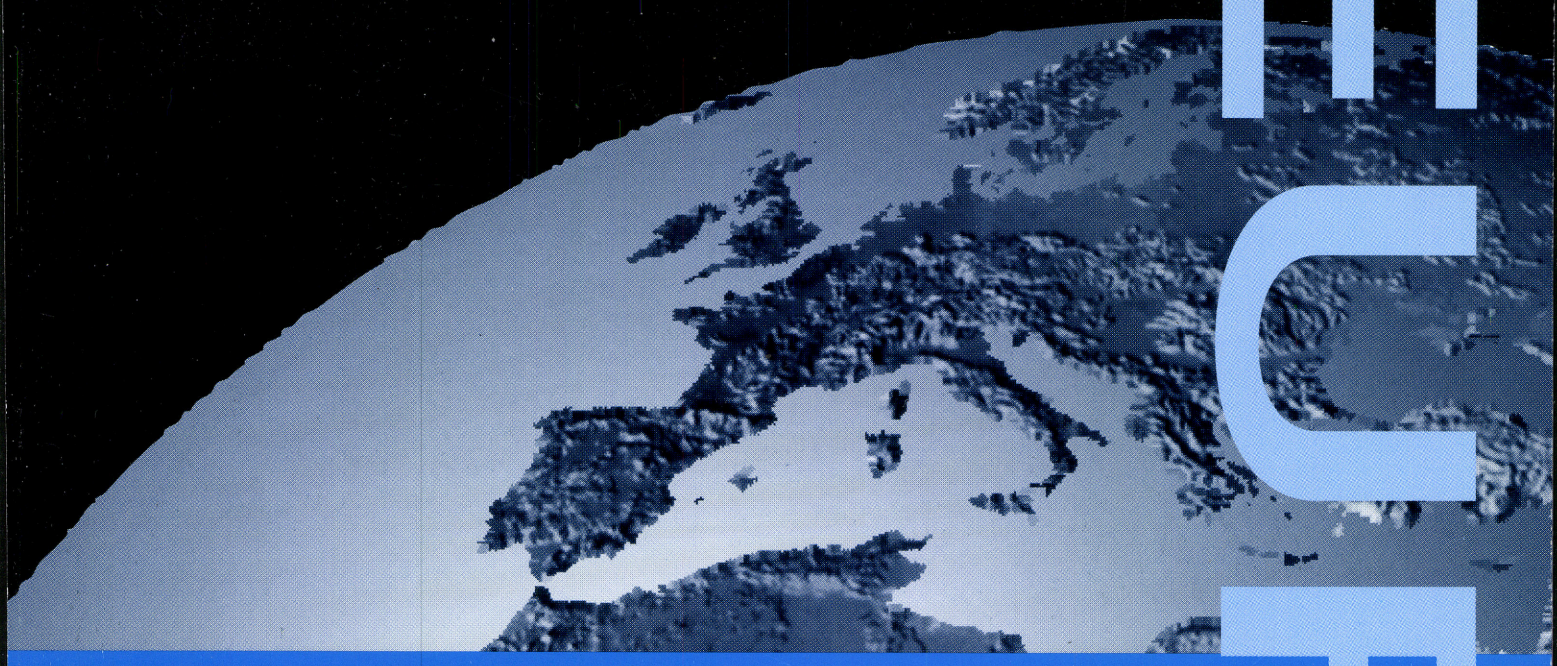
The Single Market Review



EUROPE

SUBSERIES I: IMPACT ON MANUFACTURING

Volume 4:

Construction site equipment

CEE: XIV / 16

The Single Market Review series

Subseries I — Impact on manufacturing

Volume:
1 Food, drink and tobacco processing machinery
2 Pharmaceutical products
3 Textiles and clothing
4 Construction site equipment
5 Chemicals
6 Motor vehicles
7 Processed foodstuffs
8 Telecommunications equipment

Subseries II — Impact on services

Volume:
1 Insurance
2 Air transport
3 Credit institutions and banking
4 Distribution
5 Road freight transport
6 Telecommunications: liberalized services
7 Advertising
8 Audio-visual services and production
9 Single information market
10 Single energy market
11 Transport networks

Subseries III — Dismantling of barriers

Volume:
1 Technical barriers to trade
2 Public procurement
3 Customs and fiscal formalities at frontiers
4 Industrial property rights
5 Capital market liberalization
6 Currency management costs

Subseries IV — Impact on trade and investment

Volume:
1 Foreign direct investment
2 Trade patterns inside the single market
3 Trade creation and trade diversion
4 External access to European markets

Subseries V — Impact on competition and scale effects

Volume:
1 Price competition and price convergence
2 Intangible investments
3 Competition issues
4 Economies of scale

Subseries VI — Aggregate and regional impact

Volume:
1 Regional growth and convergence
2 The cases of Greece, Spain, Ireland and Portugal
3 Trade, labour and capital flows: the less developed regions
4 Employment, trade and labour costs in manufacturing
5 Aggregate results of the single market programme

Results of the business survey

The Single Market Review

IMPACT ON MANUFACTURING

CONSTRUCTION SITE EQUIPMENT

EUROPEAN COMMISSION

The Single Market Review

IMPACT ON MANUFACTURING

CONSTRUCTION SITE EQUIPMENT

The Single Market Review

SUBSERIES I: VOLUME 4

OFFICE FOR OFFICIAL PUBLICATIONS
OF THE EUROPEAN COMMUNITIES

KOGAN PAGE . EARTHSCAN

This report is part of a series of 39 studies commissioned from independent consultants in the context of a major review of the Single Market. The 1996 Single Market Review responds to a 1992 Council of Ministers Resolution calling on the European Commission to present an overall analysis of the effectiveness of measures taken in creating the Single Market. This review, which assesses the progress made in implementing the Single Market Programme, was coordinated by the Directorate-General 'Internal Market and Financial Services' (DG XV) and the Directorate-General 'Economic and Financial Affairs' (DG II) of the European Commission.

This document was prepared for the European Commission

by

W. S. Atkins

It does not, however, express the Commission's official views. Whilst every reasonable effort has been made to provide accurate information in regard to the subject matter covered, the Consultants are not responsible for any remaining errors. All recommendations are made by the Consultants for the purpose of discussion. Neither the Commission nor the Consultants accept liability for the consequences of actions taken on the basis of the information contained herein.

The European Commission would like to express thanks to the external experts and representatives of firms and industry bodies for their contribution to the 1996 Single Market Review, and to this report in particular.

Office for Official Publications of the European Communities
2 rue Mercier, L-2985 Luxembourg
ISBN 92-827-8771-0 Catalogue number: C1-67-96-004-EN-C

Kogan Page . Earthscan
120 Pentonville Road, London N1 9JN
ISBN 0 7494 2308 0

Table of contents

List of tables

List of figures

List of abbreviations

BSI	British Standards Institute
CAD-CAM	Computer Aided Design - Computer Aided Manufacturing
CEC	Commission of the European Communities
CECE	Committee for European Construction Equipment
CEN	European Committee for Standardization
CENELEC	European Committee for Electrotechnical Standardization
CEOC	Confédération européenne d'organismes de contrôle
CNC	Computerized Numerical Control
CSE	Construction Site Equipment
CSO	Central Statistical Office
DIN	Deutsche Industrie-Norm (German industry standard)
DRL	Fédération nationale des distributeurs, loueurs et réparateurs matériels de bâtiments - travaux publics - manutention
ECJ	European Court of Justice
ECU	European Currency Unit
EFTA	European Free Trade Association
EMC	Electro-Magnetic Compatibility
EMS	European Monetary System
EOTC	European Organization for Testing and Certification
ESB	European Standardization Bodies
ESR	Essential Health and Safety Requirements
ETSI	European Telecommunications Standards Institute
EU	European Union
FDI	Foreign Direct Investment
FEM	Fédération européenne de la manutention
FOPS	Falling Object Protection Systems
GS	Geprüfte Sicherheit
ISTAT	Istituto Nazionale di Statistica
INSEE	Institut national de la statistique et des études économiques
ISO	International Organization for Standardization
JIT	Just-In-Time
MTPS	Union des industries pour la construction, les infrastructures et la métallurgie (French construction site equipment trade association)
NA	New Approach
NACE	General industrial classification of economic activities within the European Communities
OJEC	Official Journal of the European Communities
PRODCOM	Production communautaire (Community production) (EC production statistics code)
R&D	Research and Development
ROPS	Roll-Over Protection Systems
SEA	Single European Act
SM	Single Market
SME	Small and Medium-sized Enterprise
SMP	Single market programme
TÜV	German Association for Testing Laboratories
VAT	Value-Added Tax
VDMA	Verband Deutscher Maschinen- und Anlagenbau e.V. (Association of German Machinery Equipment Manufacturers)

1. Summary

1.1. Introduction

This report reviews the impact of the single market programme (SMP) on the construction site equipment (CSE) sector.

The analysis is based on an extensive programme of discussions with trade associations, manufacturers, distributors, and users (Chapter 2). The research included a programme of semi-structured face-to-face interviews with 30 manufacturers in six EU countries (around 10% of the total number of manufacturers identified in the EU), and a postal questionnaire sent to all remaining manufacturers in a database of 274 manufacturers. Forty telephone interviews and a number of face-to-face interviews with distributors, equipment rental companies and contractors were also carried out. Four companies were selected for more detailed case studies, presented at the end of the report.

1.2. Sector description

1.2.1. Definition

The sector divides loosely into two subsectors:

(a) off-highway equipment (mobile excavating, materials handling and other equipment, either wheeled or tracked, usually powered by diesel engines), such as bulldozers, bucket loaders, backhoe loaders, graders and road-rollers;
(b) fixed equipment such as cranes.

Manufactured parts and repair services are included.

Some manufacturers will produce related equipment for sectors other than construction sites, for example, dock and marine handling equipment, and mining and quarrying equipment. Identical equipment is often used in quarrying and construction sites, and some of the same equipment is used in marine handling, and in industrial materials handling, so the nearest relevant statistics on trade include all these applications. Firms also sell to the military sector.

Production and other sector data at the EU level exist only at the level of mechanical engineering as a whole, so a complete statistical picture of the sector is not possible from official sources.

1.2.2. Structure

The sector described in Chapter 3 is dominated by large global firms, marketing world-wide, with manufacturing bases in one or more of the three main regional markets: Japan (36% of world production), the EU (32%) and the USA (28%). Korea is now also an important manufacturing location (4%), with expanding global firms. The global firms tend to view each of these regions as a single market and optimize the location of production within each region. Several of the global firms also specialize at a global level, partly because of different traditions of use of construction site equipment.

There are also many smaller firms, producing for local markets or for specialized applications. The total number of firms identified in the EU is 274, of which the five largest accounted for 43% of EU sales in 1994 and the 20 largest for 87%.

There has been a significant amount of inward investment from Japan and Korea in the last decade. This investment was driven by concerns about anti-dumping and external tariffs, but the development of the large single market and the ability to locate investment in the most favourable location to serve the whole market were also incentives. The major North American manufacturers have been present for longer, but the large single market may have encouraged them to continue to invest in the EU rather than in lower-cost parts of the world.

1.2.3. Manufacturing process

Most manufacture is in small batches or single items. Many components are bought in, and there is a trend towards increasing subcontracting to general steel fabrication firms of the steel fabrication of major components such as crane sections, and replacement parts such as buckets. There are some products, such as the common types of excavators, which the main manufacturers make in long production runs so that economies of scale can be achieved, but for many products there are many variants, and much equipment is made to customer specifications. In these cases, there are limited opportunities for economies of scale in manufacturing and therefore the benefits that can be achieved by the single market in this area are small. As manufacture is in small batches, with many variants, the benefits from reducing the number of national variants are also limited. On the other hand, the large number of variants and specialist equipment produced by some manufacturers, especially the smaller firms in specialist niches, makes compliance costs for type examination, testing and documentation relatively high.

1.2.4. Market development

The CSE sector is dependent upon activity in the construction sector. There have been two distinct periods over the last decade.

1984 to 1990 was a long period of growth in construction, which led to increased mechanization of construction processes, and increased investment by contractors in equipment to increase productivity and relieve labour shortages. The same was true in the USA and Japan. There were improvements in CSE design, and investment in new facilities, which permitted some optimization of plant location. Japan in particular invested in research and development of construction processes, leading for example to the rapid growth of mini excavators, and new equipment for trenching and pipe laying. Intra-EU trade grew rapidly towards the end of this period, and production increased by 60% from 1986 to 1989, while exports from the EU to the rest of the world fell.

1990 to 1995, however, has been a period of absolute decline in construction. Contractors cut back on investment in equipment, and relied more on plant hire and second-hand equipment. The rate of adoption of more mechanized methods has probably also slowed down. The EU demand has, nevertheless, held quite well. Production of CSE declined slightly from 1990 to 1993 because EU exports fell; extra-EU imports were fairly steady.

In the period when SMP effects should have been felt, therefore, the industry was more concerned with defending its market position, and did not really take advantage of

opportunities for increased intra-EU trade. It was a period of pressure to reduce costs, and the industry tended to see new requirements for compliance with Directives as a burden rather than an opportunity.

Exports also became more difficult because of declining world demand, and the growth of low-cost competitors from Japan, Korea, and more recently Central and Eastern Europe.

The EU is still a significant net exporter, although the ratio of extra-EU exports to imports has declined from 5:1 in 1981 to about 1.7:1 in 1994. Manufacturers are concerned about their declining competitiveness in world markets. The UK and France are the main net exporters, with Germany the largest net importer; despite being the largest producer Germany is also at present both the largest market for CSE, because of the reconstruction in eastern *Länder*, and a target for other CSE manufacturers.

1.3. Single market programme measures

1.3.1. The situation prior to the single market programme

The principal barriers faced by manufacturers prior to the SMP were national health and safety regulations and testing requirements, including measures related to the security of lifting equipment (toppling or buckling of cranes); protection for plant operators from falling objects (FOPS: falling object protection systems) and from equipment working in unstable conditions (ROPS: roll-over protection systems); failure of hydraulic systems; noise of cranes and equipment both for operators in cabs and for bystanders; and road regulations for transport and driving of equipment. These frequently required testing of equipment in the importing country, and manufacture to a number of different regulatory specifications or standards. Parameters such as the load safety margins on cranes, noise levels in cabs, speed and lighting on roads, all differed.

Border delays and administrative costs for delivery of parts were a problem because users need rapid breakdown response and some parts need to be made to order or delivered from a central location because of the specialized nature of the equipment.

Of particular concern to manufacturers was the requirement, perceived by many to be mandatory, for GS marking in Germany. This was previously a serious barrier to non-German firms, but it now seems to be alleviated by the possibility of firms obtaining the GS mark from test houses outside Germany, although German customers still prefer to see the mark. Previous testing requirements in France, and a preference by French contractors to buy French equipment, was also noted as a barrier.

1.3.2. Harmonization measures

Harmonization of noise levels, exhaust emissions, and ROPS and FOPS requirements, as described in Section 4.2, were commenced by the Commission prior to the SMP. In discussions of single market measures, most manufacturers still mainly refer to these provisions.

The most important measure directly affecting the sector is the Machinery Directive (89/392/EEC and subsequent amendments) which came into force on 31 December 1992, but only completed its transitional phase on 1 January 1995, and integrated the ROPS and FOPS

requirements on 1 January 1996. During the period of research for this study most manufacturers were still trying to come to terms with the requirements of the national legislation transposing this Directive, and any beneficial impact had not yet been seen.

The Machinery Directive introduces EU-wide rules and approval procedures governing safety, and sets out essential safety requirements in some detail. One of the alternative ways to comply with the Directive is by manufacturing to harmonized standards. There is a CEN programme covering all machinery, not just construction site equipment, which aims to complete some 700 standards between 1996 and 2000: about 70 were adopted by early 1996.

The EMC Directive (89/336/EEC) establishes EU-wide rules and approval procedures governing the placing on the market of machines complying with emission levels and immunity on electro-magnetic compatibility. This tends to impose new requirements arising from the growing use of electronic controls and telecommunications in all aspects of economic activity, pre-empting separate national regulation. As such its implementation is seen as a new burden by manufacturers, most of whom have not yet fully complied with the requirements, which only completed their transitional phase on 1 January 1996 (after most of the research for this study was completed). Some manufacturers of large equipment say they cannot find test facilities willing to test their equipment.

Other Directives with which some equipment may have to comply include: low voltage electrical equipment (73/23/EEC); simple pressure vessels (87/404/EEC); equipment for use in explosive atmospheres (94/9/EC). Interviewees, however, were neither generally aware of nor concerned by these.

The remaining problems faced by interviewees relate largely to the requirements of the health and safety inspectors in the workplace, who enforce requirements on the users. The previous national regulations have been harmonized by the adoption of the Directive on the use of work equipment (89/655/EEC) in force since 1 January 1992. This sets out health and safety requirements on the operation of equipment, for which users are responsible, which then effectively become requirements on the equipment manufacturers. In particular, the Directive requires that all equipment given to workers after 31 December 1992 has to comply with any other EC Directives which apply (i.e. the Machinery Directive). This includes equipment the user has manufactured himself, or second-hand equipment assembled in a new way so that it constitutes a new machine. After 1 January 1997, all equipment will have to comply with Annex 1 to the Directive on the use of work equipment. Some old equipment in use before 1992 will have to be upgraded or scrapped.

1.4. Views of manufacturers on the Directives

Respondents (Section 4.3) generally welcomed the measures taken to remove technical barriers, but were greatly concerned about the costs of adaptation of equipment and compliance. The study revealed, however, a wide lack of knowledge and considerable misunderstanding about the requirements of the Directives. This in itself led to costs in management time spent on learning about the requirements, and sometimes costs from unnecessary or mistaken actions. There was general concern about the initial costs of compliance, and more particularly about the distortions to fair competition which were perceived to be arising as a result of differing interpretation (by manufacturers themselves, by

the notified bodies or by the enforcement authorities) of the essential safety requirements, and differing levels of enforcement between countries.

It was believed that SMEs would suffer disproportionately high transitional costs of compliance. These represent a one-off fixed cost which is significant for small firms. Small manufacturers also tend to produce bespoke equipment, so the costs of conformity for each new model is high. EU firms were concerned about the CE marking being applied to imported equipment which does not comply.

1.5. Impact of the single market on manufacturers

All manufacturers who responded, except four German companies, had adapted their products to meet the Machinery Directive. They were unable to quantify the costs of compliance. The majority of respondents had also previously had to adapt their products to meet the Directives on exhaust and noise, and to meet differing national road regulations. Only a quarter of firms had (yet) had to modify equipment to meet the EMC Directive.

The majority of firms thought that the Directives had helped improve the quality of their products (Section 4.4). Only about one in six firms thought the Directives had helped make their products more competitive or encouraged them to sell in world markets. Three quarters thought they had increased product costs (although few thought that production costs or pre-production costs had increased: the increased costs probably came from higher specifications and the cost of components).

There was relatively little awareness of other SMP measures (Sections 4.5 and 4.6). Reduced border delays, reduced administrative costs and freer road haulage was seen by some as an advantage, particularly in rapid delivery of spare parts, which enables firms to adopt an EU-wide marketing policy. Freer movement of workers was not an issue. The transitional VAT arrangements were seen by some as distorting cross-border trade.

Some global firms are wary of EU competition policy on monopoly power. This seems to have inhibited attempts to reap economies of scale through consolidation of the EU industry and by concentrating production in single sites.

1.6. Remaining barriers

The main concern of exporters (Section 4.7) is the preference of customers in Germany for the GS mark, which is believed by exporters to be *de facto* obligatory. This may be changing as CE marking becomes better understood, and because GS marking, if required by customers, can now be obtained outside Germany.

There remain differences in national road regulations on maximum speeds, lighting, steering and brakes, which require specific modifications to equipment. It is also reported that despite the Noise Directive there are more stringent requirements in some countries.

There still seem to be problems caused by national health and safety authorities continuing to impose requirements on the use of work equipment which should have been superseded by the Machinery Directive and the Use of Work Equipment Directive. The cases were reported during the research in 1995 and referred to earlier periods, so this is presumably a transitional

problem dependent upon retraining of the inspectors and a proper understanding of the new regime.

1.7. Impact on sectoral performance

The questionnaire and data collection were designed to test a series of hypotheses about the impact of the SMP on sectoral behaviour. The conclusions of this are as follows.

The SMP has created a freer and more open market for construction site equipment (Section 5.1). In the years since 1989 intra-EU trade has actually declined in absolute value, and relative to GDP and extra-EU trade, but this has been in a period of recession and defensive marketing. Nevertheless, enterprises recognize a reduction in barriers, a reduction in the number of models they have to produce, and an increase in the level of standardization.

Companies report decreasing international competitiveness and increasing product costs over recent years (Section 5.2). Few firms, however, attribute this to the effect of EC legislation on production costs. Instead, they point to overcapacity as a result of the recession, increasing customer expectations about quality and specifications, increased research and development to remain competitive, and exchange rate problems. The SMP is seen to have had a beneficial effect in reducing inventory costs, because of easier delivery of parts and fewer model variants.

In the short term, increased compliance costs, which are mainly one-off costs, are seen to have outweighed the long-term benefits from standardization and inventory savings, but these long-term benefits will continue to increase in importance.

In spite of the recession, the SMP has had a significant effect on encouraging firms to increase their pan-European sales presence and strategy (Section 5.3). Most firms did think that the SMP had had an influence on their marketing strategy, mainly by increasing efficiency and decreasing the cost of trade. They had also increased their sales outlets, particularly by using independent distributors. In some cases, the SMP has enabled sales to be carried out more centrally, especially the stockholding of spare parts.

On the other hand, merger and acquisition activity and rationalization have taken place, mainly at an EU rather than a national level. The SMP has evidently been instrumental. The potential savings (Section 5.4) arising from economies of scale, capacity utilization and product standardization have been limited because there are still national variants and because of the recession.

The SMP, allied with external tariffs and anti-dumping actions, has encouraged inward investment, which in turn has stimulated rationalization within the EU (Section 5.5).

The SMP has encouraged wider sourcing of parts, components and capital equipment (Section 5.6). Over 40% of firms reported that they had revised their policy on purchasing from other EU countries as a result of single market measures. 70% of respondents reported increasing their purchases from other EU countries.

The SMP has increased competition (Section 5.7). The market share of the five largest firms fell after 1988, reversing a previous trend towards concentration. Most companies perceived

an increase in the number of competitors, and in the intensity of price competition. Margins are reported to be much lower in the EU than in the USA, where competition is less intense.

Manufacturers did not think SMP measures had contributed to increasing productivity (Section 5.8). On the contrary, many see that in third markets the essential safety requirements of the Machinery Directive have made EU equipment over-specified and therefore uncompetitive. Many developing country markets demand basic equipment with little regard for safety. This may have contributed to the decline in extra-EU exports. We believe, however, that the increased degree of competition in the EU (see above) will have been a factor in promoting the significant productivity increases which are observed.

The productivity increases, combined with static demand since 1988 and declining exports, have lead to reduced employment (Section 5.9). Increased labour mobility in the single market has had no noticeable impact. There has been some impact on reducing price dispersion (Section 5.10), but few firms pursue a single price strategy across the EU. Strong price differences in national markets persist, but users perceive some narrowing of price differences, and there is some parallel trade. here is no evident impact of environmental measures (other than the Noise and Exhaust Directives) relating to recycling or sustainable manufacturing (Section 5.11).

1.8. Conclusion

In conclusion, it was found that most large firms interviewed do have a European market strategy, and there is significant exporting by SMEs. This in itself is evidence of the impact of the single market. The impact mainly manifests itself in mergers and acquisitions, and in the development of strategic alliances.

There is a high level of awareness of the specific measures affecting the industry, but a very high degree of misunderstanding or ignorance of the detailed requirements. Companies are vocal about the short-term cost of compliance and the management problems, but are naturally less aware of the long-term benefits. They ascribe their European marketing successes to their own strategies, but their problems to the SMP measures. They see the SMP as an enabler, whereas we believe that the single market has had a more direct impact than firms acknowledge.

Some manufacturers claim that EC legislation, by raising specifications for the domestic market, has had a negative impact on competitiveness in those third countries where customers demand low-cost equipment with less regard for safety or environmental aspects. Larger companies (both European and non-European) have demonstrated that it is possible to manufacture competitively for both types of market. However, by reason of their smaller volumes, Europe's SMEs may have more difficulty manufacturing economically to multiple specifications. Overall, however, empirical data and survey results on this subject are rather inconclusive. It should also be recalled that other factors such as exchange rate movements will have had an impact on price competitiveness over the period.

The success of the single market is perhaps best illustrated by the fact that all global manufacturers have facilities here, most carry out research and development here, and most perceive that the strength of competition in the EU market keeps their gross margins well below levels in the USA and Japan; as a result, customers have enjoyed high quality

equipment, high levels of safety, low prices and the benefits of impressive levels of innovation in technology and design in recent years.

2. Introduction

2.1. Purpose of the study

The overall objective of this study is to assess the effectiveness of the single market programme and the extent to which benefits have been achieved in the construction site equipment sector.

The study aims to:

(a) review measures: analysis of the effectiveness of horizontal and sectoral legislation and regulatory changes in facilitating cross-border transactions, and their impact on enterprise costs and on the environment (analysed by size of firm if possible);
(b) assess the impact on market structure: statistical analysis of changes in market structure;
(c) assess the impact on operators: analysis of impact of the single market on operators' trading patterns, production costs, marketing and distribution, productivity, competitiveness, pricing policies and overall business strategy;
(d) present case studies: four case studies of individual enterprises' responses to the single market, its impact on their cost structures and markets, and changes in their marketing, sales patterns, distribution, sourcing, location and the consequences for profitability and performance.

2.2. Sector definition

For the purposes of this study, construction site equipment is taken to mean earth-moving and excavating machinery, self-propelled, and parts thereof (NACE 29.52.2); other excavating machinery (NACE 29.52.3); track-laying tractors (NACE 29.52.5); lifting and handling equipment and parts thereof (NACE 29.22.1); buckets, shovels, grabs and grips for cranes, excavators and the like (NACE 29.22.2); and installation, repair and maintenance services of lifting and handling equipment (NACE 29.22.91).

This definition excludes hand tools, hand-operated equipment such as pneumatic drills and pumps and compressors, concrete pumps, mixers and other items of small equipment and equipment for specialized uses. On the other hand, it is assumed to include heavy items such as pavers, planers, demolition equipment and rollers.

2.3. Methodology

The study has consisted of five key phases:

(i) initial desk work and review of measures, preliminary discussions with trade associations;
(ii) data and statistics analysis;
(iii) postal questionnaire and face-to-face and telephone interview programme;
(iv) case studies;
(v) reporting.

2.3.1. Sampling frame

The sampling frame was drawn from the following sources:

Manufacturers

(a) discussions with national trade associations, the CECE and the FEM, who provided lists of members;
(b) the European equipment index published by Construction Europe, which lists manufacturers by product type;

Distributors

(c) DRL, the European association of construction site equipment distributors and rental companies, who supplied lists of key construction equipment distributors in each country;

Testing organizations

(d) the CEOC (Confédération européenne d'organismes de contrôle) who provided a list of regulatory and testing organizations;

Users

(e) DRL, the European association of construction site equipment distributors and rental companies, who also supplied lists of key construction equipment rental companies in each country;
(f) a list of major European contractors, drawn up and based on WS Atkins' knowledge of the European construction sector.

The details of the manufacturers and trade associations were entered into a database designed for this study. The total number of entries is 316, of which 274 are manufacturers. The database facilitated the mail-out and response monitoring of the postal survey.

2.3.2. The sample

The sample consisted of face-to-face interviews, a postal questionnaire and telephone interviews, as described below.

30 face-to-face interviews

A stratified sample was selected according to geographical location and type of product. Table 2.1 shows the spread of interviews which took place in five key areas of European production: Germany, France, the UK, Italy, and Spain. The interviews conducted in Belgium were with head offices of companies operating throughout the EU. The interviews concentrated on large manufacturers, but the structure of the sample was designed to include a number of SMEs in order to discuss in more depth the issues relating specifically to smaller companies, e.g. the cost of complying with technical Directives. We are confident that we have visited the major manufacturers in each product area. Table 2.2 shows the major players in each field and indicates those which we have visited.

Table 2.1. Breakdown of face-to-face interviews

Country	Number of manufacturers in WS Atkins database	Face-to-face interviews conducted
Austria	1	
Belgium	8	2
Denmark	1	
Finland	1	
France	32	6
Germany	85	10
Greece	0	
Ireland	1	
Italy	52	4
Netherlands	6	
Norway	3	
Spain	36	4
Sweden	3	
Switzerland	3	
UK	42	4
Total EU	274	30

Table 2.2. Largest EU manufacturers

Manufacturers	* = visited by WS Atkins
Largest EU manufacturers	
Caterpillar	*
JCB	*
VME	*
New Holland	*
Atlas Weyhausen	
Largest EU manufacturers of backhoe loaders	
JCB	*
Caterpillar	*
New Holland	*
Case Corporation	*
Fermec	
Largest EU manufacturers of wheeled loaders	
VME	*
Caterpillar	*
O&K	*
Atlas Weyhausen	
Kramer	
Largest EU manufacturers of mobile cranes	
Liebherr	*
Grove-Krupp	*
Mannesmann Demag	*
Tadano/Faun	
Terex/PPM	

244 postal questionnaires

A postal questionnaire was sent to all remaining manufacturers in our database.

40 telephone interviews

Telephone interviews were conducted with the five largest distributors, rental companies or contractors in eight countries. The person identified within these organizations was either the purchasing director or a technical manager. Care was always taken to ensure that the person interviewed was involved in the choice and specification of products and not simply the procurement.

2.3.3. Response rate

Approximately 80% of the largest European manufacturers contacted agreed to an in-depth interview. Of the 20% that refused, the majority were based in Germany.

A 10-20% response rate was expected for the postal survey. The actual response rate was 16%.

The total response rate (face-to-face interviews plus postal responses) was 27%. We interviewed 10 of the 11 largest EU off-highway manufacturers (in terms of turnover) which account for two thirds of EU production. In addition, interviews were conducted with the leading crane manufacturers, namely Grove-Krupp, Leibherr and Potain.

2.3.4. Questionnaires

Questionnaires for use in the postal, telephone and face-to-face interviews were approved by the European Commission. The postal questionnaire was based on closed questions, while the questionnaire for the telephone interviews was a combination of closed and open-ended questions which allowed the interviewer to probe, according to the amenability of the telephone respondent.

The questionnaire used in the face-to-face interviews incorporated the same questions as those in the postal questionnaire so that these responses could be included in the analysis of the postal questionnaires. The face-to-face questionnaire contained open-ended questions in order to probe into each area of information (e.g. sales and marketing, production, R&D).

2.4. Report structure

The report commences with a summary of the findings and conclusions of the study. Chapter 3 is a sector overview which summarizes the structure of the industry and analyses the development of trade patterns within the EU and externally. Chapter 4 summarizes the legal and administrative measures taken to complete the single market which directly affect the construction machinery sector, reviews comments made by interviewees regarding these measures, and lists the remaining obstacles as perceived by companies. Chapter 5 evaluates the impact of the single market on sectoral performance. Each subsection commences with the consultant's original hypothesis upon which the questionnaires were based. This is then evaluated in the light of evidence gained from analysis of industry data, face-to-face interviews with manufacturers, the postal survey and telephone interviews with distributors and users. Each subsection ends with a conclusion box which evaluates whether the original

hypothesis is assessed to have been proven or not. Chapter 6 contains four case studies on a global player, an SME, a large pan-European contractor and a rental company.

Throughout Chapters 3 and 4 practical examples of industry's experience, perceptions and opinions are given. To differentiate these from the rest of the text they are presented in boxes.

Some percentages in tables do not add up to 100% due to roundings.

Appendix C contains complete bibliographical references of Community legislation.

3. Sector overview

3.1. The main producing regions: the EU, Japan and the USA

The construction site equipment industry is largely dominated by specialist producers who compete on a global basis. Key manufacturers are multinationals with plants set up in one or more of the large regional markets of Europe, the USA, and Japan. More recently South Korea has become an important source of supply. Construction site equipment is also manufactured in limited quantities in Brazil, India, and other emerging industrialized countries.

The sector divides into two types of equipment: cranes and other handling equipment, and off-highway vehicles. There is little statistical information in the public domain covering the first category of equipment. The market for mobile cranes is reported to be around 6,000 units per annum, which Japanese manufacturers dominate with 45% of the world market. EU producers account for 29% of which Germany represents nearly half.

By contrast, substantial statistical information on the second category has been made available to the European Commission. Total production of off-highway equipment (i.e backhoe loaders, wheeled loaders, excavators) reached 318,665 units in 1993, with a value estimated at approximately ECU 41 billion.

In 1993, Japan was the largest regional manufacturer in the world accounting for 36% of world production in unit terms, closely followed by Europe with 32%, North America 28% and Korea 4%. The three principal producing regions, Europe, Japan, and North America, have their own product specializations, as seen below.

(a) In Europe backhoe loaders comprise more than a quarter of European output, and represent 64% of global world production.
(b) 87% of skid steer loaders are made in North America where they account for 41% of annual off-highway output. North America is the main market for this equipment.
(c) Japan specializes in mini excavators. These represent 40% of Japanese production of off-highway equipment and 71% of the world's mini-excavator output.
(d) South Korea does not have a strong product position in the world market yet. Korean manufacturers (Samsung, Hyundai and Daewoo to name the largest) tend to concentrate on crawler excavators, in which they have an 8% share of the world market.

