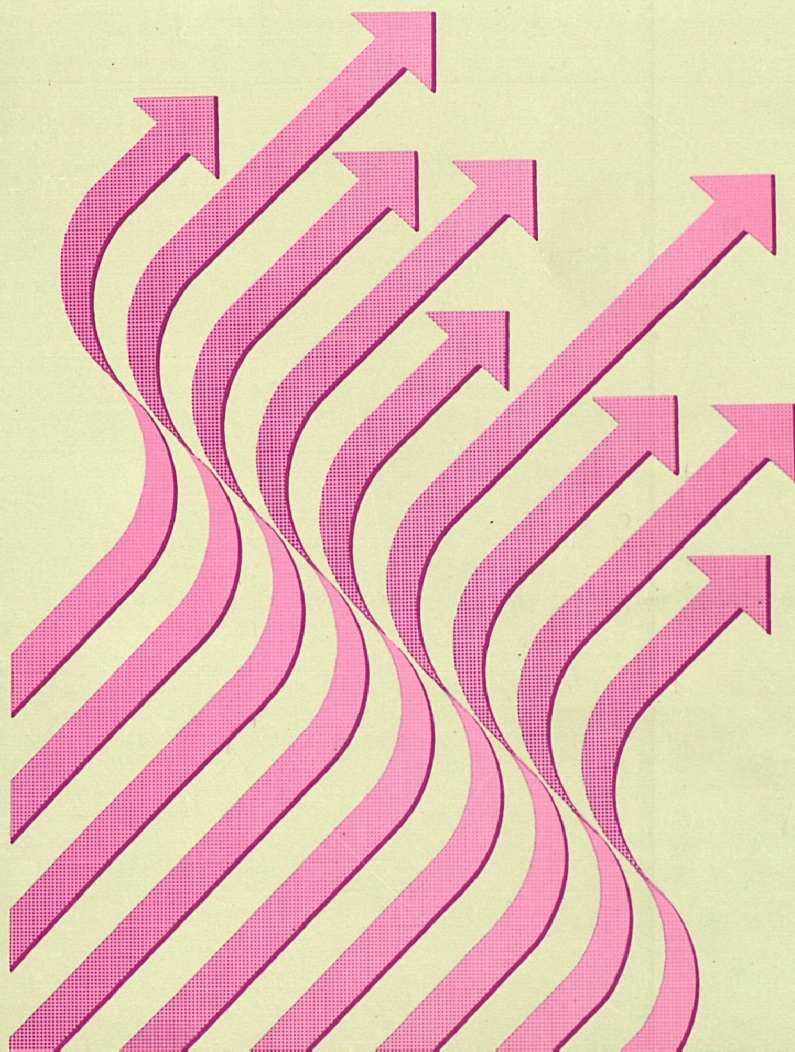


EUR 10.955

# Supporting infrastructure for innovation, technology transfer and enterprise creation in Spain and Portugal



Commission of the  
European Communities

1987

EUR 10955 EN-ES



# Supporting infrastructure for innovation, technology transfer and enterprise creation in Spain and Portugal

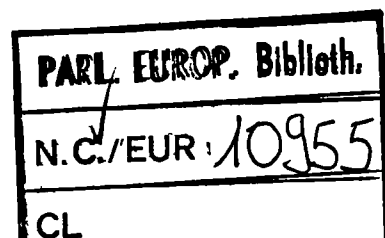
Study conducted by the Department  
of Research of IESE under the  
direction of Professor Pedro Nueno

Instituto de Estudios Superiores  
de la Empresa  
Universidad de Navarra  
Av. Pearson, 21  
E-08034 Barcelona (Pedralbes)

Commission of the European Communities  
Directorate-General  
Telecommunications,  
Information Industries and Innovation

1987

EUR 10955 EN-ES



**Published by the  
COMMISSION OF THE EUROPEAN COMMUNITIES  
Directorate-General  
Telecommunications, Information Industries and Innovation  
Bâtiment Jean Monnet  
LUXEMBOURG**

**LEGAL NOTICE**

Neither the Commission of the European Communities nor any person acting on behalf of the Commission is responsible for the use which might be made of the following information

Cataloguing data can be found at the end of this publication

Luxembourg: Office for Official Publications of the European Communities, 1987  
ISBN 92-825-7228-5 Catalogue number: CD-NA-10955-2N-C  
© ECSC-EEC-EAEC, Brussels · Luxembourg, 1987

