the lower the number of job losses. The higher the technological level, the greater the increase in productivity. However, the sectors at an intermediate level are those that achieved a greater increase in productivity in the period under consideration, since many more jobs were lost than in the leading sectors and their production also went up. The rate of variation of exports shows that the sectors with the highest degree of technological development are the biggest exporters; but it is also observed that the sectors with an intermediate-low or lower level of technological development, consisting of companies that manufacture traditionally low-cost products had a higher export capacity than sectors with an intermediate level of technology. Finally, it is clear that there is a perfect correlation between the level of technology and the degree of foreign capital.

The sectors with the largest number of multinational undertakings are also those with the highest level of technology.

If we restrict ourselves to employment of graduates and technical staff in electronics and computer science, we see, from a recent study carried out by FUNDESCO, that there is a great imbalance between supply (mainly in telematics engineering and software technology) and market demand. The main conclusion to be reached is that it is necessary to extend training in computer science, telecommunications, etc., in order to arrive at the right balance[59].

IV.3. Qualifications

The various studies carried out show that new technologies are producing great changes in the structure of qualifications.

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58 Castells et al., op. cit., 1986.
59 FUNDESCO, INFOCEM journal, 1985.

TABLE IV.2. VALUE OF SELECTED VARIABLES FOR GROUPS OF SECTORS OF ECONOMIC ACTIVITY CLASSIFIED ACCORDING TO THE TECHNOLOGICAL LEVEL OF THE SECTOR
(Quarters of distribution of the sectors according to technological level)

Technological level	Variables		
	Production (Variation rate 1981/1973 of % sector in total GNP)	Employment (Variation rate of No. of jobs 1983/1976)	Employment (Absolute variation of jobs 1983/1976)
High (1st quarter)	119.34	99.6	- 15,400
Medium (2nd quarter)	115.22	95.12	- 116,500
Medium-Low (3rd quarter)	102.50	86.98	- 586,100
Low (4th quarter)	67.57	78.89	- 765,300

DISTRIBUTION IN QUARTERS OF SECTORS OF ACTIVITY ACCORDING TO CNAE* CLASSIFICATION BASED ON TECHNOLOGICAL LEVEL
(In descending order)

1st quater
13. Oil refining
14. Extraction of radioactive ores
15. Electricity
22. Production and processing of metals
25. Chemical industry
33. Office machinery and computers
34. Electrical machinery
35. Electronic machinery
36. Cars
38. Other transport material
76. Communications
81. Banking
82. Insurance
83. Financial auxiliaries
84. Services for companies
91. Public Administration

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*CNAE = National Classification of Economic Activites

TABLE IV. 2. (cont.)

Level of productivity % GNP/ % working population			Variables		
	1976	1983	Productivity variation rate 1983/1976	Export variation rate 1983/1975 (constant pts)	% of foreign capital over total foreign capital in the entire economy
1st quarter	159.94	169.94	106.26	276.51	58.00
2nd quarter	99.08	107.78	108.78	163.04	23.23
3rd quarter	86.74	90.03	103.80	256.60	13.38
4th quarter	84.87	64.01	75.43	187.77	3.34

2nd quarter	3rd quarter
12. Oil extraction	2. Cattle
16. Water collecting and distribution	6. Fishing
21. Extraction of metallic ores	11. Solid Fuels
24. Industries for processing of non-metallic ores	23. Extraction of non-metallic ores
32. Mechanical machinery	31. Manufacture of metallic products
37. Shipbuilding	47. Paper and graphics
39. Precision instruments	49. Other manufacturing
41. Food industry	50. Construction
42. Other food	63. Agents
48. Plastic industries	64. Retail trade
61. Wholesale trade	65. Restaurants
72. Land transport	66. Hotel business
73. Maritime transport	67. Repairs
74. Air transport	71. Rail transport
93. Education and research	75. Related transport
94. Health	85. Letting of personal property
	96. Recreational services

4th quarter	
1. Agriculture	46. Wood and cork
3. Agricultural and livestock services	62. Recovery of products
4. Game	86. Letting of real estate
5. Forestry	92. Health services
43. Textile industry	95. Social work
44. Leather industry	97. Personal services
45. Footwear and clothing	98. Domestic service

Source: CASTELLS et al., "Nuevas Tecnologías, Economía y Sociedad en España," (vol. 2), op. cit., pp. 520 and 521.

Recent studies of the car sector in Spain indicate that the introduction of new technologies has meant an increase in the indirect labour force responsible for maintenance and quality control to the detriment of staff directly involved in manufacturing and handling materials. At the same time, a certain polarization has been observed in those companies which have introduced new technologies to a greater extent between the highly skilled workers (chief maintenance workers) and those who have few or no qualifications[60].

There have also been great changes in qualifications in the area of banking. The categories of Heads of Department and Administrative Staff have swollen, while those of General Clerical Staff have diminished, and those responsible for manual handling of information processes have totally disappeared[61].

IV.4. Working Conditions, Health and Safety

In several of the studies mentioned, it was observed that the increase in productivity generated by the new systems is often used by companies to increase the rhythm of work. New forms of piecework are emerging, and there is an increase in the number of shifts in order to intensify the use of equipment, and thus increase the profitability of investment in new equipment. The automation of maintenance and control systems is putting increasing pressure on the worker.

Typically effects are an increase in physical tension, normally affecting eye-sight, as well as mental tension. Among the most common complaints of people working with computer screens are tired eyes and osteo-muscular complaints. The effects of radiation from the screens are at present more difficult to assess. According to some research, low-frequency non-ionizing radiation is the type that can have the greatest effects on the nervous system. There is an increase in the mental load the effects of which are not recognized as occupational hazards but tend to be attributed to causes outside the work situation.

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60 See C. CASTAÑO, "Cambio tecnológico y mercado de trabajo en la industria del automóvil", published by the "Instituto de Estudios Laborales y Seguridad Social", Madrid, 1985.

61 For the banking sector see section III.3. (Las nuevas tecnologías en el sector Bancario) of the book by M. CASTELLS, et al, "Nuevas Tecnologías", op. cit., pp 639-684. The studies contained in the book published by José Manzanares, "Trabajo y Nuevas Tecnologías", FUNDESCO, Madrid, 1985, also refer basically to the banking sector.

Premature ageing and the loss of skill at the job are very difficult to assess and relate to a unilateral cause, resulting from the work situation[62].

A survey of 554 data screen operators and their working conditions carried out in June 1982 gave the following results:

1. Terminals (data screen/keyboard)
   - 58.8% work with screens and keyboards which are fixed to the terminal.
   - 49.0% The distance between eyes and screen is less than 50 cms.
   - 45.0% The position of the eyes in relation to the screen is forced.
2. Working Environment
   - 64.5% Reflection from the screen.
   - 58.9% Reflection from the keyboard.
   - 47.8% The lighting in the room is inadequate.
   - 23.0% Very strongly contrasting colours in immediate environment.
   - 25.3% Unsuitable chairs.
   - 70.9% Before the terminal was installed, operators received no previous instructions about working conditions.
3. Organization of work
   - 76.5% Work more than four hours a day in front of the screen.
   - 64.0% Have to look at the screen for a long time.
   - 24.0% Never alternate their work at the screen with other tasks.
   - 27.7% Do not have a break during their working day.
4. Visual load (eye complaint)
   - 72% tired sight
   - 64% itching, aching
   - 54% pain when they close their eyes
   - 24% double vision
   - 64% eyes become oversensitive to light

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62 See the following works: M. GRAU RIOS, "Necesidad de una normativa para el trabajo ante pantallas de datos"; C. LEON MORGADO, "Problemas visuales y osteo-musculares en operadores de pantalla de datos"; C. SERRANO, "Las radiaciones de las pantallas. Un problema no resuelto todavía"; F. ALONSO ARENAL, "La salud, la seguridad y la higiene de los operadores ante pantallas de datos" in the book published by J. MANZANARES, "Trabajo y Nuevas Tecnologías", op. cit., pp. 155-204. The many leaflets published by the "Gabinete de Salud Laboral de la Confederación Sindical de Comisiones Obreras" should also be consulted.

5. Posture problems
   - 76% backache
   - 55% aching neck
   - 31% painful joints
   - 30% lumbar pains
   - 38% limbs feel heavy
6. Increase in mental fatigue and adaptation problems
   - 45% difficult to concentrate
   - 43% depressed
   - 59% irritability
   - 40% unstable attention
   - 35% anxiety[63].

IV.5. Conferences

A Franco-Spanish seminar was held on 25 and 26 November 1985 on "The employment of young people in the context of economic and technological change". The main conclusions of the seminar were:

i) There is a trend towards a polarization of the labour market, and the danger of many young people becoming trapped in a market that is poorly skilled, accounted for mainly by small and medium-sized firms with obsolete technologies, and a rapid turn-over of young workers. In this connection, they emphasized the need to probe more deeply into the underground labour market, which affects young people in search of their first job.

ii) There is a danger of a break in the skills/qualifications ladder, and a disruption of the place occupied by intermediate levels of technical training.

iii) The issue of the creation of a more flexible labour market must be approached from a wider viewpoint than a reduction of the minimum legal wage, labour cost and social security.

iv) The training of a young labour force, prepared to welcome the new technologies and new ways of organizing work, is an imperative requirement for the positive involvement of young people in employment.

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63 Data taken from the "Grupo Informático y Trabajo", UGT, Madrid, "Condiciones de trabajo ante pantallas de datos", Madrid, Fundación IESA, 1982. Reproduced in J. MANZANARES, "Trabajo y Nuevas Tecnologías", op. cit., pp. 198-200.

V. EXPERIENCES IN SPECIFIC SECTORS

In this section we describe the most salient aspects of the introduction and diffusion of information technologies in some sectors of the economy and Spanish society in recent years. One is based chiefly on the results of the studies by CASTELLS et al, (1986), mentioned earlier in this report, which contain interesting appraisals of the said process with regard to the motor, banking, education and administrative sectors, as well as with regard to home life. We also include a section on the computerization of machine tools.

V.1. Information technology in the motor industry

With an output of 1,254,515 vehicles in 1984, the Spanish motor industry holds sixth position in the world, after the industries of Japan, the United States, Germany, France and Italy. Six companies of different sizes, linked to multinational companies, operate within this industry: Seat, linked to Volkswagen; Fasa-Renault which belongs to the Régie National des Usines Renault; Citroën and Talbot, part of the PSA group, Ford España which is part of the European division of Ford; and General Motors España of the European group of General Motors.

Since 1979, when Seat introduced 13 robots to weld bodywork in their Barcelona factory, the Spanish motor industry has increasingly seen the introduction of new production technologies resulting in a greater degree of automation and flexibility in the production processes. The new technologies consist basically of the following: robots - 418 in 1984 -, programmable controllers - 1,542 in 1984 -, computer control of the manufacturing process, manufacture to order and control of suppliers through computer processing of the corresponding data. The techniques of computer-assisted design and manufacture (CAD/CAM) have not yet been introduced, although three companies have access to these systems through their respective European head offices.

The degree of diffusion of the technologies mentioned can be seen in Table V.1., where major differences between companies are observed. Thus, the top users of flexible manufacturing technologies are two subsidiaries of North American multinational firms - General Motors and Ford -; in the intermediate position are Renault, Citroën and Seat; and using very few of these technologies, Automóviles Talbot.

TABLE V.1. PRODUCTION, STAFF AND NEW TECHNOLOGIES IN CAR MANUFACTURING FIRMS IN 1984

FIRMS	Production of cars and by-products	Staff	No. of robots	No. of programmable controllers	Computer-programmed or controlled workshops	Manufacture to order
Seat	278,855	23,610	57	45	Listed programming	NO
Renault	239,691	21,586	72	700	Programmed	NO
Citroën	120,602	8,702	25	77	NO	NO
Talbot	86,207	8,661	7	50	Listed programming	NO
Ford	269,185	8,834	84	170	Listed and direct orders from computer to robots and programmable controllers	YES
G. Motors	259,971	8,828	173	500	Idem	YES

FIRMS	CAD/CAM	Control of suppliers	Vehicles per employee	No. of employees	
				per robot	per programmable controller
Seat	NO	Not operational	11.8	414.2	524.7
Renault	NO (*)	Partial	11.1	299.8	30.8
Citroën	NO	In preparation	13.8	348.1	113.0
Talbot	NO	In preparation	10.0	1,237.3	173.2
Ford	NO (*)	YES	30.4	105.2	52.0
G. Motors	NO (*)	YES	31.2	48.1	17.6

(*) Except via use the European headquarters

Source: CASTELLS et al, (1986), pp. 584 and 586.