Table 3.1 and Figure 3.1 present a comparison of the growth in off-highway equipment by geographical manufacturing area. The table demonstrates the high rate of growth in the mid- to late-1980s. There was growth in all areas from 1984 to 1989, followed by decline until 1993/94. This pattern reflects the world construction industry pattern.

Figure 3.1. Production of construction site equipment

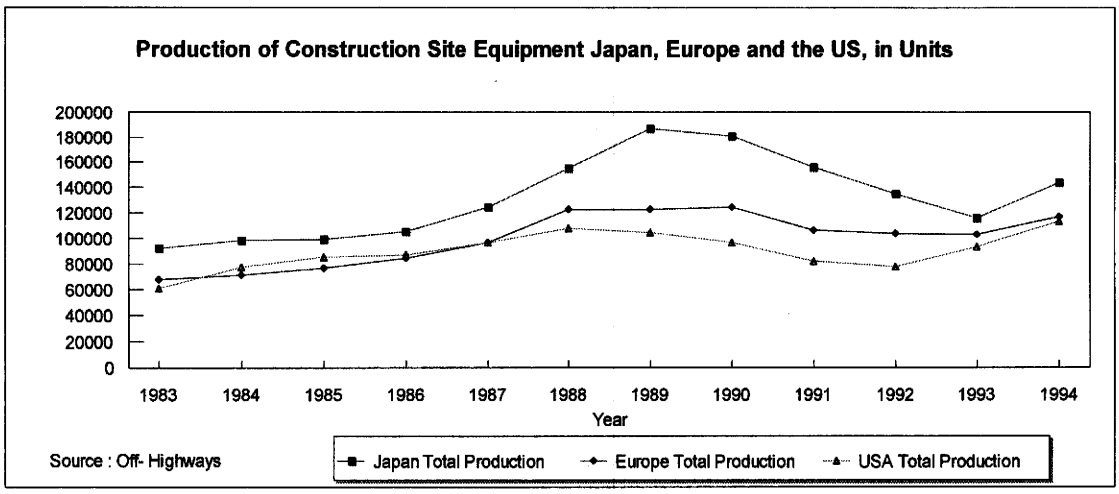


Table 3.1. Growth of off-highway production in the EU, Japan, and the USA

(% per year)

	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994
EU	4.9	7.4	10.2	14.1	27.1	-0.3	2	-15	-2.6	-0.8	13.9
Japan	6.5	1.1	5.7	17.9	25	19.9	-3.2	-13.6	-13.3	-14.3	24
USA	27.8	9.9	2.1	10.7	12.1	-3.7	-7.5	-15.6	-5.4	21.3	20.8
Total growth	11.9	5.6	5.8	14.5	21.7	6.8	-2.8	-14.4	-8.1	-1.2	19.9

Source: Off-Highway Research and WS Atkins.

Table 3.2 shows that output in the three main regions, Europe, the USA and Japan, grew by 68% from 1983 to 1994, but Japanese output grew slightly more slowly than that of the USA or Europe. The transplant policies of Japanese manufacturers who set up production in other countries may partially account for this.

Table 3.2. Growth of production, 1983–94

	1983 output in units	1994 output in units	% growth since 1983
EU	68,154	116,949	71.6
USA	60,848	111,220	82.8
Japan	92,376	143,850	55.7
Total	221,378	372,019	68

Source: Off-Highway Research.

The USA has increased its share of world production from 27% to 29% in the period, whereas the EU share has remained stable, ranging between 31–32%. Figure 3.1 demonstrates these movements.

3.2. The structure of the sector in the EU

In Europe the sector comprises a mix of global, pan-European and national players. The global players focus on the European market and/or making models that in the main can be sold world-wide. The pan-European and national producers have either an international or European/national market focus.

Although there are some 274 companies with manufacturing facilities in the EU, the five largest produce 50% of the EU output. 87% of the output comes from only 8% of the manufacturers. A third of the sector's manufacturers are based in Germany, which as mentioned earlier is the principal location for crane production. The UK, however, is the main producer of off-highway equipment.

3.3. Driving forces in the sector

The main factors, other than the single market, that are driving the change in production and trade in the sector are:

(a) the cyclical construction markets;
(b) changes in the structure and operation of the construction sector;
(c) new entrants to world markets (South Korea, Central and Eastern Europe);
(d) technology and design development.

3.3.1. Construction markets

Sales of construction machinery follow, and amplify, changes in construction output, particularly civil engineering *(travaux publics)* output. Contractors invest in new construction machinery to improve productivity when workloads are high, and when their profits and cash flow are strong. They dispose of equipment onto the second-hand market when construction demand is weak, thus depressing new sales of equipment, and prices, more than the actual fall in the construction market itself.

The construction sector is unique in that there has been a long cycle of demand as well as the short-term economic cycle of individual countries. Construction output in Europe enjoyed a long period of growth from 1984 to 1990, followed by a severe decline (by around 30% in volume) from 1991 to 1993. After that demand has stagnated. There are some significant national deviations from this overall trend: for example German construction output grew by 16% in 1991, but in Denmark and Finland construction output fell in the same year. Local markets are also much more volatile, both because of the four- to five-year business cycles in individual Member States, which in the past were not in step, and because of purely local factors related to the growth or decline of regional economic activities.

The period of growth from 1984 to 1990 also coincided with a growth in construction output in Japan and the USA. To an extent this represented growth catching up with construction needs, which had been postponed by world recession and uncertainty during the period of construction decline from 1974 to 1984, caused by the oil crises. In Europe, the investment and restructuring generated by the expectation of the single market, the accession of Spain and Portugal, and infrastructure development in advance of the 1992 Olympics and Expo, may also have been factors. This boom encouraged inward investment by the 'implants', and investment in facilities, new models and rationalization by European manufacturers.

The collapse of this construction boom led to surplus capacity in the parc of construction machinery, which affected new sales. This has halted new investment in the industry.

3.3.2. Changes in the structure and operation of the construction sector

The construction sector has become increasingly more mechanized over the period, partly stimulated by the need for increasing productivity during the pre-1990 boom. Because the sector consists mainly of small firms, mainly family-run (around 1.7 million enterprises in the EU with less than 10 employees), its capacity to invest in heavy equipment is limited. This has led to the growth of an important hire market, and to specialist contractors for the operation of plant. This hire sector can be more discriminating in the procurement of machinery, and this favours a growth in trade. It also favours heavier and more efficient equipment.

At the same time there has been a growing need for small, light and low-cost plant for the small contractors, which created a niche for new entrants.

3.3.3. New entrants to world markets

The third country markets have become far more difficult for EU firms because of three factors.

Firstly, Japan has targeted the construction machinery industry as a sector for export growth, and this has been aided by massive spending by the major Japanese contractors on research and development in construction methods, enabling the Japanese machinery manufacturers to develop new products and designs.

Secondly, the big South Korean manufacturers of machinery have moved into construction plant.

Thirdly, the big construction combines of Eastern and Central Europe, many of which had their own construction plant manufacture, have lost their home construction markets. These construction combines and the heavy machinery manufacturers of the region have seen construction machinery sales, and more particularly the subcontract manufacture of heavy parts for European construction machinery manufacturers, as a new market. This had relatively little impact in the period up to 1992, but is now a significant factor.

3.3.4. Technology and design development

There have been significant improvements in construction equipment design, particularly the ergonomics of operators' cabs, the range of equipment, new specialized applications (e.g. pipe and cable laying), reliability and improved visual appearance. Japanese competition may have been a factor in this. It has led to a greater polarization between high quality equipment for the developed markets of Europe, North America and Japan, and the lower-cost markets of third countries. Many EU manufacturers see their competitiveness in third markets being eroded by 'over-specification' and, to some extent, this report will show later that they attribute part of this to the stricter European safety requirements.

There will have been some improvements in manufacturing technology for the larger construction equipment manufacturers as a result of CAD-CAM and flexible manufacturing, and better use of subcontracting (including subcontracting to low-cost Central European

fabricators), but there have been no major changes in technology. Most equipment is built using labour intensive small batch assembly techniques, which give some comparative advantage to the low-wage producers of South-East Asia and Central Europe.

3.3.5. Exchange rate movements

The manufacturers themselves, when asked about external factors on competitiveness and trade, ascribe great importance to exchange rate movements. This is particularly the case for German manufacturers who believe their competitiveness has been undermined by high labour costs and a strong currency.

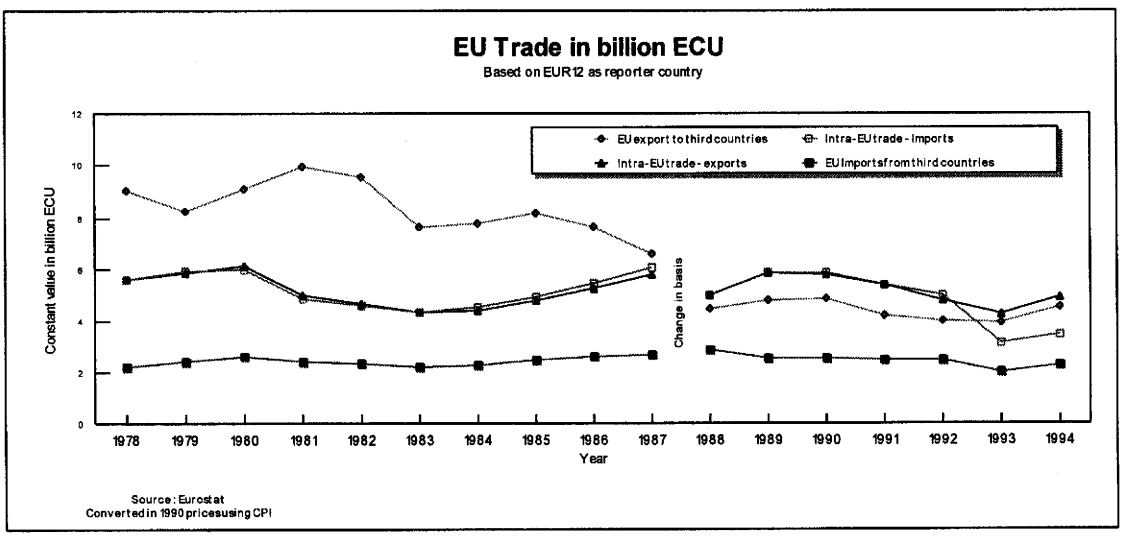
3.4. EU trade

Figure 3.2 shows intra- and extra-EU trade from 1978 to 1994 (constant 1990 prices). The figure shows:

(a) a dramatic decline in exports to third markets;
(b) a fluctuating picture as far as intra-EU trade is concerned;
(c) imports from third countries remaining static.

This picture, however, does not reflect the trends shown by other industry sources (Off-Highway and MTPS). Analysis suggests that Eurostat data prior to 1987 are not compatible with later data.

Figure 3.2. Intra- and extra-EU trade, 1978–94



If the decline is true, however, it may be a result of:

(a) a decline in major infrastructure projects in developing countries;
(b) import substitution from local manufacture and Japanese/South-East Asian implants in third countries;
(c) increased exports from former centrally planned economies.

The EU has a positive balance of trade in construction site equipment. In 1992, the ratio of exports to imports was 1.2, but this had declined from 2.1 in 1988. By 1994, there had been a modest recovery to 1.65.

The balance of trade in 1994 for the two categories of cranes and other handling equipment, and off-highway equipment, are shown in Table 3.3 and Table 3.4 respectively. The tables indicate that, except for Spain, all countries had strong balance of trade positions. Even Spain had a positive balance in crane and other handling equipment, turning around a large deficit in 1992. Germany also had improved on its 1992 position which was negative for off-highway equipment. This was mainly due to a reduction in imports rather than an expansion of German exports reflecting the recession in Germany.

Table 3.3. Trade in cranes and other handling equipment, 1994

(million ECU in 1994 prices)

Member State	Exports	Imports	Balance of trade
Germany	2,118	886	1,232
France	826	648	177
Italy	840	291	549
UK	906	625	281
Spain	228	217	10
Total EU	6,015	3,650	2,364

Note: Eurostat codes 8425/8426/8427/8428.
Source: Eurostat.

Table 3.4. Trade in off-highway equipment, 1994

(million ECU in 1994 prices)

	Exports	Imports	Balance of trade
Germany	1,093	710	383
France	957	467	489
Italy	553	240	312
UK	998	525	472
Spain	53	162	-109
Total EU	5,073	3,035	2,038

Note: Eurostat product codes 8429/8430/ 8431.
Source: Eurostat.

Intra-EU trade grew in the 1980s and peaked in 1990 at ECU 10.6 billion. It then fell relative to EU GDP in the early 1990s. This is to be expected, as in periods of economic recession the construction industry is generally more deeply affected than other industries.

Figure 3.2 shows that since 1988 EU manufacturers have exported more to the EU than to other countries. Prior to this, third countries took the larger share of Member States' exports.

3.5. Trade position of Member States

Germany and France are the largest traders within the EU. In 1988 Germany was the second largest importer of EU equipment behind France. In 1992, Germany became the largest, importing the equivalent of ECU 2.3 billion of equipment, of which two thirds came from other EU States compared to 5.5% in 1988. German imports from other EU Member States have increased sharply since 1989 and have grown faster than imports from third countries. This is partly due to the recession hitting other EU markets whilst the German market continued to grow on the back of German reunification.

The following is a summary of the trade position in the principal manufacturing EU countries: France, Germany, Italy, Spain and the UK.

3.5.1. French international trade

Figures 3.3–3.5 present the French trade situation, which can be summarized as follows:

(a) The French balance of trade was positive in 1994 at ECU 666 million (Eurostat source), with exports exceeding imports by 60%.
(b) The balance of trade in cranes and other handling equipment is small, yielding a positive net export ratio of 0.23 in 1994. For off-highway, the trade position is much stronger in favour of France with a ratio of 0.34 in 1994.
(c) French exports peaked at approximately ECU 2.2 billion in real terms in 1982 and 1983. Since 1980, France's exports to other EU Member States, although fluctuating, have tended to grow slightly. French exports to third countries have also fluctuated but fell to their lowest level in 1993.
(d) In 1988, French exports appear to drop suddenly. This may be explained by the change in Eurostat codification, especially as world output peaked between 1988 and 1991.
(e) French imports have remained fairly stable since 1978 with the exception of 1987 when they reached a high of ECU 2 billion (constant 1990 prices). Since 1978, the value of imports sourced from third countries has declined in favour of intra-EU imports which represented 74% of total imports in 1994, compared to 60% in 1980.
(f) The balance of trade appears to be widening in recent years in France's favour.

Figure 3.3. French exports and imports, 1980–94

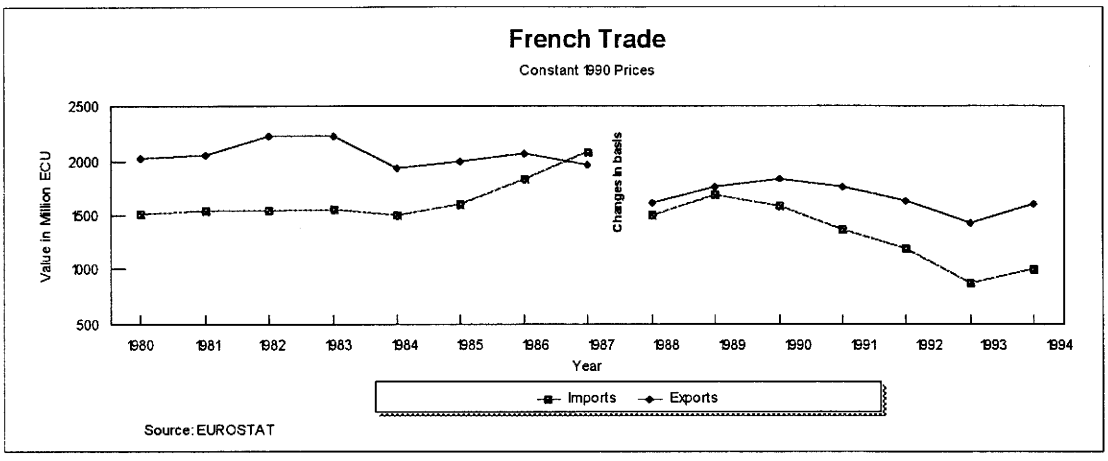


Figure 3.4. French exports by destination: EU/non-EU, 1980–94

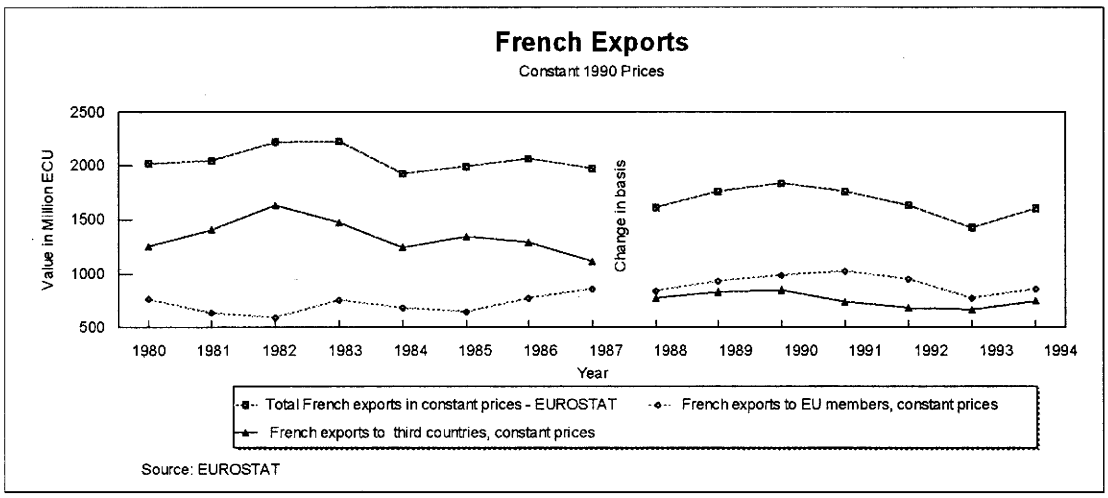
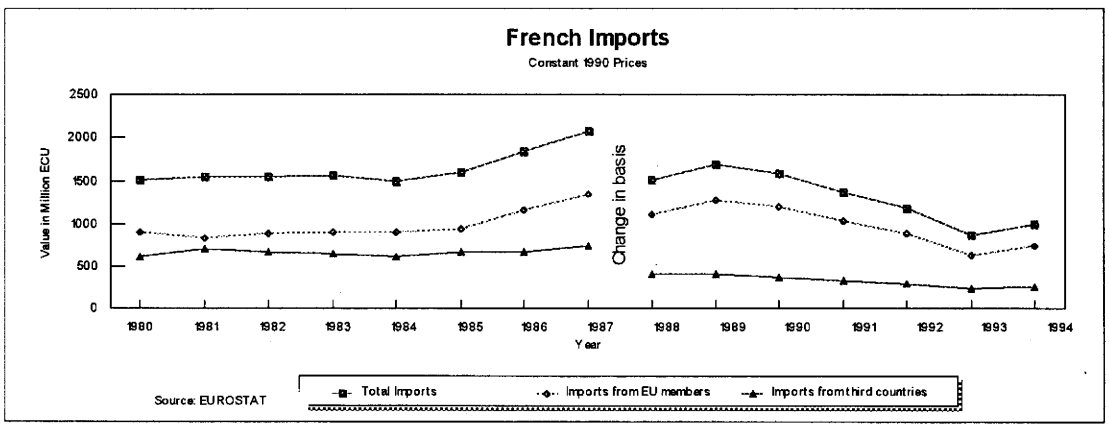


Figure 3.5. French imports by source: EU/non-EU, 1980–94



3.5.2. German international trade

Figures 3.6–3.8 show the trade situation in Germany over the period 1980 to 1994, which can be summarized as follows:

(a) The German balance of trade is positive, with exports being twice that of imports in 1994. This positive balance had declined between 1988 and 1992 but has improved since.
(b) Germany's comparative advantage lies in cranes and other handling equipment. Exports exceeded imports by 139% in 1994. They also account for 35% of EU exports (both intra-EU and third country).
(c) Germany is also the largest EU exporter of off-highway equipment.
(d) From 1980 to 1987, German imports declined, but increased rapidly after 1988.
(e) In 1992, 62% of German imports were sourced from EU countries compared to 48% in 1986 and 40% in 1981. But in 1994, the ratio was down to 49%.
(f) Since 1980, German exports to third countries have declined, with a low point in 1988. In 1988, exports to third countries were for the first time lower than the level of exports to the EU. Since 1988, both exports to the EU and exports to third countries have remained at a similar level, but there seems to be a decline in German exports to the EU in recent years.

3.5.3. Italian international trade

Figures 3.9–3.11 show the Italian trade position from 1980 to 1994, which can be summarized as follows:

(a) The trade balance of Italy is positive, with exports outstripping imports by over two and a half times in 1994. There has been a fairly consistent favourable difference between imports and exports since 1981.
(b) The Italian industry has a positive balance both in cranes and other handling equipment and off-highway, the former product group having a particularly large surplus.
(c) Italian imports have grown steadily although the proportion of imports sourced from third countries has declined significantly since 1986, from around 50% to around 25%.
(d) Italian total exports have grown only very slightly and reached ECU 1.4 billion in 1992. Since 1988, exports to both EU Member States and third countries have been similar.

3.5.4. Spanish international trade

Figures 3.12–3.14 show the Spanish trade position, which can be summarized as follows:

(a) The Spanish balance of trade is strongly negative, with imports 74% higher than exports in 1994. The industry is stronger in exports of cranes and other handling equipment, where the balance of trade was close to being in equilibrium in 1994.
(b) Imports into Spain increased after 1986, when Spain joined the EU, to peak in 1990 at ECU 1 billion. Since then, Spanish total imports have fallen back to ECU 379 million in 1994, below 1986 levels.
(c) The proportion of Spanish imports from other EU countries has always been greater than imports sourced from third countries and represented 71% of total imports in 1994.
(d) Exports have increased since 1986 to reach ECU 281 million in 1994. Exports to third countries account for the majority of Spanish export markets (55% in 1994).

3.5.5. UK international trade

Figures 3.15–3.17 show the UK trade position, which can be summarized as follows:

(a) The UK's trade balance had a small positive balance (around 20%) in the 1980s, but this balance rose to 65% of the import level in 1994.
(b) The British industry is particularly strong in off-highway equipment where in 1994 exports exceeded imports by 89%.
(c) The industry's balance of trade in cranes and other handling equipment is also strongly positive (exports 45% greater than imports in 1994).
(d) UK imports and exports have closely followed the pattern of construction output since 1980, with a decline from 1980 to 1983, growth from 1984 to 1990 (except for the statistical discontinuity in 1988) and a decline from 1990.
(e) The additional imports during the construction boom from 1986 to 1990 came mainly from EU sources. Non-EU imports were fairly steady. No structural change in the share of EU imports can be detected; EU imports account for 55-60% of total imports.
(f) UK exports have fluctuated since 1980, within a range from ECU 1.2 billion to ECU 2 billion, with indication of a growth trend since 1983.
(g) There appears, however, to have been a steep change in the destination of UK exports. Before 1988 only one third went to EU countries. Since 1988 exports to the EU increased to half of total exports (allowing for statistical discontinuity). However, in 1993 and 1994, sales to third countries have taken off while sales to the EU have declined slightly, reflecting the recession in Germany.

Figure 3.12. Spanish exports and imports, 1986–94

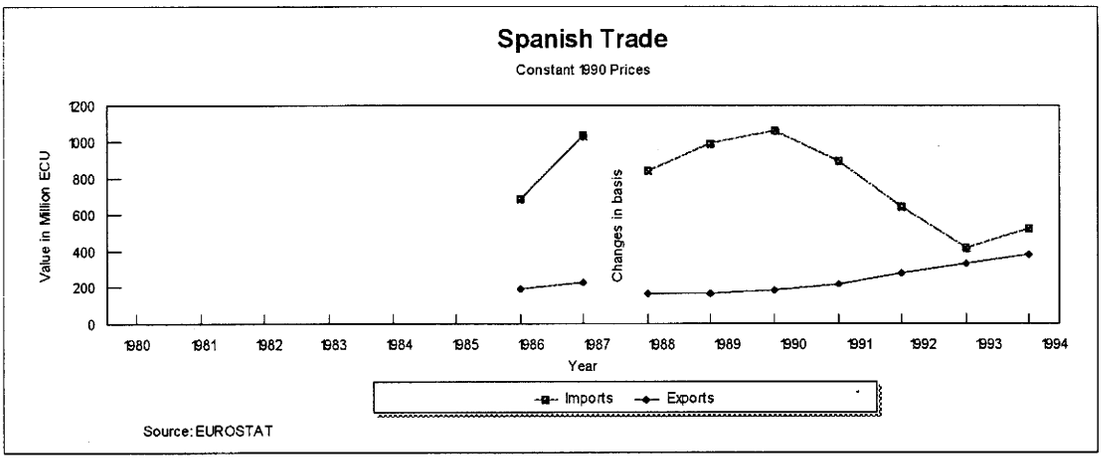


Figure 3.13. Spanish exports by destination: EU/non-EU, 1986–94

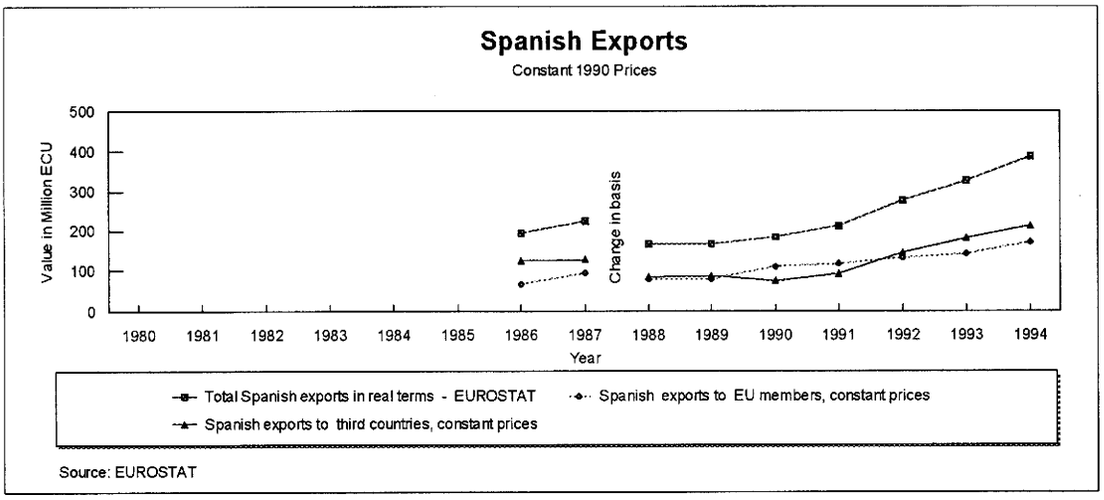
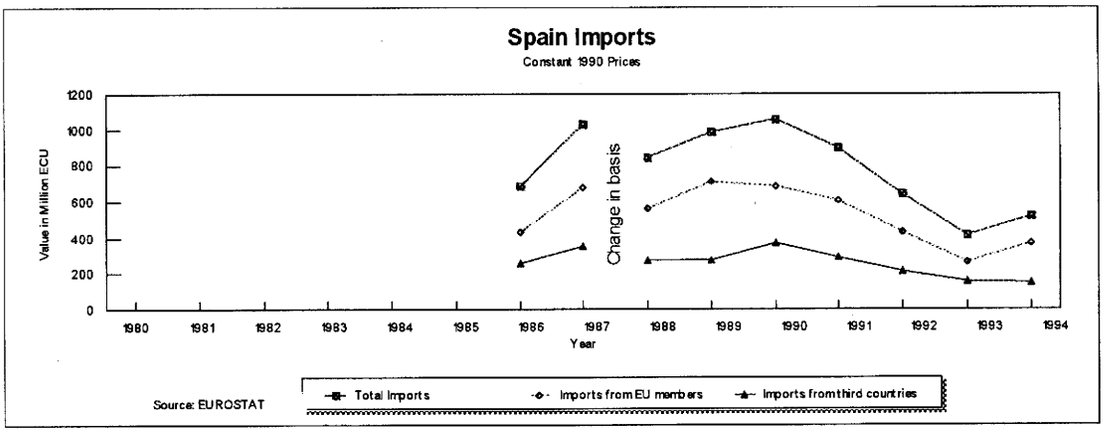


Figure 3.14. Spanish imports by source: EU/non-EU, 1986–94



specifications for specific products (the 'old approach'), Directives would be adopted which would define only the essential health and safety requirements (ESRs). Products falling within the scope of a new approach (NA) Directive must comply with the essential health and safety requirements in order to be placed on the market (i.e. offered for distribution and/or use within the EU by a manufacturer or importer).

Each Directive sets out the alternative routes available to manufacturers or suppliers in order to demonstrate conformity, which range from a simple self-declaration to full processes of third-party testing for attestation of conformity and certification within the quality assurance system with or without continuing surveillance of the manufacturing process. In each case the manufacturer has to carry out an assessment of the risks, and hold a technical file on the product which is available for inspection if required. The modules by which the attestation process can be composed have been formalized in the 'global approach' to conformity assessment (Council Resolution 90/C 10/01 of 21 December 1989) complemented by the decision of 13 December 1990 on the modules for the various phases of the conformity assessment procedures.

The conformity assessment system is underpinned by harmonized standards. Harmonized standards are elaborated by European standardization bodies (ESBs) (CEN, CENELEC and ETSI) on the basis of mandates given by the Commission. (It should be noted that the CEC also gives mandates to the ESBs for work on standards which are required at an EU level but are not harmonized standards in the sense of the NA Directives; the ESBs also work on European standards requested by industry which are not related to European legislation.) Harmonized standards give a presumption of conformity with essential requirements, and therefore provide a fast track to compliance, and give the supplier a level of comfort that his declaration of conformity should not be challenged if there is an incident. The manufacturer is free, however, to apply other technical solutions, including use of national standards if harmonized standards have not yet been developed (after which conflicting national standards would have to be withdrawn) or his own technical specifications.

The Directives require Member States to inform the Commission of the 'notified bodies' which are competent to carry out those parts of the conformity assessment procedures for which third-party intervention is necessary under each Directive.

The Commission is continuing to develop the procedures for coordinating the notified bodies' work, and to develop cooperation between enforcement authorities. As we shall see later in the report, coordination of notified bodies and cooperation between enforcement authorities are two areas where some of those interviewed feel that further work is needed to reduce uncertainty for manufacturers.

4.1.3. CE marking

Products which fall into the scope of one or other of the NA Directives are required to be affixed with the CE marking to indicate that the manufacturer or importer has carried out the attestation of conformity with ESRs of all applicable Directives, in accordance with one of the routes available under the Directives in question. The CE marking acts as a 'passport' for those goods to which one or more NA Directives apply. (For goods to which no NA Directives apply it has no legal meaning and legally should not be used. This is sometimes a source of confusion to customers who demand CE marking on products to which no NA

Directives apply.) The requirements for CE marking were harmonized across all NA Directives by Directive 93/68/EEC, which came into force on 1 January 1995 with a transitional period up to 1 January 1997.

4.1.4. Mutual recognition

Wherever there are national regulations in force which govern the placing on the market or the use of products (that is, where no harmonized arrangements - old or new approach Directives - are in force), the principle of mutual recognition applies. This is founded on Article 30 of the Treaty prohibiting any measures having equivalent effect to a quantitative restriction on imports, and subsequent legal judgments, in particular the *Cassis de Dijon* case in 1979 which established that: 'any product lawfully produced and marketed in one Member State must be admitted to the market of any other Member State'.

The Commission has set up procedures, put into force by Directive 83/189/EEC, by which Member States must notify the Commission of any new regulations, and of any new national standards or programmes of standardization. A committee is set up to deal with issues arising from this. All notifications are passed on by the Commission to interested bodies and other Member States, and a list of the subjects of notifications is published in the *Official Journal of the European Communities* (OJEC) to forewarn industry. Where a potential problem is noted the Commission issues an opinion to the Member State. When action is not taken (for example, by inserting clauses permitting equivalent standards or specifications in technical regulations), issues are dealt with in meetings with the Member State, and may ultimately be taken to the European Court of Justice (ECJ). The 83/189 Committee also approves mandates from the Commission to the ESBs for work on European standards.

The European Organization for Testing and Certification (EOTC) has been set up, funded partly by the Commission, principally to promote the development of mutual recognition arrangements for testing and certification to facilitate free trade of products in the non-regulated sphere, but the EOTC also supports mutual recognition arrangements for testing and certification of many products which fall into the harmonized sphere, particularly electrical and electronic products.

4.2. Implementation of sector-specific measures

Summarized below are the measures identified as having a specific impact on the construction site equipment sector. These are divided according to their relevance for manufacturers and users, and by new and old approaches.