*Printed in Belgium*

# INDEX

	Page
1. INTRODUCTION: OBJECTIVES AND METHODOLOGY .....	1
2. BACKGROUND TO INDUSTRIAL PROMOTION IN SPAIN .....	3
2.1. Unemployment and Reconversion .....	3
2.2. Technological Dependence .....	4
2.3. Government Response .....	5
2.4. Handicaps for Entrepreneurship .....	6
2.5. The Process of Regionalization .....	10
3. THE SPANISH INFRASTRUCTURE FOR DEVELOPMENT OF TECHNOLOGY AND ENTERPRISE CREATION .....	13
4. THE NATIONAL LEVEL .....	14
5. PROGRAMMES OF THE MINISTRY OF SCIENCE AND EDUCATION .....	17
5.1. The CAICYT .....	17
5.2. The role of the Spanish University System in Research .....	18
5.3. The CSIC .....	19
5.4. University - Enterprise Cooperation .....	20
6. PROGRAMMES OF THE MINISTRY OF INDUSTRY AND ENERGY .....	22
6.1. Rationalization of mature industries .....	22
6.2. Strengthening of the technological base .....	24
6.3. Incentives for Research and Development in general. The CDTI .....	32
6.4. Official Venture Capital .....	34
6.5. The Nuclear Energy Committee (JEN) .....	36
7. THE FUTURE: THE SCIENTIFIC AND TECHNICAL RESEARCH PROMOTION AND COORDINATION ACT .....	37
8. THE MINISTRY OF DEFENSE .....	40

	Page
9. THE MINISTRY OF AGRICULTURE AND FISHING .....	41
10. PRIVATE SECTOR HELP TO TECHNOLOGICAL INNOVATION AND ENTERPRISE CREATION .....	42
10.1. Venture capital firms .....	42
10.2. Industrial Associations .....	44
10.3. Commercial Data bases .....	45
10.4. Business Schools .....	45
10.5. Consultancy firms and other services .....	46
11. THE REGIONAL LEVEL .....	47
11.1. The Basque Country .....	47
11.2. Catalonia .....	54
12. OTHER REGIONS: VALENCIA, ANDALUSIA AND GALICIA .....	63
12.1. Valencia .....	63
12.2. Andalusia .....	66
12.3. Galicia .....	71
13. CONCLUSION AND RECOMMENDATIONS FOR ACTION .....	73
14. BACKGROUND TO INDUSTRIAL PROMOTION IN PORTUGAL .....	81
15. THE PORTUGUESE INFRASTRUCTURE FOR DEVELOPMENT OF TECHNOLOGY AND ENTERPRISE CREATION .....	85
15.1. The Portuguese Scientific and Technological System .....	85
15.2. Science and Technology in Portuguese Companies .....	88
15.3. Supportive Instruments for Technological Innovation .....	90
15.4. University Research and University-Industry Cooperation .....	98
15.5. Creation of New Enterprises in Portugal .....	100
16. CONCLUSION .....	109
APPENDIX I .....	113

## **SUPPORTING INFRASTRUCTURE FOR INNOVATION, TECHNOLOGY TRANSFER AND ENTERPRISE CREATION IN SPAIN AND PORTUGAL**

### **Summary of the study**

Based on personal interviews and analysis of documentation, this study describes the infrastructure for development of technology and enterprise creation in Spain and Portugal. The differences between this infrastructure and that of other EEC member countries lead to some tentative conclusions and recommendations for action.

In Spain, the framework used for the analysis is a matrix: public level/private level; national level/regional level. This is done because Spain is in a process of political and economic decentralization and, as a result, the programmes of regional governments are a relevant component of the infrastructure under study. The programmes of two regions, Catalonia and the Basque Country, are analyzed in certain detail, while three other regions (Andalusia, Galicia and Valencia) are summarized.

In Portugal, since concern for the development of technology and enterprise creation has become a national priority at a later, relatively recent, stage, and no clear framework was identified, the study has analyzed the major institutions and programmes that contribute to the subject under consideration.

In Spain, both at the national and regional levels, the key elements of the infrastructure studied are the ministries of industry and education of the government (national government and regional governments). The model of delivery of assistance to technology development and enterprise creation is similar for the two ministries. There are programmes managed directly by the ministry; in addition, each ministry also has an institution that channels funds to a variety of programmes and actions (CDTI in the case of the Ministry of Industry and CAICYT in the case of the Ministry of Education); finally, each ministry has a major laboratory where research programmes are directly implemented. The Ministry of Education also has control over the public university system (30 universities out of a total of 34 in Spain) and its research.