The effects of the introduction of these technologies was studied by CASTELLS et al[64], and their principal conclusions were as follows:

i) The introduction of these technologies generates a substantial increase in productivity which, for the entire industry, is calculated at 14.6% between 1980 and 1984; in 1980, 13.7 vehicles per employee were manufactured, and, by 1984, this figure had risen to 15.7. In considering these figures, we should bear in mind that the market was not very favourable to expansion during the period mentioned and that a large part of the increase was due to the activity of General Motors, which began operations in 1983.

ii) Output per employee is much higher in firms with a high level of technology (see Table V.1.). The same is true as regards output per direct employee, which is tending to grow with the introduction of the information technologies analyzed here.

iii) Moreover, there have been major falls in labour requirements, which, in a context where production figures are stable, meant the loss of 7,605 jobs between 1980 and 1984, i.e. there was a 8.7% fall in employment in comparison with the number of workers in 1980. In this respect, it should be indicated that the setting up of General Motors meant the creation of 8,328 jobs, so that the loss of jobs in the other companies affected 15,933 workers, i.e. 18.2% of the workers in 1980.

iv) In addition, the introduction of new technologies has occasioned changes in the composition of the workforce. More precisely, greater implementation of these technologies means a lower proportion of directly productive jobs and a higher proportion of workers performing maintenance work and quality control jobs. There also seems to be a tendency towards greater wage differences as the technological level goes up.

v) Finally, the use of the technologies analyzed has an obvious impact on efficiency of production, since the period of time between ordering and delivering vehicles is shorter, as are the length of time that materials and components remain in stock and the time taken to locate vehicles.

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64 See CASTELLS et al., "Nuevas Tecnologías, Economía y Sociedad en España", Alianza Editorial, Madrid, 1986, pp. 596-625.

V.2. Information technologies in the banking sector

In the banking sector, the introduction of information technologies has been an intense process, which has coincided with the expansion of the network of branch offices, which, in turn, has enabled them to improve their information-processing procedures. With regard to this process, there are two basic pieces of research available: one by POLO REDONDO[65], based on a survey of 33 "Cajas de Ahorro" (Savings Banks) - 42% of the total existing in Spain - and 22 Banks - 23% of total, and the other by CASTELLS at al, 1986[66], based on data providing by three "Cajas de Ahorro" and seven private Banks.

The technologies introduced are the following:

i) Central computers for data-processing and minicomputers for departments with specific functions.
ii) Network of terminals installed in branches.
iii) Network of cashpoints and issue of credit cards.
iv) Automatic cash dispensers; printing machines and machines for preparation of correspondence.

Table V.2. shows the data concerning diffusion of these technologies according to the results of the broader piece of reserach mentioned. In it we can see the high degree of diffusion reached by the use of computer systems and the clear diffence in rhythm between the proliferation of central computers and that of terminal networks, since, while the former spread mainly during the seventies, the latter are now spreading in the eighties. On the other hand, automatic cashpoints have not spread so much, despite the fact that they were introduced in the early seventies. However, on this point we should point out that in 1984 and 1985 this technology spread more quickly, helped by the setting up of three different networks: "Confederación Española de Cajas de Ahorro" (Spanish Confederation of Savings Banks), "4B" and "Servired". All the "Cajas de Ahorro" are part of the first network; the second is not so widespread, and 27 banks are involved in the third. All together, these three networks have 5,500 cashpoints, according to 1985 data.

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65 Y. POLO REDONDO, "Difusión de innovaciones en Bancos y Cajas de Ahorro", a paper presented at the "Ciclo de Seminarios sobre Política Industrial y Desarrollo Tecnológico, Escuela de Organización Industrial", Madrid, 1986.
66 CASTELLS et al., op. cit., pp 639-684.

TABLE V.2. DIFFUSION OF INFORMATION TECHNOLOGIES IN THE BANKING SECTOR

Technologies	Year started	Years taken to reach diffusion of 10%	50%	90%	% of entities that had adopted the technology in 1983	Establishments
Central Computer	1960	0	11	17	100%	Banks
	1960	5	12	21	96%	Savings Banks
Terminals in branches Teleprocessing	1971	0	10	13	91	Banks
	1967	2	7	13	100%	Savings Banks
Automatic cash dispensers	1972	3	11	-	59%	Banks
	1974	6	8	-	88%	Savings Banks
Credit cards	1971	0	7	-	77%	Banks
	1965	8	9	-	88%	Savings Banks

Source: POLO REDONDO (1986)

Lastly, the issue of credit cards has become quite widespread amongst credit institutions and they have been very well received by commercial establishments. This was complemented throughout 1985 by the introduction of electronic point of sale in commercial establishments, which made it possible to make payments with credit cards automatic. Today, there are 2,000 electronic point of sale in the network and a great increase is forecast in the next few years[67].

POLO REDONDO's study (1986) analyses the main factors that encourage the spread of these innovations and reaches the following conclusions:

i) The size of the credit institutions is the most significant variable in the explanation of the speed of adopting innovations.

ii) The existence of decentralized organizational structures has an influence on the adoption of innovations.

iii) The profitability of credit institutions has no bearing on the adoption of the technological innovations studied.

For its part, the study by CASTELLS et al (1986) analyzes the implications that the diffusion of the new technologies has had for employment in the ten credit institutions studied. The main conclusions of this study are:

i) Between 1979 and 1983 there was a 7.3% fall in employment in banks and a 23.6% increase in employment in the "Cajas de Ahorros". All together the fall was 5,329 jobs - 4.5% of the total. However, there is no evidence that there is any relation between the reduction in the number of jobs and the use of new technologies.

ii) The new technologies have a considerable influence on the organization of work, and, consequently, on staff structure. There is a substantial reduction of repetitive tasks and of the manual handling of documents, while there is an increase in commercial tasks and in attending customers.

iii) There has been an increase in the relative number of employees in central services, while the number of employees in branches has gone down. Thus, in the branches there has been a sizeable decrease in the average number of employees.

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67 See "El Pais", 28 May 1986.

iv) Finally, between 1979 and 1984 the relative number of female employees increased, especially in the intermediate grades. However, very few women are employed in senior grades[68].

V.3. Information technologies in the home

Since 1980 there has been a spread of new information technologies in the home, accounted for mainly by videos and microcomputers, although there has also been some development in the field of telecommunications equipment in the home.

As far as videos are concerned, the number of machines has increased considerably, so that, in 1984, nearly 13% of households were video-equipped, as can be seen from Table V.3. This expansion of the market has led to the setting up of video manufacturers since 1984 under the industrial promotion policy of the PEIN. Five companies have set up projects in this field - Sony, Sanyo, Grundig, Panasonic and Sharp -, although at the moment they simply assemble imported components to manufacture low-range products, since those that are more technologically sophisticated are assembled before they are imported. These projects will be complemented by a future video components factory, set up by Sanyo on the basis of agreements concluded with the Ministry of Industry and Energy in May 1986.

TABLE V.3. NUMBER OF HOUSEHOLD VIDEOS IN SPAIN

Year	Number of videos	% of homes
1980	39,000	0.39
1981	127,000	1.27
1982	372,000	3.72
1983	833,000	8.33
1984	1.275,000	12.75

Source: TORRES (1984). Taken from CASTELLS et al. (1986)

Another product, connected with information technologies, that has become fairly widespread in the home in the last few years is the microcomputer. There are very few data on the subject, but it is thought that, although these machines hardly existed in Spain in 1982,

68 Other studies on the computerization of the banking sector in Spain which confirm this information and go into more detail can be found in J. MANZANARES (editor), "Trabajo y Nuevas Tecnologías", FUNDESCO, Madrid, 1985.

by the end of 1985 there numbered 250,000. They are mainly used for games (80%) and to a much lesser extent for teaching or household management[69].

Finally, trials and experiments in fields related to the telephone have taken place since 1978, e.g. videotex and teletext. Nevertheless, the introduction of videotex is still at the project stage, and teletext at the trial stage, through 2 hours 25 minutes daily broadcasting on the first TV channel[70].

V.4. Information technologies in education

The teaching of computer science at the junior and secondary school level is still exceptional, as the data in Table V.4. reflect. These data are taken from a survey conducted in 1984 with a sample of 1,871 public and private centres. The data also show that classes in computer science in the centres with the necessary equipment are mainly voluntary. Moreover, the data show the dual nature of this type of equipment: it is used to teach computer language and to back up teaching of other subjects, although this latter function is not so widespread[71].

The reasons for the continuing rarity of computer science teaching in education are, basically, the following:

i) The cost of the equipment which, if we bear in mind the fact that there is a lack of financial resources and that many basic needs have not been satisfied, discourages centres from buying them.

ii) The non-compulsory nature of computer science classes.

iii) A lack of suitably trained staff in this field.

iv) Contradictory attitudes on the part of parents, teachers and pupils towards the subject of computers, which is the product of the interest evoked by computers and the feeling of insecurity caused by insufficient information on the subject[72].

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69 Cf. M. CASTELLS, et al., op. cit., 1986, pp. 834-837.

70 Other studies on the same subject can be found in R. RISPA, (editor), "Nuevas Tecnologías en la vida cultural española", FUNDESCO, Madrid, 1985, pp. 93-111.

71 For more details, see Ministry of Education and Science, "La informática en la enseñanza de los niveles básicos y medios del sistema educativo", Madrid, 1984, and M. CASTELLS, et al., op. cit., pp. 841-860.

72 See M. CASTELLS, et al., idem, pp. 846-848, and F. FIGINI, "Actitudes de los educadores de Básica y Media frente a la inclusión de nuevas tecnologías en la enseñanza", FUNDESCO, Madrid, 1985.

TABLE V.4. SOME RESULTS OF THE SURVEY ON COMPUTER SCIENCE IN SPANISH EDUCATION (1984)

POSSESSION OF COMPUTER EQUIPMENT

Educational level	Equipment		No equipment		Total	
	No.	%	No.	%	No.	%
EGB	11	1	918	99	929	100
BUP and COU	143	35	265	65	408	100
FP	97	30	226	70	323	100
More than one level of education	43	20	168	80	211	100
TOTAL	294	16	1,577	84	1,871	100

VOLUNTARY OR COMPULSORY NATURE OF COMPUTER SCIENCE TEACHING

Educational level	Voluntary		Compulsory		Total	
	No.	%	No.	%	No.	%
EGB	8	100	-	-	8	100
BUP and COU	126	95	7	5	133	100
FP	27	33	56	67	83	100
More than one level of education	23	66	12	34	35	100
TOTAL	184	71	75	29	259	100

USE OF COMPUTER SCIENCE

Educational level	Computer science teaching		Support for other subjects	
	Centres	% of total	Centres	% of total
EGB	8	73	8	73
BUP and COU	133	93	63	44
FP	83	86	38	39
More than one level of education	35	81	14	33
TOTAL	259	88	123	42

Source : Ministry of Education and Science (1984)
Initials: EGB: Enseñanza General Básica (Junior and middle school)
BUP: Bachillerato Unificado Polivalente (Secondary Education)
COU: Curso de Orientación Universitaria (Pre-University year)
FP : Formación Profesional (Vocational training)

The "Atenea" project put forward by the Ministry of Education and Science for the introduction of microcomputers in teaching centres should be situated in this context. The basic aims of the projects are[73]:

i) To facilitate education in the field of computers, teaching languages and uses.

ii) To use computers as aids for the teaching of other subjects, to help learning and encourage creativity.

There are two basic approaches to these aims: on the one hand, to use computers as a more modern means of teaching; and, on the other, to look for a line of teaching that tries to encourage the assimilation of knowledge through experience, which has led to the use of Logo language in the project. This was set in motion in 1985-1986.

V.5. Information technologies in Public Administration

Although the process of equipping the Spanish Public Administration with computers goes back to the early sixties, the present level of use of computers is still limited[74]. However, there are no data on the subject that allow us to assess the phenomenon in quantitive terms, since the inventory of public computer resources has not yet been published. Therefore, we can only make a few qualitative references so to provide an idea of the situation. The best equipped departments are those of the Ministry of Taxation and Social Security, while there are still some Ministries with a minimum level of equipment, such as the Ministry of Health and Consumer Protection. And, to a large extent, the same holds true for local administrative bodies. Moreover, the way in which the Administration has been equipped, has been conditioned by a concern to simplify the management of information within each bureaucratic unit, without considering how equipment can be used to provide better service for the ordinary citizen or to connect different units and thus facilitate information flow. Thus, incompatibility between the equipment installed in different Ministries, and even within the same Ministry, seems to be common place, which makes it difficult to use the information and which also means that there is a high degree of underutilization of equipment.

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73 See Ministry of Education and Science, "Proyecto Atenea", Madrid, 1985.
74 See M. CASTELLS, et al., op. cit., 1986, pp. 853.

This situation has made it necessary to draw up a series of projects to improve the situation of computer science in the sector; these projects are coordinated by the Higher Council for Computer Science (Consejo Superior de Informática) and their general outlines can be seen in Table V.5.

V.6. Manufacturing

In this section we will comment on the work of José Ma. Echevarría Amenabar, "El desfase español en la innovación technológica de la informatización de la máquina-herramienta"[75].

The thesis is divided into two separate parts. The first part consists of a detailed analysis of the technological advances made in the principal ways of computerizing machine tools. Thus, it analyzes Numerical Control, Industrial Robots, Computer-Assisted Design and Manufacture, Group Technology and Flexible Manufacturing Systems. For all these areas, not only the technological content is studied, but also the lines diffusion has followed in more developed countries, the effects on the economy in general and on employment in particular and Government policies drawn up in Japan, the United States, France, the Federal Repubic of Germany, the U.K., Sweden, the U.S.S.R and other countries with centralized economies.