Table 4.1. Directives for the removal of technical barriers affecting construction site machinery

Manufacturers
New approach Directives
89/392/EEC - Machinery Directive, amended by (1) 91/368, (2) 93/44, (3) 93/68 on CE marking.
89/336/EEC - Electro-Magnetic Compatibility (EMC) Directive, amended by 91/263, 92/31 and by 93/68 on CE marking.
73/23/EEC - Low Voltage Electrical Equipment Directive, amended by 93/68 on CE marking.
87/404/EEC - Simple Pressure Vessels Directive, amended by 93/68 on CE marking.
94/9/EC - Equipment and protective systems intended for use in potentially explosive atmospheres (replaces a series of old approach Directives).
93/465/EEC - Council Decision on Modules for Conformity Assessment Procedures (repeals 90/683).
Old approach Directives
86/295/EEC & 86/296/EEC, concerning roll-over and falling object protection; now replaced and repealed by the Machinery Directive.
86/662/EEC, amended by 89/514 on noise emissions of earth-moving equipment.
84/534/EEC, amended by 87/405 on noise emissions from tower cranes.
Users
89/655/EEC, amended by 95/63/EC. The Directive on the use of work equipment is a complement to Directive 86/655. Covers health and safety in the workplace, relating to the use of equipment.

4.2.1. The Machinery Directive 89/392/EEC amended by 91/368/EEC, 93/44/EEC and 93/68/EEC

The Machinery Directive applies to machinery, generally defined as an assembly of linked parts, of which at least one is moveable, or a safety component placed on the market separately. It therefore applies to all construction machinery. It sets out in some detail the essential safety requirements with which such machinery must comply before it may be placed on the market, and the conformity procedures to be followed.

Before placing it on the market, the manufacturer or his authorized representative established in the EU shall, in order to affix the CE marking, submit his product to the conformity assessment procedures set out in the Directive. These are:

(a) for all machinery other than that referred to in Annex IV to the Directive:
the manufacturer must prepare a technical file and a declaration of conformity, in which he states that the machinery complies with the essential requirements of the Directive;
(b) for machinery referred to in Annex IV (generally those for which most Member States required type approval because the machinery was considered to be especially hazardous)

... if harmonized standards are applicable and they are complied with in full:

the manufacturer makes a declaration of conformity, stating compliance of the machinery with the essential requirements:

(i) after forwarding the technical file to a notified body; or
(ii) on the basis of certification of the technical file by a notified body; or
(iii) following the 'EC type examination' by the notified body;

... if harmonized standards are not applicable or are not complied with in full:

the product is submitted to 'EC type examination' by the notified body, followed by the manufacturer's declaration of conformity stating that the machinery complies with the type certified by the 'EC type examination'.

The Directive was initially adopted in 1989 and entered into force on 31 December 1992. It has been transposed into national law in all Member States with the exception of Italy, against whom ECJ procedures have been instigated.

Mandates have been issued to CEN for the production of around 700 standards which are specific to machinery. About 70 of these standards had been adopted by early 1996.

4.2.2. Directive 73/23/EEC (amended by 93/68) – the Low Voltage Directive (LVD)

The Low Voltage Directive (LVD) applies to most equipment designed for use with a voltage rating of between 50 and 1,000V AC or between 75 and 1,500V DC. This would apply to any electrically driven tools and machinery on the building site. There is not likely to be much of this type of equipment within the scope of this study, but outside the scope of the study electrical power tools, lighting, and other ancillary construction site equipment might be covered.

The Directive has been in force for 20 years, but the CE marking requirements, which make it in effect a new approach Directive, even though it pre-dated the new approach, came into force in 1995 with a transition period up to 1 January 1997.

The LVD sets out the principal elements of the safety objectives with which such equipment must comply in order to be legally placed on the EU market, and the conformity assessment requirements. The LVD covers all safety aspects of the equipment, not just the electrical hazards.

Under the Directive, no category of electrical equipment is automatically subject to mandatory third-party inspection or certification. Provided the standards referred to in the Directive (Articles 5, 6 and 7) exist and have been applied in full, the Directive allows electrical equipment to be placed on the market if the steps set out below are followed:

(a) relevant technical documentation, established by the manufacturer, must be kept on EU territory at the disposal of the relevant authorities for inspection purposes;
(b) the manufacturer must take all necessary measures in order that the manufacturing process ensures compliance of the manufactured products with the technical documentation;
(c) the manufacturer draws up a declaration of conformity, which must be kept with the technical documentation; and

(d) the CE marking is affixed attesting to the conformity of the product with the provisions of all relevant new approach Directives.

Nevertheless, in the event of a challenge, the manufacturer or importer may submit a report on the conformity of the electrical equipment with the safety objectives, drawn up by a body which is notified in accordance with the procedures set out in the Directive.

It should be noted that the standards referred to in the Directive are not harmonized standards in the sense of the later new approach Directives, but rather national standards which have been recognized as equivalent for the purposes of the Directive.

4.2.3. Directive 89/336/EEC (and related amendments) on electro-magnetic compatibility

The EMC Directive applies to any apparatus, equipment, or system of installations containing electrical and/or electronic components liable to create electro-magnetic disturbance or whose performance is liable to be affected by such disturbance. All equipment driven by internal combustion engines or electric drives contains electrical parts which emit electro-magnetic radiation and so most construction site equipment, except equipment which is purely mechanical or pneumatic (e.g. equipment driven off the power train of a tractor or by pneumatic power), is covered.

For products other than radio transmitters, the Directive provides for the manufacturer's declaration of conformity. If the manufacturer has followed the relevant harmonized standards, he has to draw up a declaration of conformity (self-certification route). If there are no harmonized standards, which for most products will be the case for some years, or if he has not fully applied the relevant harmonized standards, he has to draw up a technical file and submit this to a competent body in order to obtain a certificate or technical report.

The essential requirements of the Directive are expressed in very general terms, because it covers a diverse range of equipment. The nature of the electro-magnetic phenomenon means that specific standards are required to ensure consistent criteria for attestation of conformity, and, in general, special test facilities are needed, usually involving screened test chambers or a screened or protected open-field site. For large items of construction plant this may involve special purpose test facilities of which few exist (they had previously been necessary for testing military equipment), but presumably for most equipment the electrical components can be tested separately.

The standardization programme is under CENELEC TC210. The fact that there are no harmonized standards available (and for many types of equipment there will be special use circumstances) means that most manufacturers will want to have the comfort of some form of third-party certification or testing even though it is not a requirement of the Directive.

4.2.4. Directive 94/9/EC on equipment and protective systems intended for use in potentially explosive atmospheres

This Directive applies to equipment and protective systems for use in potentially explosive atmospheres. The explosive atmosphere is a mixture of air under atmospheric conditions and flammable substances in form of gases, vapours, mists or dusts. The scope of the Directive also covers safety devices, controlling devices and regulating devices intended for use outside potentially explosive atmospheres, but required for contributing to the safe functioning of

equipment and protective systems with respect to risks of explosions. In certain circumstances construction site equipment works in environments which are potentially explosive, so manufacturers have to consider this Directive, particularly for equipment used in mines and quarries. The Directive is not yet in force and will have a transitional period until 2003.

4.2.5. Directive 86/662/EEC on noise emissions from construction plants

The Directive on the limitation of noise emitted by hydraulic excavators, rope-operated excavators, dozers, loaders and excavator loaders is an 'old approach' Directive to harmonize national legislation on the control of noise emitted from construction equipment, to ensure adequate environmental and health protection. It contains six annexes of technical information. For this Directive, equipment needs to be tested in order to obtain an EC-type examination certificate. From 1997 there will be tighter limits.

4.2.6. Directive 87/405/EEC amending 84/534 on the sound level of tower cranes

Like the previous Directive this is an old approach Directive, requiring EC type examination and affixing a mark (showing the sound levels guaranteed by the manufacturer and the symbol epsilon). It has technical annexes.

4.2.7. Directive 89/655/EEC on the use of work equipment

Unlike the Directives listed above, the Use of Work Equipment Directive is a Directive originating in social policy and concerns the health and safety of workers in the workplace, not the placing on the market of equipment. It is intended to harmonize certain minimum health and safety requirements related to the use of tools and machinery, such as maintenance, training of workers, instructions, and the location of controls, alarms, and emergency switches. Unlike the rules on placing on the market, Member States may impose higher health and safety requirements on the use of equipment than those in the Directive.

The Directive came into force on 1 January 1992, and from 31 December 1992 any equipment newly given to workers has to comply with any relevant EC Directive which is applicable, as well as the requirements of the Use of Work Equipment Directive itself. This includes the Machinery Directive, for machinery as defined. After 1 January 1997, machinery already in use before 1992 will have to comply with the minimum requirements in Annex I to the Use of Work Equipment Directive.

A proposed amendment would set minimum requirements for the provision of physical safeguards on six specific types of work equipment, including mobile and lifting equipment. This would significantly extend the original Directive.

4.2.8. Directive 94/12/EC on exhaust emissions

The Exhaust Directive of 23 March 1994 relates to measures to be taken against air pollution by emissions from motor vehicles and amends Directive 70/220/EEC. At present, EURO 1 regulates emissions from on-road vehicles. As of 1 October 1995 new models of on-road trucks have to comply with EURO 2 regulations and these will apply to new vehicles from 1 October 1996. To date, none of these regulations apply to emissions emanating from off-road vehicles. A proposal regarding the regulation of exhaust emissions for off-highway vehicles

loses business as a result of the reduced amount of multiple testing which the CE marking facilitates, so would like to see the maximum amount of third-party testing being carried out.)

Several German manufacturers stated that they carry out third-party testing to ensure that their product complies with the Machinery Directive in spite of the fact that they could affix the CE marking by the route of self-certification. They do this partly as a marketing tool, since it increases customer confidence, but also to cover themselves for insurance purposes. They believe that the risk is transferred away from the company management and to the testing body in the event of an accident. Companies in other countries disagree with this and are of the opinion that if an accident occurs the company will be liable even if third-party testing has been carried out. (We believe that test labs and notified bodies may include a disclaimer of legal liability if asked to give an attestation of conformity for products for which harmonized standards, which should form a basis for objective and comparable test procedures, do not exist. If harmonized standards do exist, of course, the manufacturer can be confident in self-certification, so the value of third-party assessment, where it is not mandatory, would be reduced if the labs do not carry liability. We have not, however, been able to check the liability clauses in test bodies' contracts. The differences in liability law between countries probably makes the liability position of manufacturers and certifiers different in different Member States.)

Quote from German manufacturer:	'We do not have to have our products tested for the GS mark. Most other companies seem to rely on self-certification, but we ask TUV to test if our products do actually meet the Machinery Directive before affixing the CE marking. We do this, not because it is compulsory, but because the risk is too high if an accident happens and the machinery is found not to comply. This takes the risk away for our management.'

Enforcement

EU manufacturers complained that in practice anyone is free to put the CE marking onto their machinery without actually complying with the Directive, implying weak policing of the Directive. There is real doubt in the industry as to the validity of some manufacturers' claims to comply with the Machinery Directive. This is an issue which the Commission is now addressing through the 'Common Approach' to administrative cooperation. It is likely that there will be some abuses in the early years of implementation of the Machinery Directive, which only enters into full application in 1997 once the transitional period is completed. The industry is clearly concerned to see effective enforcement.

The approach to penalties for non-conformity in Member States was investigated.

The *Gewerbeaufsichtsämte* in Germany are reported to carry out spot checks to ensure that equipment is meeting the Machinery Directive. If the equipment does not comply, the supplier is informed and distribution in the market is prohibited.

In the UK it would appear that there have been few reported cases of non-conformity. This may be because enforcement is the responsibility of the Trading Standards officers, whose workload was in the past dominated by consumer products cases and who may have to develop competence in machinery. On the other hand, the inspectors of the Health and Safety Authority, who are involved with inspecting working conditions in factories and on sites, are

concerned with the use of the machinery, not *per se* whether it conforms with the MD or whether the manufacturer correctly carried out the declaration of conformity. If a machine is found to be the cause of an accident and has no CE marking, or has a CE marking but does not actually comply, it is reported that the user can be prosecuted more heavily than would otherwise have been the case, since it is the user's responsibility to ensure the equipment complies with safety legislation when it is purchased and installed (as required by the Use of Work Equipment Directive).

Anecdotal evidence from an Eastern European company suggests that importers of new non-CE machinery are circumventing the regulations by declaring them as second-hand. We have not been able to quantify the degree to which this is happening (but the practice has been verified through other sources). If true, it stems from a failure on the part of the national authorities concerned to police the Directive properly in their territory. The declaration of conformity and affixing of the CE marking is required by importers who first place equipment on the EU market, whether it is new or second-hand. It is probably easy, however, for equipment sold as second-hand to be presented as if it had previously been placed on the EU market.

Examples of apparent lack of enforcement by national authorities:	It was alleged that one EU distributor imports from the US products that do not conform, and affixes the CE marking. No one polices this, so nothing prevents it from happening. Information from Eastern European sources suggests that as a way of circumventing the need to comply with the Machinery Directive, some importers are bringing in equipment bound for third-country markets. If the sale falls through, the equipment is auctioned and sold into the EU market without a declaration of conformity, as though second hand (i.e. not the first placing on the EU market).

Other comments on the Machinery Directive

(a) It was felt that the interpretation of the ESRs varies too much from country to country. Each requirement is worded in terms of an aim to be achieved. There are many possible technical solutions. The solution chosen may be regarded as satisfactory by some and unsatisfactory by others. (This is an inevitable transitional problem until the set of harmonized standards is completed and common approaches to testing and certification are developed. The Commission is working on this by promoting and funding cooperation between notified bodies and administrative cooperation between enforcement authorities under the so-called 'Common Approach'.)

(b) There appears to be a common misunderstanding in industry as to the purpose of the CE marking. It was believed by trade associations that users regarded the CE marking as a guarantee of quality assurance. Discussions with manufacturers and users, however, indicated that many are not aware of CE marking at all.

(c) There was a belief that the implementation of Directives is not consistent in all Member States. One particular, fairly trivial, issue mentioned by one manufacturer is the wording regarding safety equipment, which in the UK reads 'electro-sensitive protective devices' whereas in Germany the word 'electro-' is omitted.

(d) A transitional difference in interpretation on the entry into force: in the UK 'machinery for sale after 1 January 1995 must legally comply' has been interpreted to mean that something in stock or supplied under a contract closed in December 1994 did not legally

need to comply, but in Germany and France it has been interpreted to mean that anything in the supply chain (e.g. if ordered in December 1994 but not delivered until January 1995) must comply. This provided a cause for complaint at the time but is no longer important.

Problems of misinterpretation

We came across many examples of misinformation or misinterpretation of the Directive. In most cases these were quoted as examples of unreasonable requirements or additional costs, which on further examination were not valid. Some examples are given below.

Examples of possible misinterpretation:	It was claimed that 'there are aspects of the Directive which are open to interpretation, e.g. wheel loaders with buckets. There is nothing in the Directive on buckets. Someone could put a very large bucket on the vehicle which would obscure view from the cab.' This is a misinterpretation because the Directive has an essential safety requirement which sets out visibility requirements. One manufacturer thought that 'interchangeable parts' do not have to conform, and was not sure what an interchangeable part is. In fact, interchangeable parts **do** have to conform, and the European Commission's explanatory document on the Directive elaborates on this.

Example of misinterpretation:	One manufacturer said 'The Machinery Directive stipulates that all construction equipment requires a fire extinguisher. Depending on which manufacturer you talk to or which EC department, the interpretation of this is either: (a) the manufacturer must indicate where the user must fit a fire extinguisher, or (b) the manufacturer must fit the fire extinguisher himself. In addition to this, it stipulates that the fire extinguisher must carry a CE marking. Until very recently, there was no product available carrying a CE marking.'

This is a misinterpretation because the section of the ESRs on mobile machinery requires that 'depending on the hazards anticipated by the manufacturer when it is in use, machinery must, where size permits: either allow easily accessible fire extinguishers to be fitted, or be provided with built-in extinguisher systems'. In neither case does the manufacturer have to fit removable fire extinguishers. Fire extinguishers themselves are not covered by a new approach Directive and cannot be CE marked.

In this example, as a result of the misinterpretation, the manufacturer sent confused messages to its US parent company, which produced skid steer loaders for the EU market. Following the first instruction from the European subsidiary, all loaders were fitted with fire extinguishers as standard. A second instruction then stated that this was not necessary. This incident caused bad relations, with the US parent company thinking that its European company did not know what it was doing. As an addendum to this story, the cab on skid steer loaders is open and extinguishers can easily be stolen, so the interviewee believed that legislators often do not understand realities. In fact the issue is one of lack of information.

Example of misinterpretation:	A manufacturer said 'In the Machinery Directive it is stipulated that in-cab noise should not exceed 85 dB(A). At BAUMA (1995), two months after the Machinery Directive came into force, one key manufacturer was exhibiting a skid steer loader with in-cab noise of 89 dB(A). We asked the people on the stand why this was and they had no idea.'

The MD does not specify noise levels: this is in the old approach Directive (86/662/EEC) on noise from construction machinery. The statement illustrates that some manufacturers try to take advantage of the confusion over the ESRs to gain competitive advantage over competitors by claiming that they meet requirements (which are often not compulsory) that their competitors' equipment does not meet.

Example of misinterpretation:	A manufacturer said that the need to translate the instruction manuals into all EU languages was a heavy cost burden, especially for SMEs. In fact, the MD only requires the manuals to be provided in the language of the customer. There is no translation requirement for SMEs which do not export to other countries.

In areas where legislation is vague, companies report that trade associations do not even appear to be able to give any clear directions. Manufacturers do talk to each other in an attempt to agree common interpretations of legislation, but this is on an *ad hoc* basis.

SMEs and the Machinery Directive

Opinions on the impact of the Machinery Directive on SMEs varied. Some companies considered that the system of self-certification for affixing the CE marking greatly supports SMEs, that it assists them in raising the technical standard of their products, therefore helping them to compete against larger companies. Other companies believe that the CE marking in itself does not assist sales since it is required for everyone; it does not provide a company with a competitive advantage.

Some SMEs are reported to view the CE marking as a necessary marketing tool. However, the cost of complying is a fixed cost which inevitably raises the break-even point: this is negligible for large manufacturers producing in series, but can be important for manufacturers of specialized one-off or short runs of machinery. It has been said that there is a danger of this increasing the failure rate of SMEs. For example, in the past some SMEs did not produce a user manual at all: now they have to produce it and translate it into the customer's language if they are exporting to other EU countries. It could be argued, however, that if costs were previously lower, this was because the level of safety now deemed necessary was not being delivered.

The burden of testing and conformity assessment on producers of small runs of equipment is, however, a serious consideration. Large companies report that they have been able to re-allocate a member of staff to deal exclusively with the paperwork needed in order to comply with the Machinery Directive. Smaller companies state, however, that this poses a serious cost

to their business, the burden being disproportionately high for the SME. On this subject, it should be noted, however, that the great majority of information required for the technical file is not new under the Directive: rather, most of it consists of technical drawings etc. which the manufacturer would have drawn up in any case during the design or manufacture of the machine. The administrative burdens can also be overstated: they seem relatively minor once the initial adjustment costs of introducing the new procedures into the company have been met.

During the course of this study some SMEs were identified that were not aware of the CE marking and were uninterested in informing themselves, in the belief that by supplying only the national market they were exempt.

One of the problems resulting from poor policing of the Machinery Directive and one which is particularly likely to affect SMEs is the fact that some companies are reported to be affixing the CE marking without complying with the requirements of the Directive. Those small companies that do comply see their competitive position weakened as they find it difficult to pass on increases in their costs until their competitors also comply. (In some cases, however, the supposed additional costs are the result of misunderstanding the requirements of the Directive.) This issue is dealt with in more detail in Section 5.8.

4.3.2. Views on the EMC Directive

According to our survey, slightly more than half the respondents (38) stated that they had not had to adapt their products to meet the EMC Directive, whilst just under a third had. Companies are unsure how to apply this Directive, and the cost of compliance is perceived to be high, particularly if third-party testing is required.

Companies interviewed to date do not perceive this to be significant in selling their products into other EU markets. In some instances, manufacturers report an increase in product costs but this has been compensated for by improved quality which has facilitated acceptance of their products in other EU markets.

There appears to be confusion in the industry as to whether or not this Directive applies to components. Several interviewees posed the question: 'How can our machine comply with this when the components are not tested?'

Interviewees complained that there are no supporting standards, making it difficult to know how to apply the Directive.

One large manufacturer interviewed stated that its products had recently been tested for compliance with this Directive and had failed, requiring additional work on electrical components and cables. The manufacturer expressed concern that his competitive position would be harmed since he felt sure that certain other EU competitors would ignore the Directive, thus creating an imbalance in the competitive environment.

A complaint made by both UK and French companies was that no national testing facility exists which is large enough to accommodate large products, making testing in Germany a necessity (we think that this is no longer the case).

Example of problem with EMC Directive:	'The only testing station large enough to accommodate combine harvesters or 45 t excavators is in Germany!' This is probably not true: there are many military installations able to test large equipment, and several new facilities have been built to respond to the Directive.

One crane manufacturer interviewed stated that the Directive did not make sense for cranes. He said that the safe load indicator needs to be tested and this is only functional when the crane boom is extended. It is not possible to extend the boom in an internal testing facility. (But there are open-field test sites available, and it should presumably be sufficient for the manufacturer to test the components. There is no obligation to carry out third-party testing.)

There is some slight evidence from the discussions held with manufacturers that the Directive is being ignored because it is not fully understood. In any case, manufacturers' efforts to comply with the Machinery Directive, which came into force this year, took priority.

Evidence of Directive being ignored:	'This Directive is neither a worry to us, nor is it well understood!'

4.3.3. Views on the LVD

There were no comments on this Directive from manufacturers interviewed. It did not apply to them.

4.3.4. Views on the Directives on noise emission from construction plants

There is evidence that different Member States have interpreted differently the way in which tests for noise should be conducted. A Spanish manufacturer claimed that the French interpretation was different to the Spanish, and that this had negatively affected their sales in France. These differences, however, are being addressed and an amended Directive should come into force in 1996 which will require tests to be carried out in a 'normal' working environment.

One inspection organization believed that the Directive should be based on danger to health and not on levels of tolerance which differ from one part of the EU to another.

4.3.5. Views on the Use of Work Equipment Directive

The definition of machinery appears to be confusing manufacturers in so far as they are required to ensure that the machinery which they are placing at the disposal of their workers complies with the Machinery Directive (i.e. the machinery they use in their factory, not the construction machinery they manufacture). One manufacturer was unsure, for example, when they are building new process lines for their own use (not for sale) from existing in-house equipment and second-hand equipment from other EU plants (which do not have to comply), whether or not they need to ensure that the completed process line complies with the Machinery Directive and compile a technical file. (We understand that they do, but only if the assembly of existing machines constitutes a new 'machine' with interlinked parts; the second-hand machinery itself does not have to comply, but manufacturing a machine for their own use constitutes 'placing on the market'.)

Table 4.4. 'Have these Directives contributed to the following?'

(% of respondents)

	Yes	No	No response
Improved quality of your products	55	34	11
Increased product costs	74	16	9
Technical problems in meeting legislative requirements	53	36	11
Making your products more competitive in the EU	16	65	19
Encouraging you to sell in other world markets	18	52	30

Base: all, n = 74.
Source: WS Atkins.

It can be seen that slightly more than half the respondents considered that the result of EC legislation had led to an improvement in product quality. In general, respondents from the face-to-face survey (mainly the larger companies) pointed out that quality can be interpreted in different ways. The Directives have improved the safety of products and created a better environment for operators. However, the majority of the face-to-face respondents agreed that the Directives had done little to improve the technical capabilities of products and make them more competitive in world markets. They thought that some of the product changes enforced by the Directives were considered to be unnecessary, and it would have been better to channel investment into improving technical performance. The majority of respondents believed that the Directives had not contributed to their products being more competitive in the EU or in other world markets. These issues are discussed in more detail in Section 5.8.

Nevertheless, a significant number of respondents thought the Directives had made a positive impact on improving the competitiveness of their products (16 firms) or encouraging them to enter other world markets (13 firms). None of these 16 firms were in France, the UK or Germany.

The majority of respondents (74%, 55) thought their product costs had increased as a result of changes made necessary by the Directives. Interviewees were unable to quantify these cost increases, nor did they discriminate between one-off adjustment costs and long-term changes in production costs. Of the 12 interviewees stating that their costs had not increased, eight were German, three French and one Spanish. From evidence elsewhere we suspect that cost increases perceived are one-off learning costs or product adaptation costs. When asked specifically about production costs, only 10% of respondents (three firms) thought there had been an increase in pre-production costs and only 13% (four firms) thought there had been an increase in production costs (see Section 5.2). It is possible that the discrepancy between those who said that 'product costs' had increased and those who said that 'production costs' had increased arises because many had been able to increase prices for the improved products by passing on increased component costs.

Slightly over half the respondents stated that they had experienced technical problems in meeting the requirements of the Directives. Only in the case of Germany did the majority of companies claim to have experienced no technical difficulties in adapting their products.

Table 4.5 shows the same responses as Table 4.4, split by size of company.

Table 4.5. 'Have these Directives contributed to the following?' (by size of company)

(% of respondents)

	Small companies		Large companies	
	Yes	No	Yes	No
Improved quality of your products	66	31	55	45
Increased product costs	91	9	69	31
Technical problems in meeting legislative requirements	57	43	59	38
Making your products more competitive in the EU	23	74	24	69
Encouraging you to sell in other world markets	29	69	7	90

Base: 35 small companies, 29 large companies. Totals do not add up to 100% because non-responses are not shown.
Source: WS Atkins.

Whilst almost all small companies stated that the Directives had increased their costs, two thirds of them acknowledged that the quality of their products had improved. The response from larger companies to both these points was similar but less strong. Most companies in each group felt that the Directives had not made their products more competitive in the EU, although a significant number, about a quarter in each case, thought they had done so, and a third of small companies thought the Directives had encouraged them to sell in other world markets.

There was no difference between the experience of small and large companies with respect to technical problems. This is somewhat surprising given the disproportionate resource inputs that small companies are likely to have in meeting technical legislative requirements. Furthermore, over 40% of SME respondents stated that they had had no problems.

Awareness

In the interviews with end-users of equipment (construction contractors and plant hire companies) we asked: 'Are you aware of the following Directives?' Table 4.6 shows the responses.

Table 4.6. Users' awareness of Directives

(% of respondents)

	Yes	No
Machinery Directive	95	5
Exhaust Directive	65	35
Electro-Magnetic Compatibility Directive	55	45
Noise Directive	90	10
National road regulations	85	15

Base: 20 replies.
Source: WS Atkins.

Although the majority of users know of the Directives, they reported that they rely on distributors to ensure that equipment meets all necessary EC Directives. The EMC Directive is still relatively little known.

4.5. Implementation of horizontal measures

This section briefly lists some of the horizontal measures which might benefit the construction site equipment industry, and industry comments on them. In general, because of the nature of horizontal measures, sector enterprises are not likely to be specifically aware of their impact on their business, so their comments are few.

4.5.1. The removal of physical barriers

The creation of the single market is intended to eliminate delays at border crossings within the EU. Administrative documents previously required to be carried with the products have been abolished (e.g. the Single Administrative Document). The invoice is taken as proof that the product originates within the European Union. In theory this should greatly enhance intra-EU trade opportunities for EU manufacturers, particularly small companies who may previously have found the export formalities to be prohibitive.

Industry comment: the research has not revealed a significant improvement in trade performance. Interviewees claimed that where there have been increases in intra-EU trade these were more likely to be due to other factors, such as the severe recession in the construction industry since 1990, which have forced producers to expand their sales territories. This issue is dealt with in more detail in Section 5.3.

The consultant has, however, received evidence that the removal of physical barriers has benefited the industry in the supply of parts, which can now be ordered and delivered between countries in under 24 hours compared to 2–3 days previously.

Example of benefit:	A manufacturer reported that before the simplification of border controls, EURO 1 certificates had to be completed for vehicle type approval. This was relatively easy to forget or to do incorrectly, and the cost of delays reportedly could add up to a significant proportion of the cost of a product.

4.5.2. Road haulage services

Directive 89/438/EEC removes the restrictions which permitted only national carriers to transport goods within a particular Member State. As a consequence, a haulier from one country is now better able to seek return loads when delivering to another in the EU. The obvious external benefits to the environment and traffic density are not examined in this study as they benefit everyone in the EU. The advantage to the industry is lower costs of delivery.

Industry comment: it would appear that it is the larger players who would gain from this Directive as they are more active in selling across all EU markets, e.g. to centres for stockholding of spare parts.

4.5.3. Free movement of workers/professionals in the Community

Free movement of labour is one of the fundamental principles of the Treaty of Rome. Mutual recognition of qualifications should mean that nationals of one Member State are free to take up employment in another Member State.

Industry comment: there is little evidence of a freer labour market operating in the construction site equipment sector. There remain the natural barriers of language and culture. More importantly, however, is the non-recognition of qualifications across national frontiers. From an individual company's viewpoint, it may not want its labour force to be mobile, otherwise the threat of losing skilled workers will emerge. On the other hand, freedom to move workers within the company to different sites in the EU has never been a serious issue for construction site equipment manufacturers.

The Proposed Directive on the Posting of Workers (93/C187/07) (which requires temporary workers to be paid according to the labour agreements and social security arrangements of the host country, not the home country of their employer) will raise, when it is enacted, implications as to the way companies use 'guest' workers, especially in Germany, and as to how companies will operate their servicing and repair and/or plant hire and contract operations. This is more a question for contractors who are becoming increasingly European in their activities rather than for makers of construction site equipment. It will also impede the development of international plant hire business for specialist equipment or specialist services such as tunnelling, where skilled operators need to travel with their equipment.

4.5.4. Capital movement and economic policy

Directive 88/361/EEC provides for the complete liberalization of all forms of capital movement within the European Union. The liberalization of capital movement corresponds with the implementation of the first stage of Monetary Union.

Industry comment: from the responses to date, this Directive has facilitated intra-EU trade and encouraged a wider choice of financial services.

Example of benefit:	A Spanish manufacturer of dumper and fork-lift trucks has received funding from a British venture capital company, which now holds a 7% equity stake in the company.

Manufacturers complain, though, that the instability of exchange rates is a major problem in selling and in taking loans across frontiers.

In the interviews with the global manufacturers we tried to ascertain if location policies have been revised as a result of this initiative. The results were inconclusive. Companies' responses indicate that it has not had a significant impact on location strategy, but there is evidence that it played a role in the decision-making process.

4.5.5. Intellectual and industrial property

Harmonization on intellectual and industrial property is intended to improve the competitiveness of firms and promote research and innovation.

There are a number of issues arising here, namely:

(a) the influence on investment in innovation (e.g. robotics);
(b) plagiarism of designs (particularly by non-EU producers with easy access to EU markets);

(c) counterfeit spares and parts (particularly from non-EU producers with easy access to EU markets).

Industry comment: there has been some evidence of plagiarism of designs and counterfeit spares/parts. The study set out to evaluate its importance and the extent to which Community-wide protection of patents is being enforced or is in fact enforceable. This topic was explored in the face-to-face interviews. None of the manufacturers perceived this to be a real issue, although some confirmed that such practice takes place.

4.5.6. Taxation

Directives have been adopted to enable the European Union firms to benefit from the single market without being penalized through double taxation of cross-border operations. One Directive is concerned with common arrangements applicable to parent companies and subsidiaries of different Member States, and seeks to eliminate the double taxation of dividends distributed by subsidiaries to their parent company in another Member State. Another deals with common tax arrangements applicable to mergers, divisions, transfers of assets and exchanges of shares between companies in different Member States.

VAT rates, however, have not been harmonized to date across the Member States but sales between Members States are not subject to VAT. The arrangement retains the principle of taxation in the Member State of consumption and partly harmonizes Member States' VAT rates. This transitional VAT arrangement came into effect on 1 January 1993. A second stage is to be introduced on 1 January 1997. As from that date supply of goods will be taxed in the country of origin and a uniform basis of assessment will be applied.

Industry comment: the transitional arrangements are seen to distort competition and favour exporters, particularly in border areas.

Example of competitor disadvantage:	A Belgian distributor pointed out that he has to compete with Dutch distributors in the Belgian home market. The Belgian has to charge VAT on the machine, the rate being substantially higher (20.5%), while the Dutch charge without VAT. In itself, there is no price difference as the buyer in nearly all circumstances is able to reclaim the VAT. However, there is a working capital cost to the Belgian client as there are timelags (of four months) between paying the VAT and receiving the credit. Of course, the Belgian distributor would have this as an advantage over his Dutch counterparts when selling in the Netherlands.

4.5.7. Competition policy

The Community has adopted a pragmatic approach towards controlling dominant market positions and other distortions of competition resulting from factors such as the completion of the single market, the globalization of markets, current economic difficulties and rapid technological change. Dismantling of monopolies and monitoring of state aids fall into this area.

Industry comment: the construction site equipment industry is oligopolistic in many product areas. This may influence manufacturer strategy with respect to acquisitions and joint ventures.

Example of concern:	A major manufacturer is keen to expand in the EU through joint ventures but is adopting a conservative approach (e.g. taking minority stakes) so as not to encourage an investigation into monopoly behaviour.

One potential restrictive trade practice is the block exemption on exclusive dealerships. This practice, common to the automotive industry, occurs when manufacturers give their dealers exclusive selling areas, creating the possibility of different prices in different regional markets. Research indicates that the majority of dealers of construction equipment are independent and are not tied to geographical areas. In fact some do participate in cross-border trade, although this brings into question the distortion to the market by VAT policy (see section on taxation above).