The major technological effort currently under way in Spain is related to the rationalization of mature industries. New technologies probably receive appropriate attention relative to the current demands of industry; these demands, however, are small and an effort should be made to stimulate them. The incorporation of new technologies to strengthening intermediate technology industries, particularly at the level of medium and small sized enterprises, would also require more attention. The infrastructure for technology development and enterprise creation seems to be particularly weaker in fields such as agriculture, fishing and health. The defense sector, however, is emerging as a powerful force in technology development.

The priority of the Spanish university system is teaching and the approach is theoretical and generalist. Public laboratories and universities are engaged in basic research primarily. This research often does not meet the needs of Spanish industry. The degree of concerted research between the public institutions and industry is still small, and the role of industry-university foundations, although growing in importance, is not yet very relevant. There are problems of coordination between institutions in the sphere of influence of the Ministry of Industry and those related with the Ministry of Education.

The situation, however has been improving fast in the last three or four years and the Congress has recently approved two laws that will provide the framework needed to solve most of the problems found today. These are the Law of University Reform (LRU) and the Scientific and Technical Research Promotion and Coordination Act (Law of Science). It is expected that these laws will lead to better overall coordination and assessment of needs and priorities.

In the area of enterprise creation, the most important development is the favourable fiscal measures that are expected very soon in order to give a real boost to venture capital. In parallel with this, several new venture capital institutions have been launched at national and regional levels. The generally unfavourable tax system, high social security costs, certain rigidity of employment contracts, and bureaucratic red tape, continue however to be barriers to entrepreneurship.

Spanish institutions must improve the quality of evaluation of R&D proposals. Spain must reduce the fragmentation of its infrastructure in order to achieve better economics of scale, and develop frameworks to facilitate the promotion of ambitious long term



oriented research efforts. Access to EEC programmes should be facilitated through dissemination of information about the programmes available and the Spanish "agent" institutions.

The contribution of the private sector to the Spanish infrastructure under study is rather weak. This is due, at least in part, to the lack of "associationism" prevailing for many years in Spain. This prevented industrial associations, chambers of commerce and other private groups from becoming strong players in economic life. The political situation in the last decade, combined with appropriate fiscal treatment to support associations could change this situation.

Portugal shares most of the problems found in Spain. The severe economic problems forced by this country might have contributed to assigning low priority to technology development and promotion of entrepreneurship. As a result, the contribution of R&D to GNP remained practically constant during the seventies and early eighties. Therefore the Portuguese infrastructure studied is relatively young and lean. This situation is changing and a strong interest in improving can be perceived in the relevant institutions.

As in the case of Spain, the Portuguese infrastructure faces problems of fragmentation, overlapping, short term focus, lack of coordination, and insufficient assessment of country needs and priorities. Some programmes address important weaknesses, like lack of entrepreneurial spirit, using particular approaches (contests for example) rather than orthodox horizontal instruments like fiscal measures and venture capital.

The priority of the University system is teaching, like in the case of Spain, and the little research done at university level has a rather basic focus. Industry-university relationships have been very limited although several foundations are trying to improve the link.

The distance in terms of economic development between Portugal and most other EEC member countries is perceived as an obstacle for Portugal's access to EEC sponsored R&D programmes. The weak networking of Portuguese institutions with those of the rest of the EEC and the little use of international information flows and data bases further contributes to this problem.

Portugal has, however, strong institutions, like the JNICT, the LNETI and the IAPMEI that can be the basis for the development of a rational infrastructure if adequate support is given to them. The initiatives of the Fundo de Turismo seem to be consistent with the needs and opportunities of Portugal, and the same can be said of the Foreign Investment Institute. Both institutions contribute in a very positive way to enterprise creation in Portugal.

## **SUPPORTING INFRASTRUCTURE FOR INNOVATION, TECHNOLOGY TRANSFER AND ENTERPRISE CREATION IN SPAIN AND PORTUGAL**

### **1. INTRODUCTION: OBJECTIVES AND METHODOLOGY**

In January, 1986, Spain and Portugal became members of the European Economic Community. The process of integration will undoubtedly affect the infrastructure for enterprise creation and technology development of the two countries, opening new opportunities for its strengthening. A first step, however, is the understanding of these infrastructures.

The objectives of this study are, therefore:

- a) To describe the infrastructure for enterprise creation and technology development in Spain and Portugal.
- b) To evaluate the efficiency and effectiveness of these infrastructures, compare these infrastructures with those existing in other EEC member countries, and identify opportunities for strengthening the infrastructures of Spain and Portugal.
- c) To make recommendations for the improvement of the infrastructure studied.