The second part of the thesis investigates the machine-tool industry in Spain and how far computer technologies have been introduced in the sector. After a description of the historical development of machine-tools in Spain, the following subjects are dealt with in depth:

i) The incorporation of numerical control in Spanish industrial production. Maladjustment is both measured by the percentage of machines manufactured which incorporate numerical control and by the number of machines installed in Spain in comparison with other nearby countries like France and Italy. However, it is an area

75 Doctoral Thesis supervised by José Molero, Faculty of Economic Science and Business Studies, Complutense University, Madrid, 1984.

TABLE V.5. PROJECTS OF THE HIGHER COUNCIL OF COMPUTER SCIENCE FOR THE SPANISH PUBLIC ADMINISTRATION

1. Projects to improve internal work	2. Projects which indirectly affect the public	3. Projects which affect services given to public
- Civil servants pay systems (NOMINA) - Budget Control Systems - Accounting systems and systems for planning and monitoring the Budget - Public Speding Auditing Systems - Systems for checking attendances - Checking for activities incompatible with status of civil servants - Production of economic and social statistics - Keeping records of public works and services contracts - Opinion polls - Systems of legislation - Office automation	- New computerized weather-forecasting systems for the National Meteorological Service (Servicio Nacional de Meteorologia) - New computerized systems for the Sub-secretariat of Civil Aviation (Subsecretaría de Aviación Civil) to improve air traffic control and airport management - System to prevent floods and to survey dams (Gen. Directorate of Hydraulic Engineering - Dirección General de Obras Hidráulicas) - Automated systems of tax administration to monitor and check tax returns and prevent tax fraud - Hospital management - Information system for law offices (INFORIUS projects) - Automation of Consultation - Information system for police files - Management of Government representatives in the provinces (Gobiernos Civiles)	- Information services for the public - Acquisition of driving licences and passports - Management of unemployment benefits - Information system for jobs (INEM) - Cultural Information Points (Ministry of Culture) - Social Security Management; applications, benefits, aid, pensions, etc. - Introduction of Computer Science into junior and secondary schools (Atenea Projects) - Establishment of a "hot line" to the Moncloa (Cabinet Office) - Management of petitions to the ombudsman

Source: CASTELLS et al 1986.

where great improvements can be made, if the tradition of the machine industry in areas such as the Basque country, is taken into account.

ii) The introduction of industrial robots. At the time when the study was completed (1984), no Spanish robots had been marketed, which should be seen in relation to the small number of researchers involved in the subject on a national scale.

iii) Computer-assisted design and manufacture. There seems to be a certain reluctance to use these technologies, although it is true that those which are marketed in Spain are designed to satisfy other industrial needs.

iv) Flexible manufacturing systems. The main obstacle is Spain's deficit in industrial electronics, which is necessary for automated industrial manufacturing. Spain occupies one of the last places in Europe with regard to the production of industrial electronics.

Other important conclusions relate to such matters as:

- The great lack of technicians with multidisciplinary training.
- Institutional disorganization.
- Need to re-design vocational training courses.

However, great steps have been taken towards the introduction of new systems of numerical control in the industry in the Basque Country in the last few years, encouraged by the Autonomous Basque Government's policy to promote technological innovation[76].

76 See IKEI, "Informatización, automatización y robotización en la industria del País Vasco", IKEI, Vitoria, October 1984.

VI. SELECTED BIBLIOGRAPHY

ALBENTOSA, Luis, "La política de ajuste despalzada: reconversión industrial" in Información Comercial Española, no. 617-618, January-February, Madrid, 1985.

BRAÑA, Javier,; BUESA, Mikel; MOLERO, José, "El Estado y el cambio tecnológico en la industrialización tardía. Un analisis del caso española," Ed. Fondo de Cultura Económica, Madrid, 1984.

CASTELLS,M., BARRERA,A., CASAL,P., CASTAÑO,C., ESCARIO,P., MELERO,J. and NADAL,J., "Nuevas Tecnologías, Economía y Sociedad en España", Alianza Editorial, Madrid, 1986. (2 vols. The authors were members of the Gabinete de la Presidencia del Gobierno. Prologue by Felipe González).

GALVA, Jesús and PFEIFFER, Amalia (editors), "Informática y esuela. Los ordenandores en las Enseñanzas Media y Básica", FUNDESCO, Madrid, 1985.

MANZANARES, José (editor), "Trabajo y Nuevas Tecnologías", FONDESCO, Madrid, 1985.

MARTIN, Carmela and RODRIGUEZ ROMERO, Luis (compilers), "Tecnología y empleo", Fundación Empresa Pública, Madrid, 1983.

MINISTRY OF EDUCATION AND SCIENCE, "Proyecto Atenea", Madrid, 1985.

MINISTRY OF EDUCATION AND SCIENCE, "La informática en la enseñanza de los niveles básicos y medios del sistema educativo", Madrid, 1984.

MINISTRY OF INDUSTRY AND ENERGY, "Informe anual sobre la industria española, 1984", Madrid, 1985.

MINISTRY OF ECONOMY AND TAXATION, "Programa Económico a Medio Plazo 1984/87", (5 vols), Madrid, 1985.

POLO REDONDO, Yolanda, "Difusión de innovaciones en Bancos y Cajas de Ahorros", Paper presented at the Ciclo de Seminarios sobre Política Industrial y Desarrollo Tecnológico. Esuela de Organización Industrial, Madrid, 1986 (Mimeographed).

RISPA, Raúl (editor, "Nuevas tecnologías en la vida cultural española", (Symposium) clebrated in June, 1984) FONDESCO, Madrid, 1985.

TORRES, Francisco, "El libro blanco del video, El mercado español en cifras 84-85", Barcelona, 1984.

SECOND PART

PORTUGAL

INFORMATION TECHNOLOGY AND SOCIAL CHANGE IN EUROPE

EPOS - FIRST REPORT ON PORTUGAL*

I. INTRODUCTION

Since Portugal became a member of the EEC only in January 1986, we describe, in this report, a number of organizational aspects which help to clarify the behaviour of various structures that have an important role to play in the introduction of new information technologies.

The development and spread of new information technologies is unsatisfactory in terms of the results achieved. Nevertheless a potential exists which justifies hopes for faster development in the near future. Owing to the very limited growth of these new technologies, little concern has been voiced about the consequences of their introduction.

However, in recent years, various activities designed to increase awareness have been developed albeit with a very poor degree of coordination. Portuguese accession to the EEC has had a positive impact in this connection.

Against this background, it is important to point to the scarcity of statistical data on this matter.

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* by Luis Tadeu Almeida, Graça Malheiro Almeida, José Santa Clara, Carlos Bana e Costa, Teresa Bana e Costa, Instituto Superior Técnico, Lisboa.

II. GOVERNMENT POLICIES

II. 1. Brief Description of Portuguese Industry

The Portuguese productive system is based on a vulnerable industrial sector that can be briefly summed up by[1]:

- production of traditional goods and services at competitive prices based on the intensive use of unskilled labour ("cheap labour was a decisive factor in the choices of national and foreign investors, which impeded the modernization of industry and kept it working on the basis of traditional labour-intensive processes")[2];
- in general, low levels of productivity, caused by outdated equipment, management deficiencies, commercial limitations and low vocational skills;
- low-quality products and almost non-existent quality control;
- high dependence on imports of raw material, intermediate goods, equipment and technology;
- deficiencies in the interface between the productive structures and the technological system, combined with (in general) poor development of scientific and technical capacities;
- an inadequate education system, particularly in the technical and vocational training fields, failing to meet the needs of the production system;
- poor articulation among the different economic branches, owing to the fact that the service sector is too underdeveloped to provide a framework for industrial activity.

"The traditional sectors still predominate in Portuguese industry: textiles, shoemaking, wood, cork, non-metallic ore. In the sectors considered modern, such as chemicals, metalworking and electrical and electronic equipment, the majority of firms, and particularly the small and medium-sized enterprises (SME) mainly produce "end-of-the-line" products, with low production of capital and intermediate goods"[3].

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1 Ministério da Indústria e Energia, "Política Industrial Portuguesa - Principais Características e Instrumentos", Comunicaçao apresentada ao Seminário: Desenvolvimento e Políticas Industriais no Contexto Internacional, Lisboa, 18-20 Junho de 1985.

2 Instituto de Apoio às Pequenas e Médias Empresas Industriais, "Revitalizaçao e modernização da indústria portuguesa", Seminário: Desenvolvimento e Políticas Industriais no Contexto International, Lisboa, 18-20 junho de 1985.

3 "Revitalização e modernização da indústria portuguesa" 1985, op. cit.

II. 2. Promotion of R&D and Industrial Policy

Portugal has only recently initiated an awareness programme concerning the main strategic options for the development of the country, as a result of which[4]:

- the role of science and technology in the qualitative improvement of Portuguese industry has become more apparent;
- the first R&D programmes aiming at the autonomy of firms have been launched;
- the profound technological changes which Portugal has to undergo owing to the advent of the new information technologies have become clearer to see.

There have been a vast number of awareness programmes recently, with initiatives springing from all directions. The difficulties Portugal has to face have been diagnosed not only in the technological field but also in the vocational training and higher education spheres, in the financial field and in the shape of the insufficiency of human resources and the inadequacy of their use, the limitations of the scientific system, a lack of innovation in enterprises, unsatisfactory export levels, etc.[5].

A significant and paradoxical aspect of the difficulties encountered in developing a new industry of information technologies lies in the presence in universities and state laboratories of highly qualified groups, trained in a wide range of disciplines inside the country and abroad, who are unable to establish links with industry (...)[6].

However, awareness of the need to develop R&D and of its relevance to industry - as an essential vehicle for the modernization of the Portuguese industrial system - has increased, especially since the Ministry of Industry published its Plano de Desenvolvimento Tecnológico da Indústria Transformadora Portuguesa (Plan for the Technological Development of the Portuguese Manufacturing Industry) in 1983.

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4 J.M. Pires de Matos, "Constrangimentos e Oportunidades ao Desenvolvimento da Indústria de Tecnologias da Informaçao em Portugal", comunicaçao apresentada ao Seminário: As Políticas das Tecnologias da Informação e o Desenvolvimento Ecomómico, Lisboa, 1-4 Outubro de 1984.

5 "Constrangimentos e Oportunidades ao Desenvolvimento da Indústria de Tecnologias da Informaçao em Portugal", 1984, op. cit.

6 "Constrangimentos e Oportunidades ao Desenvolvimento da Indústria de Tecnologias da Informação em Portugal", 1984, op. cit.

This document assigns priority to "the improvement of scientific and technological capacities, with emphasis on R&D in the production sector". Several programmes have since been drawn up, mainly with the support of the "Laboratório Nacional de Engenharia e Tecnologia Industrial" - LNETI (National Laboratory of Engineering and Industrial Technology), which is accountable to the Ministry of Industry, and under cooperation agreements with universities, research laboratories and industrial associations and enterprises; some of them entail applied research projects and the creation of R&D undertakings.

These initiatives were backed up in 1985 with the "Política Industrial a Médio e Longo Prazo" (Medium- and Long-Term Industrial Policy), where the Ministry of Industry identifies the creation of a research, development and demonstration programme as one of the fundamental tools of industrial policy. The main aim of such a programme must be to underpin the development of new technologies and their penetration of the industrial fabric, by expanding the national R&D capacity mainly in the research laboratories and industrial concerns.

Thus, the LNETI considered that in 1986 existing research capacities were already significant in Portugal, there being several groups which had reached a critical size and the leanings of the majority of which were predominantly industrial in nature, making for an up-to-date understanding of the techniques and scientific knowledge entailed by information technologies and of the importance of their applications for a considerable range of products and equipment.

Finally, the LNETI recognizes and emphasizes that the development of the technological policy strategy, particularly in the priority area of information technologies, demands that maximum priority be given to the training of scientists and highly skilled technicians, slanted towards R&D activities and the needs of industrial and service enterprises.

II. 3. Industrial and Technological Policies

II. 3.1. Background

The application to join the EEC in 1977 meant that the modernization of Portuguese industry became a matter of priority. In 1980, the first bill providing incentives for industrial investment was passed. Certain

external financial support schemes - the most important being loans from the World Bank for small and medium-sized enterprises - were aimed at increasing investment in viable projects but without requiring that these projects contribute to the modernization of the industrial system[7].

The only programme with external support that included a component specially designed to encourage the modernization and development of S.M.E. was the EEC pre-accession aid programme. It was initiated in 1982 and about 200 S.M.E. industrial projects qualified for aid (about 50% of the projects belonged to the traditional sectors - textiles, shoemaking, wood, cork, non-metallic ore). Nevertheless the industrial sector which had the greatest number of financial projects was the metalworking industry, which is important because it is strategic for the modernization of the other sectors[8].

It is important to mention the launching, after 1980, of the initiative called "Industrial Projects Competition - Support the Future, Build your Company". It aimed at revitalizing the S.M.E. sector by encouraging the establishment of new firms. The majority of the projects belonged to the traditional sectors although some were true innovations or used modern technologies according to international patterns.

It is also important to point out that most of the new entrepreneurs were young (aged between 30 and 40) and possessed technical qualifications above the Portuguese average[9].

The drive for modernization through technological innovation was only given government expression after 1983 with the accomplishment of the "Plan for the Technological Development of the Portuguese Manufacturing Industry" launched by LNETI under the supervision of a team of advisers from the Massachussets Institute of Technology and concluded in 1983 (see 2.3.)[10].