Spanish manufacturers have benefited from grants to help with export promotion (e.g. attendance at trade fairs). It would appear that these have now been withdrawn.

4.5.8. Public procurement

Public bodies in the Member States have historically given preference to goods and services supplied by domestic companies. The series of Public Procurement Directives now make discrimination and the use of national standards illegal, and require publication, open tendering and reporting of contract awards.

Industry comment: this is of little relevance to the construction machinery sector because sales to the public sector appear to be insignificant. One of the leading manufacturers reportedly sells less than 1% to military clients and nothing to local authorities. There are some sales to local authority in-house road units which fall below the public purchasing thresholds but these are small. There are also sales to the military sector. These would probably be claimed to be exempt from the Public Procurement Directives: they could be classified under the public purchasing régime as 'dual-use' goods, having both a 'war-like' and a civilian use. The research has not indicated any benefit to the industry from public procurement legislation.

4.6. Conclusions from the survey with regard to all horizontal measures

Table 4.7 shows the responses from the survey with regard to respondents' perceptions of the effectiveness of the horizontal measures. More detail of the consequences of these measures can be found in Chapter 5 of this report which deals with the impact of the single market on sectoral performance.

It can be seen that the areas of horizontal legislation which the highest number of respondents consider to have had a positive impact are: 'elimination of delays at border-crossing points' and 'measures to remove barriers to cross-border transactions in terms of sales, purchases and distribution', followed by 'changes in administrative formalities'.

The area which the lowest number of respondents felt had had a positive impact was that of 'action to promote fair competition in tender procedures for public authority contracts', presumably because the public sector was not a major purchaser of their equipment.

Table 4.9 shows the same results broken down by size of company. Small companies tended to be more critical of SM measures: fewer small firms see a positive impact and more see a negative impact. The ranking of horizontal measures is shown in Table 4.8 (in order of most important), in order of the number of companies assessing it as having a positive effect.

Table 4.7. 'Have the following measures had a positive/negative/no impact on your firm?' (% of respondents)

Type of horizontal measure	Positive impact	No impact	Negative impact	Do not know	No response
Measures to remove barriers to cross-border transactions in terms of sales, purchases and distribution	57	28	7	1	7
Measures to provide for EU-wide acceptance of conformity assessment results (testing and certification) obtained in country of origin	49	26	11	4	9
Moves to provide for single registration and EU-wide protection of industrial property rights (patents, trade marks, and (in future) utility models and designs)	32	48	4	8	8
Action to promote fair competition in tender procedures for contracts awarded by public authorities in other Member States	18	47	15	12	8
Elimination of delays at border-crossing points with EU	61	26	4	4	5
Liberalization of competition in provision of road haulage services	38	36	7	5	14
Changes in administrative formalities (customs documentation and VAT arrangements) for cross-border shipment of output	57	19	14	4	6
Elimination of restrictions on transfers of capital	41	35	4	11	8
Moves to avoid double taxation of earnings or income repatriated by subsidiary in another Member State	23	43	7	22	5

Base: all, n = 74; numbers may not add up due to rounding.
Source: WS Atkins.

Table 4.8. Ranking of the impact of horizontal measures

Ranking of horizontal measure	Percentage of firms who think it has a positive impact	Percentage of firms who think it has no impact
1. Elimination of delays at border-crossing points	61	26
2. Measures to remove barriers to cross-border transactions	57	28
3. Changes in administrative formalities	57	19
4. EU-wide acceptance of conformity testing	49	26
5. Elimination of restrictions on transfers of capital	41	35
6. Liberalization of competition in road haulage	38	36
7. Single registration and EU-wide protection of industrial property rights	32	48
8. Moves to avoid double taxation	23	43
9. Fair competition in public authority contracts	18	47

Source: WS Atkins.

Table 4.9. 'Have the following single market measures had a positive/negative/no impact on your firm?' (by size of company)

(%)

Type of horizontal measure	Small companies					Large companies				
	Positive impact	No impact	Negative impact	Do not know	No response	Positive impact	No impact	Negative impact	Do not know	No response
Measures to remove barriers to cross-border transactions in terms of sales, purchases and distribution	58	26	8	3	5	58	34	7	-	-
Measures to provide for EU-wide acceptance of conformity assessment results (testing and certification) obtained in country of origin	42	26	13	8	11	62	28	10	-	-
Moves to provide for single registration and EU-wide protection of industrial property rights (patents, trade marks, and (in future) utility models and designs)	37	53	3	7	-	31	45	7	7	10
Action to promote fair competition in tender procedures for contracts awarded by public authorities in other Member States	18	39	21	21	1	17	62	10	3	8
Elimination of delays at border-crossing points with EU	58	13	8	8	13	69	31	-	-	-
Liberalization of competition in provision of road haulage services	31	37	11	8	13	48	41	3	3	5
Changes in administrative formalities (customs documentation and VAT arrangements) for cross-border shipment of output	47	24	18	8	3	72	17	10	-	1
Elimination of restrictions on transfers of capital	39	34	5	18	4	48	38	3	7	4
Moves to avoid double taxation of earnings or income repatriated by subsidiary in another Member State	13	53	5	29	-	38	41	3	17	1

Base: all, n = 74, 35 small companies, 29 large companies. Totals do not add up to 100% because non-responses are not shown.
Source: WS Atkins.

Tables 4.10 and 4.11 show the importance which distributors and users accord to the various single market measures.

Table 4.10. 'What has been the impact of the following measures on your business?' (responses of distributors)

Measures	Positive impact	Negative impact	Insignificant impact
Easing of border controls between EU countries	7	0	6
Movement of capital between EU countries	3	0	10
Movement of people between EU countries	3	1	9
Removal of technical trade barriers	6	0	7
Introduction of the CE marking	8	0	5

Base: all, n = 15 (2 respondents failed to answer this question).
Source: WS Atkins.

Table 4.11. 'What has been the impact of the following measures on your business?' (responses of users)

	Positive impact	Negative impact	Insignificant impact
Easing of border controls between EU countries	11	2	6
Movement of capital between EU countries	3	1	16
Movement of people between EU countries	9	2	9
Removal of technical trade barriers	12	1	7
Introduction of the CE marking	7	4	5

Base: all, n = 25.
Source: WS Atkins.

Removal of technical barriers and easing of border controls were considered by the highest number of users to have had a positive impact, whereas most distributors considered the introduction of the CE marking to have had a positive impact in addition to the above two measures. The majority of users and distributors felt capital movement had had an insignificant impact.

4.7. Remaining legal or administrative obstacles and/or shortcomings

This section lists some of the remaining obstacles to free trade mentioned by interviewees.

4.7.1. Delays in implementation and transposition of Community legislation

There were no specific comments from interviewees about problems caused by delays in implementation of any of the measures. Rather, the industry is finding it hard to assimilate and adapt to the new Directives. Implicit in many comments, however, is the fact that the harmonized standards, which undoubtedly facilitate attestation of conformity with the Machinery and EMC Directives (although they are not in fact indispensable for it), will in many cases not be available until the end of the century or later.

4.7.2. National quality marks

The most frequently quoted 'barrier to trade' by interviewees was customer demand for local certification, in addition to the CE marking: in particular the GS mark in Germany. This is only a legal requirement in Germany on machinery outside the terms of reference (namely, machinery which cannot be self-certified). The GS mark does not therefore constitute a technical barrier in the true sense, but it is a commercial requirement which is sufficiently widespread to become a *de facto* barrier.

During our face-to-face research, there were numerous cases of non-German manufacturers stating 'the GS mark is obligatory for the German market'. Whilst this is a misperception, the importance of the GS mark is nevertheless real. German clients often insist on it, as more importance is placed on the supervision of the work environment. No other national marks were specifically cited although British clients often require ISO9000.

Only the CE marking is mandatory (the GS mark attests to similar criteria as the essential safety requirements of the Directives, but is evidence of third-party testing by a TUV or other testing laboratory, including non-German laboratories), but the market demand for third-party testing remains. This is exacerbated by the fact that the testing organizations, keen to ensure their continued business now that they have lost the captive market of compulsory third-party testing, are reported to be urging customers to continue requesting third-party testing as a purchasing criteria.

Example of misperception:	One manufacturer reported: 'To sell into Germany we have to meet the national safety regulations which the Germans believe to be more stringent than EU requirements. We need TUV testing in order to prove conformity.' Another manufacturer reported: 'To sell into Germany it is a legal requirement to have products which meet DIN standards. This means that the single market measures have brought no benefits of standardization. Other markets will not buy the German specification because it is too expensive.'
Example of perceived barrier:	One manufacturer reported: 'Previously, cranes sold to the Netherlands required certification by the national testing laboratory Aboma. Although this is no longer a legal requirement, Aboma is saying to Dutch customers "You've been used to buying equipment with our approval. Now the CE marking is based on German standards which are not as stringent as the Dutch standards. Surely you want to maintain our standards. You should still be testing".' This manufacturer felt that nothing had changed effectively.

There are reported to be advantages of lower insurance premiums for users who have machinery certified to national standards. There is also the question of a lack of confidence on the part of the users. During research several interviewees alleged that some companies apply the CE marking to their equipment without it complying with the Directive, so users appear to be protecting themselves against fraudulent CE marking by continuing to require (national) quality marks.

Some users simply appear to be unaware of the significance of the CE marking and continue to protect themselves with national certification.

In some cases, if they think clients demand it, exporters can obtain certification to foreign marks in their own country. ATISAE (Entidad de inspección y control reglamentario) (Inspection and regulatory control entity) in Spain, for example, is approved to provide both the Association des propriétaires d'appareils à vapeur et électriques (APAVE) (Association of owners of steam and electrical equipment) and GS certification. One Spanish manufacturer has decided to certify all his products to the GS mark believing that this will give him a 'quality' edge in both EU and international markets.

4.7.3. Delays in understanding and applying the Directives

Several interviewees stated that they believe it will take manufacturers and users several years to understand fully what is needed to comply with the Directives. The training of design engineers to become familiar with the Machinery Directive, the standards, the modification of the equipment and related literature represent substantial investments. Several interviewees stated that they believe it is only the largest players in the industry which have the wherewithal to meet all EC legislation. The Directives have created the need for companies to manage large quantities of documentation, in particular for the CE marking, which is particularly difficult for SMEs. On this subject, it should be noted, however, that the Directive does not oblige the manufacturer to keep the technical file permanently assembled; rather, it must be possible to put it together in a suitably short time if required by the inspection authorities. Equally, it should be recalled that a number of companies considered that the obligation to draw up a technical file had improved business practices in the sector (see Section 4.3).

4.7.4. Road regulations

Little has been done to harmonize requirements for the use of off-highway vehicles on public roads. The unique requirements of each Member State for maximum permissible speeds, lighting, steering and braking, represent real barriers to trade and have cost implications for manufacturers. Work on harmonization of these regulations is extremely slow. Member States appear to be reluctant to change and there is no schedule for completion.

Examples of barriers:	'In Italy, a vehicle needs a special licence to travel on the roads if it is more than 2.5 m wide. In virtually all other countries it is 3 m. If a manufacturer has a vehicle which is 2.6 m wide this creates a problem for selling into the Italian market.'
	'Wheel hydraulic excavators in Germany must have a maximum speed limit of 20 km per hour whilst other countries have a maximum limit of 35 km per hour. Mechanically they have to limit the speed. Manufacturers still need to make two models because of this.'
	'TUV in Germany still asks for extra equipment on machines, a different distance between bulbs or a different lining system on the machine.'

Examples of barriers:	'Differences exist in axle loadings throughout Europe, which prevent economies of standardization. For example, in France this is 13 tonnes on 2 axles, more in Italy, and 12 tonnes on a single axle in Germany.' 'In Italy, for on-road homologation skid steer loaders are required to have a brake light. This is the only country in Europe where this is required. The skid steer loader is hydrostatic and does not have a mechanical stop brake. Whilst not impossible, this is not easy to fit from a technical point of view.' 'In Germany, backhoe loaders are restricted to 20 km/hr for on-road use. This is the only country requiring this and products destined for the German market need to be adapted.'

4.7.5. Noise regulations

There is some confusion over the harmonization of national legislation on the control of noise emitted from construction equipment.

Example of barrier:	'Limits are given in the [Noise] Directive but some countries still have tighter limits, e.g. the Netherlands. For selling equipment into the Dutch market these tighter limits need to be met.' We have not been able to verify this.

4.7.6. Other national health and safety requirements

Whilst manufacturers admit that the Machinery Directive has afforded them economies of standardization in the area of safety, there still appear to be important differences between Member States concerning use of machinery in the workplace. In some cases these differences may arise because harmonized standards have not yet been adopted, so manufacturers, testing and certification bodies and inspection bodies still refer to national standards. It should be recalled that legally, once compliance with the essential requirements of the Machinery Directive has been established, according to that Directive there is no requirement to apply national standards. A product which complies with the Directive cannot be lawfully withdrawn from the market simply because it does not follow national product standards.

In other cases, differing enforcement or interpretation of the Use of Work Equipment Directive may occur. This Directive only sets minimum common standards, rather than introducing the same absolute level of protection throughout the EU.

The following are examples quoted by interviewees. We have not been able to verify these statements, but they appear to contain misunderstandings. It was not usually clear whether interviewees believed these requirements were regulations, standards, *ad hoc* criteria applied by health and safety inspectors, or user specifications.

Examples of national differences:	It was reported that in France the safety factor applied to lifting cables for cranes is 6. This compares with only 4.5 in other countries. A user in France will not accept cranes fitted with cables whose rated loads are higher than one sixth of their theoretical maximum breaking load. It was reported that Italian authorities are still demanding specific changes to meet their national safety standards. They request, for example, a cut-out device on the door of electrical equipment which would automatically cut out any electrical power when the door is opened (note: the MD has provisions about stopping devices). For the Italian market for loaders, grid and safety gear are required for on-road transportation. This is reported to be compulsory and expensive. An interviewee stated that every crane has a safe working load which is calculated as a percentage of its maximum working capacity (the point at which it breaks or tips). The Machinery Directive stipulates 75%. This is close to DIN and BSI. However, other states are reported not to accept this. The load factors differ between states as follows: Switzerland/Spain 85% France 75% Germany 75% Belgium 71% UK 71% Netherlands 67%. One manufacturer reported that cranes are delivered to Spain which comply with the Machinery Directive. The customer then adapts the crane to the national standard of 85% in order to be able to lift heavy loads and increase productivity.

Note: the figure of 75% safe working load does not appear in the Machinery Directive. It suggests 'as a general rule' a test coefficient of 1.25 (i.e. safe working load 80% of the test value), and there is a reference guide suggesting other values.

Examples of national differences:	It was reported that in France, equipment cannot be used on certain construction sites if it does not have a hose-burst check valve (if a hose bursts everything stays where it is: this is standard on large equipment but not on smaller machines). This applies in particular to sites managed by the municipalities. The Machinery Directive is vague and stipulates that these valves are not needed for lifting less than 1 tonne (tests must be carried out 'in least stable position' - but what is that? It should be specified more tightly). (Note: we do not find any reference to this in the Directive.) Some manufacturers advise users to fit a check valve if the equipment will be lifting more than 1 tonne, leaving it to the user to decide. Other manufacturers fit the valve themselves. It was reported that one French *département* will not accept the essential safety requirements of the Machinery Directive, claiming that the previous national standards were superior. They are currently complaining to Brussels that the Machinery Directive should be tightened.

4.7.7. Exchange rate uncertainty

The currency structure within Europe was quoted as being a problem by the many face-to-face interviewees, particularly by German manufacturers. There are two aspects to this:

(a) The cost of exchange management. The management of exchange risk is time consuming and can have a big impact on the profits of small companies. There are financial charges associated with each transaction which are also significant.

(b) Disruptive competition effects of devaluation. The Italian lira has been devalued several times and French and German manufacturers stated that it is impossible to compete with the Italians on price. This issue is dealt with in more detail in Section 5.8.

5. The impact of the single market on sectoral performance

This chapter reports the results of both the questionnaire survey and other evidence collected to test a series of hypotheses about the impact of the SMP on the performance of the sector. Each subsection states the hypothesis, reviews the evidence and summarizes the survey results.

5.1. Changes in market access resulting from the single market programme

5.1.1. Original assumptions

Hypothesis: **The single market programme has created a freer and more open market for construction site equipment.**

Likely importance: High.

Basis of hypothesis:

(a) discussions with CECE and national associations;
(b) indications of increased levels of intra-EU trade.

Proof of causality:

We looked for evidence of:

(a) increased intra-EU trade and imports over the period of implementation of the SMP (1988 onwards) (unfortunately data are not available from 1992 onwards);
(b) evidence of product acceptance across all EU national markets as a result of technical harmonization.

5.1.2. Analysis of evidence

Trade statistics

Evidence of a freer market would be provided by an increasing share of the intra-EU trade in total demand (i.e. apparent consumption: production imports-exports) and/or by increased imports in total demand.

Statistical evidence is limited by the reliability of the statistical information. EU production data for the entire sector does not exist so it is not possible to calculate apparent consumption. Trade information for the sector relating to imports and exports is provided by Eurostat but industry sources questioned the validity of these data. We compared Eurostat data for imports into France with comparable data collected by the French construction site equipment trade association (MTPS). This showed virtually no correlation between the two series over the period 1980 to 1987, but a high correlation between 1988 and 1992. We concluded that Eurostat data are probably reliable since 1988.

Unfortunately it is not possible to make a direct analysis of the share of intra-EU trade or imports in apparent consumption, because production data do not exist at an appropriate level of detail in Eurostat statistics. We can, however, compare trends in demand and trade.

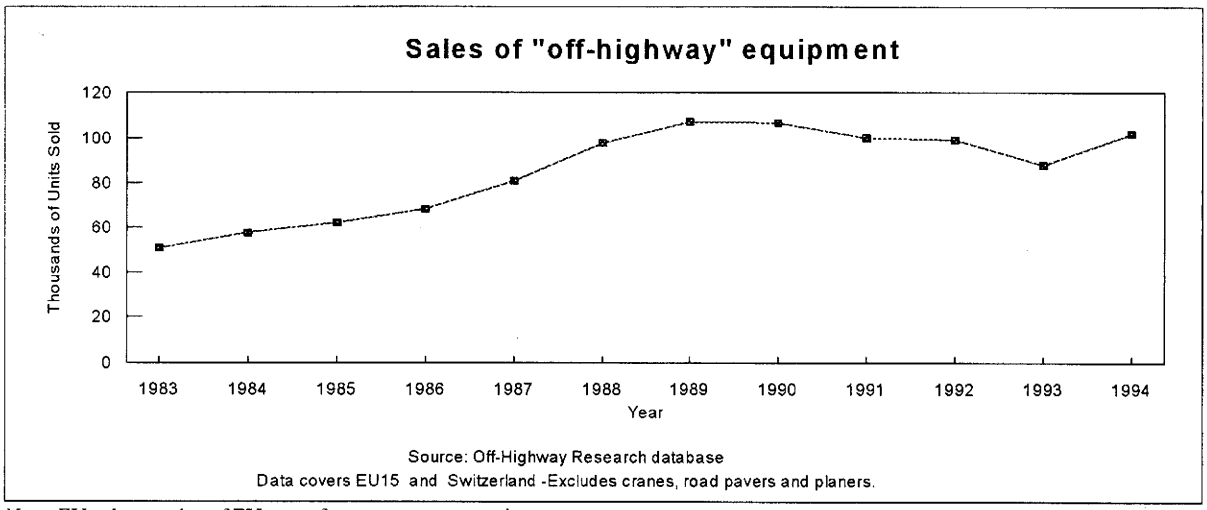
Figure 3.2 in Chapter 3 indicates that intra-EU trade in 'construction site machinery' varied very little over the whole period from 1978 (but it is not clear what happened across the discontinuity in data in 1988). Intra-EU trade seemed to follow construction output, rising from 1983 to 1989, then falling. Total production of equipment, however, was rising throughout the period (Figure 3.1) except for a fall in 1991, and so demand must have been rising also because net exports were declining. Figure 5.1, which only shows off-highway equipment (i.e. excluding cranes and road-making machinery) and is from industry sources, also indicates a rising demand up to 1988, and then a decline in 1993, which recovered in 1994. The data do not warrant accurate analysis, but, from these considerations, it appears that the share of intra-EU trade in EU demand was declining before 1989, but was approximately constant thereafter. The decline in intra-EU trade before 1989 could be explained because in a growing market (due to increasing mechanization of construction) the expansion of production to meet national markets by import substitution was viable and national producers expanded their product ranges. After 1989 a static market (increased mechanization being offset by declining construction output) reversed this trend, possibly also because of some rationalization of product ranges leading to increased intra-EU trade. We could conclude that the single market has had some impact in halting the previously declining share of intra-EU trade, but the evidence does not support the hypothesis of an increasingly open market in terms of the share of intra-EU trade.

A similar picture arises by looking at imports from outside the EU. These have been fairly constant over a long period (except again that we do not know precisely what happened across the break in statistical series in 1988). Their share of demand therefore declined during the period up to 1989, and has since been roughly constant. The explanation for this is probably that there was increasing import-substituting production in the 1980s, both from existing national producers and from inward investment by US and Japanese firms (because the market was relatively difficult for imports). This import substitution has now reduced, partly because the market has been static for several years and also because the market is more open.

A further indicator as to whether the market has become more open is given by the intra-EU trade, deflated by EU GDP. This shows a rising trend (see Figure 5.2), which shows that although the intra-EU trade may not have increased its share of construction site equipment demand, it did grow faster than GDP.

It is also indicated that intra-EU trade grew faster than extra-EU exports. This might be taken as a sign of decreasing EU competitiveness, but it shows that the manufacturers were reorienting their exports from third-country markets to other EU countries, a sign of the increasing openness of the EU market (see Figure 5.3).

Figure 5.1. European sales of 'off-highway' equipment



Note: EU sales = sales of EU manufacturers - exports + imports.

Figure 5.2. Ratio of intra-EU exports/GDP EU-12

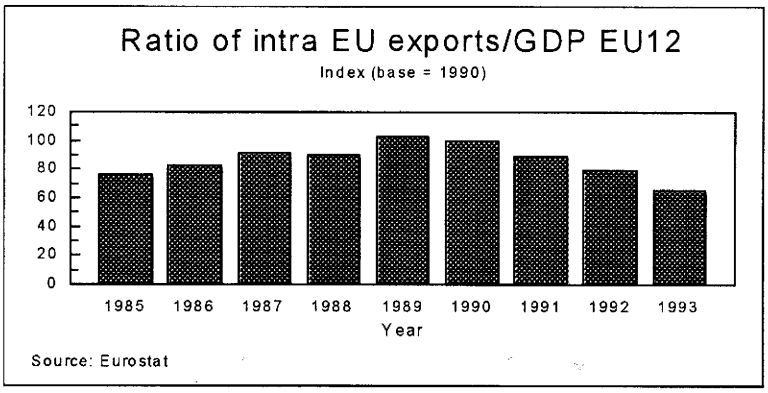
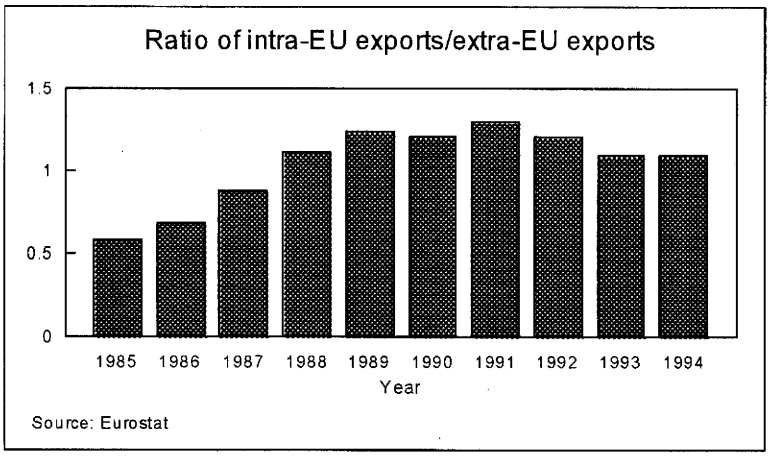


Figure 5.3. Ratio of intra-EU exports/extra-EU exports



Enterprise marketing activity

Evidence from our survey of EU manufacturers strongly supports the view that intra-EU trade has become more important. We asked companies: 'How many other EU markets did you sell into in 1988 and how many do you sell into now?' Of the 24 companies which responded to this question, the results were as follows:

(a) 75% of companies are selling into more other EU markets than previously;
(b) 17% are selling to fewer other EU markets;
(c) 8% are selling to the same number of other EU markets.

Mutual recognition of testing and certification

In order to establish if the principle of mutual recognition and its aim of improving market access is functioning in the marketplace, we asked manufacturers: 'Do customers in other EU markets still specify certain national standards or local product testing?' The responses were as follows:

(a) Yes: 62%
(b) No: 27%
(c) No response: 11%.

It is perhaps disappointing that such a high number, 62%, stated that customers in other markets were continuing to specify national standards or testing. However, this was confirmed by our distributor survey where a similar proportion of distributors believed that customers are continuing to specify certain local standards and product testing.

The following table shows a breakdown of these responses by size of company:

Table 5.1. 'Do customers in other EU markets still specify certain national standards or local product testing?'

(% of all respondents)

	Small companies	Large companies
Yes	71	66
No	29	34
Total	100	100

Base: all, n = 74.
Source: WS Atkins.

It can be seen that slightly more small companies responding to this question are finding customers requesting national standards and/or certification. This would suggest that customers have a higher level of trust in larger companies supplying them from other EU countries and are less likely to request their own national standards and testing.

It is interesting to look at the breakdown of these responses by country, as shown in Table 5.2. Germany is the only country where the majority of respondents (60%) have stated that their customers in other EU countries do not request national standards and testing. This is backed

up by the face-to-face discussions in which German companies claimed that their products have always been widely accepted in other EU countries. This suggests that other EU countries have a high level of confidence in German certification results.

Table 5.2 Perceptions of other countries' use of national standards/testing (by country of origin of respondent)

(number of replies)

Country	Yes	No
Germany	8	12
France	14	1
UK	12	1
Italy	7	2
Belgium	1	
Spain		2
Portugal	1	
Denmark	1	
Finland	1	1
Netherlands	1	

Base: all, n=74.
Source: WS Atkins.

Example of German company:	'We have never had to make different models for different markets. Products are manufactured to DIN standards, which have always been widely considered as the highest standards in Europe by most other European countries. Customers in other countries always accepted our products without any need for anything other than minor changes. There was never a need for additional testing in other countries. Our products all carried the GS mark, three quarters of our products carried the blue angel mark, and today all products carry the CE marking of course.'

We then asked all the companies who had stated that customers did continue to request specific national standards: 'If yes, does this mean you have to adapt your products?' Of the 46 companies, almost all (44) claimed that this resulted in them having to change their products.

Respondents were also asked: 'Does the customer accept test and certification procedures carried out in your country?' Forty-six companies replied that customers in other EU countries do accept these, compared with 20 who said that this was not the case. This is undoubtedly a significant improvement on the situation that would have existed before the Machinery Directive came into force. Moreover, companies have reported that the CE marking has provided greater market assess for their products.

Example of benefit to Spanish companies:	'The CE marking has been very beneficial to us in trying to sell products in other EU countries, particularly Germany.' 'Some German customers have now accepted the Spanish technical standards together with the CE marking as being adequate.'

Example of benefit:	'Scandinavian countries have quickly adopted EC Directives, which has eased market access.'

Reduction in production ranges

One expectation of the removal of technical barriers and the principle of mutual recognition might be that manufacturers are now able to manufacture one basic model rather than needing to make several versions for different markets. In theory, this single product should be accepted in all EU Member States and should facilitate market access.

In reality, the single market measures appear to have gone some way towards achieving a reduction in the number of models required for the European market, but they have not been entirely successful. In the survey we asked: 'How many different models do you make in order to be able to sell into all EU markets?'

The results of the postal survey were disappointing since virtually all respondents failed to reply to this question. This subject was explored during the face-to-face interviews, and of the companies who were able to comment on this (15 out of 30), slightly less than half stated that they made the same number of versions of each model as they used to, compared with only one company which claimed to be making less versions than previously.

On the surface this may seem to be a disappointing result. When examined in greater depth, however, it can be seen that benefits of standardization have been achieved. The proportion of product content which previously differed in order to meet the requirements of each market has decreased significantly.

Example of benefit:	'It is not yet the case that one standard model can be sold without difficulty in any European country. In order to satisfy the different transport regulations it is necessary to make six different versions of each model. Italy, the UK, Germany and Austria all have different road regulations. Whilst we still need to supply certain markets with equipment which meets the specific requirements of that market, previously 20% of the equipment needed modification - today it is only 5%.'

The above comment, made by one manufacturer, was echoed in other face-to-face interviews.

Prior to the creation of the single market, machine specifications differed from country to country. This resulted in:

(a) a different machine for most EU markets;
(b) high levels of stocks of finished products;
(c) large component inventory;
(d) high costs associated with adapting equipment;
(e) differing pricing strategies.

To varying degrees the single market has brought the following benefits:

(a) reduction of the number of models required;
(b) reduction of stocks of finished products;
(c) reduction of component stock;
(d) simplification of production planning;
(e) shorter lead times.

Example of savings:	'In 1990, we held stocks of 500 finished products in order to meet demand in different EU markets. Today we have been able to reduce stock levels to 130 units.'

From the point of view of safety and noise standards, manufacturers have been able to incorporate almost identical technology in all models.

Example of benefit:	'Prior to the Noise Directive, we had to produce machines individually tailored to the needs of each market. To sell between countries we had to adapt products and dealers, and production sites had to have at their disposal equipment which would enable them to make the necessary product changes. This is no longer necessary.'

It is predominantly due to the lack of harmonization in the area of road regulations that different product specifications are required. This is clearly demonstrated by the following examples.

Example of benefit:	'In 1988 we made five specifications for EU markets (Italian, German, Swedish, French, rest of EU). Today we make only three specifications (Italian, German and rest of EU). The different variants are necessary almost exclusively because of the on-road regulations in each country.'

Example of benefit:	'In 1988 we faced great difficulties since a high proportion of our stock had to be reworked to meet the individual requirements of various markets. In 1980, we produced six versions of any one model, in 1990 three versions and today one basic model.'

Where cranes are concerned, the market appears to be slightly different. One manufacturer reported that in the absence of performance standards, the market ends up with the 'Liebherr standard' or the 'Grove standard'.

Example of policy:	'We select the most stringent of each country's national requirements in order to produce a design which will be accepted throughout the EU. We are still doing this today for commercial reasons. In some areas we could simply choose to fulfil the requirements of the Machinery Directive but we choose the worst case scenario in order to ensure acceptance by customers.' 'However, the CE marking has enabled us to raise the standard product content to a higher level; for example, whereas only 50% of our product was previously accepted widely throughout the EU, now it is 75%, leaving us with less modifications to our product base.'

In our survey of manufacturers we asked: 'Are product requirements between Member States converging?'

Several manufacturers stated that maximum standardization from the legal point of view has now been reached and that remaining differences will be in terms of differing customer requirements. These differences will remain, for three main reasons:

(a) Equipment requirements depend on the terrain on which the equipment is to be used, and considerable differences exist, therefore, between the type of equipment sold to northern and southern Europe.
(b) In general, customers in Spain, Portugal and the UK want simpler machines. Scandinavia, Austria, Germany and France, on the other hand, want a higher level of technology, and manufacturers state that these countries continue to be willing to pay a premium for this.
(c) Certain products are more popular in some markets than others because of customary differences in equipment use. For example: backhoe loaders are not popular in Germany, but very popular in the UK, France and Italy; wheeled excavators are very popular in Germany (80% of total demand), but not as popular in Italy or the UK; and wheel loaders are very popular in Germany, particularly the smaller models.

5.1.3. Conclusion

The single market has contributed to creating a freer market and manufacturers have benefited from an increased level of standardization in areas such as noise and safety. This has enabled them to reduce the number of basic models that need to be manufactured for different markets. However, a lack of technical standards, a lack of harmonization in the area of road regulations, and the continuing requirement on the part of customers for third-party testing (see Section 3.3 on remaining obstacles) are preventing the single market from reaching its full potential.

The statistical evidence points to a trend of greater trade in EU markets. The experience of users and manufacturers suggests that this has been only partially due to single market

measures. Other factors such as economic recession and relative exchange rate movements have also played their part.

In the light of the research carried out, the importance of the single market on market access is considered to be high, because, without it, the differences in national regulation and preference would have continued to diverge.

5.2. Direct short-term impact on production costs

5.2.1. Original assumptions

There are frequent anecdotal claims that the industry's costs have increased and competitiveness has declined, and this is often attributed to the technical requirements of Directives. It is more likely, however, that other factors have been the cause of cost increases, if they have occurred.

Hypothesis: **The existence of recession has created overcapacity in the industry and has therefore placed upward pressure on production costs.**

Likely importance: Low.

Basis of hypothesis: Evidence of economic recession in most EU countries and downturn in the EU construction industry during the early 1990s.

Proof of causality: Survey enquiry on the causes of increased costs.