The methodology for the study has followed three stages. First, published information has been gathered on the infrastructure for enterprise creation and technology development in the EEC member countries. Second, interviews have been conducted in Spain and Portugal with most of the relevant institutions concerned; the amount of published

information on this field available in Spain and Portugal is very limited, but an effort has been made to gather it. Third, the two sources of data have been analyzed and compared, leading to this report. There is concern, however, in Spain and Portugal for the scarcity of published information on the subject of this study and several institutions are preparing documents on a variety of related topics. In addition, the OECD has a study on innovation policy in Spain under way and J.M. Didier and Associates have updated their report on Direct and Indirect Measures to Promoting Industrial Research, Development and Innovation in the Member States of the European Communities (1) covering some aspects of the Spanish and Portuguese infrastructures.

Taking into account the importance of regionalization in Spain, and the involvement of regional governments in technology and enterprise promotion and development, it was considered useful to study Spain according to a matrix: national/regional and public/private levels. In the case of Portugal, however, the recent nature of the country's concern for this matter suggested an approach based on the analysis of the policies and actions of the leading institutions in technology and enterprise promotion and development.

---

(1) J.M. Didier and Associates. *Directory of Direct and Indirect Public Measures for Promoting Industrial Research, Development and Innovation in the Member States of the European Communities*. 5th Edition. Commission of the European Communities.

## 2. BACKGROUND TO INDUSTRIAL PROMOTION IN SPAIN

By way of background to the study, it is important to highlight a number of conditioning factors of the infrastructure available particularly at government level, to support the creation of businesses, innovation and the transfer of technology. The measures available and likely changes in them correspond to political options or deficiencies in previous policy. This introduction is intended to serve as a means of understanding these political decisions.

### 2.1. Unemployment and Reconversion

The abnormally (by European standards) high level of unemployment in Spain, officially estimated at 21 per cent of the labour force at the end of 1985, is due to the concurrence of internationally-felt factors, such as the energy crisis and the introduction of automation technologies (1), together with local factors, such as a sharp rise in labour costs accompanying the transition to democracy and a belated response to the need for industrial reconversion stemming from the decline of traditional industries. This view is reflected in the government White Papers on Industrial Reconversion published in 1983 (2). The first steps in redimensioning traditional sectors date from 1980, compared to 1974-75 elsewhere. The need for a reconversion policy have thus dictated industrial policy in recent years although the 1983 White Paper did stress the need for industrial promotion as a counterpart to the reconversion policy; in particular the aim was stated of strengthening technology policy, regional policy and the support of Small and Medium Enterprises (SME's). The government has produced in 1986 a new White Paper with emphasis on industrial promotion, examining progress achieved with the restructuration effort of the period 1980-85 and with the different industrial promotion programmes launched during this period. The new White Paper established guidelines, new programmes and extensions of previous programmes; the implementation of this second paper however, will depend on the allocation of the necessary funding not yet assigned in some cases.

---

(1) The introduction of automation has contributed to unemployment in Spain because the more automated equipment was capable to produce the same or a bigger output with less labour and, in addition, this new equipment was, in most cases, imported.

(2) Ministerio de Industria y Energía (MINER), *Libro Blanco de la Reindustrialización*, (Madrid: MINER, 1983).

## 2.2. Technological Dependence

It will be readily seen from Table 1, that Spain is characterized by a high level of technological dependence. It has also been calculated (1) that the part corresponding to technical assistance, as opposed to patents, rose from 42.1 per cent to 82.76 per cent between 1974 and 1981. In addition, in the same period, 70 per cent of the payments were made by 96 firms of which 72 per cent had foreign capital. Payments for all types of technical assistance require the previous registration of contracts with the Ministry of Industry. The Ministry approves contracts when the technology involved is not available in the country and the price falls within reasonable industry standards.

TABLE 1. Payments and Receipts for technical assistance and patent royalties 1974-82  
Millions US dollars

Year	Payments	Receipts	Difference
1974	314	36	278
1975	292	49	243
1976	468	61	408
1977	390	59	331
1978	398	73	326
1979	517	114	403
1980	618	152	465
1981	567	180	387
1982	707	143	564
1983 *	632	130	402
1984 *	532	130	402
1985 *	606	143	462

\* Estimated

Source: Ministry of Industry and Energy (2)

Reasons for this level of technological dependence can be found in the massive indiscriminated importation of technology during the period of rapid economic development of the 1960's and failure to appreciate the importance of promoting science and

(1) Pedro González Blasco, *"El Proyecto de Ley de Fomento y Coordinación General de la Investigación Científica y Técnica"*, (Madrid: Instituto de Estudios Económicos; June 1985) p.p. 222 and 243 to 245.