7 "Revitalização e modernização da indústria portuguesa", 1985, op. cit.
8 "Revitalização e modernização da indústria portuguesa", 1985, op. cit.
9 "Revitalização e modernização da indústria portuguesa", 1985, op. cit.
10 "Revitalização e modernização da indústria portuguesa", 1985, op. cit.

As a result, a variety of initiatives and aid schemes is now in existence which, together, should propel Portuguese industry, particularly the less developed sectors, towards innovation and technological modernization (see 2. 3.)[11].

In 1985, the Ministry of Industry and Energy published a document entitled "Medium- and Long-Term Industrial Policy" which defines the basic strategies of the industrial policy. Its objectives and instruments are described in point 2.2.

II. 3.2. Medium- and Long-Term Industrial Policy[12]

II. 3.2.1. Basic Strategies - Objectives

The strategic vectors of the industrial policy are four in number:

1. Restructuring and modernization of traditional industries;
2. Expansion of industries already having introduced new technology and with potential for growth;
3. New areas of production based on advanced technologies (innovation in products and processes);
4. Optimized use of natural resources.

The objectives are the following:

Vector 1

- Technological modernization of firms and improvement of production and selling processes with a special focus on marketing.
- Development of new capacities.
- Increasing the range of products with high added value.

11 "Revitalizaçao e modernização da indústria portuguesa", 1985, op. cit.

12 This point is based on the following official publications:
- Laboratório Nacional de Engenharia e Tecnologia Industrial - LNETI, "Plano de Desenvolvimento Tecnológico da Indústria Transformadora 1983-1993" - P.D.T (Plan for the technological development of the Portuguese manufacturing industry), Lisboa, 1983.
- Ministério da Indústria e Energia, "Política Industrial a Médio e Longo Prazo", Lisboa, 1985.
- Laboratório Nacional de Engenharia e Tecnologia Industrial, "Plano de Desenvolvimento Tecnológico - Relatório de Progresso", Lisboa, 1985.

These documents define the bases of the technological and industrial policies and are largely interconnected.

Vector 2

- Raising the technological level of Portuguese industry.
- Support for the production of durable goods and equipment.

Vector 3

- Creation of an advanced technological capacity.
- Application of this capacity to the production of new high-quality products.
- Dissemination of this innovatory effect throughout the industrial structure.
- Mobilization of national scientific and technical capacity.

Achievement of these objectives will be ensured by the measures contained in the "Plano de Desenvolvimento Tecnológico das Indústrias Transformadoras Portuguesas" (Plan for the Technological Development of the Portuguese Manufacturing Industry). The plan designates those priority technological areas which have an horizontal impact - microelectronics, automation, software technology, telecommunications, new materials and bio-industry.

Vector 4

- Establishment of the necessary conditions for the identification and processing of those natural resources in Portugal which industry can use on competitive terms.

II. 3.2.2. Instruments of Industrial Policy

The strategic vectors referred to above reveal the need to complement the normal market mechanisms with state intervention in support of industrial firms, particularly in the following areas:

- deployment of scientific and technical resources in innovation projects in strategic horizontal areas;
- technical assistance, dissemination of information and support in vocational and management training.

The instruments of industrial policy encompass the following support schemes and programmes:

1. Incentives for innovation and the development of the technological base;
2. Incentives for sectoral conversion;
3. Incentives for diversification of production and rationalization of the use of energy;
4. Incentives for the development of activities based on natural resources;
5. Research, development and demonstration programme;
6. Training and technical assistance programme;
7. Standardization programme.

One of the fields for the R&D activities under point 4 above is the use of information technologies in equipment produced.

The Standardization programme (point 7) recommends that existing capacities concentrate on fields favoured by the EEC, i.e. information technology, energy conservation, safety, health and the environment.

Points 1, 5 and 6 have the most direct bearing on the subject of this report.

Point 1 - Incentives for innovation and the development of the technological base.

Intended to promote the development of new products and processes, with the following objectives:

a) support for innovation activities in firms;
b) encouragement and support for new firms with growth potential mainly in intensive technological fields;
c) development of the technological base of firms through the assimilation of industrial technologies.

The incentives (mainly under the responsibility of IAPMEI and in some cases together with LNETI) take the form of:

- tax reductions;
- non-repayable or interest-free subsidies;
- technical assistance contracts where financial aid has been granted.

Attention is also drawn to the need for specific awareness programmes designed to step up the dissemination of information.

Point 5 - Research, Development and Demonstration Programme

The main objective of the programme is to promote the development of new technologies and their penetration of the industrial system by expanding the national R&D resources primarily in research institutes and industrial enterprises.

Point 6 - Training and Technical Assistance Programme

The main objectives of this programme are:

- technical support for industrial firms;
- training programmes for managers;
- training programmes in new technology areas.

Activities in this field are organized on the basis of:

- infrastructures created under the PDT;
- programmes and contracts with the industrial associations.

II. 3.3. Technological Policy

II. 3.3.1. Implementation and Executive Bodies

The Ministry of Industry provides encouragement and support for activities in the form of:

- centralized measures, launched, assisted and executed by the Ministry of Industry;
- decentralized measures, with joint backing from the Ministry of Industry, industrial associations and firms;
- measures launched by industrial firms and assisted by the Ministry of Industry.

The departments of the Ministry of Industry more closely involved in the implementation of the schemes referred to above are:

- "Direcção Geral da Indústria" - DGI (Directorate General for Industry);
- "Laboratório Nacional de Engenharia e Tecnologia Industrial" - LNETI (National Laboratory for Engineering and Industrial Technology);
- "Instituto de Apoio ás Pequenas e Médias Empresas Industriais" - IAPMEI (Institute for the Support of Small and Medium-Sized Industrial Enterprises).

LNETI accomodates the "Secretariado do Plano Tecnológico" - SPT (Secretariat for the Technological Plan) which is responsible for the coordination and management of activities provided for in the PDT.

Responsibility for managing the finance involved in these activities lies with the "Centro para o Desenvolvimento e Inovação Tecnológica" - CEDINTEC (Centre for Development and Technological Innovation) which also has some industrial associations as members.

The industrial associations are directly involved in the implementation of the PDT and are consulted in the framework of the working parties that have been set up.

It is also important to mention that a number of agreements have been signed with industrial firms and their associations as also with research institutes and universities (see IV).

II. 3.3.2. Policy on Information Technology

The main objectives to be pursued in the information technology area are:

a) development of pre-competitive research activities in order to maintain and develop research capacity;
b) intensification of competitive research, especially in the production of equipment for industies of major importance to the economy in order to strengthen the national technological base;
c) development of the software industry, mainly in connection with the solution of specific problems;
d) development of the robotics industry;
e) creation of national know how in the field of microelectronics.

A major impediment to the development of this strategy is the lack of human resources with specific know- how. Consequently, maximum priority must be given to the training of research workers and technicians in these particular areas of R&D.

II. 3.4. Measures to Implement Government Policies

The activities devised with a view to implementing the plans mentioned fall into four main categories:

1. Promotion of advanced technologies; development of scientific infrastructure; support for industrial innovation;
2. Modernization and greater competitiveness in traditional sectors;
3. Promotion of innovation and national technology;
4. Training and improvement of the technical capacities of firms.

The following activities have taken place in the field of information technology:

a) CODETI

In 1984 an agreement was signed between the Ministry of Industry, the Ministry of Supply, the "Associação Industrial Portuguesa" - AIP (Portuguese Industrial Association) and the "Associação Nacional dos Industriais de Material Eléctrico e Electrõnico" - ANIMEE (National Association of Electrical and Electronics Industries) to set up the "Comissão para o Desenvolvimento das Tecnologias da Informação" - CODETI (Committee on the Development of Information Technology).

The main responsabilities of CODETI are:
- to recommend ways of assessing trends and the future impact of new information technologies and of gauging what awareness and training activities are needed;
- to support the use of new information technologies
- to establish and equip "Centros de Tecnologia de Informação" - CTI (Information Technology Centres)
- to set up the "Centro Português de Informática" - CPI (Portuguese Data Processing Centre).

b) "Contratos de Desenvolvimento Industrial" - CDI (Industrial Development Contracts)

CDIs have been concluded with universities, research institutes, industrial associations and various firms.

According to the "Relatório de Progresso do PDT (1985)" (PDT progress report) 24 CDIs on the assimilation and development of new technologies have been concluded.

The cost of those projects has been calculated at ESC 1,149 million with a contribution from the M.I. of ESC 756 million.

In the information technology field there are 5 projects, costing ESC 244 million (ESC 188 million from the M.I.).

In the industrial innovation field 41 CDIs have been concluded with various firms at total cost of ESC 4,922 million (ESC 1,933 million from the M.I.). In the area of information technology there are 13 projects costing a total of ESC 2,443 million (ESC 930 million from M.I.).

The contribution from the M.I. is normally interest-free and repaid in five years. Responsability for the management of the projects lies with the LNETI and the IAPMEI.

c) "Empresas de Investigação e Desenvolvimento" - EID (Research and Development Enterprises)

EIDs are competitive research untertakings which perform research under contract. They are operated jointly by research institutes and industrial enterprises in order to be able to produce results. More that 50% of the capital of the EIDs must belong to private enterprises. The M.I. and public enterprises can also own a part of their capital.

In the information technology field there is the Microelectronics EID, which participates in some CDIs.

d) R&D and Demonstration Centres for New Technologies

The aim of these centres is to create new and strengthen existing enterprises.

LNETI, INESC and various electronics enterprises are in the process of setting up a Microelectronics Centre.

e) Technological Parks

These parks should accommodate universities, research institutes and new technological enterprises in order to develop cooperation among them.

Though no such park has yet been built, the first is being planned near the LNETI Campus in Lisbon.

II. 4. Labour Law and General Working Conditions

The present system of labour agreements is still, to a large extent, based on legislation passed in the late 1960s. This legislation, which governs the individual employment contracts, contains mainly binding provisions.

Employment contracts may take one of the following forms:

a) Individual contracts - these entail a direct agreement between the employer and the worker where all the conditions are stated;
b) Collective agreements - these are drawn up between the union and the employers association "Convenção Colectiva de Trabalho" - CCT or between the unions and the enterprise "Acordo Colectivo de Trabalho" - ACT. The ACTs are generally only applied in large firms.

In the case of a CCT, all the enterprises of a sector of activity represented in the same association will apply the same conditions. If an enterprise is not affiliated to an association it can negotiate an ACT (if it is large enough) or otherwise will be subject to the conditions laid down in the CCT for its sector.

If an agreement cannot be reached by negotiation, the final conditions will be imposed by the Ministry of Labour - M.L. by means of a "Portaria Regulamentadora de Trabalho" - PRT (Ministerial Employment Order).

The ACTs and CCTs normally cover the following:

- working hours;
- work organization;
- payment (direct/indirect, night-work, shifts);
- holidays;
- social provisions (retirement, etc.);
- discipline.

Some years, the Government sets a ceiling for wage increases ("tecto salarial"), which is not binding, but then applies mechanisms which penalize those who fail to comply with it.

In 1986 the minimum wages for the various economic sectors were:

- ESC 15,200 for domestic service workers;
- ESC 19,500 for crop-farming, cattle-breeding and forestry;
- ESC 22,500 for the other sectors.

The rules on dismissal were separated from the legislation of the late 1960s by the law of 1976 - D.L. 831/76.

An individual employment relationship can be terminated for one of the following reasons:

- agreement between the parties;
- cancellation on the part of the worker;
- end of a fixed-term contract;
- completion of work provided for in the contract;
- justifiable dismissal - as a result of disciplinary proceedings brought by the employer. The worker can go to the "Tribunal do Trabalho" (Employment Tribunal) if he wishes to contest the result.

Collective dismissals are only possible with the intervention of the M.L. and the final decision always lies with the Government. They are possible only in two cases:

1. introduction of new technologies causing redundancies;
2. restructuring of the firm (not necessarily as a result of the introduction of new technologies).

In the case of undertakings in "a difficult economic situation" (which has to be so deemed by the Governement) it is possible to apply lay-off arrangements. In this situation wages are paid by the Social Security - (Ministry of Labour).

Normal workers have to pay 10% of their wages to the Social Security and the employers 23%. The Social Security will pay wages in the event of illness and is responsible for the pensions scheme.

The retirement age is 65 except for civil servants who retire at 70 or after 40 years of work. Early retirement incentive schemes are under study for civil servants so as to reduce the excessive number of employees and open the way for more skilled people.

The unemployment rate in Portugal rose substantially during the late seventies and early eighties:

1974 ----- 1.8%
1981 ----- 9%
1985 ----- 9%.

According to the M.L. statistics (the unions quote different figures), the unemployment rate rose by 0.5% in the first quarter of 1986 (unemployed people registered with the Regional Social Security Offices). But if we include workers owed wages in arrears, the figure rises to about 12%. In some cases, many months of arrears are owed (for example, in a ship-repair firm which recently went bankrupt, the workers had 20 months wages owed to them amounting to some ESC 300 million). These figures mean that out of a working population of about 4.1 million, about 490 000 people are unpaid.

It is also important to mention that about 82% of the people registered with the Regional Social Security Offices are not entitled to unemployment benefit.

The introduction of new technologies and the accession of Portugal to the EEC with the attendant intensification of competition may give rise to a significant increase in the rate of unemployment. As far as we know, no quantitative study has been done on this subject, though the matter has been tackled in some public speeches and seminars.