5.2.2. Analysis of evidence

Pre-production costs

In the face-to-face interviews, we asked manufacturers whether, in real terms, their pre-production costs had increased, decreased or remained the same. Of the interviewees able to respond to this question, two thirds of the companies stated that their pre-production costs had increased. None of the companies reported a decrease in pre-production costs.

Interviewees were asked subsequently to place a rating of 'important', 'fairly important' or 'not important at all' against the following possible reasons for changes in pre-production costs:

(a) EC regulations on you as a manufacturer;
(b) EC regulations on your customers;
(c) other reasons.

Table 5.3 shows interviewees' responses.

Table 5.3. Perceptions of influences on changes in pre-production costs

(% of interviewees)

	Important	Fairly important	Not important at all	No response
EC regulations on you	13	33	43	11
EC regulations on your customers	10	13	67	10
Other	37	7	33	23

Base: all, n = 30 (face-to-face interviews only).
Source: WS Atkins.

It can be seen that almost half of the interviewees who responded to this question (46%) considered EC regulations affecting manufacturers to have had an important or fairly important influence on their pre-production costs, compared with around a quarter (23%) who considered that EC regulations on their customers had had an important or fairly important impact on their pre-production costs. The highest number of respondents considered other factors to have had the most important impact on their pre-production costs. These results are surprising since all interviewees were keen to stress the increased cost implications of the technical Directives.

Other reasons quoted for increased pre-production costs were:

(a) improved quality expected by customers;
(b) new product development in order to remain competitive;
(c) company strategy to become a technology leader.

It should be recognized that increased pre-production costs are frequently due to increased effort in design, specification and manufacturing planning. In most cases these increased pre-production costs are more than outweighed by a reduction in unit costs as manufacturers reap the benefits of a simplified model range and fewer production problems.

A comparison of the responses in Table 5.3 with the responses in Table 4.4 show that a far greater proportion of respondents stated that in overall terms EC Directives were considered to have contributed to increased product costs. However, when questioned in more detail about specific costs, the majority of interviewees considered other factors to have played a more important role in increased costs. This may highlight an inconsistency in the way in which respondents have answered questions. It may be, however, that product costs have increased because of having to meet higher standards, but production and pre-production costs are less affected.

During the face-to-face interviews the majority of interviewees stated that in general terms the Directives had resulted in increased costs to their business, in spite of the fact that many also claimed that they had not had to adapt their products or that specific cost increases were more likely to be due to non-SMP factors. It must be remembered that the introduction of these Directives coincided with a time of recession in the EU industry and, therefore, the cost impact of familiarization and compliance is likely to have been felt more by manufacturers than it would have been in a period of market growth.

Production costs

Interviewees were also asked to state whether, in real terms, their production costs had increased, decreased or stayed the same. Of the companies which responded to this question, the results are as follows:

Increased	50%
Decreased	27%
Remained the same	20%
Do not know	3%.

Again interviewees were asked to place a rating of 'important', 'fairly important' or 'not important at all' against the possible reasons for changes in production costs. The results are shown in Table 5.4.

Table 5.4. Perceptions of influences on changes in production costs

(% of interviewees)

	Important	Fairly important	Not important at all	No response
EC regulations on you	13	13	57	17
EC regulations on your customers	13	7	63	17
EC regulations on your suppliers	7	6	70	17
Other	47	-	-	53

Base: all, n = 30.
Source: WS Atkins.

Only 26% of companies felt that EC regulations on manufacturers had had an impact on production costs, which is a substantially lower proportion of interviewees than the 46% of companies considering EC regulations to have had an important influence on pre-production costs.

It can be seen that other reasons are perceived to have played a more important role in the development of production costs. The main reasons given by companies whose production costs have remained the same or decreased relate to an increase in efficiency through company internal measures. In order of importance these appear to be:

(a) automation and rationalization;
(b) reorganization;
(c) improvements in production equipment.

For companies whose production costs have increased, the main reason is stated to be a decrease in demand which has led to underutilization of plant capacity, which has resulted in inefficiencies. This is followed by rising raw material costs.

Of German companies which experienced an increase in production costs, the main reasons were quoted to be increases in labour costs and taxes. Last year, a reunification tax of 7.5% was introduced. This year the metalworking union *IG Metall* negotiated two pay increases for

workers of 3–5% each (with an agreed pay freeze for two years). This situation has been exacerbated by a reduction of the working week to 35 hours.

Single market benefits:	'The single market has not had a direct short-term impact on reducing production costs. However, the cost of holding stocks has fallen. Previously it was necessary to keep in stock finished products, sub-assemblies and components which corresponded to the specific legislative requirements in each country market. To a significant extent, this had been reduced.' 'The single market has brought benefits of product standardization but these have been limited by customers demanding more tailored products.' 'Product standardization has enabled savings to be made, but at the same time meeting the requirements of the technical Directives has increased costs. This has resulted in a net increase in costs.'

In order to assess the cost or benefit of the conformity assessment procedures for the CE marking, all manufacturers were asked: 'Are conformity assessment procedures for the CE marking more or less costly or the same as preceding arrangements for demonstrating compliance with various national arrangements?'

The results to this question break down as shown in Table 5.5.

Table 5.5. 'Are conformity assessment procedures for the CE marking more or less costly or the same as preceding arrangements for demonstrating compliance with various national arrangements?'

(% of respondents)

	Small companies	Large companies
More costly	69	33
The same	25	41
Less	6	26

Base: all, n = 74.
Source: WS Atkins.

It can be seen that a greater proportion of small companies are finding the cost of conformity assessment for the CE marking more expensive than previous procedures, whilst a significant proportion of the large companies state that it is less costly for them.

It is likely that small companies used to testing products only for the home market find CE conformity assessment procedures onerous. Large companies, on the other hand, probably find a single EU-wide conformity assessment procedure less costly than complying with the requirements of multiple export destinations.

5.2.3. Conclusion

Our original assessment of the single market having a low importance in relation to the direct short-term impact on production costs is considered to be correct.

5.3. Development of cross-border sales and marketing

5.3.1. Original assumptions

Hypothesis: **The single market has encouraged a pan-European sales presence and strategy.**

Likely importance: High.

Basis of hypothesis:

(a) press articles in the specialist press highlighting new products developed by a manufacturer in one Member State intended to meet the precise requirements of another Member State;
(b) increased European presence at trade fairs;
(c) evidence of cross-border joint ventures, mergers and new investments by existing EU companies in other EU markets.

Proof of causality: It is difficult to separate SM effects from general trends towards increased exports; the survey response gives some evidence.

5.3.2. Analysis of evidence:

Trade patterns

In Section 5.1 above, evidence was presented from statistical data that suggested a relative increase in trade within the EU, with imports both from third countries and from other Member States taking larger shares of national markets.

In the survey of EU manufacturers, we asked companies for their sales to the domestic market, other EU markets and rest of world for 1980, 1988 and now. Only approximately one third of total respondents provided data for all three periods, but the data provide an indication of the trends in companies' sales.

Table 5.6. Trends in sales, 1980–95

(% of respondents recording each pattern of sales trend)

Sales pattern	Domestic sales	Other EU sales	Rest of world sales
Continual patterns			
Continual increase 1980-95	30	20	17
Continual decrease 1980-95	20	10	3
Cyclical patterns			
Decrease 1980-88, then increase 1988-95	23	37	30
Increase 1980-88, then decrease 1988-95	10	13	20
No response	17	20	30
% of responses	100	100	100
Total responses	25	24	21

Base: all, n = 30.
Source: WS Atkins.

At first glance, the results do not support the hypothesis. Only 20% of the companies claim increased sales to other EU countries across the three dates, which is only slightly higher than the proportion of companies which increased sales to the rest of the world. By contrast, around one third of companies claimed increased sales to the domestic market.

This result, however, is not surprising given that EU demand was close to peaking in 1988 and levels have yet to recover from the recession. With this in mind, the expectation might have been to see increased sales to 1988 followed by decreased sales. Interestingly, the responses indicated the reverse with 37% of the respondents indicating decreased sales to other EU Member States prior to 1988 and increased sales in the period 1988 to the present date. In all, 57% of respondents increased EU sales since 1988 and only 23% decreased sales, despite the declining market demand. However, as the proportion of companies who increased sales to third-country markets is almost the same (47%), the question of whether the removal of cross-border barriers has encouraged a pan-European sales presence and strategy or not remains difficult to answer.

It is difficult to separate the effects of the single market from other effects such as recession. We asked respondents to rank as 'important', 'fairly important' and 'not important' a list of possible factors which may have influenced their sales in the EU. The responses to this question assist in understanding the perceptions of companies regarding the key influences on their business and are shown in Table 5.7.

It can be seen that relative movements in exchange rates are considered to have played the most important role on company sales within the EU, even more so than the recession in Europe, with 77% of respondents considering that exchange rate movements have had an important influence on their sales.

Table 5.7. 'What has been the influence of the following factors on your sales?'

(% of respondents)

	Important	Fairly important	Not important	No response
The removal of cross-border barriers to ease intra-EU purchases, sales and distribution	36	26	30	8
Pressures within your domestic economy (increased competition)	38	24	30	8
The recession in Europe	55	18	14	13
Mutual recognition of technical standards	18	41	30	11
CE marking	24	34	31	11
Corporate strategy to become a European player	39	26	27	8
Increased competitiveness in EU markets	35	32	26	7
Relative movements in exchange rates	58	19	14	9
Other	15	-	-	-

Base: all, n = 74.
Source: WS Atkins.

62% of respondents ranked the removal of cross-border barriers as 'important' or 'fairly important'. Nearly 60% of respondents believed that mutual recognition of technical standards and the CE marking have positively influenced sales within EU markets, regarding them as being fairly important or important. During face-to-face interviews, companies credited these mandatory initiatives as going some way towards creating a level playing field in EU markets. The conclusion to be drawn from this is that the single market measures have had some positive influence on a company's EU sales activities.

There are no significant differences between the responses of small and large companies.

Speed of access

A benefit of the single market perceived to facilitate the marketing and distribution of products is that delivery times have greatly reduced. This has had a particular impact on the supply of spare parts. The majority of companies offer guaranteed 24-hour delivery of parts compared with 48 hours or more previously. Some companies even stated that if a customer in another EU country faxes through an order for a part by the close of play one day, it is possible that delivery will be effected by the next morning.

Example of benefit:	'After-sales services has been eased through the SM. When an overseas client had a machine which had broken down, it could take up to one week for it to be repaired. Since 31 December 1992, it takes far less time to supply spare parts, usually just one day. Prior to 1992, there was a need for the structure to back up the dealers/clients in case of a breakdown. Since 1992 it is a lot easier and the structure is no longer needed.'

Examples of benefit:	'It has had an impact on stocking procedures. Previously, each European subsidiary carried its own stock; now there is one central stocking point in Europe.' 'Bureaucracy at borders has been greatly reduced and spares can be ordered and delivered between countries within less than 24 hours; previously this took 2-3 days.' 'It has brought amazing cost savings and has made us more flexible and able to supply faster.' The TGV railway involves Belgian and French contractors. Previously, when working on the French side the contractor would have had to use a French distributor for parts and service. Due to the open borders they are now able to use Belgian distributors because they are actually closer than the French distributor.

Most users and rental companies report that this has been an important benefit during the recession, since they have increasingly purchased just-in-time (JIT). Prior to the recession, the practice was often to purchase in bulk at the beginning of the financial year (in Germany, however, framework or call-off contracts were and are more common). Those users who felt that delivery times had not reduced argued that machinery was in short supply during the boom.

Users criticized the fact that manufacturers are relying too much on minimizing stocks saying that JIT delivery was hindered by manufacturers keeping low stocks. Notably, one user disagreed quoting experience of a 24-hour spares service from one major equipment supplier.

Distribution and marketing

The majority of distributors are independent and represent more than one manufacturer (in some cases as many as 20 manufacturers). Nevertheless, the contractual terms of the distribution agreement frequently prevent distributors from selling to customers in another country.

In the survey we asked companies whether their marketing strategies had been affected by single market measures. These results are shown in Table 5.8.

Table 5.8 'To what degree have single market measures caused you to revise or adopt new business strategies with respect to various aspects of marketing and distribution?'

(% of respondents)

Aspect of strategy	Large degree	Small degree	Not at all	No response
Increase in cross-border provision of services to other EU states	20	35	31	14
Efficiency in the provision of products/services	37	28	24	11
Establishment of operations in other EU countries	15	22	49	14
Distribution networks in other EU countries	30	23	34	14
Advertising in other EU countries	15	36	34	15

Base: all, n = 74.
Source: WS Atkins.

More than half of all respondents thought that the SMP had affected all aspects of their marketing strategy. However, a higher number of companies felt the single market measures had had a positive influence on the efficiency of provision of products and services more than on actually increasing cross-border provision of services.

There was little difference in the results when disaggregated by size of company.

From discussions with sales and marketing managers in this sector it is clear that the single market has brought some benefits in terms of the distribution and marketing of products. However, none of the companies were able to quantify these benefits.

In the face-to-face interviews we asked companies how many sales and service outlets they had throughout the EU in 1988 and how many they have now. Most of the companies were unable to quote actual numbers. Of those who were able to provide figures, most stated that the number of outlets had either remained static or increased. Of those who stated that the number had remained static, most were referring to wholly-owned outlets and added that they had increased the number of independent distributors through which they sell.

Example of increased sales sales and distribution:	'In 1980 we had 100 outlets in the EU, compared with 200 in 1988 and 250 now.'

There was also evidence from the face-to-face interview programme that manufacturers who previously only sold via independent distributors have created their own subsidiaries or branch offices in other EU countries.

5.3.3. Conclusion

In the light of the analysis of statistics and the results of the survey, the importance of the single market on enterprises' development of cross-border sales and marketing arrangements is assessed as medium.

5.4. Scale and scope effects

5.4.1. Original assumptions

Hypothesis: **The removal of non-tariff barriers at the national level and the free movement of capital within the EU have encouraged production to be concentrated in plant of minimum efficient technical scale.**

Likely importance: High.

Basis of hypothesis: Reports of merger and acquisition activity.

Proof of causality: We seek to see whether rationalization of production has taken place at an EU level. If rationalization is at a purely national level, or at a global level, we can conclude that the single market was not an important factor.

5.4.2. Analysis of evidence

The benefits of a larger market include the fact that manufacturers can operate in plants of optimal scale, can recover their R&D costs more quickly, and can spread their marketing costs over a greater number of sales as a result of mergers and acquisitions which allow product line rationalization, possibly including closure of surplus capacity.

Whilst there is evidence of concentration taking place in the industry due to takeovers and cross-border alliances, there is only scant evidence (with one or two exceptions) to suggest that plant size has been increasing. There are a few examples where this appears to have led to the closure of plants and the concentration of production in a smaller number of more efficient plants.

Examples of benefit:	'We have reached economies of scale, but not because of the single market, because it is still impossible to produce one basic product which can be sold in all markets. In 1980, we had five plants in the EU. After 1988 we closed two in order to rationalize production and maximize plant capacity utilization.' (Clearly the manufacturer believed he could supply previous customers from the remaining three plants - this is a benefit of the SMP.) 'We have always tried to improve our productivity through new production systems and the development of robotics and state of the art production facilities. We have reached economies of scale which have been reinforced through the rationalization of production. We have standardized the equipment sold.' 'Our production site in France supplies markets world-wide. The production site in Belgium supplies Africa and the Middle East.'

Example of benefit:	'Productivity has increased as a result of rationalization of production sites. Recession was the main driver. New capital investment led to an increase in productivity. Demand for skid steer loaders has increased and we centralized production in one plant to realize economies of scale. We used engineering resources which developed productivity.'

In our face-to-face interviews we asked companies how many production plants they have/have had in other EU countries at three points in time. Of the 30 companies interviewed, 20 responded to this question.

Total number of plants:

1980	29 plants
1988	36 plants
Now	40 plants

Although these figures show that the number of plants owned by companies has increased, it can be seen that the increase in number of plants took place between 1980 and 1988, before the single market measures could have an impact. Also during the 1983–88 period, EU demand for off-highway equipment grew substantially (by more than 100%) which probably influenced the growth in the numbers of plants.

In the survey we asked companies: 'Do you believe you have the best size of plant for optimum efficiency?' Table 5.9 shows interviewees' responses.

Table 5.9. 'Do you believe you have the best size of plant for optimum efficiency?'

(% of respondents)

	Small companies	Large companies
Yes	59	76
No	41	24

Base: all, n = 74.
Source: WS Atkins.

It is perhaps surprising to note that the majority of companies felt that they already have the best size of plant for optimum efficiency. The table shows that a higher proportion of large companies believe that their operations are of the best size.

One leading manufacturer stated in a face-to-face interview that there are a smaller number of companies in the EU as a result of mergers and acquisitions but there is little evidence of plant size increasing. This could be explained by the fact that, of the companies interviewed who have bought other EU companies, the majority stated that this was for the purpose of 'buying' products missing in their range, i.e. to complement their product range. Although a degree of rationalization may have taken place between plants, the main purpose for the acquisitions was for strategic product development reasons and for gaining economies in distribution.

There is other evidence of manufacturers achieving economies of scale in distribution, for example one central stocking point for Europe (see Section 5.3).

There is little evidence of economies of scale in R&D/product development resulting from an enlarged market, as the increased opportunity has been countered by economic recession in nearly all markets. There are examples, though, of foreign (non-EU) investors establishing R&D centres in Europe as well as manufacturing facilities to support product development of their European products which are sold into world markets.

The extent of restructuring and the benefits from increased asset utilization are limited by the recession in Europe. Manufacturers reported large underutilization of their capacities, because of the fall in demand in the EU in recent years. According to several interviewees, in 1994 half of the demand for construction site equipment came from Germany, where reconstruction in the eastern *Länder* had boosted demand. During the same period, falls in demand of up to 70% were reported in countries such as Italy and Spain. Manufacturers also reported large overcapacities in the construction site equipment parc, resulting in sales of new equipment being hindered by sales of second-hand machinery.

Example of the extent of the reccessionary effect on a manufacturer:	'In the first quarter of this year we held orders for 5 cranes compared with orders for 50 cranes during the same period in 1992.'

Mergers and acquisitions

Whilst the single market has created greater competition in national markets, the total number of suppliers in the industry has been around 250 for many years. In recent times, however, there has been a flurry of merger and acquisition activity. It is unlikely that this activity has been a direct result of the single market, as the industry world-wide has had to manage a deep economic recession and downturn in sales. Further, key players have been taking strategic positions in the industry. However, the research undertaken points to the enabling effect that the single market has had on facilitating such development.

The following are examples of mergers, acquisitions and trade agreements which have taken place in recent years:

(a) French Groupe Legris sold its division of mobile lifting equipment, PPM, to the American group, Terex Corporation.
(b) French manufacturer Manitou acquired German manufacturer Ahlmann, Turkish importer Hidromek and Portuguese dealer, Emplhadores.
(c) Grove International is acquiring the construction site equipment division of German-based group Krupp (1995).
(d) American manufacturer Caterpillar and German manufacturer Zeppelin trade agreement.
(e) American manufacturer Caterpillar R&D agreement with Japanese manufacturer Mitsubishi (Shin Caterpillar Mitsubishi). This joint venture is now sourcing gear box castings and hydraulic cylinders for large and medium-sized hydraulic excavators from Hungary.
(f) Dana Spicer, a manufacturer of transmissions for highway vehicles, is being acquired by Caterpillar. It currently supplies units for Caterpillar's backhoe loader factory at Desford, UK.

(g) Japanese manufacturer Komatsu has acquired a majority shareholding in German manufacturer Hanomag (1989).
(h) Komatsu has also taken a 37% share in Italian manufacturer Fai and a 33% share in Norwegian manufacturer Moxy.
(i) Fiat Holding acquired the British-based Ford tractor operation and combined it with theirs to form New Holland.
(j) Fiat-Hitachi's joint venture is 59% owned by New Holland, 36% by Hitachi and 5% by Sumitomo.
(k) Ingersoll Rand and Clark Equipment have announced merger plans.
(l) Ingersoll Rand took over AVG.
(m) Swedish-based manufacturer Volvo acquired Akerman, the Swedish excavator manufacturer.
(n) Volvo acquired Zettelmeyer, a German manufacturer of small wheel loaders.
(o) Volvo acquired the remaining 50% of VME from Clark Equipment to take full control of the company, forming VCE (1995).
(p) VCE acquired the French mini excavator producer Pel-Job to increase VCE's product range (1995).

One manufacturer expressed the belief that at some point in the future, the leading manufacturers will need to sit down together and decide which suppliers are going to be the 'champions' since there is overcapacity in the supply industry.

5.4.3. Conclusion

There is some evidence of manufacturers achieving economies of scale and cost savings through product standardization resulting from the removal of technical barriers, but the extent of the benefit is limited by the effects of the recession. All the evidence of restructuring and rationalization is at an EU level, however, so we deduce that the SMP has been an important factor in driving the savings.

5.5. Foreign direct investment and location effects

5.5.1. Original assumptions

Hypothesis: **The creation of a large EU single market with external barriers and a strong anti-dumping policy has encouraged inward investment in the EU industry.**

Likely importance: High.

Basis of hypothesis:

(a) Substantial evidence of increased investment by American, Korean and Japanese companies both in new manufacturing facilities and in mergers and takeovers with the existing EU industry. For example, Samsung Construction Equipment is manufacturing hydraulic excavators in Yorkshire, making it the third Korean firm to develop factories in the EU. Fellow Korean firms Hyundai and Daewoo have built plants in Belgium.
(b) The official complaint by the EU industry of alleged dumping by Korean competitors in the EU.

Proof of causality: Enterprises' responses on the motivation for inward investment.

5.5.2. Analysis of evidence

In response to questions regarding their perception of the industry, users of construction site equipment believed the industry to be truly global. They have been purchasing from EU and non-EU suppliers since before 1988 and their purchasing practice has not changed greatly. In fact users view the industry more as a collection of American and Japanese companies with only a few European players.

Our hypothesis refers mainly to effects in encouraging foreign direct investment (FDI) from outside the EU, but FDI within the EU is also an important issue. Examples of FDI from both outside and inside the EU are given in Section 5.7.

It can be seen from Section 5.4 that companies have increased the number of plants in other EU Member States since 1980, although the increase appears to have taken place largely prior to the introduction of the single market measures.

The enlarged EU market has undoubtedly made it economically feasible for non-EU companies to invest in EU manufacturing facilities because the market is large enough to justify new investment. Their reasons are not merely because of the single market measures. Some invest to escape from anti-dumping complaints, others because the EU is the principal regional market for the product. The SMP has enabled new investments to be sized for the whole market and moreover makes the EU a good location to serve global markets.

Example of American manufacturer:	'Our location in the EU and recent decisions regarding location strategy are not directly linked to the single market. It may have been an enabler but certainly not a driver.'

Example of Japanese manufacturer:	'We originally invested into a greenfield operation in the EU, but this has not proved to be the correct strategy for market implementation. We prefer now to invest through acquisition and joint venture. In this way we coexist with the competition without increasing the number of competitors.'

Example of FDI for global markets:	'100% of our EU production has been for the European market. This year, we are beginning to export a small quantity to America and Africa.' 'We have begun a "cross-sourcing" project. We now export excavators to America and we will be using our European plants as a base for exporting to third countries.'

Example of R&D investment:	One leading producer, who invests 4% of its turnover in R&D world-wide, has gradually established R&D teams within its EU factories to deal with the specific designs required by the European market. Currently it has 250-300 R&D engineers in Europe, all reporting to the main centre for R&D in the foreign company's home country, where R&D was previously concentrated.

Some regions of the EU have benefited more than others from FDI. The UK is preferred because of a perceived lower cost base, the existence of strong supporting engineering skills and services, and flexible labour laws. Spain was quoted as an example where the labour laws are a positive disadvantage to FDI. International companies with manufacturing operations in the EU cited Germany as a high cost centre and one company has moved its operations to France. Another would like to transfer production from its German plant to one of its other EU sites but sees this as being politically impossible at present. This ability to locate plants in the most advantageous location to serve EU and world markets must be a major benefit of the SMP.

5.5.3. Conclusion

The SMP has made the EU an attractive location for investment to serve EU and global markets. Enterprises say it is an enabler but we doubt that so much FDI would have come to the EU without the SMP, because existing global firms might instead have relocated to other regions. Therefore we conclude that the SMP has been a key driver in encouraging investment in the EU industry and that the hypothesis is proven.

5.6. Sourcing patterns and upstream/downstream linkages

5.6.1. Original assumptions

Hypothesis: **The single market has encouraged wider (intra-EU) sourcing activities to achieve greater competitiveness within the EU industry.**

Likely importance: High.

Basis of hypothesis: Evidence of sourcing/subcontracting of parts, components and product lines to specialists or suppliers with a lower cost base (e.g. O&K of Germany subcontracting to Macmoter of Italy).

Proof of causality: Manufacturers require rapid response and delivery from subcontractors so cross-border sourcing would not occur without the single market.

5.6.2. Analysis of evidence

In the survey we asked companies: 'To what degree have single market measures caused you to revise or adopt new business strategies with respect to the purchase of business services, financial services and subcontracting from other EU countries?' The results are shown in Table 5.10 below.

Table 5.10. 'To what degree have single market measures caused you to revise or adopt new business strategies with respect to the purchase of business services, financial services and subcontracting from other EU countries?'

(% of respondents)

	Large degree	Small degree	Not at all	No response
Purchase of business services from other EU countries	15	28	45	12
Purchase of financial services from other EU countries	1	16	70	13
Subcontracting to other EU countries	16	24	46	14

Base: all, n = 74.
Source: WS Atkins.

The majority of manufacturers felt that the single market measures had no effect, particularly on purchase of financial services. Nevertheless, a significantly large proportion of firms did agree that the SMP had affected their cross-border purchasing decision; 43% changed their purchasing of business services and 40% their subcontracting. Bearing in mind the large number of SMEs, these proportions are surprisingly high. Nearly all of the respondents who replied positively were large companies. This view was confirmed by the face-to-face interviews which were mainly with the largest manufacturers in the industry.

We asked in the survey: 'Have you increased your sourcing from domestic suppliers, other EU suppliers or rest of world suppliers?' Table 5.11 shows the responses to this question. Of those who gave a response, over 70% (28% out of 39% of replies) said they had increased sourcing from other EU suppliers.

Table 5.11. 'Have you increased your sourcing from domestic suppliers, other EU suppliers or rest of world suppliers?'

(% of respondents)

	Yes	No	No response
Domestic suppliers	12	26	62
Other EU suppliers	28	11	61
Rest of world suppliers	11	26	63

Base: all, n = 74.
Source: WS Atkins.

The majority (70%) of respondents in the face-to-face interviews also stated that their sourcing from other EU countries had increased but they were reluctant to attribute this to the single market. However, on probing, they admitted that the single market has made more competitive sourcing EU-wide easier, due to faster delivery, reduced administrative procedures and a mentality which is becoming more open to Europe. Out of 30 manufacturers:

(a) 16 companies had increased subcontracting to domestic companies;
(b) 14 companies had increased subcontracting to other EU companies;

(c) 14 companies had increased subcontracting to Eastern European companies;
(d) 3 companies had increased subcontracting to rest of world companies.

Several companies pointed to the movement in exchange rates as influencing their decision to source in other parts of the EU. Those companies based in countries with relatively strong currencies have sought lower material and component costs by sourcing in other countries which have devalued in recent years. The single market has clearly made this sort of optimizing of purchasing possible, and has made sourcing within the EU easier and, therefore, more competitive, resulting in lower prices and/or a better quality/service.

There is also evidence of sourcing/subcontracting of basic parts, components and simple product lines to non-EU suppliers with easy trade access to the EU market, e.g. Liebherr of Germany is subcontracting to Metalna of Slovenia, and Shin Caterpillar Mitsubishi is sourcing gearbox castings and hydraulic cylinders for large and medium-sized hydraulic excavators from Hungary.

The following are examples of the ways in which EU manufacturers have had to rethink their sourcing policies in order to remain competitive.

Example of benefit:	'Traditionally we have purchased a high proportion of components from Germany which has a strong supply base. However, currency movements are influencing our current purchasing decisions and we are sourcing increasingly from Italy and also Eastern Europe.'

Example of German manufacturer:	'The depreciation of the lira is forcing us to look at suppliers in Italy.'

Example of French manufacturer:	'In the 1980s most of our sourcing was carried out within French borders. Now it is spread throughout the EU.'

Due to the strength of the German Mark, German manufacturers report that in an attempt to remain competitive alongside their UK, Italian and Spanish counterparts, they are increasingly subcontracting work to Eastern European companies in order to reduce their costs. German companies consider this strategy to be directly linked to European Monetary Union since they believe a single market cannot be achieved while their revenue is exposed to currency variations which prevent the creation of a level playing field.

5.6.3. Conclusion

There is very strong evidence of increased subcontracting and the hypothesis is considered to be proven.

5.7. Changes in competition and market concentration

5.7.1. Original assumptions

Hypothesis: **The single market has increased competition providing lower real prices to the end-users, and leading to a shake-out of marginal and inefficient players.**

Likely importance: Medium.

Basis of hypothesis:

(a) mergers and acquisitions which have taken place in the industry in recent years;
(b) increased number of suppliers to country markets.

Proof of causality: We seek to see if there has been an increase in the number of suppliers from other EU countries and a fall in domestic suppliers in national markets.

5.7.2. Analysis of evidence

Number of suppliers and concentration

The structure of the sector in the EU and the world was described in Chapter 3, with further details in Appendix B. It demonstrates the oligopolistic and global nature of the industry where a few international manufacturers dominate certain key segments of the market, although there are also many smaller specialist manufacturers. Competition is keen, however, because of the presence of low-cost new entrants from South-East Asia and Eastern Europe. There are also signs of oligopsonic tendencies in some national markets with the growth of plant hire companies.

It has been difficult, however, to use official statistics to analyse changes in the competitive structure since the data do not provide sufficient detail. The main conclusion from the research is that, due to mergers and acquisitions, the overall number of players in the market is reducing but with little evidence of plant size increasing.

Table 5.12 shows concentration ratios, i.e. the proportion of products produced by the top five EU companies across the three years surveyed. In 1994, the five leading manufacturers accounted for 42% of total EU production, a reduction from 50.3% in 1988 and only marginally more than the share for 1983. These figures appear to indicate clearly that the trend towards concentration that was evident in the 1980s has been reversed by the single market. The mechanisms by which this has occurred are probably:

(a) the arrival of new entrants from Japan and Korea;
(b) increased market opportunities for smaller specialist firms in the enlarged single market.

Table 5.12. Concentration ratios

	1983	1988	1994
Total units produced in Europe by top 5 manufacturers	26,687	56,793	50,050
Total European production (units)	68,154	112,950	116,949
Share of European production for 5 largest manufacturers	39.1%	50.3%	42.7%

Source: Off-Highway Research International Database - Europe includes EU + EFTA countries.

Competitive environment

In order to gain a better understanding of the competitive environment in recent years, we asked interviewees: 'What have been the changes in competition levels on the domestic market in recent years (number of competitors, on the basis of price and on the basis of quality)?' Table 5.13 shows the responses to this question.

Table 5.13. Changes in competition levels perceived by interviewees

(% of respondents)

Change perceived	Increase	No change	Decrease	No response
Change in the number of competitors				
Domestic firms	20	58	11	11
Other EU firms	50	35	4	11
Non-EU firms	35	49	3	13
Change in price competition				
From domestic firms	42	41	7	10
From other EU firms	53	35	1	11
From non-EU firms	46	38	3	13
Change in competition on quality				
By domestic firms	26	54	7	13
By other EU firms	34	47	5	14
By non-EU firms	16	61	7	16

Base: all, n = 74.
Source: WS Atkins.

Half of companies responding felt that there had been an increase in the number of other EU firms competing in their home market but no change in the number of domestic or rest of world players (implying increases in EU trade and competition). Most of these firms were French or German, the target markets for new entry. It was mainly small firms who reported increased competition for domestic firms, perhaps because the single market allowed existing firms to expand their product range and attack niche markets.

Where price is concerned, it is interesting to note that a higher proportion of survey respondents believed that price competition had increased from other EU firms rather than

from rest of world firms. This is surprising, since face-to-face interviewees stressed the effects on the EU market of low prices offered by rest of world producers. Of the 53% of companies which stated that price competition had intensified amongst other EU firms, the majority were again French and German. These responses could probably be attributed to the fact that these countries have strong currencies, and manufacturers emphasized the difficulties in competing with competitors from the UK or Italy, for example, whose currency realignments have given them a competitive edge in international markets.

The majority of small and large companies alike believed that there had been no change in competition with regard to quality. Nevertheless, a significant number (34%) identified increased competition on quality by EU firms, which we interpret to mean that there are better quality products now on the market which they have to match.

The effects of increased competition appear to have been felt in particular in the German market. The reasons for this are likely to be twofold:

(a) Firstly, Germany previously had a market protected by the requirement for DIN standards and third-party testing. Whilst users are reported to be continuing to specify extra testing, the market is in theory open and any product bearing the CE marking should be accepted. German manufacturers report that foreign producers who previously dared not attempt to enter the German market are now doing so.

Statement by German manufacturer:	'Previously, fewer manufacturers were brave enough to tackle the German market. Now, thanks to mutual recognition, they are enjoying success in what used to be a very difficult market.'

(b) Secondly, Germany was the only EU growth market between 1991 and 1994, due to reconstruction work in eastern Germany. German manufacturers complain that this attracted new players to the market. Due to intensified competitive conditions, German companies report that margins have shrunk, resulting in net losses.

There are over 40 competing manufacturers of mini excavators in Italy. The most serious competition is reported to be arriving in the form of Korean direct and transplanted production. The latter is, of course, mostly due to inward investment in the UK. The number of domestic competitors, already high, is on the increase. Competition from other European companies is on the wane.

An illustration of the degree of competition generated by the single market is given by this quote from an American firm.

Example of level of competition:	'In the US our gross margin is 40-50% compared with only 10%, if we are lucky, within the EU. In the US, price levels are well established, competition is less intense and there has been no glut of second-hand machinery.'

5.7.3. Conclusion

The evidence supports the hypothesis that the single market has encouraged greater competition, both in number of perceived competitors, and in price and quality competition. There have been new entrants and new firms in cross-border trade. Despite mergers and acquisitions for strategic aims, the dominance of the large firms has not increased, but there has undoubtedly been rationalization, which will lead to closure of some less efficient units.

5.8. Productivity and competitiveness

5.8.1. Original assumptions:

Hypothesis: **The single market has encouraged improvements in productivity and competitiveness in the EU industry.**

Likely importance: Low.

Basis of hypothesis: Evidence in Section 5.4 of gains in product standardization and economies of scale, which should lead to improved productivity and competitiveness.

Proof of causality: It is difficult to separate productivity improvements due to increased competition (X-efficiency), from economies of scale due to rationalization in the larger market, and technology progress (e.g. due to more use of CNC machine tools and CAD). The evidence in previous sections on competition and on scale effects, however, leads us to attribute a significant share of the increased roductivity to single market effects.

5.8.2. Analysis of evidence

Of the 30 face-to-face interviewees, only 21 were able to comment on changes in the company's productivity. Of these, the changes in productivity quoted are shown in Table 5.14.

Table 5.14. 'What have been the changes in your company's productivity since 1988?'

(% of all interviewees)

Productivity improvement	Responses
Less than 10%	13
10-50%	50
51-100%	7
More than 100%	-
Do not know	30

Base: all, n = 30.
Source: WS Atkins.

It can be seen that, of the companies which responded, 57% had experienced increases in productivity of over 10% since 1988.

Companies were asked to rank as 'very important', 'important' or 'not important' a list of possible factors which may have played a role in productivity improvements. Their responses can be seen in Table 5.15.

Table 5.15. 'How important a role have the following factors played in productivity improvements?'

(% of all interviewees)

	Very important	Important	Not important	No response
Re-engineered products	33	37	17	13
New manufacturing process technology	47	30	10	13
Improved production management	53	27	7	13
Capacity utilization	20	27	30	23
Gains in economies of scale	17	27	33	23
Improved labour relations	17	27	40	16
Other	10	-	-	-

Base: all, n = 30 (note: respondents could tick several factors).
Source: WS Atkins.

It can be seen that manufacturers believe that three factors (improved production management systems; new manufacturing process technology; re-engineered products) have played the greatest roles in achieving productivity improvements. These are 'technology' factors which are the mechanisms by which productivity improvements are achieved. It does not indicate whether competition, enlarged markets, or restructuring have been the drivers for the change.

The main aims have been to develop leaner production systems and introduce quality management methods. Manufacturers are producing less in-house and depending more on the supplier chain not merely to provide a component but also to participate in the development of new products. The move to 'partnership sourcing' has enabled manufacturing industry as a whole to reduce costs by lowering the quantity of stock in the system *per se*, shortening lead times and speeding up new model development.

As indicated above in 5.6 and 5.7 there has also been some evidence of company reorganization, probably driven mainly by the excess capacity caused by the recession, but facilitated in some cases by the single market.

Examples of productivity gain:	In 1988 it took us 2,500 hours to manufacture a crane compared with only 400 hours today. This compares with approximately 300 hours in Japan.' 'Productivity has increased as a result of rationalization of production sites. The recession was the main driver behind this. New capital investment led to the increase in productivity, e.g. demand for skid steer loaders increased, so we decided to centralize production in one plant in order to achieve economies of scale.' 'We have improved productivity in Germany since we have been a partner, not because of the single market but because the factory is 160 years old and we have made many improvements and endeavoured to introduce Japanese management philosophy.'

Competitiveness

In the survey we asked companies if the single market programme had made their products more competitive in the EU, to which the response was as follows:

Yes	22%
No	65%
No response	14%.

An even larger majority of respondents stated that the single market programme had not encouraged them to sell into other world markets. Exports to third countries, however, appear to have declined steadily since 1981 (see Figure 3.2), long before the SMP was initiated.

Yet almost all manufacturers visited believed that the single market measures had made their products less competitive when exporting to third markets outside the EU. The following statements made by manufacturers illustrate their perception.

It should be recalled that many of the global manufacturers interviewed have plants outside the EU manufacturing lower specification equipment for third countries. They presumably could, if it suited their strategy, produce lower specification equipment in the EU for other markets, but possibly would lose out on economies of standardization. Owing to their smaller volumes, SMEs may have more difficulty in manufacturing economically to multiple specifications.

Examples of competitive problem:	'The level of EU standards that needs to be met means that our products are less competitive in third countries, which will lose us business for some time. Many of our non-EU competitors producing in the EU also have factories outside of Europe, and are still making lower specification products for third countries and may possibly take market share from EU manufacturers.' 'The single market has set standards too high. There is an important technical gap between EU and third-country equipment standards which reduces the competitiveness of EU machines.' 'The single market has improved competitiveness with the EU but has not done so in third markets. Machines produced in the EU are more expensive than in the USA. We could never export to the USA a machine which meets the Noise Directive. We would not be competitive.' 'The single market Directives have resulted in more environmentally friendly equipment. This, however, risks making EU manufacturers less competitive in other parts of the world where standards are less stringent and where a competitive price is likely to win a contract.' 'EC legislation has caused many unnecessary improvements to products. This has not affected our competitiveness in other world markets since we manufacture a lower specification product for North America and the rest of the world.' 'We can imagine that a European manufacturer who maybe manufactures 500 skid steer loaders, only 100 of which are destined for non-EU markets, may find his competitiveness affected in those other markets. He will not be able to afford to manufacture these 100 to a different specification, but the EU specification may be too expensive for customers in non-EU markets.'

Example of exchange rate impact:	'Exchange rates are a major issue for us as an international company. We manufacture in France with a strong French franc, and our main competitor based in the UK has a strong competitive advantage due to the low value of sterling.'

Contrary to the manufacturers' opinion on quality, two thirds of users believed that the single market has raised product quality. This, however, depends on the interpretation of 'quality'.

As discussed earlier in the report, manufacturers' interpretations of the technical Directives vary and some manufacturers perceive the interpretations of their competitors to be harming their own competitive position. This is demonstrated by the following example.

Interpretation of the Machinery Directive:	'At the beginning of 1995 one of our key competitors launched a campaign to promote the CE marking through a series of customer/dealer meetings. They promoted the fact that they had produced a machine which was the ultimate in safety. In actual fact, aspects of the machine went beyond the Machinery Directive but customers perceived them to be necessary to comply with the Directive.'

It is probable that this manufacturer has been outwitted by the competitor, who is using his interpretation of the Machinery Directive to his strategic advantage.

During the research, manufacturers have reported cases where they are sure that other companies are not complying with the technical Directives but are affixing the CE marking nonetheless. If this is the case, it will lead to an imbalance in companies' cost structures and will defeat the objective of technical harmonization initiatives. The following example highlights this problem.

Example of competitive problem:	'We are an SME and have invested considerable money in complying with Directives, which has affected our competitiveness. Our competitors are circumventing legislation, making their products more price competitive. This is made possible due to different interpretations of legislation and the lack of policing of the CE marking.'

It is encouraging to note the benefit which Spanish companies attribute to the creation of the single market. Whilst these companies are feeling the short-term cost impact of meeting the technical Directives, they recognize the longer-term strategic benefits.

Competitive benefit:	Spanish companies in particular felt that although the Directives had led to increased costs for them, they had also forced them to raise the standard of their products to compete throughout the EU on equal terms with other EU manufacturers.

5.8.3. Conclusion

There has been an increase in productivity achieved by new technology and management improvements, driven partly by the recession and partly by increased competition in the SM.

5.9. Effects on employment

5.9.1. Initial assumptions

Hypothesis: **Productivity increases in the industry will have led to reduced employment levels. The SM should have accelerated the rate of productivity increase (increased competition and restructuring to achieve economies of scale), which with static or declining output since 1990 will lead to sharply reduced employment.**

Likely importance: Low.

Basis of hypothesis: Conclusions above about productivity, and data on output (Figure 3.1).

Proof of causality: Any impact of the SMP since 1992 cannot be observed because there are no recent data on employment, and in any case these effects will take several years to work through. An acceleration of the rate of productivity increase would be an indication that the SMP was a factor in increased productivity. We can, however, look at trends up to 1992 when SMP measures were beginning to take effect.

5.9.2. Analysis of evidence

Statistical information on employment at the level of PRODCOM category is poor, and the industry associations also have limited information on a time series basis. The surveys have therefore been relied on to reveal indicators of employment change over time, and interviews to provide insight into the reasons for the decline in employment.

Of the 74 companies which responded, only 40 supplied data on numbers of employees across three points in time. Other companies provided data only for the present time. For the purpose of comparing employment levels across the three points in time, companies not providing the data for all three points have been excluded, since it is not known whether the data are not provided because they are not known or because the company did not exist in 1988 or 1980.

The total number of employees in the 40 companies in 1980, 1988 and currently are as follows:

1980	31,959
1988	29,654
Now	26,160.

It can be seen that the total number of employees in these 40 companies has decreased by 18%. The decrease between 1980 and 1988 (7%) occurred at a time of demand growth. The decline of 11% since 1988 is after a steep decline in construction activity. However, these numbers represent only a small proportion (10%) of total employment in the industry (estimated and CECE), and can only be regarded as an indication of employment loss in the industry. Since 1980, over half the companies decreased the number of employees and only one of the companies increased the number of employees. In fact, the period 1980-88 was one of increasing production in the EU, and 1988-92 of stagnation, so this very limited evidence

suggests a more rapid increase in productivity in the 1980s than since. No firm conclusion can be drawn, however.

Increased mobility of workers might facilitate restructuring and economies of scale. In fact, language and cultural issues restrict mobility. The study has not revealed any real changes in intra-EU mobility of employees. Companies have reported slight increases in the number of applications for jobs from other EU countries, but this has been largely in the area of sales. Mainly short-term exchanges take place between the EU sites of manufacturers that have cross-border operations.

5.9.3. Conclusion

Mobility is therefore not seen as a factor in increased productivity. We have insufficient evidence to support the hypothesis.

5.10. Evolution of final prices

5.10.1. Initial assumptions

Hypothesis: **Price dispersion should decrease, and price levels decrease, as a result of increased competition, but other market factors limit the extent to which increased competition in the single market can encourage the convergence of prices across the EU.**

Likely importance: Low.

Basis of hypothesis:

(a) distributors and manufacturers indicate that different market conditions exist in national markets;
(b) some national markets (e.g. the UK) have strong buyers, such as the plant hire companies, which purchase in large quantities and therefore can negotiate substantial discounts;
(c) some national markets have cultural traits which influence their purchasing criteria (e.g. in Germany, buyers place more weight on technology than price);
(d) national reputation of the supplier's equipment is more important in some markets than others (e.g. German equipment is perceived as being over-specified in some markets);
(e) exchange rate movements make it difficult for companies to maintain a single pricing strategy, as they view the risks as being different in the various national markets.

Proof of causality:

The impact of the SMP cannot be tested because:

(a) price differences are obscured by changes in model and specification;
(b) any impact would only be felt in recent years, for which a time series of prices does not exist.

Therefore, the proof has been derived from interviews with and surveys of users, distributors and manufacturers.

5.10.2. Analysis of evidence

Interviews with manufacturers indicated that a single price strategy is pursued by only a few companies. In fact, only one company in our sample of 22 uses a single price list for all EU countries. Some manufacturers have tried to launch a single pricing policy but found it impractical.

Market prices appear to vary even more than list prices because of the different practices of discounting and bargaining in the Member States. For example, discount rates are lower in Germany than in Italy, Spain and the UK.

Most manufacturers prefer using strategic or tactical pricing in specific national markets. For most product groups, the variance in prices is up to ± 12% although it was wider, up to ± 19%, in 1988. It is recognized that the sample frame used for this analysis was small and not fully representative, although it did include most of the major market segment leaders. Therefore the figures should be used as indicators only of some narrowing in price differences between Member States.

One company interviewed, which is represented throughout Europe, stated that they have tried to implement a single pricing strategy throughout Europe but found different market conditions occurring in national markets.

According to distributors, the prices in each geographical and segment market are very different. Prices tend to be set by the segment market leader, e.g. in Germany it could be Bomag while in Nordic countries it could be Volvo. Distributors then tend to follow their lead.

There are several factors that explain the national differences:

(a) different methods of product distribution between Member States (use of independent distributors or direct-selling offices in some and exclusive distributors in others);
(b) different national bargaining behaviours;
(c) stronger buying power in some national markets, especially in the UK with the growth of the rental sector;
(d) demand buoyancy: in France demand fell by a third and with it prices;
(e) differences in culture and organization of construction work;
(f) exchange rate fluctuations.

Differences in market culture need to be taken into account: for example, German customers are more likely to pay a price premium for technology. Users, however, are beginning to approach distributors in other countries to seek out lower prices (e.g. in the UK, where large plant hire companies place bulk orders) or where currency fluctuations make products temporarily more price competitive. If they do buy from a distributor in another Member State, the problem then is with obtaining warrantees, servicing and spare parts.

According to distributors and manufacturers alike, prices are significantly affected by exchange rates and the risk of exchange rate movements. Prices tend to be high in countries which peg their currency to the German Mark (for example, the Benelux countries, Austria and Switzerland).

In spite of these market factors causing price differences between EU Member States, users confirmed that these differences have narrowed in recent years.

Statistical information on prices at the level of PRODCOM category is poor, and the industry associations also have limited information on a time series basis. Similarly, manufacturers have been unable to oblige with the appropriate data to examine price trends over time.

5.10.3. Conclusion

There is some evidence of a closing of price differences and the inference is that the single market has influenced this. Hard evidence to support this inference is thin, however.

5.11. Contribution to sustainable development

5.11.1. Initial assumptions

Hypothesis: **There is a low level of awareness at the industry level of environmental issues.**

Likely importance: Very low.

Basis of hypothesis: Orgalime's position paper *Towards Sustainability* dated 12 May 1995 points to a lack of measures relating to sustainable manufacturing in the engineering industries. There are EU working groups at a general industry level but not specific to the construction site equipment sector.

Proof of causality: We seek to find out what actions are in place or planned by industry with respect to cleaner technologies and sustainability.

5.11.2. Analysis of evidence

There is no evidence that the industry has any particular programmes for recycling materials and components that are used to make construction site equipment products (other than steel, which is recycled by the well-established steel industry routes).

5.12. Business strategy

5.12.1. Initial assumptions

Hypothesis: **The single market has stimulated the occurrence of strategic alliances to the benefit of the competitiveness of the EU industry.**

Likely importance: High.

Basis of hypothesis: Evidence of mergers, acquisitions and other commercial arrangements (see Section 3.4).

Proof of causality: We seek to understand the reasons for alliances that have occurred in the industry over the past 10 years.

5.12.2. Supporting analysis/evidence

Section 5.7 details various mergers and acquisitions in recent years involving EU and non-EU companies. The section indicates that global recession as well as single market effects have influenced this activity. The strategy of most firms, however, seems to be to create strategic alliances or make acquisitions in other EU countries as a prelude to developing an EU-wide production and marketing strategy without creating new capacity and upsetting the supply-demand status.

The majority of EU manufacturers interviewed in the face-to-face programme believe that the single market has been an enabler, supporting their company strategy, rather than driving it. We asked them: 'Has the single market been a driver, an enabler or neither?'

Enabler	63%
Driver	13%
Neither	10%
Not sure	13%

The evidence gained is anecdotal and has been collected during the face-to-face interviews with 30 EU manufacturers.

Nevertheless, it is clear from our interviews that most large firms do have an EU market strategy, which must be a direct consequence of the SMP.

Example of enabling benefit:	'The SM has assisted us in implementing our own company strategy and it has also confirmed that our strategy to expand within Europe was correct, but it was not the driving force behind the strategy.'

Example of foreign investor strategy:	One leading producer who originally invested into a green-field operation in the EU has decided to opt for expansion through acquisition and joint venture. In this way the company coexists with its competition without increasing the number of competitors. A key feature of its strategy was to develop European image producing equipment largely sourced within the EU (e.g. at least 70% local content and in some cases 95%).

Example of EU acquisition:	VCE (Volvo Construction Equipment) has concluded an agreement for the acquisition of French mini excavator producer Pel-Job. The acquisition of Pel-Job adds products to VCE's range which were previously missing. The Chief Executive of VCE stated in a recent journal article: 'Light construction equipment is an area offering growth opportunities. An acquisition initiative was logical.'

Example of SME strategy:	One Spanish company has opted to differentiate its products on quality and expand in EU markets, and has therefore invested in obtaining the GS mark for its product range. Its new market targets are principally Germany but also other northern European states where premium prices exist for quality.

Example of EU strategy:	One of the leading producers decided in the 1980s to adopt a strategy of becoming a key European player. It created its own distribution in the main national markets and improved local and regional access by using additional independent distributors. The company made two major acquisitions to strengthen its product range and European market presence. Other joint venture and merger activities followed. It established its headquarters in Brussels so that it could be close to the EU administration. It established central spare parts stocks so that customers could be serviced quickly. This decision was the result of the abolition of cross-border barriers.

But:

Example of SME strategy:	One of the smaller players producing road compaction equipment decided to compete away from its principal EU competitors by exporting to niche third-country markets (e.g. Australia where it entered two years ago and now has a 15% market share).

6. Case studies

As part of the interview programme, a number of companies were selected as case studies for more in-depth analysis of the impact of the single market on their operations. More extensive interviews were held with them, and relevant company documents were studied. Case studies were drafted and submitted to the companies for their comment and agreement. Four of these companies agreed to have their case studies included in the report. They were selected to illustrate a range of different issues and viewpoints. They are:

(a) a global player which has invested in manufacturing plants in the EU;
(b) a medium-sized manufacturer operating principally in a national market;
(c) an equipment hire company;
(d) a major contractor operating across the EU.

6.1. Case study A

6.1.1. Issues addressed

(a) Business strategy/reasons for strategic alliances (SM enabler vs. driver?).
(b) Improved competitiveness:
    (i) economies of scale in production (e.g. greater automation, achieving Minimum Efficient Scale (MES) plants) and in marketing (e.g. low finished stocks, greater volumes through distribution channels);
    (ii) economies in better plant utilization (e.g. plant rationalization);
    (iii) economies in standardization of products/components (e.g. lower set-up times, lower material and work-in-progress (WIP) stocks, shorter lead times).
(c) Market access.

6.1.2. About the global player

The European headquarters coordinate all European activities, which include the following:

(a) 5 major manufacturing sites;
(b) 21 distributors;
(c) over 100 dealers;
(d) 2 financing companies;
(e) a central spare parts warehouse.

Although overall turnover has not increased greatly over the past 15 years, its composition has changed from 100% import-based to 85% originating from the European operations.

Market share

The global player's market share in the EU has been:

1992	12%
1993	11%
1994	10%
1995	10%.

One of the reasons for this drop in market share is the crash of the EMS. In weak currency countries (Italy, UK, Denmark, Spain), many distributors went bankrupt in 1993 and the global player lost market share as a result. In 1994, the company had to re-establish its sales network.

Another factor was that some products retained a significant level of non-EU content imported from 'high cost' countries.

6.1.3. Business strategy

Overall strategy

The global player's strategy is to offer the most advanced technology in the market and to be fully integrated into its markets (i.e. coexist with its partners). It changed its approach to Europe in 1985, when it opted for manufacturing in Europe rather than exporting from outside the EU. It began this by setting up a 100%-owned manufacturing facility. More recently, it changed its strategy and started working with partners who had existing sites and technology rather than setting up any more greenfield sites.

The company's overall aim was to produce a product with a local content of at least 70%. It has surpassed this target (over 80%), and in Italy it already achieves 95%. For the product manufactured in the UK and Germany it needs to import specialist components.

The global player says that the decision to set up production in Europe was based on a combination of the following factors:

(a) anti-dumping claim;
(b) high market demand in Europe;
(c) to be closer to the market and thus able to respond faster;
(d) to become a European manufacturer.

Some time after this, the global player decided to expand its presence in Europe but without creating 'additional' competition in an already highly competitive market. The solution to this was the creation of 'strategic alliances'. Due to the importance of direct labour in this sector, the global player considers the labour policy of a national government to play a key role when deciding on location of manufacturing facilities.

The global player believes that the single market was not the driving force behind its strategy but that the single market has definitely accelerated its implementation.

The global player believes that its roots offer certain image benefits while at the same time the company sees itself as a global player with production facilities throughout the world. The strategy is 'think globally, act locally'.

At the regional level, the global player's European headquarters is perceived as a truly European company for the following reasons:

(a) the local product content is over 80%;
(b) further 'Europeanization' of top management is being carried out (all EU factories have European managing directors);

(c) products are designed specifically with European customers in mind;
(d) strategic alliances are formed with well-established European companies.

6.1.4. Strategic partnerships/range complementation

Range complementation has been one of the driving forces in the global player's decision to link up with other EU companies. Linking with specialist companies producing equipment not in the global player's catalogue has effectively enabled the global player to widen its product range in a short timescale and exploit shifts in market demand.

The global player's new partners are specialists in their field and have a good knowledge of the EU market. Through these joint ventures, the global player is now able to offer its customers a more complete product and service package. Additionally, the global player believes it is offering its European partners the opportunity to export to parts of the world in which they previously did not trade.

Through joint ventures with EU companies, the global player has been able to strengthen its distribution network. It has rationalized the sales network and strengthened the local base and hence links with the customer.

The company is keen to enter into more partnerships to cover other product ranges which are currently imported. It would prefer to be able to source these in Europe. The major concern is maintaining economies of scale. Producing for global markets in two locations will result in less efficient production units. Hence, it would be considered a bonus if a potential partner could offer a complementary product to realize scale economies.

6.1.5. Sourcing

The global player is constantly striving to increase the local content of products manufactured in the EU. It is influenced by currency movements. Although Germany has a traditionally large supplier base, it is becoming expensive and the global player is, therefore, increasing its sourcing from Italy and Central Europe.

Another development is increased supplier service, such as JIT delivery strategy with respect to steel cut to size.

The global player believes that the single market has definitely made sourcing more easy across the EU and, therefore, more competitive, resulting in lower prices and/or better service and quality of goods.

In terms of finished products, in the past the global player's factories were only allowed to sell within a defined sales territory. Today the global player has set up a global sourcing project which enables all marketing organizations belonging to the company to purchase machines from the most competitive plants. This results in better capacity utilization, reduced overheads and production costs.

6.1.6. Research and development

As an international company, R&D effort is shared throughout world sites. The global player invests 4% of its turnover in R&D.

Each production unit in the EU has its own R&D division which in some cases adapts products to the needs of European customers. Each site is linked with the main design centre (on-line system) and there is a regular interchange of information in order to avoid duplication of effort.

The development costs have changed as a result of the single market. Previously engineers from the parent company's design centre dealt with adapting designs to meet the different requirements in Europe. This is now done by development engineers within the European factories.

6.1.7. Establishment of focus companies

The global player has recently implemented cross-sourcing projects. This is a concept commonly found in the automotive industry whereby the marketing centre can choose where to source its vehicles. The company has implemented at least five projects.

6.1.8. Standardization and competitiveness

Prior to the creation of the single market, machine specifications differed from country to country. This resulted in:

(a) a different machine for each EU market;
(b) high levels of stocks of finished products;
(c) a large component inventory;
(d) high cost and difficulties associated with adapting equipment (e.g. if a machine was built for country A, but subsequently sold in country B);
(e) different pricing strategies.

The global player believes that the single market has brought the following benefits:

(a) minimization of the number of models required;
(b) minimization of stocks of finished products;
(c) minimization of component stock;
(d) easier movement of goods across borders within the EU;
(e) simplification of production planning (larger batches of one machine model, resulting in lower line set-up times).

In an effort to hold stocks of finished products to an absolute minimum, it used to be necessary to forecast accurately demand for each EU market. In 1990 one plant held stocks of 500 machines in order to meet demand in different markets. Today stock levels have been reduced to 130. This results in a saving of approximately DM 60 million in working capital (based on a unit price of DM 180,000).

Previously, if a machine was sold in a country other than the one it was originally intended for, high rebuild costs could have occurred which would have not been passed on to the customer. A great part of the benefits of standardization has been the result of harmonization of safety standards in Europe. This has led to a reduction in the stock levels of components and therefore lower working capital requirements.

Another advantage has been the shortening of production times. In one case this has led to a 6% reduction.

6.1.9. Production costs

Rationalization of personnel

The company quoted an example whereby labour productivity has improved by 12.5% over the past five years through reduced labour inputs. Greater benefits could be gained through higher levels of capacity utilization, but these are currently prevented by the recession.

There are big advantages in cross-fertilization of research and production efficiency. The company is now endeavouring to avoid double investment in research and development. The R&D departments within all the global player's EU plants have on-line design systems linked to the main headquarters for the exchange of information.

6.1.10. Market access

The global player considers the single market to have brought great benefits. Previously each country had its own regulations, with Nordic countries and Germany having many additional safety requirements. Italy has very different road transport regulations, which are still in force, and France has particularly stringent noise emission regulations. Previously, each country's requirements had to be met. Now many of the safety and environmental issues are harmonized. The company says 'it [the single market] has brought amazing cost savings, made us more flexible and able to supply faster', but the company stressed that quantifying the benefits is not possible.

These benefits are summarized as a competitive advantage in increased flexibility, cost savings and faster supply of products to customers.

The introduction of technical Directives has brought advantages but there are still areas where there are problems. The following are examples of barriers still in existence:

(a) In Italy a vehicle needs a special licence to travel on the roads if it is more than 2.5 m wide. In virtually all other countries the limit is 3 m. If a manufacturer has a vehicle which is 2.6 m wide this creates a problem for selling into the Italian market.

(b) In Germany difficult homologation procedures are required if a vehicle has a maximum speed limit of 20 km per hour or more, whilst in other countries the limit is higher at 35 km per hour. This means that for the German market the company has to fit mechanical speed governors. The global player still needs to make two models because of the German market.

The Machinery Directive

On the whole, the company assesses the Machinery Directive positively. The conformity assessment procedures are much easier. Previously its products were tested in almost all countries in order to prove that the equipment met with the safety standards applicable in that country. A machine built for one market would be over-specified and therefore too expensive in another, and costly to adapt. Mutual recognition has also led to cost savings, for example:

(a) previously, products for Germany had to have an overload warning device;
(b) previously, products for the UK had to have boom and arm safety valves.

Horizontal measures

Other single market measures have benefited the global player. It is now much easier to transport products from one country to another. For example, a Belgian transport company can now collect a product in the UK, take it to Italy, collect another product and deliver that to Norway. In the past this would not have been possible since each load would have had to be carried by a local transport company.

6.1.11. Demand differences

The global player believes that maximum standardization from a legal point of view has now been reached. Demand variances will remain, however, in terms of clients' individual requirements. The technical attributes required are frequently a function of the terrain on which the machine is to be used, e.g. the arm needs to be shorter if the machine is to operate on rocky ground rather than on sandy ground. Certain products are also more popular in some markets than others.

6.1.12. Employment

The global player sees no particular benefits from free movement of labour in the single market, and there is no permanent exchange of labour between sites, only short-term exchanges as a part of training.

6.1.13. Pricing

Prices are equalizing amongst countries. German manufacturers have traditionally developed high specification machines and have been able to command high prices. German manufacturers are now having to reduce their prices in order to be able to remain competitive. The company believes that it is now easier to buy the same machine from the cheapest supplier in the EU as prices amongst countries are beginning to level out.

6.2. Case study B

6.2.1. Issues addressed

(a) The technical difficulties and cost for an SME in meeting technical legislation.
(b) Improved market access.

6.2.2. Introduction

This case study conveys the views of an SME manufacturer. The opinions portrayed in this case study echo views expressed by other companies during the field work about the difficulties which smaller companies experience in dealing with single market legislation.

The company is experiencing competitive problems which it firmly believes are caused by single market legislation. It considers that far from creating a level playing field, the single market is disturbing the competitive equilibrium, in particular between large and small enterprises. The company was particularly concerned about the volume of new legislation. In

this belief, the SME has entered into considerable correspondence with the appropriate government ministry, its representative in parliament and various technical institutions.

Differences in interpretation of the Directives are another issue highlighted by this case study. Some customers may be led to believe that certain extra features found on the equipment of the larger manufacturers are mandatory under the Directives when in fact they are not. This may highlight a need for product users to be better informed with regard to EC legislation.

Initially, the SME had one product specification which satisfied EU markets and the rest of the world. Price competition intensified outside Europe, and the company's American competitors began to strip out non-essential safety items for markets such as the Middle East. In order to maintain its market share, the SME had to follow suit and therefore introduced a second 'rest of world' specification. This happened one year prior to the introduction of the CE mark. Today the SME claims that it could not sell its EC-specification product outside the EU as it would not be price competitive.

The SME considers the draft standard on its core product to be a higher safety specification than the ESRs of the Machinery Directive require. It believes that German manufacturers will make the standard *de facto* mandatory for both German products and imported products and that it will be enforced by local health and safety inspectors, i.e. *Gewerbeaufsichtsämte.* (But note that manufacturing to a harmonized standard is only one of several routes to compliance.)

The company wants to see the creation of a truly level playing field with harmonized standards throughout the EU. It quoted several examples which show how the company's competitive position has been affected by the legislation.

Example 1: interpretation

In order to comply with the Machinery Directive, the SME was faced with the option of either (a) using its own judgement to decide if its product met the essential safety requirements (ESRs) of the Directive or (b) using a European standard. This required the mandatory fitting of a double-insulated electric motor. It decided it would be best to manufacture according to the draft European standard. In order to comply with this, the SME incurred substantial R&D and tooling costs in developing such a motor together with its suppliers. The new product was launched in October 1992 in time for the CE marking deadline. The SME has produced 100,000 units since 1992 at an additional cost.

The SME says that its competitors are continuing to fit older metal-cased, earthed electric motors without having to incur this extra significant expense. The company claims that this places it at a serious competitive disadvantage in the marketplace and it believes that this is a direct result of the dual compliance route.

The SME believes that the continuing lack of harmonized standard has penalized the company by ECU 600,000 (not including loss of market share). This is a significant sum for an SME. Whilst the standard remains in draft form, the company believes there is no basis on which the Trading Standards and/or Health and Safety inspectors can operate. This results in differing interpretations which the SME believes its competitors are exploiting.

Example 2: interpretation

The difference in interpretation of regulations is demonstrated by a case the SME knows of, where products are being imported from Eastern Europe. It believes that the Eastern European manufacturer is producing to a lower safety standard which is putting the SME at a price disadvantage, due to the extra components which the SME is fitting to its machines.

Example 3: interpretation

The SME used to import a product from an Italian company for sale in its domestic market. These excavators did not carry a CE marking. When the SME raised the issue with them they wanted simply to affix the CE marking without preparing a technical file. Although the SME was having success with these products it decided that it could not continue the commercial arrangement. (Although the manufacturer is not obligated to prepare a technical file if it decides to follow the self-certification route, the company was probably wise to discontinue trading in the product if it had doubts about the product's compliance. The SME is no doubt upset at losing a profitable business, but this seems to show the Machinery Directive is having an impact on safety levels.)

Example 4: interpretation

Whilst the SME was exhibiting at the BAUMA trade fair in Germany last year, an inspector from the German *Gewerbeaufsichtsamt* informed the company that its product should be withdrawn from the stand as it did not, in his opinion, meet EC legislation. The SME pointed out that its German competitors were exhibiting a product which in its opinion clearly contravened the Machinery Directive since it had dangerous ring gear exposed.

Example 5: interpretation

Interpretation of the EC Directives can vary and result in competitive imbalances. The SME complained that something it describes as a frame, another manufacturer is calling a cab. Under the Machinery Directive anything which is classified as a cab is required to have clear rearward vision. The competitor is going beyond the requirements of the Machinery Directive, which, the SME claimed, means that customers then perceive its own products as not fulfilling the ESRs.

Example 6: interpretation

Spanish skid steer loaders are fitted with flashing beacons and a reversing alarm. This is their way of meeting the ESRs. Spanish customers believe that this is mandatory and that a machine only complies with the Directive if these extra items are present. The SME considers that this type of competitor behaviour prevents the creation of a level playing field.

The same type of situation exists in another product area. Two competitors have started putting parking brakes onto their product. The SME's customers are now asking why its products do not have these extra items.

Example 7: barriers due to road regulations

For Italy, certain products need to be homologated for compliance with road regulations. In Germany, TUV certification is also still needed to demonstrate compliance with German road

regulations. Of all EU markets into which the SME sells, Italy is the most difficult in terms of the continued existence of technical barriers. The homologation procedure in Italy is complex. The SME's Italian distributor refused to accept its product as Italy had not transposed the Machinery Directive and it was therefore not mandatory to have a product with a CE marking. The SME believes that compliance with the Directive and the associated cost had caused the product to become uncompetitive.