II. 5. Health and Safety

The Portuguese legislation in the area of health and safety at the workplace which is restricted to the traditional areas of high-risk work, is not recent and does not consider the new technologies.

Apart from a number of provisions concerning equipment and buildings in the areas of hygiene, health and safety at the workplace (Portuguese Standards) the most important legislative component is the safety regulation which covers the areas of greater risk.

The Government is expected to approve and publish the "General Regulations of Hygiene and Safety at Work in Shops, Offices and Services" in the near future. However, this legal document does not mention the new technologies, namely the prevention of health risks caused by the use of VDUs.

The "Direcção Geral de Higiene e Segurança no Trabalho" - DGHST (General Directorate for Hygiene and Safety at Work) is the body responsible for government policy on health and safety at the workplace.

The DGHST represents in Portugal the "International Occupational Safety and Health Information Centre" whose purpose is to compile and analyse specialized documentation from the whole world and operate an international network for the exchange of information.

As to the new technologies and more specifically the information technologies, the DGHST's activities are recent and limited to the dissemination of data sent by the Centre, relating mainly to problems caused by VDUs.

II. 6. Education and Vocational Training

The Portuguese education system is organized as follows:

Four years of primary school (1st, 2nd, 3rd and 4th years) followed by two years of pre-secondary school (5th and 6th years) and 3 years of secondary school (7th, 8th and 9th years). These 9 years constitute the compulsory period of education. During the 7th, 8th and 9th years students may choose from among several options (health, sport, art and design, electronics, etc.).

At the end of the 9th year, the following choices are offered to students:

a) via técnico-vocacional (technical/vocational option) of two years' duration - 10th and 11th year. The student may end his education after the 11th or go to the 12th year of vocational training, which will enable him to enter working life, or a pre-university 12th year,

at the end of which, and depending on the results obtained in examinations held at national level, he will be able to enter university.

From 1984/85 onwards

b) via técnico-profissional (technical/professional option) of three years' duration - 10th, 11th and 12th year - at the end of which the student will be able to enter working life or go to university.

The latter option is still at the introductory stage and exists only in certain fields. It is expected gradually to replace the first option, at least in the schools where it can operate fully.

c) via profissional (professional option) consisting of one year at school and 6 months of training in a firm or factory. During these 6 months the student is observed and advised by a monitor appointed by the firm or factory and regularly visited by one of his school teachers who verifies the conditions under which the training takes place. After the 6-month training period, the student returns to school and sits his/her professional aptitude examinations. He will then be ready to take up work.

If after the 12th year the student wishes to embark on a further course of study, he can choose to attend one of the following:

a) a university
b) a polytechnic
c) a higher institute.

University - the courses in new information technologies are generally of 5 years' duration. There are also some M. Sc. Courses of one or two years' duration. As can be seen from the following table[13], the existing official courses are very recent (the only exception being the 2 year course in "Engenharia Informática" (Computer Engineering) introduced in 1975):

13 Isabelina Jorge, A.J. Simões Monteiro, J.M. Gomes de Almeida, "Algumas Reflexões sobre um Curriculum a Nível Universitário de Sistemas de Informação", comunicação apresentada ao 3º Congresso Português de Informática, Lisboa, 1984.

LEVEL	DESCRIPTION	DATE (1)	UNIVERSITY
UNDERGR.	Computer Engineering/2 years	1975	FCT/UNL
	Computer Engineering/5 years	1983	FCT/UNL
	Computing	1981	FC/UL
	Systems and Computer Engineering	1983	UM
	Systems and Computers	1983	IST/ULT
	Mathematics/Data Processing	1983	IUBI
MASTER	Data-processing	1982	UM
	Computer science	1982	FCT/UC
	Telecommunication and Computers	1983	IST/UTL
	Computing	1983	FC/UL
	Digital Systems and Computers	1983	FC/UP
	Electrical Engineering	1983	FCT/UC

(1) - Official Data (Diario da República)

Polytechnics are expected to offer courses as from October 1986. These institutions were created with a dual aim:

- to train technicians to a high standard - three-year courses with a strong practical content both in teaching and through contacts with the industrial world;

- to boost regional development.

The courses are of three years' duration.

Higher Institutes derive from the Industrial Institutes which existed in the 1960s.

As regards training in new information technologies, there is no national policy and the existing courses and options have therefore sprung up in a rather uncoordinated fashion, without aiming at fulfilling existing or forecast needs (it is not known whether studies exist on this subject).

An analysis of the education structure reveals the paucity of measures relating to information technology and the non-existence of technicians of intermediate level due to the lack of an integrated training policy in this area.

Under the Ministry of Education there are two institutions - the "Instituto Português de Ensino á Distância" - IPED and the "Instituto de Tecnologia Educativa" - ITE, whose plans will be discussed in chapter V. 3.

Vocational Training

There are a number of state institutions to which training tasks have been entrusted.

- The IAPMEI and the LNETI under the Ministry of Industry.

Activities in the field of the new information technologies are, however, limited and the man/hours involved of very little significance.

- Under the Ministry of Labour is the "Instituto de Emprego e Formação Profissional" - IEFP, whose training activities relate mainly to traditional sectors.

  There are no known plans to integrate activities and direct them towards specific objectives.

  Still in the field of vocational training institutions, CODETI can play an important role in the information technology sphere.

  A number of training activities in the field of the new information technologies (mainly computing) have also been conducted by the "Instituto de Engenharia de Sistemas e Computadores" - INESC, the "Instituto Nacional e Administração" - INA (directly accountable to the Cabinet) and some private undertakings, though of little significance.

II. 7. Civil Liberties

The question of privacy and the protection of individual data in connection with the new information technologies has been discussed in a number of seminars and papers. In this context it is relevant to mention some studies by the "Damião de Góis" Social Research Institute[14].

14 Instituto da Pesquisa Social Damião de Gois, "A Sociedade Portuguesa face às Novas Tecnologias - Primeira Fase, 1984", Lisboa, 1985.

The first legislative steps in this domain were taken in 1973 (L. 2/73 - National Registration; L. 3/73 - Personal Privacy Provisions, D.L. 555/73 - National Identity Number).

According to L. 2/73, the Ministry of Justice was to be responsible for administering the national identity register and ensuring its protection and confidentiality.

Owing to the political changes of 1974, this legislation was never implemented and rendered superfluous by the 1976 Constitution.

Articles 32 to 35 of the Constitution deal with the protection of personal privacy with explicit reference to the divulging of information (Article 32 and 34) and the use of computers (Article 35):

Article 32, (6) - (Criminal proceedings) - "Information obtained by illicit interference in private life, private accommodation, mail and telecommunications shall not be admissible as evidence"

Article 34, (1) - "The home and the confidentiality of mail and all other private means of communication may not be violated".

(2) - "Except in special circumstances relating to criminal proceedings, all interference by public authorities in mail and telecommunications shall be prohibited".

Article 35, (1) - "Every citizen shall be entitled to know what data relating to him are contained in data banks".

(2) - "Access by one individual to information contained in a data bank about another individual is prohibited".

(3) - "Computers may not be used to record information about philosophical or political beliefs or party or union memberships, except for statistical purposes and then without individual identification".

(4) - "The definition of individual information for data bank purposes shall be as laid down by law".

(5) - "The allocation to citizens of a single national identification number shall be prohibited".

For the moment there is no specific legislation based on paragraphs 2 and 4 of Article 35. In this connection it is important to note the setting up (D.R. 74/84) of the "Comissão Inter-Ministrial de Informática" - CII (Interministerial Committee on Data-Processing) which has, among other things, the task of giving advice on "proposals and recommendations in the field of the privacy and the protection of information".

On data protection, Article 176 and 183 of the Penal Code refer to areas covered in the previous law L. 3/73 and Article 181 sets out the penalities applied to ensure automatic data protection.

There are several pieces of draft legislation intended to deal with the problems relating to new information technologies and individual data. They have yet to be debated in Parliament.

The D.L. 163/82 setting up the Management Information System for Civil Servants contains a number of provisions relating to protection and confidentiality.

III. SOCIAL GROUPS

III. 1. Employers' Attitudes

In the industrial sector, Portuguese employers are organized as follows:

The base is formed by associations for each industrial sector (chemicals, plastics, electronics) to which firms are affiliated.

These associations have played a very active part in negotiating collective agreements with the trade unions.

The associations are grouped together in the "Confederação da Indústria Portuguesa" - CIP (Confederation of Portuguese Industry) which represents them.

Alongside this vertical structure of CIP Industrial Associations there are also a number of parallel industrial associations which embrace industrial and service enterprises as well as, in some cases, industrial sector associations, examples of which are the Portuguese Industrial Association and the Industrial Associations of Oporto and Minho.

These associations do not participate in wage negotiations but devote their energies to more technical aspects relating, amongst other things, to vocational training.

The most important of these, in terms of both size and prestige, is the Portuguese Industrial Association (AIP), which is represented in several international organizations (EFTA, EEC, etc.).

These parallel structures may very easily give rise to conflict. To illustrate the general attitude of a large proportion of Portuguese employers in the past, we reproduce some sections of the 1984 OECD report "Industry in Portugal - Development, Restructuring and Industrial Policy"[15]:

- "Given the habits acquired in the context of the hermetic and highly protectionist model prevalent under the previous regime, and given the upheaval in conglomerate structures following the 1974 revolution, doubts have been expressed as to whether Portugal has entrepreneurs of sufficient quantity and quality. Levels of management and organisation in most enterprises are low.

- Similarly, the technical level of companies is poor and definitely insufficient, because of the lack of skilled staff but also because of inadequate management and organization. There is also a lack of incentive, in view of the low salaries."

"In Portugal, as in most of the less industrialized OECD Member countries, revitalization of the SME fabric encounters certain obstacles:

- Businessmen appear to be unaware of the need to rationalize their methods of management and organisation and/or they lack the means to do so (i.e. specialized staff or funds);

15 OECD, "Industry in Portugal - Development, Restructuring and Industrial Policy", Paris, July 1984.

- There is little in the way of special financing arrangements for SMEs. Banks tend to over-estimate the risk of this kind of investment or are basically uninterested in small projects;

- Technical and commercial assistance (e.g. through the Institute for Small and Medium-sized Enterprises, IAPMEI) is too heavily concentrated in just a few sectors;

- There is an obvious lack of well established distribution circuits;

- Too little attention is paid to enterprise-creation."

"As yet some of the services offered by the IAPMEI (technical information, training, inter-firm co-operation) are not used as much as they should be because there is little demand. This lack of interest on the part of businessmen is largely due to habits inherited from the period before 1974. Many businessmen continue to use the old management methods associated with a protected economic and technical environment that changed slowly and predictably. In that scheme of things management was a job for accountants, while technology and quality control were taken care of by technicians. The different functions were kept separate and information hardly circulated at all. This static, bureaucratic model of the enterprise is obviously anything but conducive to innovation and risk-taking. If it is to be replaced by a strategic and high-performance type of management, proper training is obviously essential. It is also important that government should shed attitudes consistent with the older model (proliferation of regulations, price controls, tax jungle). Even if the necessary transition takes a long time, the emergence of a new class of entrepreneurs in the past few years justifies extention of the technical measures proposed. The new practices should be encouraged so that competition accelerates the change needed".

The employers' associations have emphasized the inconsistency between employment law and the need to restructure industry, a fact which has also been stressed by the present Ministry of Labour.

However, most Portuguese entrepreneurs seem to have a more open attitude, which can be attributed to the activities developed as a consequence of Portugal's accession to the EEC.

The employers' associations hold or help to finance seminars, conferences, etc., while the AIP has set up a Committee on the EEC - to promote awareness and discussion of problems faced by Portuguese industry as a consequence of accession to the EEC.

Another example of the interest shown by Portuguese entrepreneurs is the existence of industrial development agreements and contracts signed by associations or enterprises, government institutions and universities, to which we will refer in detail in Chapter V.

III. 2. Trade Unions' Attitudes

III. 2. 1. Position of Trade Unions

In Portugal there are two trade union groupings:

The General Union of Workers (UGT) and the General Confederation of Portuguese Workers (CGTP-IN), which cover two complementary political forces in the world of labour.

The CGTP-IN which is the older of the two (1975), has a predominantly Communist component, encompassing, as it does, the blue-collar unions.

The UGT was formed as an alternative to the CGTP. Politically, it is closely aligned to the Social-Democratic and Socialist parties and comprises mainly the white-collar unions.

The two groupings have a certain similarity of outlook on how the new technologies should be introduced, namely the need for dialogue within undertakings and the negotiation of all changes in the organization of labour.

In a document entitled "Economic and Social Implications of the Application of the New Technologies"[16], the UGT considers that to obtain

16 União Geral dos Trabalhadores, "As Implicações Económicas e Sociais da Aplicação das Novas Tecnologias", Documento de divulgaçao, Lisboa, 1986.

social agreement on the introduction and development of the new technologies, three conditions have to be respected:

- real concern to limit the social cost of the changes;
- effective participation by all workers, through their union representatives, in the management of the process of change;
- a guarantee that progress will result in a more just and equitable distribution of the product of collective labour.