Example 8: customer requirements

The SME has self-certified its products but one major customer would not accept this as proof of conformity and requested that the SME use a specific testing house to certify its products.

Example 9: impact of the Machinery Directive

The Machinery Directive requires that a kick-back starting handle is used. All manufacturers are having to comply with this. This handle is the item most frequently lost on a building site. Previously, the simple handle cost £15 compared with a cost of £148 for the new handle (on a product price of £2,000). Plant hire companies are reporting that construction companies are losing this handle but refusing to pay for it. This was not a major problem when the handle only cost £15, but now that it costs £148 it is more serious.

6.2.3. Impact on costs

The SME estimates that it has had to increase prices between 3.5% and 11.56% to recover costs associated with compliance with EC Directives.

The company believes that most of its competitors' prices have increased, and that some companies must have improved their margins since the company does not believe that their costs have gone up.

The SME estimates the cost of compliance with the Directives has been nearly ECU 1 million.

6.3. Case study C

6.3.1. Issues addressed

Impact of Directives on:

(a) price developments;
(b) improvements in quality, service, delivery times;
(c) greater product choice.

6.3.2. Introduction

The crane hire company belongs to a diversified industrial and service conglomerate group which has an annual turnover of approximately ECU 2 billion.

The crane hire company is split into four operating divisions:

(a) crawler cranes;
(b) mobile cranes;

(c) cranes for Europe;
(d) cranes world-wide.

6.3.3. The crane hire business since 1980

In 1980 the construction sector was very buoyant. The crane hire company was expanding its business, obtaining lucrative rental rates, and new players were trying to enter the marketplace. At this time, availability of equipment was the most important issue, not price.

Since the early 1980s the following has happened:

(a) the purchase price of cranes has doubled;
(b) operators' wages have trebled;
(c) crane rental rates have remained stable.

6.3.4. Equipment sourcing

In the past, the crane hire company has always purchased cranes from all the global players, in particular German and American manufacturers. All telescopic cranes were sourced from German suppliers whilst crawler cranes were purchased from both American and German companies.

In the mid-1980s there was a dramatic change in the marketplace. Demand shifted to the all-terrain crane which was a universal crane, more compact and able to lift a load and travel with it. The European market led the move to this type of vehicle.

Because the market was buoyant, the key purchasing criteria in the 1980s were availability and speed of delivery, rather than just price.

Today, the crane hire company is purchasing more and more from Japanese suppliers who have a stronger presence in the EU and who are demonstrating greater flexibility in responding to the company's individual requirements than some of the traditional EU-based suppliers.

As an amalgamation of many companies, the crane hire company has a crane parc which comprises the full range of makes. Its future company strategy will be to standardize by focusing on two makes only. As part of this new strategy, the company has recently developed its own specification. An element of the specification is, of course, full compliance with all EC Directives. A supplier must also give a three-year guarantee for parts and service. If a crane breaks down for more than five days in any year, the supplier must pay for the loss of rental income.

6.3.5. Technical issues

Despite the harmonizing of ESRs, there are still differences in national requirements.

National differences

The crane hire company uses left-hand-drive cranes. In the UK, this necessitates the addition of special electric mirrors to improve visibility for the driver. Also, in the UK, a mobile crane

can carry more weight, e.g. fuel and ballast, so cranes generally travel more widely, compared with an average of 60 km travelled by cranes in Europe. The consequences of this is that cranes destined for the UK market need larger fuel tanks.

Road regulations in Germany are still a major barrier (e.g. no driving at weekends, police escort requirements).

Inappropriate standards

The crane hire company believes that crane manufacturers have made crane technology too complicated and user-unfriendly. Design changes have been too rapid. Technology obviously plays a key role in large capacity cranes, but manufacturers are allowing this technology to filter through into the smaller cranes where it is not considered to be necessary. The company believes that users are concerned that EU manufacturers are producing equipment without listening to them. The procedures for developing harmonized standards are alleged to be a factor in this. Previously, national standard-making committees had end-user representation. The make-up of the CEN standards committees is now a political issue and country representation takes precedence over user representation. Countries often send their key manufacturers and not their users.

CE marking compliance

The crane hire company has carried out an audit on some cranes purchased recently. Although the cranes are affixed with the CE marking, the company believes that the manufacturers have not fully understood the risk assessment procedures. It believes that manufacturers address this issue post-design rather than at the design phase. This is particularly noticeable in the case of boom safety protection. There are technical issues which the company thinks need clarification and guidance.

6.3.6. Impact of the single market

Economic benefits

The single market has been beneficial in overall terms, particularly in the area of noise and pollution minimization. It does not believe that equipment is any safer than previously as a result of the Machinery Directive.

However, whilst these general benefits are recognized, the crane hire company believes that there has been a significant cost impact for the user. Manufacturers are complying with new technical Directives and are passing on the entire cost to the customers (contractors and plant hire companies), but they in turn are not able to pass these increases on to their own customers because of the present construction recession.

In general, however, the crane hire company does not see any economic benefits brought by the single market to it as a user. It has not benefited from lower prices, and any price benefits due to standardization are considered to be enhancing the manufacturers' bottom lines.

The company claims that parts are also just as expensive as previously. Increased commonality of parts, however, means that it is able to source parts wherever they are cheapest. The crane hire company does not recognize this as a benefit resulting from the

single market, although it clearly is. (This kind of prejudice was fairly common among respondents to the study.)

The company also sells cranes, but has not noticed any benefits from the single market horizontal measures.

Choice of products

The crane hire company does not believe it has a wider choice of suppliers. It is still dealing with the same suppliers as previously. One noticeable change is possibly the increased strength of the Japanese in the EU, and also the rapid demise of the UK manufacturing base.

Free movement

There are still barriers which are a result of national safety regulations. For example, safety factors for ropes differ from country to country, and if the company sends a crane to France and Norway it must have the crane inspected. The crane hire company worked at the EuroDisney site and used cranes purchased in France. Upon completion of the project it did not have any difficulty taking these cranes to the UK. Had it bought UK cranes and tried to take them into France, however, the situation would have been different because of different requirements regarding rope safety factors, sheave diameters, air receivers and breaking.

6.4. Case study D

6.4.1. The contractor

The contractor is one of Europe's largest in the field of building and civil engineering, and is a major purchaser of construction site equipment. Its main suppliers are:

(a) tower cranes: Potain;
(b) mobile cranes: PPM, Liebherr (at the larger end);
(c) excavators: Caterpillar, JCB (for smaller models).

6.4.2. Purchasing of equipment

The company has a central purchasing department which procures all equipment and materials, but the development of technical specifications and the choice of equipment are made by technical experts in different departments. These experts are familiar with the technology and the building site for which the machine is needed, and they supply the central purchasing department with a very tight specification. They will also usually cost out all options prior to submitting their choice to the central purchasing department. The central purchasing department, therefore, carries out a largely administrative function. For this reason, it was difficult to obtain a complete picture of the contractor's purchasing practice over time, as it is fragmented across the company.

Most of the company's equipment is purchased as opposed to being rented. Equipment is mainly rented when it is required at very short notice or for a brief period.

6.4.3. Changes in purchasing practice

The company's purchasing practice has changed little during the period of implementation of the single market programme. It claims to have increased only marginally the proportion of products procured from other EU countries. One noticeable change since the single market is that the company has become more aware of what foreign companies have to offer and now knows of new suppliers.

As a large contractor requiring high safety standards, good service and above all a high level of confidence in a supplier, the company has built up long-standing relationships with local suppliers and has a preference for continuing to work with these suppliers.

80% of its crane parc comes from one manufacturer. At the beginning of 1994, a crane manufacturer from another Member State tried to enter the local market. It targeted one of the contractor's construction sites. In order to try and gain a foothold, the crane manufacturer offered the contractor a very attractive price. The price offered was approximately 40% lower than that offered by the contractor's usual supplier. Technically, the cranes were very similar and used almost the same components.

The contractor approached its regular supplier with the other company's technical dossier and asked them why there was such a price difference. Meanwhile it sent an engineer to inspect the competitor's factory. The fact that the manufacturer could not explain why its prices were 40% cheaper concerned the contractor. The company decided to remain with its regular supplier because of their long-standing relationship and confidence in their products, but as a result of the offer the contractor was able to negotiate a price reduction.

This example demonstrates the way in which the single market has brought benefits through increased competition. It also illustrates the strength of customers' scepticism of non-national suppliers, and the commercial pressures to support national 'champions' and established suppliers, especially where after-sales support to an existing equipment parc is required.

6.4.4. Distribution structure

The contractor does not consider that the distribution structure for construction site equipment products has changed since 1980. Its perception is that manufacturers are not creating sales networks: rather they are employing visiting sales persons. Foreign companies are, therefore, trying to sell into the local market without a supporting after-sales network being in place.

Owing to the easing of cross-border trading, it is easier for a manufacturer to trade in another country without having a local base. Whilst this may bring savings to the manufacturer, it does little for the level of service offered to the user.

The contractor believes that it is difficult for a new player to enter the market and find a suitable distributor, so these costs of entry have limited the real impact of the reduction in barriers in this sector.

6.4.5. Purchasing criteria

Even if a supplier's products have the CE marking and fulfil all relevant EC Directives, this is not enough for the contractor to have confidence in them. It would not necessarily believe

that equipment complied with Directives because the CE marking had been affixed. The contractor's focus on safety is paramount, as is its need to feel confident in a supplier.

The contractor may purchase products which are not listed in Annex IV to the Machinery Directive, but if it considers that the application of the machinery is dangerous it would request third-party certification.

When the contractor wants to buy a new piece of equipment it takes it apart in order to inspect it and check that the equipment meets the Machinery Directive. The contractor would always inspect the supplier's factory at least twice.

The contractor does buy second-hand equipment. Compliance of second-hand equipment with the Machinery Directive is not of concern as the contractor always ensures that the equipment has been brought up to its own safety standards.

6.4.6. Benefits of the single market

Prices

The contractor believes that prices have reduced in real terms since 1980. The two influencing factors are:

(a) foreign suppliers trying to enter national markets;
(b) a downturn in the European economies.

The contractor pointed out that it is impossible to separate the different influences, but the fact that a major supplier indicated that prices are being pushed down due to new market entrants from other EU countries shows that the single market has indeed brought benefits for end-users in terms of prices. Significant price differences exist: for example, the contractor states that there is a 40-50% price difference between Caterpillar and Komatsu in its national market (but there may also be differences in features, operator costs and resale value).

The contractor believes that the price benefits may have been more important to smaller contractors, to whom initial price advantages of 40-50% may have been more tempting. To a smaller company investment in machinery is a larger burden than it is to a company like the contractor.

Quality

The contractor considers that there have been improvements in quality due to manufacturers paying more attention to quality control and employing personnel specialized in dealing with these issues. Although the contractor does not consider that the EC Directives *per se* have led to better quality products, the single market could have had an indirect influence by intensifying competition.

The Directives are written in a way that leaves much open to interpretation by the manufacturer and can therefore result in many different standards of end-product, but the contractor was unable to give examples of differences in interpretation.

Delivery times

The contractor considers that supply of spare parts has become quicker but the delivery of new machinery has not.

Moving equipment from one EU site to another

Prior to the single market it was necessary to purchase equipment which met local standards for each EU market. However, the contractor pointed out that its nationality is fortunate as standards had always been high in its country. As a consequence, the contractor has the advantage of being able to take equipment from one EU site to another, crossing frontiers. (The interviewees did not point out, but we believe it to be true, that the contractor has expanded its operations in other EU countries, partly by acquisition. The single market programme, including the freer movement and easier EU-wide sourcing of construction site equipment, must have made this easier for the company.)

The contractor does not feel that the EU has brought any significant standardization benefits.

Concerns as a user

The contractor is sceptical about the value of the CE marking at present, and as a user it has little confidence in such self-certification. It does not know who polices it and thinks that there needs to be a better system of enforcement in place before the whole system can function adequately.

7. Conclusions

The research indicates that the single market initiatives are welcomed by the industry, including users, distributors and manufacturers of construction site equipment. The industry has, however, been preoccupied with economic recession during the 1990s and this, together with other specific factors (e.g. liberalization of Eastern Europe, reunification of Germany), has been the main driver of business strategy. The single market measures are viewed by the industry as enablers of defensive strategies including cost reduction through optimizing procurement and rationalizing production. The industry is, however, dominated by global firms operating a clear EU marketing strategy which would not occur without the SMP.

Perceived benefits

(a) economies in product standardization;
(b) lower transport costs;
(c) reduced costs of paperwork associated with intra-EU exports;
(d) faster delivery time to intra-EU clients, particularly of spares;
(e) extra-EU manufacturers becoming EU manufacturers and in some cases establishing R&D capabilities in the EU;
(f) encouraging cross-border competition among independent distributors;
(g) improved product quality;
(h) wider choice of financial services;

However, the industry perceives a number of cost and marketing difficulties resulting from the Directives, as outlined below.

Problems and delays in implementation of SMP Directives

(a) differences in interpretation of noise level regulations (to be corrected by an amendment to the Directive which is currently in draft);
(b) examples of misinterpretation and mistranslation of the Directives;
(c) lack of policing of the CE marking (particular criticism of the customs authorities which are perceived to be weak in checking imported machinery for the CE marking);
(d) lack of awareness of the CE marking and other single market measures by some users;
(e) lack of trust in the CE marking by some users who insist on specifying national standards.

Negative effects of the SMP

(a) administrative costs of complying with the CE marking, especially for SMEs;
(b) impact on competitiveness in third countries which do not have equivalent health and safety requirements.

APPENDIX A

Contacts

A.1. Trade fair

The consultant made numerous contacts with association representatives and manufacturers whilst visiting the BAUMA trade fair in Munich in 1995.

A.2. Trade associations

Contact has been made with the following trade associations and organizations (the asterisk denotes where a face-to-face interview was conducted):

(a) CECE, Frankfurt, Germany*
(b) VDMA, Frankfurt, Germany*
(c) FIMET, Helsinki, Finland
(d) APAVE, Paris, France*
(e) MTPS, Paris, France*
(f) DLR, Paris, France*
(g) FENAME, Lisbon, Portugal
(h) COMMAMOTER, Rome, Italy*
(i) UCOMESA, Milan, Italy*
(j) FMIB, Zoetermeer, Netherlands
(k) ANMOPYC, Zaragoza, Spain*
(l) ATISAE, Madrid, Spain*
(m) SEOPAN, Madrid, Spain*
(n) FEM, Barcelona, Spain*
(o) SACE, Stockholm, Sweden
(p) FMCEC, Thornton Heath, UK*
(q) ANNI, Barcelona, Spain
(r) FME/GKT, Zoetermeer, Netherlands
(s) NVS, Oslo, Norway
(t) BMHF, Smallbrook, UK
(u) SIGMA, Brussels, Belgium
(v) BBI, Bonn, Germany.

A.3. Other organizations

Visits have also been made to the following:

(a) European Metalworkers Association, Brussels
(b) DTI, Standards Policy Unit
(c) European Organization for Testing and Certification (EOTC)
(d) ORGALIME
(e) Construction Europe
(f) Bavarian Ministry of Employment and Social Affairs
(g) TUV.

A.4. Enterprise interviews

The following manufacturers were visited for face-to-face interviews:

Germany

(a) O&K
(b) Bomag
(c) Elba
(d) Liebherr
(e) Komatsu-Hanomag
(f) BKT
(g) Putzmeister
(h) Lescha
(i) Ahlmann
(j) Liebherr

France

(a) Furukawa
(b) Solem
(c) Caterpillar
(d) Potain
(e) Manitou
(f) Case

UK

(a) JCB
(b) Blaw Knox
(c) Grove Worldwide
(d) New Holland

Italy

(a) Fiat-Hitachi
(b) Komatsu-Fai
(c) Mariani
(d) Macmoter

Spain

(a) Comoplesa
(b) Neumac
(c) Tecnoprens
(d) Ausa

Belgium

(a) Komatsu
(b) Volvo

A.5. Case studies

Four companies were visited for the purpose of case studies.

APPENDIX B

Construction site equipment market overview

B.1. Introduction

B.1.1. Sources of statistics

Reliable time series statistics on the construction site equipment sector are not available. There is little statistical information on the construction site equipment industry at a European level. What information there is does not give a full enough coverage of the EU industry and its products, nor a long enough time series to identify long-term trends.

There are four principal sources of data:

(a) Eurostat;
(b) Off-Highway Research;
(c) national governmental statistics;
(d) national associations.

Harmonized European nomenclatures for the construction site equipment sector are still being defined. Comparable European statistics on national sales and production at product level are not expected before 1997.

Eurostat has provided trade statistics from 1978 to 1992 for each of the 12 EU Member States and for Japan, USA and Norway. Statistics cover seven product classifications: 8425, 8426, 8427, 8428, 8429, 8430 and 843140.

Analysis of Eurostat data is difficult due to the following:

(a) It only covers trade information production and other data are at a higher level of aggregation.
(b) There are differences in classification over time: the use of the Nimexe classification for the time period 1978-87 and the use of the CN classification for the 1988-93 time period.
(c) There are differences in the definition of trade data between Eurostat data and national governmental statistics. A comparison of Eurostat data for France with figures provided by the French trade association (MTPS) shows no correlation between the period 1980 and 1987 and a high correlation between 1988 and 1992, suggesting that Eurostat data are only reliable between 1988 and 1992.
(d) Intra-EU import and export data for 1993 and 1994 do not equate as they are now taken from different data sources.
(e) Eurostat statistics are given in current prices.

Off-Highway Research is a consultancy which specializes in statistics for the construction site equipment sector. The Directorate-General for Industry (DG III) of the European Commission has provided the *Construction Equipment Industry in Europe* study produced by Off-Highway (May 1995). The study covers all EU and EFTA countries, and presents

industry data including output, imports and exports in units and ECU value from 1990 to 1993. The study does not, however, include any lifting equipment, such as cranes, nor planers and rollers.

The consultant purchased from Off-Highway Research the international database which is used by the industry and which provides the most accurate market information available for all EU and EFTA countries, the USA and Japan, in terms of sales and production. The database measures production and sales in units for the main geographical areas and covers the time period 1983-94. (Off-Highway Research advises that data available for 1980, 1981 and 1982 are not fully reliable.)

The only data available on cranes is from the Roland Berger report for mobile cranes.

National governmental statistical organizations produce an annual industry census which covers the mechanical engineering sector as a whole. Statistical information was received from the Belgian, British and French organizations but it is at too high an aggregate level for adequate analysis of the construction site equipment industry.

Following the consultant's request, statistics were received for three points in time from Italian ISTAT, French INSEE, Belgian *Institut National de Statistique* and British CSO and OTS. The data vary from one country to another in terms of the years provided and the information available. The consultant has chosen not to use the data.

Some **national industry associations** have statistics but these are confidential to their members. However, in the case of France, the consultant commissioned FEM/MTPS to provide statistics for the 1980-94 time period, broken down by product category.

B.1.2. Methodology

Trade data analysis

Eurostat trade data were supplied in current prices. In order for the data to be meaningful in time series comparisons, data has been converted into constant ECU values. We had no choice but to use the EU-12 consumer price index as the deflator for EU trade. In the case of individual Member States, the producer price index was used as it reflects more closely the product number consideration.

Production data

All production data analysis in the report is presented in terms of units of equipment unless stated otherwise, and is sourced from the Off-Highway international database.

B.2. Demand

B.2.1. The construction industry

Activity in the EU construction industry peaked at the beginning of the 1990s, giving way to a period of recession which has been more marked in some Member States than others. For instance, the German market experienced strong growth in 1991 due to demand in the former East Germany. The UK, by contrast, went into recession.

The indications are that the construction sector is now improving, as can be seen in the forecast shown in Table B.2.1. The exceptions are France and Italy where recession prevails.

Table B.2.1. Forecast construction activity in Western Europe (% change)

	1993	1994*	1995**
EU	-1.6	2.1	2.5
Germany	3.5	7	4
France	-5.1	-1.9	0
UK	-2	2.2	1.5
Italy	-10	-9.5	-2.2
Spain	-7.4	0.6	3.7
Netherlands	-3.4	1.5	3.7
Belgium	-1.6	-1.1	1.5
Portugal	0	-0.8	6.5
Denmark	-3.5	3.4	7.9
Sweden	-13.0	-13.2	3.1
Austria	-0.9	2.2	2.9
Switzerland	-1.9	3.7	1.2
Finland	-17.1	-2.6	6.7
Norway	-1.9	3.3	6.2

*Estimates, ** Forecasts.

Source: *MTPS Info*, May-June 1995.

B.2.2. World demand for earth-moving and road-making equipment

Using production figures as a proxy for demand, world demand in 1993 for earth-moving and road-making equipment (but excluding cranes and other lifting equipment) was 318,655 units. As shown in Table B.2.2, mini excavators accounted for the largest share, with 20% (but a smaller share in value terms). Three products, the wheeled loaders, crawler excavators and mini excavators, accounted for over 54% of total world demand.

Table B.2.2. Structure of world demand[1]

Products	1993
Mini excavators	20.3
Crawler excavators	18.8
Wheeled loaders	15.4
Skid steer loaders	13.1
Backhoe loaders	13.0
Crawler dozers	5.9
Rough terrain lift trucks	4.2
Wheeled excavators	3.9
Motor graders	2.2
Asphalt finishers	1.1
Crawler loaders	0.8
Articulated dump trucks	0.7
Rigid dump trucks	0.6

[1] As % of world production in units.

Source: Off-Highway Research.

B.2.3. World demand for mobile cranes

Mobile cranes include truck cranes, all terrain cranes and rough terrain cranes. In 1993, world demand for mobile cranes was 6,000 units, broken down as follows: 60% of world mobile cranes are rough terrain cranes, 23% are all terrain cranes and 17% are truck cranes. The global mobile cranes market has dramatically declined during the last three years. This sharp decline is illustrated by the 1990 market demand figures of 11,500 units, representing a reduction of almost 50% over a four-year period.

Japan is the largest market for mobile cranes and accounts for 2,700 cranes (compared with almost 5,000 units in 1990). The USA is the second largest market, with sales of 1,104 units in 1993 compared to 1,600 in 1990.

Table B.2.3. Structure of world market for mobile cranes, 1993

Country	Number of units sold	% share of market
Japan	2,700	45
US	1,104	19
Germany	828	14
Italy	72	1
UK	72	1
Netherlands	72	1
Other European States	702	12
Other Asian countries	300	5
Rest of the world	96	2
Total world market	**5,946**	**100**

Source: Roland Berger Management Consultancy.

B.2.4. European markets

The EU is the second largest market for construction site equipment in which sales of all types of equipment, excluding cranes, reached ECU 5.75 billion in 1993.

Between 1990 and 1993 sales fell by 18.5% in volume, representing a unit decline from 102,000 to 86,000 units. Over the same period, however, the value of sales fell 27% from ECU 7,019 million to ECU 5,746 million, because of the trend towards smaller, cheaper types of equipment such as mini excavators and small wheeled loaders.

The table below shows that while total sales fell over the 1990-93 period, the percentage of sales attributable to the five largest EU countries increased by approximately 5% in unit and value terms. In 1993, Germany, Italy, France, Spain and the UK accounted for 87.5% of total European sales as against 83% in 1990. It can also be seen that Germany tends to build higher value equipment whilst the other four countries tend to specialize in lower value high volume products.

Table B.2.4. Market shares in the industry by EU Member State

Country	1990		1993	
	Market share (units)	Market share (value)	Market share (units)	Market share (value)
Germany	28.1%	30%	47%	54%
Italy	16.5%	13.5%	12.9%	8%
France	15.6%	14.5%	10.3%	9%
UK	14.3%	12%	15%	12%
Spain	8.5%	10%	2.5%	2%
5 largest EU markets	**83%**	**80%**	**87.7%**	**85%**
Other EU countries	**17%**	**20%**	**12.3%**	**15%**

Source: Off-Highway Research.

B.3. Supply

B.3.1. Structure of European supply

Using national construction site equipment associations in each country, WS Atkins has recorded 274 companies manufacturing equipment within the scope of this study.

Table B.3.1. Number of European manufacturers

Country	Number of manufacturers
Austria	1
Belgium	8
Denmark	1
Finland	1
France	32
Germany	85
Greece	0
Ireland	1
Italy	52
Netherlands	6
Norway	3
Spain	36
Sweden	3
Switzerland	3
UK	42
Total	274

Source: WS Atkins, Off-Highway Research and Member State trade associations, 1995.

Analysis of the earth-moving and road-making equipment market structure shows that:

(a) 82% of sales in EU and EFTA countries are by 23 major companies;
(b) the five largest manufacturers produce 45% of total EU and EFTA demand;
(c) manufacturing locations in Europe are concentrated in Italy, the UK, France and Spain.

Table B.3.2. Five largest European manufacturers in 1993 in terms of units

Company name	Manufacturing location	Equipment portfolio	Units
Caterpillar	UK, France and Belgium	45% backhoe loaders 24% wheeled loaders 16% crawler excavators 15% others	14,300
JCB	UK	60% backhoe loaders 18% rough terrain lift trucks 9% mini excavators 13% others	12,455
VME	Sweden and Germany	71% wheeled loaders 18% articulated dump trucks 11% others	6,050
Atlas Weyhausen	Germany and UK	45% wheeled loaders 30% wheeled excavators 14% mini excavators 11% crawler excavators	5,050
New Holland	Italy	100% backhoe loaders	4,700
Total for 5 firms			**42,555**
Total sales by EU manufacturers			**86,140** **ECU 5,747 million**

Source: Off-Highway Research 'Report Volume 1 for European Commission DG III'.

Table B.3.3. The next 16 largest European manufacturers in 1993 in terms of units

Company	Manufacturing location	Units
Liebherr	Austria, France, and Germany	3,910
FAI	Italy	3,871
Manitou	France and Italy	3,590
Case Corporation	France	3,500
O&K	Germany	3,420
Fiat-Hitachi	Italy	3,181
Komatsu	UK and Germany	2,787
Kramer	Germany	2,550
Kubota	Germany	2,400
Pel-Job	France	2,170
Fermec	UK	2,000
Hanix	UK	1,064
Aveling Barford	UK	600
Furukawa	France and Germany	594
Terex	UK	363
Vogele	Germany	400
Total for 16 firms		**36,400**
Total sales by EU manufacturers		**86,140** **ECU 5,747 million**

Source: Off-Highway Research 'Report Volume 1 for European Commission DG III'.

Figures B.3.1 to B.3.6 show the European production breakdown by product and country and indicate the various changes that have occurred in the industry at three points in time, 1983, 1988 and 1994.

The main five products manufactured in Europe are:
(a) backhoe loaders;
(b) wheeled loaders;
(c) mini excavators;
(d) crawler excavators;
(e) wheeled excavators.

These products account for 81% of total European output. Table B.3.4 details their percentage share of world production and the number of units produced in 1993. The table shows that this is a global industry, with specialization between regions, not just within the EU. EU firms have a leading world share in backhoe loaders, wheeled excavators and wheeled loaders.

Table B.3.4. Main products in EU production of 'off-highway' equipment

Product	EU share of world production (%)	EU production (units, 1993)
Backhoe loaders	64	26,336
Wheeled loaders	47	23,076
Mini excavators	21	3,704
Crawler excavators	17	10,173
Wheeled excavators	77	9,513

Source: WS Atkins and Off-Highway.

Figure B.3.1. EU production of wheeled loaders (units)

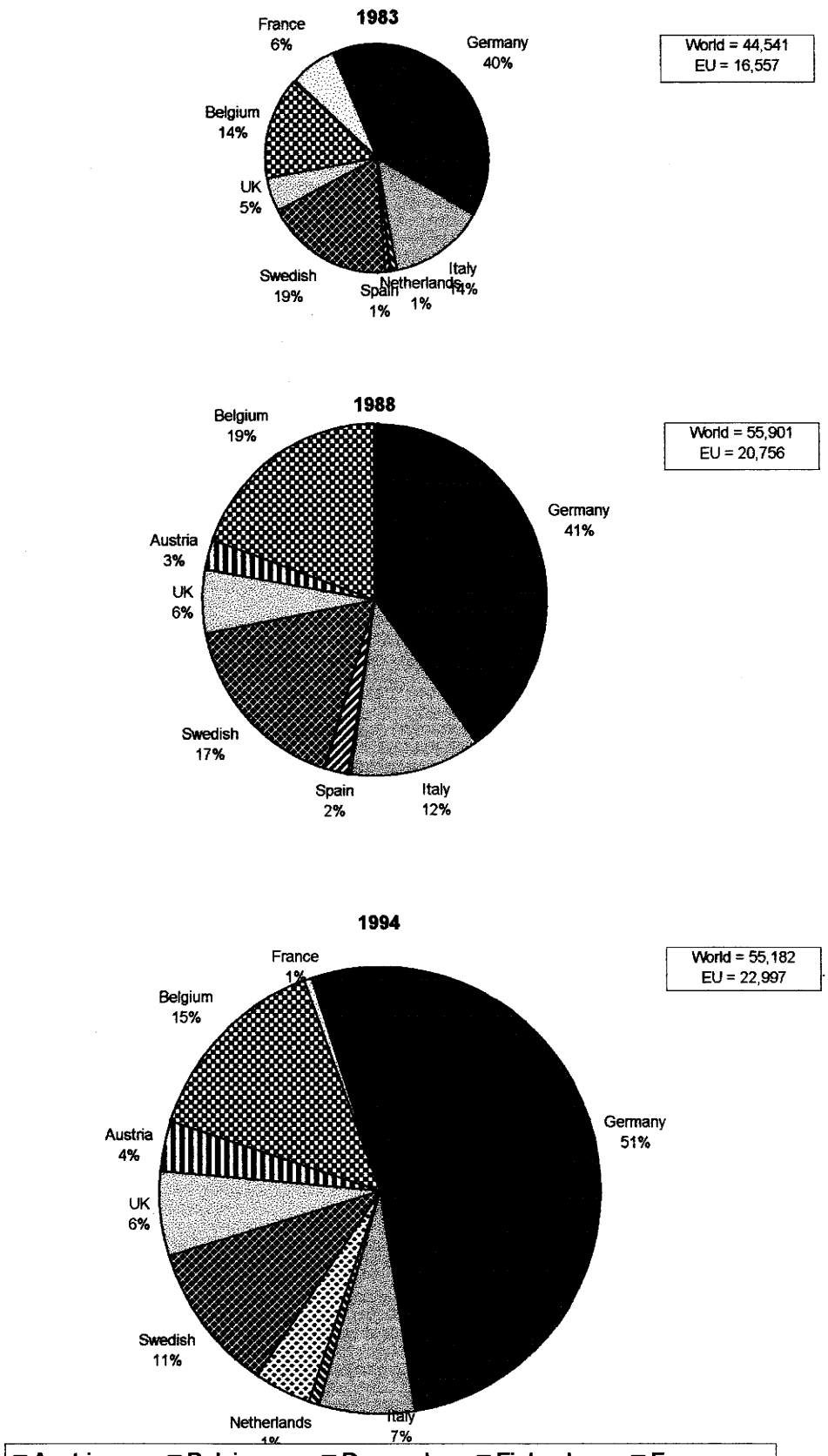


Figure B.3.2. EU production of wheeled excavators (units)

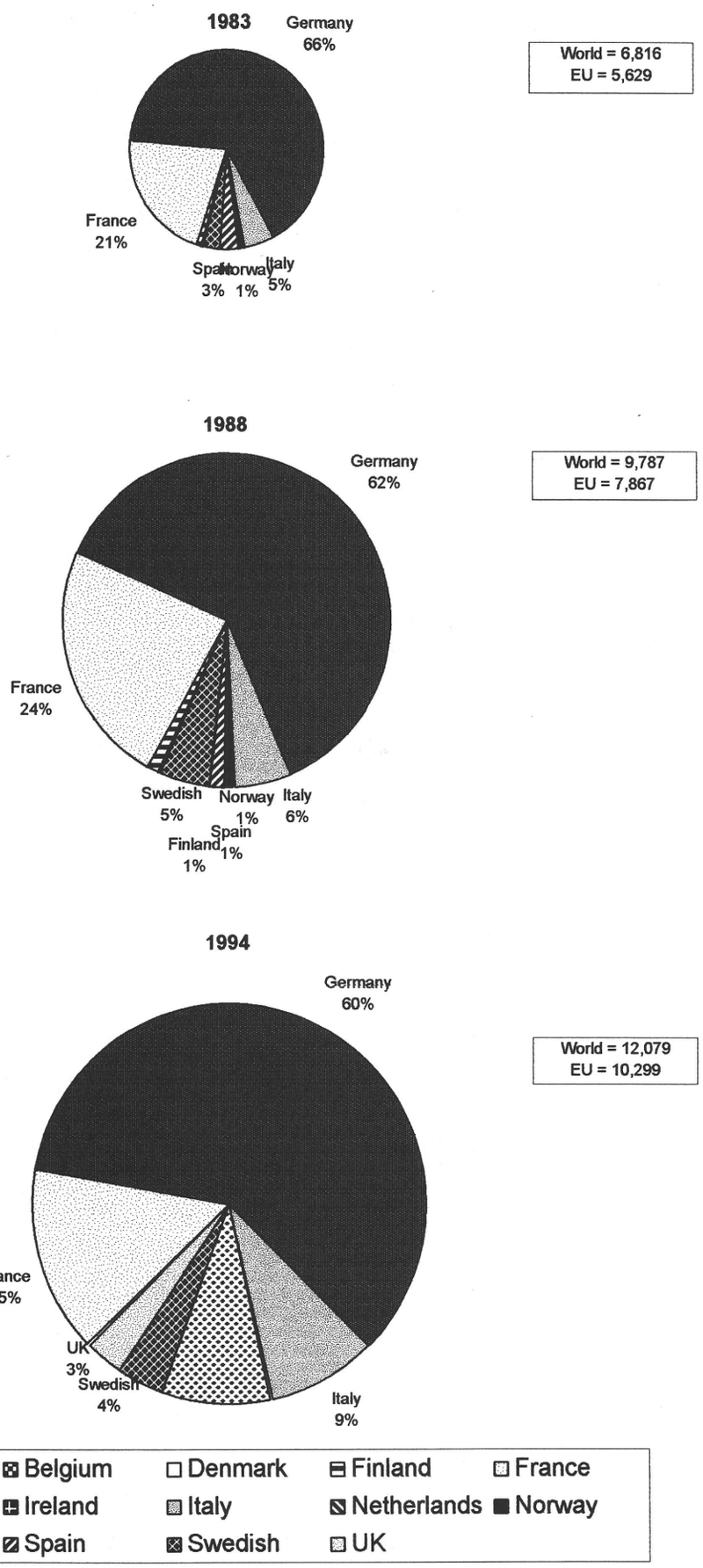


Figure B.3.3. EU production of rough terrain lift trucks (units)