It also considers that all changes must be negotiated before the new technologies are introduced or the changes in the organization of work become effective. Decisions concerning the changes in production methods, the organization of work and technology must not be assumed to be exclusively a matter for the boards of directors.

Measures must be taken to abolish all restrictions, particularly of a legal nature, as to the object and field of collective negotiations, which must be left to the consideration of the parties involved.

The UGT supports the proposal of the ETUC (European Trade Union Confederation) concerning the adoption of a policy on the introduction of new technologies making it compulsory for the employers to inform, consult and negotiate with the trade union on all problems relating to the introduction of new technologies.

Continuous information systems will have to be introduced so as to ensure that the unions have access to all kinds of information.

In a report to be presented to the 5th Congress[17], the CGTP considers that the non-programmed introduction of new technologies will lead to a decline in stable undertakings, collective dismissals, a fall in real wages and a drastic increase in the pace of work.

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17 Confederação Geral dos Trabalhadores Portugueses - Intersindical Nacional, "O Movimento Sindical Face às Novas Tecnologias", Documento para o V Congresso, Lisboa, 1986.

The negotiated introduction of new technologies would, by contrast, minimize its negative effects, if combined with greater participation and control by the workforce and better organization and management of undertakings.

In the view of the CGTP, the negotiated introduction of new technologies has to be based on the opportune provision of full information.

This problem has been discussed in great detail in those unions which represent workers from the services sector, where new information technologies were first introduced (banking, insurance, etc.).

III. 2. 2. Measures

The measures taken thus far have served to enlighten and train workers. Information about new technologies has been disseminated through publications and seminars.

In 1985, the Northern Bank Employees' Union (S.B.N.) began publishing "Training Information Sheets", the title of the first being "Banking and the New Technologies - Social Consequences of Technological Innovation".

In February 1984 the S.B.N. held a seminar in Oporto on "The Banking System and the New Technologies".

In April 1985 the UGT held a seminar on "The Introduction of New Technologies and Service Workers".

In conclusion, as Portugal is, as yet, only on the threshold of introducing new technologies, the unions' concern about their social and economic implications is very recent and it is difficult to foresee what impact it will have on working conditions.

IV. RESEARCH

IV. 1. General Background

To provide a general picture of the situation as regards scientific and technological research in Portugal, we reproduce some figures from the publication "Recursos de Ciência e Tecnologia"[18] (Resources in Science and Technology) published by the "Junta Nacional de Investigação Científica e Tecnológica" - JNICT (National Board for Scientific and Technological Research). These figures are the result of a two-yearly survey of national scientific and technological (S & T) resources.

"In 1980 expenditure on S & T activities amounted to ESC 15,300 million, i.e. 1.3% of the Gross National Product (GNP) for the same year. The corresponding expenditure on Research and Experimental Development (R&D) was ESC 4,100 million, i.e. 0.35% of GNP.

From 1978 to 1980 annual expenditure on R&D rose at a rate of 27.8% (at current prices). As a sector of performance, the Government accounted, in 1980, for the largest share of total R&D expenditure: 47.3%. In structural terms, current expenditure on personnel amounted to 57.1% of total R&D expenditure. However, in proportional terms, expenditure on personnel has been declining since 1976. Capital expenditure has been rising, particularly in the Government and commercial sectors. In 1980 funding was still mainly provided by the Government, with approximately 2/3 of the total. Commercial undertakings provided 26.6% of total funding while at same time spending 28.6% of the total R&D expenditure on their own activities.

In 1980, basic research accounted for nearly 1/4 of total R&D expenditure, with a further 1/3 taken up by experimental development, and the remainder devoted to applied research. With the commercial sector excluded for lack of appropriate data, Government was the only performance sector spending predominantly on experimental development. As regards the distribution of resources by field of S & T (again and for the same reason excluding the commercial sector), engineering, physics and life and earth sciences predominated. Nonetheless, the pattern of distribution has been changing, particularly in the period 1976 to 1980.

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18 Junta Nacional de Investigação Científica e Tecnológica, "Recursos de Ciência e Tecnologia", Lisboa, 1983.

There has also been a similar evolution in the pattern of distribution in terms of socio-economic objectives. In 1980 the objective "Advancement of Knowledge" accounted for 1/4 of R&D expenditure in Government, higher education and private non-profitmaking institutions.

From 1976 to 1980, R&D personnel grew by 14.7% in terms of full-time equivalent (FTE). In 1980, human resources stood at 7,700 FTE. From 1978 to 1980, the commercial sector experienced a manpower expansion at an annual rate of 42.0%. During the same period, a decline was observed in the Government sector. Nonetheless, in 1980, Government still accounted for 48.1% of the total R&D personnel. Of the total figure of 7,700 FTE, 34.5% were researchers, 37.2% technicians and the remainder (28.3%) other workers. Most research workers were employed in the higher education sector (51.8%). In the commercial sector, the number of research workers was 1 for every 3.7 in the higher education sector. Nonetheless, from 1978 to 1980 the number of research workers employed by the commercial sector rose at an annual rate of 66.2%".

IV. 2. Ongoing Research Projects

This section covers the main known ongoing research projects that can be considered to involve the new information technologies.

In order to achieve the objective set out in the PDT, i.e. to reinforce the national scientific and technological infrastructure, a number of activities have been developed and coordinated by the Ministry of Industry and its bodies as referred to in point II. 2. Among these are the agreements signed with universities, research institutes, industrial associations and commercial undertakings.

As a consequence of these agreements, and in the area of new information technologies, a number of research activities have been developed, viz :

a) Research Contracts - "Contratos de Desenvolvimento Industrial" -CDIs (Industrial Development Contracts);
b) Establishment of an "Empresa de Investigação e Desenvolvimento" - EID (Research and Development Enterprise) in the microelectronics field - see II.2.;
c) Training activities - see II.2.

Of the CDIs referred to in the "Relatório de Progresso do PDT" (Progress Report on Technological Development Plan)[19], published by the SPT in 1985, the following ongoing examples are particularly worth noting:

1. Impact of the Third Industrial Revolution (Instituto Superior Ciências Políticas Sociais) with the following objectives:
   - Assessment of the impact of the third industrial revolution on:
     - the Portuguese population
     - Portuguese society
     - the state and information;

2. Flexible Automated Production - UNIROB (Universidade Nova de Lisboa and EID) with the following objective:
   - developing and assimilating the technologies associated with flexible automated production;

3. Artificial Intelligence (Universidade Nova de Lisboa) with the following objective:
   - production of knowledge-base interactive systems;

4. Optimized Energy Management (Universidade do Porto, Energama; Sigma) with the following objective:
   - development of equipment and data bases and applications of microprocessors to real time systems control;

5. New Industrial Processes (União Metalomecânica) with the following objective:
   - use of robots in the motor industry;

6. Robots for the Textile Industry (Laser Cutting) (EFACEC, EID, "Instituto Universitário da Beira Interior)

7. Disc Drive/Switching Mode Power Supplies (Timex) with the following objective:
   - development, production and selling of: Disc-Drive Commodore and Switching Mode Power supplies.

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19 Laboratório Nacional de Engenharia e Tecnologia Industrial, "Plano de Desenvolvimento Tecnológico - Relatório de Progresso", Lisboa, 1985.

V. EXPERIENCES IN SPECIFIC SECTORS

V. 1. National and Local Administration

V. 1. Introduction

The introduction of new information technologies to civil service departments is characterized by a lack of coordination and the absence of overall planning.

It was only at the end of 1984 that the "Comissão Interministerial de Informática" - CII (Interministerial Committee on Data-Processing) presented to the Cabinet an overall data-processing plan for the civil service (PDIAP) which has not yet been ratified.

In 1974 the "Direcção Geral da Organização Administrativa" - DGOA (General Directorate for Administrative Organization) was set up to advise the Cabinet on hardware and software acquisition.

This General Directorate is now extinct. One of its main activities was to conduct an annual survey of the hardware/software situation in the central and local civil service departments[20].

This survey is the fullest source of information on this subject and is meant as a tool for monitoring the application of the PDIAP.

2. Developments and Sectoral Situation

2. 1. Hardware

Data-processing techniques have gradually been introduced to the departments of the civil service (Table I), focusing heavily on some sectors whereas in others development has been almost non-existent.

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20 Direcção Geral da Organização Administrativa, "A Informática na Administração Portuguesa, em 1 de Janeirode 1984", Lisboa, 1985.

Table I

at 1 January	MC ≤ 64 K nr.	%	64 < MC ≤ 256 K nr.	%	MC > 256 K nr.	%	TOTAL nr.	%
1974	52	86.7	8	13.3	-	-	60	100
1975	71	89.9	8	10.1	-	-	79	100
1976	80	88.9	9	10.0	1	1.1	90	100
1977	94	87.9	11	10.2	2	1.9	107	100
1978	94	86.3	11	10.0	4	3.7	109	100
1979	104	88.2	9	7.5	5	4.3	118	100
1980	109	86.5	10	7.9	7	5.6	126	100
1981	115	84.2	13	9.3	9	6.5	137	100
1982	105	70.0	26	17.3	19	12.7	150	100
1983 (1)	32	29.3	42	38.5	35	32.2	109	100
1984 (1)	32	24.2	53	40.2	44	33.3	132	100

(1) Figures exclude microcomputers, personal computers and office computers.

(source: DGOA, 1982, 1985)

One third of the total number of computers installed belong to the defence, research and social security sectors. In additional to these, there were, in 1984, 227 microcomputers, personal computers and office computers in operation in civil service offices. The majority of microcomputers and personal computers are to be found in the research sector, while the finance and social security sectors have the greatest number of office computers.

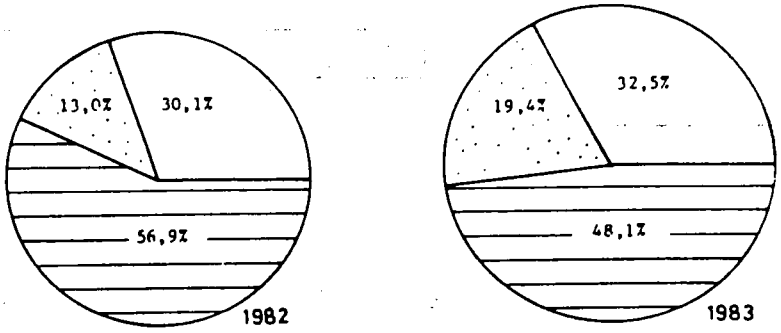
2. 2. Software and its application

In January 1984 around 1000 basic software products were recorded in the civil service, an increase of 45% over the previous year.

The most commonly used processors are BASIC (21%), COBOL (19%) and FORTRAN (17%).

50% of the data management products are concentrated in the defence, social security, statistics and industry departments.

Figure 1 - Development and Distribution of Applications at 1 January 1984



Management
Technical/Scientific
Specific Applications
(source: D.G.O.A.)

34% of the 1260 applications recorded in the management area in January 1984 (see figure 1) were accounted for by personnel management, 5% by production management and 5% by management planning and control.

2. 3. Personnel

At 1 January 1984, the total number of people involved in data-processing was 2751, corresponding to an increase of 14.9% over the previous year and representing about 0.5% of the civil service staff.

An analysis of the trend in staff recruitment (see Table III) reveals a slow increase up to 1980, attributable to the restrictions imposed on recruitment to the civil service and to deficient training and retraining in the civil service.

The great "leap forward" of 1980 happened when the law on data-processing careers in the civil service took effect. Law 110-A/80 thus gave rise to new staff grades due to the introduction of new categories for staff who, in previous years, had already been performing tasks connected with computing.

Table II

EDP staff in civil service

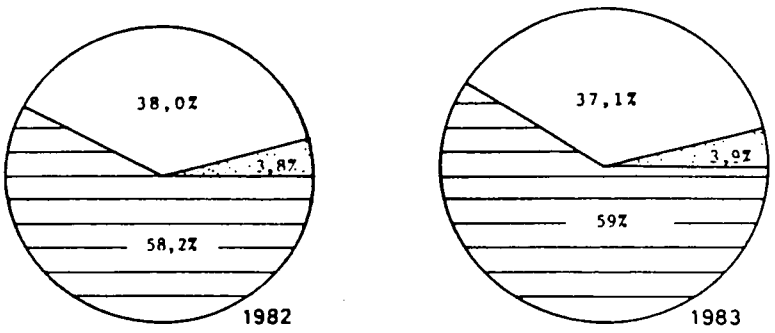
1 January	Staff
1977	1350 (1)
1978	1500 (1)
1979	1500 (1)
1980	1500 (1)
1981	1774
1982	1927
1983	2395
1984	2751

(1) approximate values (source: D.G.O.A.)

The careers created in 1980 are obsolete and the law is being amended.

By way of illustration, in 1983, 14% of the graduate staff (who accounted for 16.2% of the total) fell into the category of keyboard operators.

Figure 2 - Development and Distribution of staff by major area



Management staff

Technical/EDP staff

Others

(source: D.G.O.A., 1985)

Table III

EDP staff growth rates

Year Staff	1980 %	1981 %	1982 %	1983 %
(1) T	16.1	12.7	3.8	14.9
(1) E	23.4	13.4	-6.6	12.1
(1) M	-19.2	8.8	3.4	20.0

(1) T - Total EDP staff

E - Expert EDP staff

M - Managerial staff

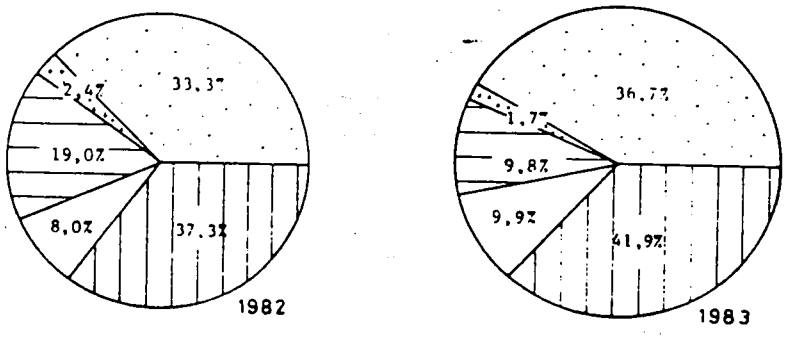
(source: D.G.O.A., 1985)

Between 1982 and 1983 training activities decreased by 12%, expecially in the sphere of in-service training and in firms.

2. 4. Expenditure

In 1985 the total expenditure on EDP in the civil service was ESC 2,851 million, an increase of 8.2% over the previous year (see figure 3).

Figure 3 - Development and Distribution of Expenditure on EDP by main area



(source: D.G.O.A., 1985)

In 1983 training accounted for only 1.3% of staff expenditure.

Table IV shows the virtual insignificance of expenditure on EDP in the civil service compared with total expenditure (R1), public consumption (R2) and public investment (R3).

Table IV

Year / Ratios	1979	1980	1981	1982	1983
EDP / Tot.exp.	0.0020	0.0023	0.0027	0.0032	0.0027
EDP / Pub.cons.	0.0047	0.0059	0.0078	0.0099	0.0085
EDP / Pub.inv.	0.0192	0.0223	0.0268	0.0418	0.0405

3. Some Significant Cases

3. 1. Social Security

Social Security is one of the civil service sectors which compiles, stores and treats large quantities of data.

Portugal has a national system for the identification of recipients with about 10 million entries, which implies reporting monthly on the situation of wage earners and updating more than 5 million entries per month[21].

21 Maria Manuel Godinho, "Tecnologias de Informação - Relação entre o Estado e a Sociedade Civil - A Segurança Social", communicaçao apresentada no Seminário dos 80, Lisboa, 1986.

The introduction of data-processing to the social security institution allows access to full data concerning the recipient and it is possible to obtain all the data concerning the users of local service centres merely by consulting a terminal.

The Regional Social Security Centres (CRSS) have had a network of district terminals for the last ten years especially in Lisbon (43%) and Oporto (19%), where they cater for 2.5 million recipients.

3. 2. Public Health

Through its Health Computing Service (SIS) the Ministry of Public Health has developed a model for EDP in the sphere of primary health care.

This project, not yet in operation, provides for the assembly of data directly at source (interface user-health attendant), the structuring of data according to the medical activities of health units and the formation of a health care databank of the individuals registered with the respective units based on a logical association between identification data and medical data per activity.

The main aim is the creation of a health data network, involving the Social Security, population registers and the National Institute of Statistics with the Ministry of Health as its axis.

3. 3. Customs

The installation of EDP equipment in the Portuguese customs service began 10 years ago and most of the main administrative areas are now equipped.

A plan for total computerization of the custom service, which had been awaiting Government assent since the end of 1984, was approved in January 1986 with a total budget of about ESC 400 million for its implementation.

The priorities under the project are:
- computerization of all branches;
- installation of a data centre in the General Directorate for Customs;
- computerization of new areas of the service.

3. 4. Value Added Tax

Portugal's accession to the EEC and the consequent introduction of the VAT system has given rise to the implementation of an automatic calculation system covering 300.000 taxpayers, receiving and sending monthly correspondence to them all. The system, which cost around ESC 230 million, came into operation at the beginning of 1986.

3. 5. Local Administration

The introduction of EDP to local civil service departments, i.e. the local authorities, has been based mainly on microcomputers.

The great microcomputer boom of recent years began to make itself felt in the Portuguese L.A. local authorities only in 1985/1986. With few exceptions no information is therefore available as to experience to date, exept for some situations.

In general, the initial objectives of all the systems consist in the introduction of applications for administrative and financial management purposes (accounting, personnel management, supervision of public works, office automation ...).

A later objective concerns applications in other areas, entailing the development of urban information systems for the management of municipal land and property registers.

V. 2. Public Services

C.T.T. (Portuguese P.T.T.)

The C.T.T. has a Central EDP Department - D.C.I. - established in 1972, whose central computer is used for the purposes of producing the invoices of telephone and telex subscribers, processing employees' salaries, accounting and the management of resources.

A teleprocessing network is currently being installed and will accelerate the spread of the services to 26 towns in mainland Portugal, Madeira and the Azores.

Two electronic office systems were recently installed in Forum Picoas and the D.C.I.

The D.C.I. is currently working on the launching of an Info-Centre to support the C.T.T.'s microcomputer users.

The most important achievement of the C.T.T. in the field of the new information technologies is the creation of TELEPAC - PUBLIC DATA SWITCHING NETWORK (see IV. 9. - Telecommunications).

V. 3. Education and Vocational Training

In this field the following experiments should be mentioned:

A) TELE-SCHOOL AND IPED - dependent on the Ministry of Education[22]

The "Telescola" programme has been in operation since the early 1960s: a form of teaching for children from 10 to 12 years of age, in the area of basic education, designed to complement the conventional face-to-face teaching system. It cannot be regarded as a genuine form of remote - teaching, as the students are organized into classes supervised by a qualified monitor.

Another experiment was the result of the work of a committee of education experts appointed by the Ministry of Education in 1975 with the specific task of assessing the feasibility and cost of setting up an Open University in Portugal.

In 1977 the Ministry of Education decided to extend secondary level courses by one year, which until then had ended at the average age of 17. Also, it was felt that some of the subjects taught as foundation courses at universities would be more effective if provided as pre-university training at upper secondary level. It was decided to use intensive television teaching for the students of this new year; this was referred to as the "Ano Propedeutico" experiment.

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22 A. Rocha Trindade, "Brief description of Instituto Português de Ensino à Distância", Lisboa, 1986.

At the end of the "Ano Propedeutico", the "Instituto Português de Ensino a Distância" - I.P.E.D. (Portuguese Institute for Remote Teaching" was set up, its statutes stipulating that its main aim was to establish the conditions necessary for a Portuguese Open University (1980).

The "Universidade Aberta" - U.A. (Open University) became operational in 1981, I.P.E.D. initially taking the shape of a pure research institution and then progressing towards applied research.

The U.A. will use remote teaching methods and techniques, its students studying by self-reliance methods based on printed didactic material and multimedia materials and facilities: television and radio (broadcasts and cassettes), correspondence, telephone and videotext, newspapers.

Students wishing to enrol for a formal course given by the U.A. must have the same qualifications as required for entrance to any other Portuguese university and must be more than 25 years of age.

Courses: Formal (diploma) courses will, for the first 10-year period, cover the arts and humanities (mainly modern languages and literatures, and social sciences). This restriction in scope is due to the decision not to teach subjects which depend heavily on laboratory work.

B) INFORMATION TECHNOLOGY CENTRES - CTI

One of the assigned tasks of CODETI was to set up non-profitmaking Information Technology Centres - CTIs.

CODETI began its activities in 1985 but the programme initially decided on was not completed due to lack of financial support.

The following CTIs have been set up:

- CTI of Madeira (Funchal) - with the support of the Funchal Industrial Association, the CTT and the Madeira Regional Government. This CTI is developing local awareness activities and, with the support of the University of Minho, is also devising a plan to introduce EDP methods in the administrative work of local authorities.
- CTI of Beira Interior (Covilha) - with the main aim of supporting the textile sector.

C) MICRO-COMPUTING CENTRES - MCC

CODETI has also supported the establishment of MCCs whose objective is to set up associations among schools and EDP equipment suppliers aimed at developing training activities in the field of information technologies.

Four MCCs have been set up in the management field:

- Catholic University in association with BULL;
- Instituto Superior de Ciências de Trabalho e de Empresa with NIXDORF;
- Instituto Superior de Gestao Comercial in Aveiro with NCR;
- Tourism in Funchal with NIXDORF.

D) LNETI

LNETI offers short courses in the field of new information technologies mainly in the following subjects:

- Robotics;
- CAD/CAM;
- Electronic Equipment (operations and maintenance);
- Operation and Programming of NC machines;
- Software/hardware.

E) INESC

INESC offers short specialized courses (less than 5 days) which, in 1985, were attended by 600 people. It also offers 6-month courses for young people having attended secondary school for a twelfth year.

F) IAPMEI

During 1985 IAPMEI supported training activities aimed at:

- helping managers and technicians to improve their knowledge of modern management techniques;
- improving the integration of young engineers without industrial experience, through paid periods of training.

G) IEFP

The Institute of Employment and Vocational Training - IEFP - was set up 18 year ago with the aim of helping both employers and workers to solve employment problems. It comprises:

- 5 Regional Coordination Centres (Porto, Coimbra, Lisboa, Evora and Faro);
- 54 Employment Centres;
- 12 Vocational Training Centres;
- 2 mixed Centres of Employment and Vocational Training (Guarda and Evora);
- 1 Centre for Vocational Rehabilitation (Alcoitao).

In the vocational training sphere, the IEFP has launched the following programmes:

a) Training of young people in enterprises

A combined initiative of the Ministry of Education and the IEFP in cooperation with private and public enterprises with the aim of creating a learning system directly connected to the production process.

These courses are specially designed for 14/15 year olds in their 6th school year and have a duration of 3 years, at the end of which the young people receive a diploma equivalent to that received at the end of the 9th secondary school year and an employment record.

This programme began in 4 undertakings in 1980 and by 1984 had spread to 14 undertakings. The courses were attended by 2316 young people, 1878 of whom were awarded certificates of aptitude.

b) Vocational training of young people by means of apprenticeship schemes

Development in this field began in 1984 with the setting up of the National Committee on Apprenticeships - CNA. Its objective is to implement a combined work and training scheme which comprises specific training to be developed in undertakings and complementary general training (technical, cultural and scientific) to be provided by schools.

It differs from technical/vocational training schemes in that it recognizes enterprises as privileged training places. In the first phase, training will include three-year courses offering 27 careers in 6 sectors:

- electronics;
- EDP;
- metalworking;
- services;
- civil service;
- chemicals.

This programme is being implemented on the basis of legislation passed in August 1985 which governs training in each occupation[23],[24].

c) Training allowances for 17-25 year olds

These allowances cover courses or training for candidates whose access to a job depends on a specific qualification provided neither by the school system nor by the vocational training courses offered by public institutions. (Official communication 214/80)

d) Employment - training of 17-25 year olds

Emloyment subsidies are awarded to undertakings which train young people who are in search of their first job and need appropriate vocational training. (Official communication 215/80)

e) Training and integration of young managers into firms - FIEQ

This programme is being carried out with the cooperation of IAPMEI and is designed to provide small and medium-sized industrial enterprises with technical staff who have received basic training but have had no professional experience.

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23 Ministério da Educação, do Trabalho e Segurança Social, "Portaria nº 546/85 - Sector de Electrónica", 1985.

24 Ministérios do Trabalho e Segurança Social e da Educação, "Portaria nº 608/85 - Sector de Informática", 1985.

The undertakings themselves are responsible for selecting candidates and do so from among new graduates registered with the Employment Centres. There is a one-month induction course followed by a six-month paid training period in the firm. (Official communication 314/80)

f) Employment cooperative - young technical managers

This scheme, which started up in 1983, is designed to attenuate the difficulties experienced by cooperatives in the technological, organizational and management fields, by bringing in newly qualified technicians.

g) Training and integration of young managers in advice bureaux to the local authorities

This programme has been carried out with the cooperation of the Regional Coordination Services and its characteristics are similar to those of the FIEQ and employment cooperative programmes.

Among the programmes mentioned, special reference should be made to those relating to vocational training in electronics and EDP through apprenticeships[25,26].

Both courses are of three years' duration and the apprentices who pass a final examination not only receive a certificate of professional aptitude but are also regarded as having reached a level equivalent the 9th year of secondary education and, in some subjects, to the 10th and 11th year, thus enabling them to go on to further education.

This initial stage only covers courses in electronics and EDP, providing for the following careers:

Electronics skills:
- telecommunications electronics
- industrial electronics
- laboratory electronics
- consumer electronics
- computer electronics

25 Ministérios da Educação, do Trabalho e Segurança Social, "Portaria nº 546/85 - Sector de Electrónica", 1985

26 Ministérios do Trabalho e Segurança Social e da Educação, "Portaria nº 608/85 - Sector de Informática", 1985

EDP skills:
- equipment salesman and installer
- software salesman and installer
- applications operator
- programmer

These courses were scheduled to start in 1986.

H) "Young experts for industry" programme

The aim of this programme is to increase the number and qualifications of technical managements in industry who have received at least 12 years education. 80% of the costs of this programme are borne by the Ministry of Industry and the other 20% by the firms involved.

V. 4. Manufacturing

In the manufacturing industry there have been several experiments involving the introduction of new information technologies.