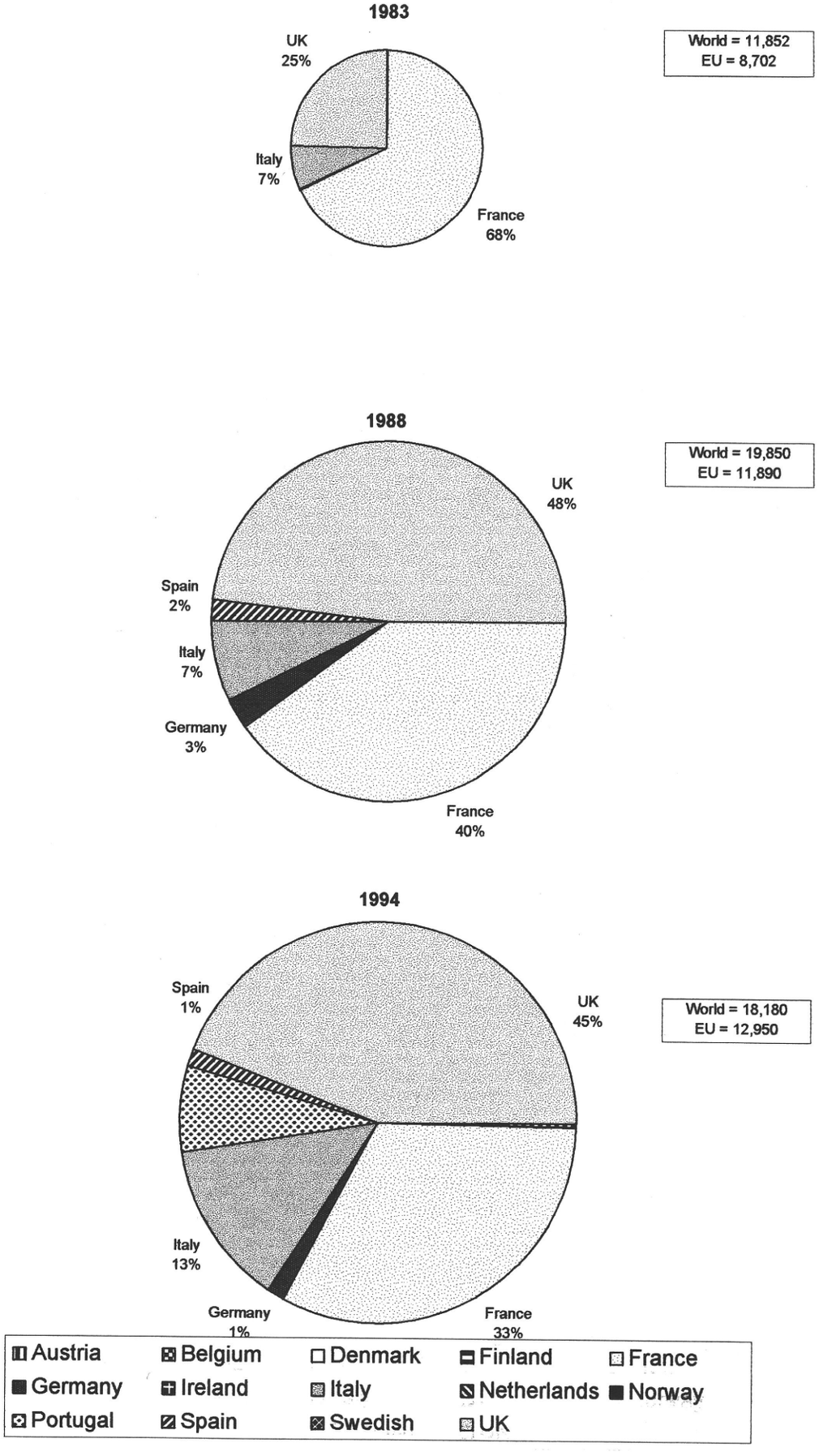


Figure B.3.4. EU production of mini excavators (units)

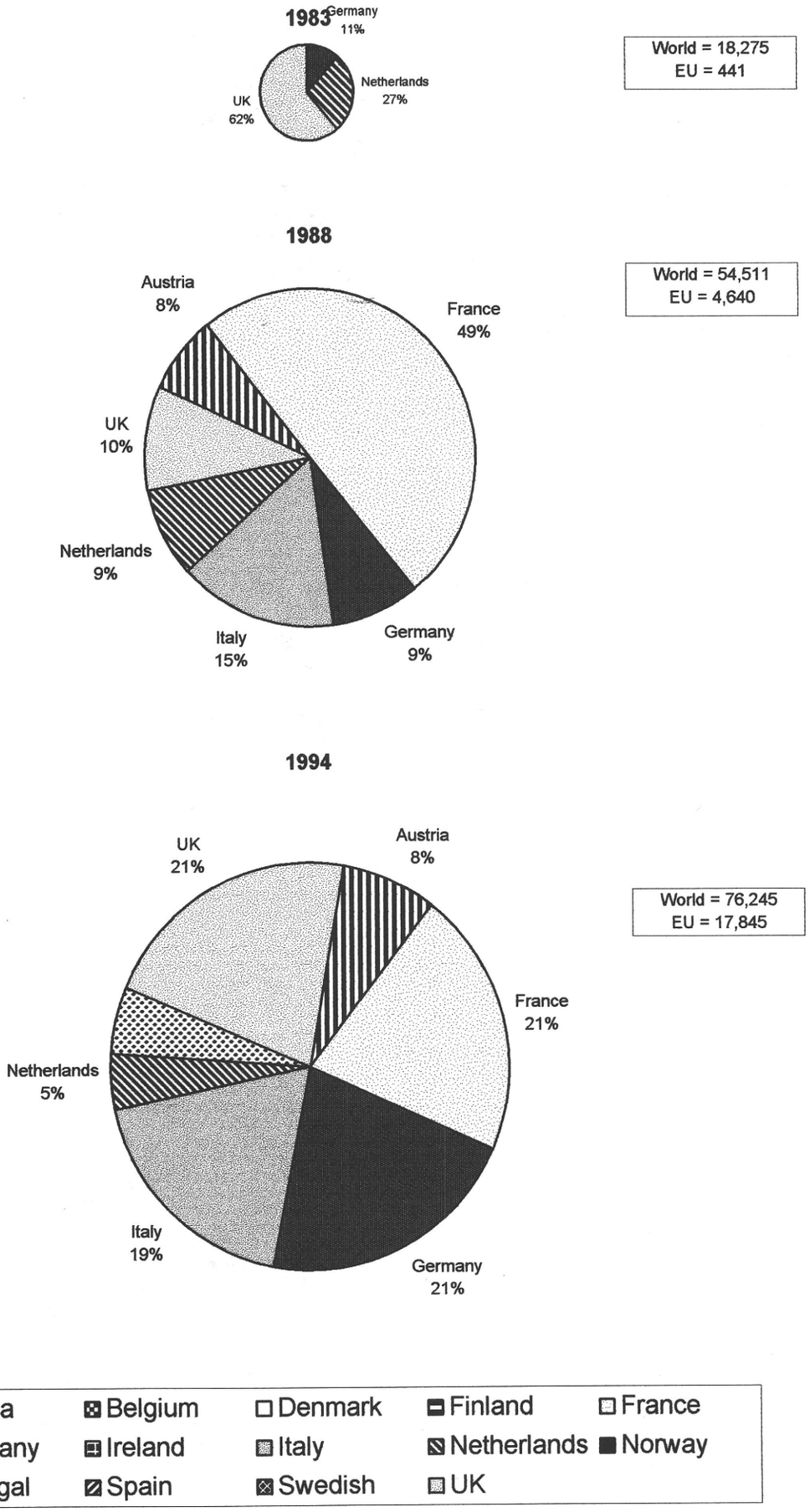


Figure B.3.5. EU production of crawler excavators (units)

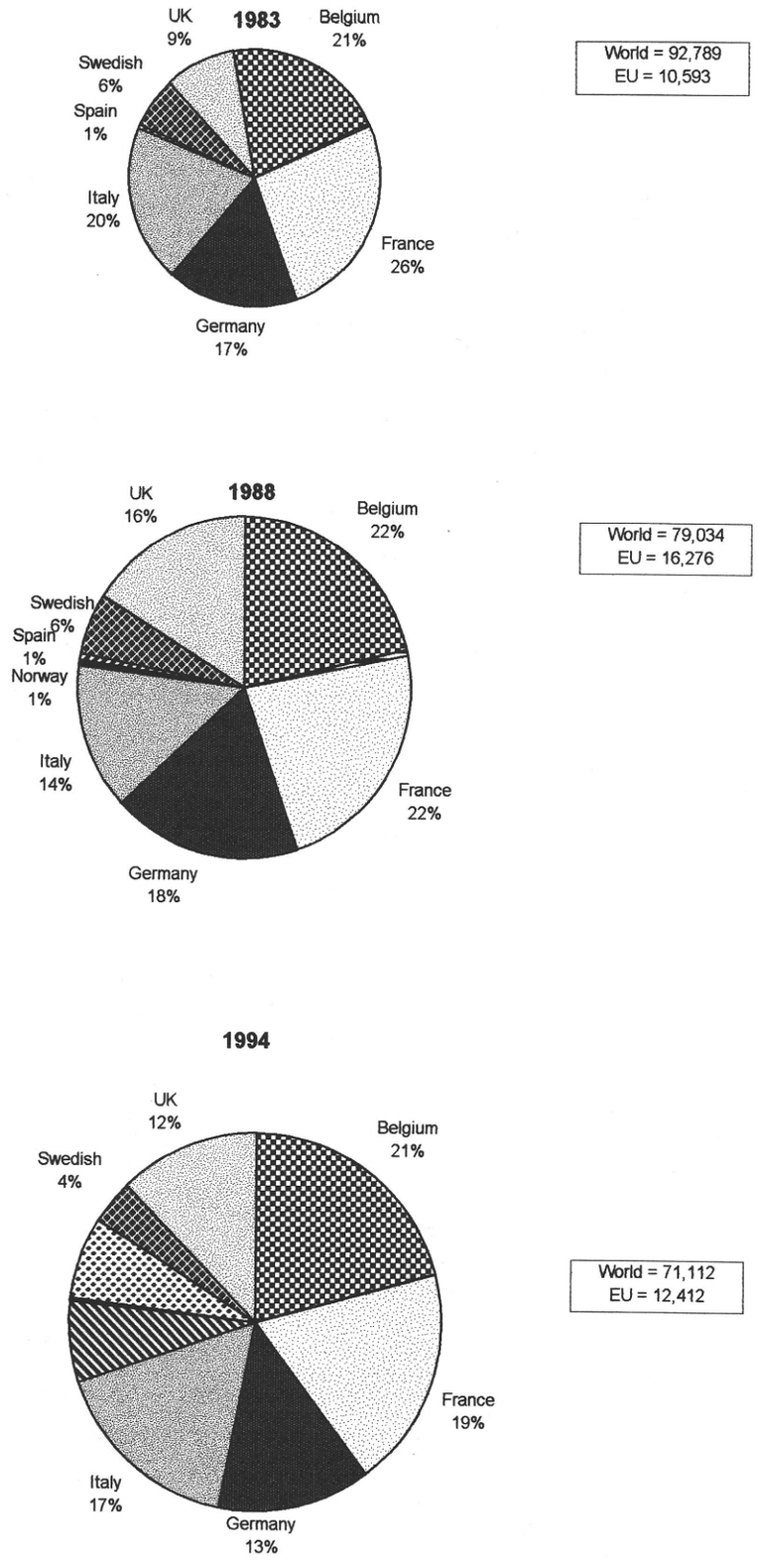
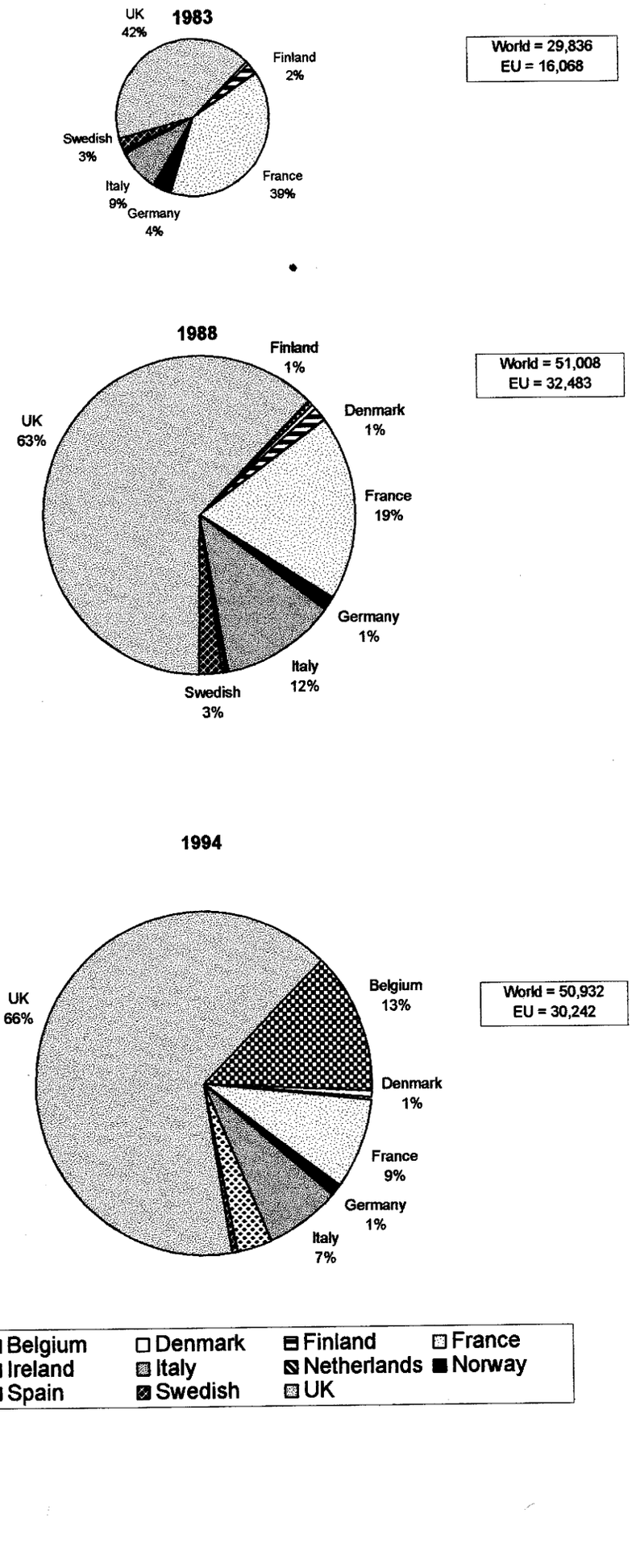


Figure B.3.6. EU production of backhoe loaders (units)



The consultant has analysed the structure of the European supply for the following equipment:

(a) backhoe loaders,
(b) wheeled loaders,
(c) mini excavators.

Largest European manufacturers of backhoe loaders

The leading product in the European construction site equipment market is the backhoe loader, of which 26,336 units were produced in 1993 representing a value of about ECU 1 billion.

European production represents 64% of world output. In 1993, five European suppliers represented approximately 87% of European output. Key production locations are in the UK where market leaders JCB and Caterpillar respectively manufacture 28% and 25% of total European production.

Table B.3.5. Largest European manufacturers of backhoe loaders, 1993

Company	Manufacturing location	Units produced
JCB	UK	7,500
Caterpillar	UK	6,500
New Holland	Belgium	4,700
Case Corporation	France	2,300
Fermec	UK	2,000
Total		**23,000**

Source : Off-Highway Research; WS Atkins

Largest European manufacturers of wheeled loaders

Total European production of wheeled loaders reached 23,076 units in 1993, accounting for 47% of world output in terms of units.

The five largest EU manufacturers of wheeled loaders produce 60% of European output with Germany as the main location for wheeled loader production.

Table B.3.6. Five largest European manufacturers of wheeled loaders, 1993

Company	Manufacturing location	Units produced
VME	Germany and Sweden	4,300
Caterpillar	Belgium and UK	3,500
Kramer	Germany	2,400
Atlas Weyhausen	Germany	2,300
O&K	Germany	1,280
Total		13,780

Source: Off-Highway Research; WS Atkins.

Largest European manufacturers of mini excavators

Total world production of mini excavators was 64,624 units in 1993, of which 21% was produced in the EU (13,704 units produced in 1993 with an average total sales value of ECU 315 million).

The five largest European manufacturers of mini excavators are shown in Table B.3.7. Together they manufacture 56% of the total European output of mini excavators.

Table B.3.7. Five largest European manufacturers of mini excavators, 1993

Company	Manufacturing location	Units produced
Kubota	Germany	2,400
Pel-Job	France	1,750
FAI	Italy	1,300
JCB	UK	1,150
Hanix	UK	1,064
TOTAL		**7,664**

Source: Off-Highway Research; WS Atkins.

B.4. Indicators of European competitiveness

Table B.4.1. Indicators of competitiveness of EU Member States

	1990	1993
Import ratio	11.9%	11.6%
Export ratio	28.2%	27.5%
Net export ratio	41%	39%
Share of world production	*	32.2%

* Not available

Source: Off-Highway Research.

Import ratio: Imports in value/apparent consumption
Export ratio: Export in value/sales
Net export ratio: Export - import/import + export
Production: Production/world production

Table B.4.2. Indicators of competitiveness, France

	1990	1993
Import ratio	19.6%	21.6%
Export ratio	50.8%	54.2%
Net export ratio	44%	54%
Share of world production	*	4.7%

* Not available.

Source: Off-Highway Research

Table B.4.3. Indicators of competitiveness, Germany

	1990	1993
Import ratio	6.5%	6.7%
Export ratio	11.7%	5%
Net export ratio	32%	-16%
Share of world production	*	9.1%

* Not available.

Source: Off-Highway Research.

Table B.4.4. Indicators of competitiveness, Italy

	1990	1993
Import ratio	8.2%	13.5%
Export ratio	21.9%	27%
Net export ratio	52%	41%
Share of world production	*	4.1%

* Not available.

Source: Off-Highway Research.

Table B.4.5. Indicators of competitiveness, Spain

	1990	1993
Import ratio	14.8%	14.5%
Export ratio		
Net export ratio	-1	-1
Share of world production	*	0.1

* Not available.

Source: Off-Highway Research.

Table B.4.6. Indicators of competitiveness, UK

	1990	1993
Import ratio	23.2%	49.5%
Export ratio	59.6%	88.2%
Net export ratio	0.66	0.77
Share of world production	*	8.6

* Not available.

Source: Off-Highway Research.

APPENDIX C

Community legislation, etc.

C.1. Directives

Council Directive 70/220/EEC of 20 March 1970 on the approximation of the laws of the Member States relating to measures to be taken against air pollution by gases from positive-ignition engines of motor vehicles (OJ L 76, 6.4.1970, p. 1), amended by Directives 78/665/EEC (OJ L 223, 14.8.1978, p. 48), 83/351/EEC (OJ L 197, 20.7.1983, p. 1), 88/76/EEC (OJ L 36, 9.2.1988, p. 1), 88/436/EEC (OJ L 214, 6.8.1988, p. 1), 93/59/EEC (OJ L 186, 28.7.1993, p. 21) and 94/12/EC (OJ L 100, 19.4.1994, p. 42).

Council Directive 73/23/EEC of 19 February 1973 on the harmonization of the laws of Member States relating to electrical equipment designed for use within certain voltage limits (OJ L 77, 26.3.1973, p. 29), amended by Directive 93/68/EEC (OJ L 220, 30.8.1993, p. 1).

Council Directive 74/561/EEC of the 12 November 1974 on admission to the occupation of road haulage operator in national and international transport operations (OJ L 308, 19.11.1974, p. 18), amended by Directives 85/578/EEC (OJ L 372, 31.12.1985, p. 34) and 89/438/EEC (OJ L 212, 22.7.1989, p. 101).

Council Directive 77/796/EEC of 12 December 1977 aiming at the mutual recognition of diplomas, certificates and other evidence of formal qualifications for goods haulage operators and road passenger transport operators, including measures intended to encourage these operators effectively to exercise their right to freedom of establishment (OJ L 334, 24.12.1977, p. 37), amended by Directive 89/438/EEC, (OJ L 212, 22.7.1989, p.101).

Council Directive 83/189/EEC of 28 March 1983 laying down a procedure for the provision of information in the field of technical standards and regulations (OJ L 109, 26.4.1983, p. 8).

Council Directive 84/534/EEC of 17 September 1984 on the approximation of the laws of the Member States relating to the permissible sound power level of tower cranes (OJ L 300, 19.11.1984, p. 130), amended by Directive 87/405/EEC (OJ L 220, 8.8.1987, p. 60).

Council Directive 85/374/EEC of 25 July 1985 on the approximation of the laws, regulations and administrative provisions of the Member States concerning liability for defective products (OJ L 210, 7.8.1985, p. 29).

Council Directive 86/295/EEC of 26 May 1986 on the approximation of the laws of the Member States relating to roll-over protective structures (ROPS) for certain construction plant (OJ L 186, 8.7.1986, p. 1); Council Directive 86/296/EEC of 26 May 1986 on the approximation of the laws of the Member States relating to falling-object protective structures (FOPS) for certain construction plant (OJ L 186, 8.7.1986, p. 10).

Council Directive 86/662/EEC of 22 December 1986 on the limitation of noise emitted by hydraulic excavators, rope-operated excavators, dozers, loaders and excavator-loaders (OJ L 384, 31.12.1986, p. 1), amended by Directives 89/514/EEC (OJ L 253, 30.8.1989, p. 35) and 95/27/EEC (OJ L 168, 18.7.1995, p. 14).

Council Directive 87/404/EEC of 25 June 1987 on the harmonization of the laws of the Member States relating to simple pressure vessels (OJ L 220, 8.8.1987, p. 48), amended by Directive 93/68/EEC (OJ L 220, 30.8.1993, p. 1).

Council Directive 88/77/EEC of 3 December 1987 on the approximation of the laws of the Member States relating to the measures to be taken against the emission of gaseous pollutants from diesel engines for use in vehicles (OJ L 36, 9.2.1988, p. 33), amended by Directives 91/542/EEC (OJ L 295, 25.10.1991, p. 1) and 96/1/EC (OJ L 40, 17.2.1996, p. 1).

Council Directive 89/336/EEC of 3 May 1989 on the approximation of the laws of the Member States relating to electromagnetic compatibility (OJ L 139, 23.5.1989, p. 19), amended by Directives 91/263/EEC (OJ L 128, 23.5.1991, p. 1), 92/31/EEC (OJ L 126, 12.5.1992, p. 11) and 93/68/EEC (OJ L 220, 30.8.1993, p. 1).

Council Directive 89/392/EEC of 14 June 1989 on the approximation of the laws of the Member States relating to machinery (OJ L 183, 29.6.1989, p. 9), amended by Directives 91/368/EEC (OJ L 198, 22.7.1991, p. 16), 93/44/EEC (OJ L 175, 19.7.1993, p. 12) and 93/68/EEC (OJ L 220, 30.8.1993, p. 1).

Council Directive 89/655/EEC of 30 November 1989 concerning the minimum safety and health requirements for the use of work equipment by workers at work (second individual directive within the meaning of Article 16(1) of Directive 89/391/EEC) (OJ L 393, 30.12.1989, p. 13), amended by Directive 95/63/EC (OJ L 335, 30.12.1995, p. 28).

Council Directive 93/68/EEC of 22 July 1993 amending Directives 87/404/EEC (simple pressure vessels), 88/378/EEC (safety of toys), 89/106/EEC (construction products), 89/336/EEC (electromagnetic compatibility), 89/392/EEC (machinery), 89/686/EEC (personal protective equipment), 90/384/EEC (non-automatic weighing instruments), 90/385/EEC (active implantable medicinal devices), 90/396/EEC (appliances burning gaseous fuels), 91/263/EEC (telecommunications terminal equipment), 92/42/EEC (new hot-water boilers fired with liquid or gaseous fuels) and 73/23/EEC (electrical equipment designed for use within certain voltage limits) (OJ L 220, 31.8.1993, p. 1).

Directive 94/9/EC of the European Parliament and the Council of 23 March 1994 on the approximation of the laws of the Member States concerning equipment and protective systems intended for use in potentially explosive atmospheres (OJ L 100, 19.4.1994, p. 1).

C.2. Decisions

Council Decision 93/465/EEC of 22 July 1993 concerning the modules for the various phases of the conformity assessment procedures and the rules for the affixing and use of the CE conformity marking, which are intended to be used in the technical harmonization directives (OJ L 220, 30.8.1993, p. 23).

C.3. Case law

Case 120/78, *REWE* v *Bundesmonopolverwaltung für Branntwein* [1979] ECR 649.

Bibliography

1. Legislation and Directives from the Official Journal

Council Directive 89/438/EEC of 21 June 1989 amending Directive 74/561/EEC.

Council Directive 93/68/EEC of 22 July 1993.

Council Directive 91/368/EEC of 20 June 1991 amending Directive 89/392/EEC.

Council Directive 92/31/EEC of 28 April 1992 amending Directive 89/336/EEC.

2. DTI booklets

The European Economic Area.

Product Standards - Machinery (UK regulations edition, April 1993).

Product Standards - Machinery Update (UK amending regulations, October 1994).

Product Standards - Machinery Update (UK amending regulations edition, October 1994).

Product Standards, Preventing New Technical Barriers.

Products Standards, Conformity Assessment.

Product Standards, Keeping your Product on the Market.

The Single Market, Influencing Decisions in the European Community.

The Single Market, New Approach to Technical Harmonization and Standards.

The Single Market, Testing Certification and Inspection.

3. Databases

Databases that have been used during the project are the following:
SPEARHEAD, DTI's computerized database on the single market and related legislation.

Market and manufacturers information

ABI/Inform

Financial Times

McCarthy Cards

Company accounts and broker reports

Amadeus

Disclosure United States

UK Company Fact Finder

4. Journal and trade magazines

Building, UK magazine.

Cranes Today, UK magazine:

(i) Italian Review, Export Bonanza, May 1994

(ii) Japanese Review, Made in Japan, February 1993

(iii) Far East/Pacific Rim, Thai Cranes, Far East Crawlers, Hong Kong Tower, February 1995

(iv) France Survey, December/January 1994

(v) Market Survey, Slight Upturn, December/January 1995

(vi) German Market, Looking for a Lift, August 1994

(vii) Scandinavia, On the up?, September 1994

(viii) US Survey, Winds of Change, November 1994

(ix) World Survey, The Rise and Rise of all Terrain, October 1994

(x) Rental Review, Crane Hire, February 1993

(xi) Cranes Today, Euro-Kosher Cranes, April 1995

(xii) USA CCO Presses for Nation-wide Operator Certification, April 1995

(xiii) CE Safety Update, March 1992

(xiv) 1993, a New Benchmark for Safety, April 1993.

Construction Equipment/Construction News, UK magazine.

Construction Europe, UK magazine:

(i) regular CECE reports

(ii) press releases on individual companies.

Costruire, Italian magazine.

Costruzioni, Italian magazine.

European Access (Journal), UK magazine.

European Construction News, UK magazine.

Fabrimetal Magazine, published monthly by the Belgian Association.

The Financial Times:

(i) The FT Engineering Review, March 1994

(ii) The Queen's Awards 1994 to JCB, April 1994

(iii) UK Company News, 16 May 1994

(iv) UK Company News, 14 June 1994

(v) Perkins Clinches Pounds 660m Deal, 8 June 1994

(vi) Earth-movers Ride a Rough Currency Road, April 1995

(vii) Gaining Ground in the Earth-mover Industry, March 1995.

Plant Managers Journal, UK magazine.

Plant World, UK magazine.

Process Engineering, 'Stay tuned in to EMC Directive from EC', April 1993.

Quarry and Construction, Italian magazine.

Resale Weekly, UK magazine.

Le Strade, Italian magazine.

5. Reports and publications

Comparative data for construction equipment, Dataquest, 1980/1983 (reports on the following products: crawler tractors, trenching equipment, hydraulic cranes and crawler cranes).

Green Guide, The standard reference for construction equipment, Palo Alto, 1980/1983.

European single market, Matters affecting the construction industry, Access, March 1989.

The UK market for electro-magnetic compatibility testing, WS Atkins, June 1989.

The construction industry and the European Community, N. F. Spencer Chapman and C. Grandjean, 1991.

Business ratios for the construction equipment industry, ICC Financial Surveys, 1991.

The guide to the EMC Directive 89/336/EEC, Chris Marshman, EPA Press, 1992.

1992, The Single Market Handbook, Euromonitor, 1992.

Fork lift truck hire (Financial analysis of UK companies), MBA Management Consultancy, 1993.

Construction sector strategy report, WS Atkins, 1993.

The Community internal market, First annual report on the operation of the internal market, 1993.

Electro-magnetic compatibility testing in the UK, Independent testing and the European Directive and survey of third-party test houses, J. Moore Associates Ltd, 1993.

Product liability in Europe: a practical guide for industry, 2nd edition, Orgalime, 1993.

Guide to the new GATT, Economic Intelligence Unit, 1994.

The construction equipment industry in Europe, Off-Highway Research, May 1995.

Interim review of implementation of the Fifth Community Action Programme on the environment: Towards sustainability, Orgalime, May 1995.

Interpreting the Machinery Directive and affixing the CE mark, 2nd edition, FEM, 1995.

Nature and structure of the world mobile crane market, study, Roland Berger & Partner, 1995.

1995-96 World Crane Guide.

European market for electro-magnetic compatibility products and services, Frost & Sullivan, 1994.

Product Guide, Federation of Manufacturers of Construction Equipment and Cranes, 1995.

A series of booklets published by the European Round Table (ERT) have been used, including *Cross-border Mergers in Europe* and *Reshaping Europe.*

6. EC publications

European Commission, *Completing the Internal Market: White Paper from the Commission to the Council,* COM(85) 310 final, Luxembourg, Office for Official Publications of the EC, 1985.

European Commission, 'The economics of 1992', *European Economy,* Vol. 35, Luxembourg, Office for Official Publications of the EC, March 1988.

European Commission, *Growth, competitiveness, employment: The challenges and ways forward to the 21st century,* White Paper, Luxembourg, Office for Official Publications of the EC, 1993.

European Commission: Massimi, P., and J.-P. Van Gheluwe, *Community legislation on machinery: Comments on Directive 89/392/EEC and Directive 91/368/EEC,* Luxembourg, Office for Official Publications of the EC, 1993.

European Commission, *Making the most of the internal market: Strategic programme,* Luxembourg, Office for Official Publications of the EC, 1993.

European Commission, *23rd Annual Report on competition policy,* Luxembourg, Office for Official Publications of the EC, 1993.

European Commission, *Internal market: Current status 1 July 1994,* Vol. 1: 'A common market for services', Luxembourg, Office for Official Publications of the EC, 1994.

European Commission, *Internal market: Current status 1 July 1994,* Vol. 2: 'The elimination of frontier controls', Luxembourg, Office for Official Publications of the EC, 1994.

European Commission, *Internal market: Current status 1 July 1994,* Vol. 3: 'Conditions for business cooperation', Luxembourg, Office for Official Publications of the EC, 1994.

European Commission, *Internal market: Current status 1 July 1994,* Vol. 4: 'A new Community standards policy', Luxembourg, Office for Official Publications of the EC, 1994.

European Commission, *Report of the group of independent experts on legislative and administrative simplification,* COM(95) 288 final (2 vols), Luxembourg, Office for Official Publications of the EC, 1995.

Directory of Community legislation in force and other acts of the Community institutions, 27th edition, Vol. I and II, Luxembourg, Office for Official Publications of the EC, 1996.