The new technologies have been applied mainly in the administrative areas (Personnel, Accounting, Buying and Selling) and to stock-taking.

In the last few years they have been used in the sphere of production planning and in fields more directly related to production such as:
- numerical control machines - in coumon use;
- C.A.D. - having come into use only very recently, there have been very few experiments here (IBEROMOLDES - plastic moulds, SOREFAME - metalomecanic; Foundry Technological Centre in Oporto; LNETI; a few textile firms);
- Robots - very recent start (EFACEC, RABOR, GALUCHOS).

The few existing experiments and their magnitude has not caused any serious problems of redundancy.

V. 5. Banking and Finance

In Portugal the first significant steps towards the introduction of EDP in banking were taken in the late 1960s and early 1970s.

Most of the commercial banks joined to form large economic groups, which gradually began setting up EDP service firms with the objective of promoting their main bodies including their own financial institutions.

It was after April 1974 and the nationalization of the banks, with the subsequent dismantling of the said economic groups, that the first computing departments began to be set up in the various banking institutions. They all operate computerized accounting systems and more than 50% of all bank branches work in "real time" with a turnover of about 300 million cheques per year.

On the other hand, the concentration of the banking sector in the hands of the state opened the way for the first initiatives towards the standardization of the banking system.

Thus, the Bank of Portugal - which coordinates banking activity - created the "Comissão Coordenadora para o Sector da Organização Informática" - CCOI (Committee for Coordination of EDP Organization) to plan and coordinate major projects in the field of interbank computing and to establish links with the authorities involved.

The standardized cheque project was launched in 1976/77 and implemented for the entire banking system in 1980.

The main aims of this project were: to introduce the automatic processing of cheques, standardize their format and improve security.

The spread of teleprocessing - which, in some banks, had been introduced before the introduction of the standardized cheque - will certainly contribute to the implementation of the teleclearance project (for cheques), which is, however, not yet in operation.

The second great project to take off was that of the Automatic Teller Machines - ATM. It was launched in 1979/80 and implemented in 1985, resulting in the first interbank computing network supported by its own EDP equipment. This network is managed by the "Sociedade Interbancária de Serviços" - SIBS (Interbanking Services Company), which embraces several banks and whose future activity will encompass other types of interbanking services.

The SIBS is now examining the cost of extending the system to international bank cards.

A new project is also being studied concerning the extension of the ATM network to the commercial sector. The aim of this project is not only to install machines in large concerns but also to introduce them to the retail sector in the form of "electronic points of sale" (now being planned by some retail firms).

Other standardization projects have meanwhile been drawn up by the Bank of Portugal:

- the interbanking collecting circuit, implemented in 1981;
- the standardization of promissory notes, approval of which is now being considered by bodies outside the Bank of Portugal;
- the clearance of promissory notes;
- the plan for the standardization of the stock market is now being finalized, its aim being to automate the buying and selling of stocks;
- RIB project (standardized Banking Information Register) is now being implemented with the creation of a data base containing full details about the corporate customer.

The introduction of EDP in the international departments and the consequent greater speed and reliability in the handling and processing of data made it possible, at the end of 1982, to begin attaining the objective of standardized banking relations with foreign countries. This was due to the introduction, in Portugal, of the international system of interbank links, promoted by the Society for Worldwide International Financial Telecommunications - SWIFT.

16 national banking institutions are now linked to the SWIFT project, but with the recent opening up of banking to the private sector, it is expected that this number will soon rise to 20.

V. 6. Retail Trade

No information is available as to any significant experiences regarding the introduction of new information technologies in this sector.

Other than the use of computers for stocktaking in wholesale warehouses (not in retail) and for purchase control, measures to increase the application of new technologies are only now being introduced, viz:

- the establishment in 1986 of the "Associação Portuguesa de Identificação e Codificação de Produtos" - CODIPOR (Portuguese Association for the Identification and Codification of Products) to tackle the problem of product codification and make way for the use of Bar Codes. EAN - European Article Numbering - will be used;

- the National Association of Pharmacists has already begun to study the introduction of a computerized information system on product specifications.

V. 7. Printing Industry

In this field the situation in Portugal is extremely varied. It is possible to find all kinds of situations from manual composition letter by letter to the most sophisticated methods. Nevertheless most undertakings use old technologies.

The new information technologies are used mainly in the field of books and magazines, where Portugal seems to be competitive in European terms due to the low wage levels.

In the newspaper sphere there is a surplus of installed capacity which already existed before the political changes of 1974, when it belonged to the private sector. State-owned newspapers have accumulated big losses while private newspapers, whose activities are limited to news production, are prosperous.

The introduction of new information technologies in this area has occurred mainly in the private sector, and the social problems have not been very significant. Most of the workers made redundant have been retrained (about 70% of workers under 40 years of age) or have retired.

However, the problem will not be the same if new information technologies are introduced into those newspaper enterprises which employ thousands of workers.

The unions of this sector have not yet adopted any clear public position on this problem.

In the mass media in general there is some discussion as to the possible privatisation of some of the newspapers now owned by the state, which could precipitate some changes as a result of the introduction of new information technologies.

V. 8. Telecommunications

In terms of its population, Portugal is the country with the least developed telecommunications infrastructure in the European Community.

The telecommunications structure is obviously prevented from growing any faster by the country's economic situation.

Portugal's geographical situation on Europe's southwestern periphery and its accession to the EEC with the consequent intensification of economic relations with the other Member States, particularly in the commercial sphere, implies an urgent need to develop and modernize its telecommunications system.

The situation in Portugal as regards the operation of the public telecommunications networks and the development of services is as follows:

A) Operating bodies - there are three public switching networks:

- telephone network: operated by the C.T.T. except for the Lisbon and Oporto areas, which are operated by the T.L.P., and the intercontinental network, which is operated by C.P.R.M.;

- telex network: situation similar to the telephone network;
- data communication network: operated by Transdata, a consortium established between the C.T.T. and the T.L.P. in 1985.

In 1984 these bodies employed 23 190 people, which corresponds to 0.57% of the total number of employed in Portugal.

B) Development of telecommunications services

1. Telephone Service

They are the basis of the national telecommunications system and account for more than 50% of investment in the sector. The telephone density (14 lines/100 inhabitants) is less than what should be expected in terms of GDP and is 12-15 years behind the European average. The situation is even worse when one considers the disparity between the urban areas of Lisbon and Oporto (24 lines/100 inhabitants) and the rest of the country (8 lines/100 inhabitants).

This backwardness is not only quantitative but also qualitative, as shown by the excessively long waiting time for installation (7-8 months) and the long waiting list (4.9% of installed telephones).

The technological backwardness, together with the expected expansion of the market, implies an urgent need for a large-scale development and modernization campaign.

With this objective in mind, several investments have been made including the introduction of digital switching based on copper cables, optic fibres and hertzian beams which will support PCM systems.

2. Telex

The telex service, particularly from the point of view of its network, is of a high standard. The equipment was recently installed and offers a range of important facilities while the number of telex machines has grown at an average yearly rate of 21% (21.6% between 1980-84).

The service is widespread and, in European terms, the density is the following: 1980 - similar to that of Italy, 1984 - similar to the British and above the Finnish.

This density, being higher than expected in terms of the GDP is justified by the fact that the telex service (besides fulfilling requirements as regards text and message services) also compensates for the poor-quality telephone service and is the cheapest in Europe. This service is expected to suffer stiff competition from other text-transmission services.

3. Data-Communication

The public data-communication service is very recent (1984) and is therefore still in a phase of establishment and market expansion.

Compared with the other European countries, the introduction of the service was 2-3 years behind but the prospects for its development are good owing to the computerization efforts made by the service sectors and its potential for serving as a means of gaining access to and exchanging information with the national and European data bases.

Between 300 and 400 network terminals are now operating, some through the public switched telephone network (RFN) and others through Packet-Switching Data Communication Network (TELEPAC), which already covers the whole country though with a small structure of interconnections.

Users of the TELEPAC network fall into the following categories:

29% - commerce and industry
23% - public administration
21% - banking
15% - insurance
12% - tourism.

4. Prospective New Services

a) Videotext: a pilot service is planned for the end of 1986 and the studies relating to the system and the network to be adopted are now in progress. In the initial stage it is the interests of professional users that count followed by domestic users (telebank, teleshopping, etc.).

b) Advanced studies of text, graphic and message transmission: these services will include teletext, telefax and electronic mail, which will compete with the present telex service.

The telephone network and the switched data network will underpin the installation of these services. The opening of the telefax service is scheduled for the beginning of 1987.

c) Video conference: this service will initially have 3 studios in Lisbon, Oporto and Funchal, which will be compatible with other European studios. The service was scheduled to open at the end of 1986 and in the period leading up to 1990 other studios will be opened in the Algarve and the Azores.

VI. SELECTED BIBLIOGRAPHY

II. GOVERNMENT POLICIES

1. Ministério da Indústria e Energia, "Política Industrial Portuguesa - Principais Características e Instrumentos", Communicação apresentada ao Seminário: Desenvolvimento e Políticas Industriais no Contexto Internacional, Lisboa, 18-20 Junho de 1985.
2. Instituto de Apoio às Pequenas e Médias Empresas Indutriais, "Revitalização e modernização da indústria portuguesa", Seminário: Desenvolvimento e Políticas Industriais no Contexto Internacional, Lisboa, 18-20 Junho de 1985.
3. J.M. Pires de Matos, "Constrangimentos e Oportunidades ao Desenvolvimento da Indústria de Tecnologias da Informação em Portugal", comunicação apresentada ao Seminário: As Políticas das Tecnologias da Informação e o Desenvolvimento Económico, Lisboa, 1-4 Outubro de 1984.
4. Isabelina Jorge, A.J. Simões Monteiro, J.M. Gomes de Almeida, "Algumas Reflexões sobre um Curriculum a Nível Universitário de Sistemas de Informação", comunicação apresentada ao 3° Congresso Português de Informática, Lisboa, 1984.
5. Instituto da Pesquisa Social Damião de Gois, "A Sociedade Portuguesa face às Novas Tecnologias - Primeira Fase, 1984", Lisboa, 1985.

- Laboratório Nacional de Engenharia e Tecnologia Industrial, "Plano de Desenvolvimento Tecnológico da Indústria Transformadora (1983-1993)", Lisboa, 1983.
- Ministério da Indústria e Energia, "Política Industrial a Médio e Longo Prazo", Lisboa, 1985.
- Laboratório Nacional de Engenharia e Tecnologia Industrial, "Plano de Desenvolvimento Tecnológico - Relatório de Progresso", Lisboa, 1985.
- Direcção Geral da Indústria, "Indústrias Eléctrica et Electrónica - seu enquadramento e caracterização", Lisboa, 1985.
- Ministério da Indústria e Energia, "Plano de Actividades para 1985 do IAPMEI", Lisboa, 1984.
- CESEM, SEI, MIEE, "Mercado Nacional de Equipamentos - evolução na década de 70 e perspectivas para 1982-1985", Lisboa, 1982.
- Instituto de Apois às Pequenas e Médias Empresas Industriais, "Oportunidades para PME - Inovação Industrial", Lisboa.
- OECD, "Innovation in Small en Medium Firms", 1982.

- OCDE, "Les Technologies de Pointe", L'Observateur de L'OCDE, 19- OECD, "Industry in Portugal: Development, Restructuring, Industrial Policy", Part II, 1984.
- Ministério da Indústria e Energia, "Informações adicionais relativas ao Programa Modernização Industrial et Tecnológica com incidência nas novas tecnologias de informação e na biotecnologia", 1985.
- Seminário: As Políticas das Tecnologias de Informação e o Desenvolvimento Económico, "Conclusões", Lisboa, 1984.

III. SOCIAL GROUPS

1. OCDE, "Industry in Portugal: Development, Restructuring, Industrial Policy", Part I, Paris, July 1984.
2. União Geral dos Trabalhadores, "As Implicações Económicas et Sociais da Aplicação das Novas Tecnologias", Documento de divulgação, Lisboa, 1986.
3. Confederação Geral dos Trabalhadores Portugueses - Intersindical Nacional, "O Movimento Sindical Face às Novas Tecnologias", Domumento para o V Congresso, Lisboa, 1986.

IV. RESEARCH

1. Junta Nacional de Investigação Científica e Tecnológica, "Recursos de Ciência e Tecnologia", Lisboa, 1983.
2. Laboratório Nacional de Engenharia e Tecnologia Industrial, "Plano de Desenvolvimento Tecnológico - Relatório de Progresso", Lisboa, 1985.

V. EXPERIENCES IN SPECIFIC SECTORS

1. Direcção Geral da Organização Administrativa, "A Informática na Administração Portuguesa, em 1 de Janeirode 1984", Lisboa, 1985.
2. Maria Mauel Godinho, "Tecnologias de Informação - Relação entre o Estado e a Sociedade Civil - A Segurança Social", communicação apresentada no Seminário dos 80, Lisboa, 1986.
3. A. Rocha Trindade, "Brief description of Instituto Português de Ensino à Distância", Lisboa, 1986.
4. Ministérios da Educação, do Trabalho e Segurança Social, "Portaria nº 546/85 - Sector de Electrónica", 1985.
5. Ministérios do Trabalho e Segurança Social e da Educação, "Portaria nº 608/85 - Sector de Informática", 1985.

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