(2) Pedro González Blasco, op. cit.

technology within the country. Spain currently allocates 0.5 per cent of its GDP to R&D, compared to 2.6 per cent in West Germany, 2.4 per cent in the UK and 2.2 per cent in France (1). No totally reliable statistics exist concerning the level of R&D in business, although the estimates made by the Ministry of Industry and Energy (MINER) shown in Table 2, give an indication of the real situation. Business is performing 38.5 per cent of all R&D, compared with 55 per cent in more developed countries (it must be taken into account that part of the research performed by business is financed by public funds).

TABLE 2. Estimated breakdown of R&D performed in Spain 1983

	Million Pesetas	Per cent	Per cent of GDP
Government	68,813.8	61.5	0.300
Public-owned Companies	21,429.0	19.2	0.094
Private-owned Companies	21,571.0	19.3	0.095
	<hr/> 111,813.8	<hr/> 100	<hr/> 0.489

Source: Ministry of Industry and Energy

### 2.3. Government Response

Faced with these problems, national and regional governments have reacted in a number of ways. Firstly, by measures to stimulate new businesses or the expansion of existing ones. The 1983 White Paper on Reindustrialization outlined the creation of a new instrument of Regional Policy, the Urgent Reindustrialisation Zones (ZUR's) as a counterpart to the reconversion policy. However, given the long-standing tradition of interventionism in the country, this philosophy remains to some extent intact: It is still assumed that the potential investor is more interested in help from Madrid or the ZUR's of one of the seventeen autonomous regional governments than in an enthusiastic workforce,

(1) Pedro González Blasco, op. cit.

the size of the market, business costs and potential profits (1). Nevertheless, the government has recently promised liberalization measures, particularly in the field of regulation of venture capital and secondary markets and new tax incentives, while a number of interesting initiatives are being taken at both national and local level to boost new business ventures.

The adoption by Parliament in March 1986 of the Scientific and Technical Research Promotion and Coordination Act is the first attempt since the advent of democracy to overcome traditional problems such as research coordination, particularly with respect to links between university and research centre activities and the needs of industry. The aim is to reduce Spain's technological deficit. At the same time, it is generally recognised that given the greater degree of competition to which Spanish industry is now exposed, it is the responsibility of the government to provide help in the incorporation of the latest technology in the production process.

#### 2.4. Handicaps for Entrepreneurship

Despite the important role which incentives can play in industrial promotion, we feel it is of importance to place them within the full context of the way in which government has a bearing on the activities of industry. Complaints from industry have focussed not so much on the lack of incentives offered, but on the way in which the task of administration has been performed.

- a) Because of this situation, small business and entrepreneurs often resort to using intermediary services (agents, consultants) to speed the administrative processes and to avoid the delays caused by incomplete applications for the various schemes of support available; this increases the cost of doing business. Again, the often complicated and ambiguous nature of legislation leaves the individual heavily reliant on legal advice, at an additional cost. High social security contributions and rigid labour legislation have been the twin complaints of employer's organizations since the start of democracy in Spain. Particular attention has been focussed on the level of social security payments borne by the employer, traditionally between 80 and 90 per cent. As Table 3 shows, the proportion of social security payments in total labour costs has tended to rise over time.

---

(1) Economic Survey of Spain, *The Economist*, March 1st, 1986.



TABLE 3. Structure of labour costs in Spain (%) (1)

	Direct Cost	Cost of Social Security
1964	86.8	13.2
1969	83.6	16.4
1975	80.6	19.4
1978	77.7	22.3
1980	75.9	24.1
1981	75.5	24.5
1982	75.7	24.3
1983	75.0	25.0

This development has placed Spain among the countries with the highest social security costs in 1981, as illustrated in Table 4. These figures are particularly relevant in face of the relatively poorer quantity and quality of the services obtained in return.

TABLE 4. Structure of labour costs in industry 1981 (1)

	Direct costs	Cost of Social Security
Spain	75.5	24.5
Germany	79.4	20.6
France	72.5	27.5
Italy	74.7	25.3
Netherlands	75.1	24.9
Belgium	77.2	22.8
Luxembourg	84.9	15.1
United Kingdom	83.3	16.7
Ireland	86.9	13.1
Denmark	96.1	3.9
Greece	83.0	17.0
Portugal	81.8	18.2

(1) MINER, "Análisis Comparativo de los Costes de Trabajo en la Industria Española y en los Sectores Industriales de los Países de la CEE" (Madrid: Secretaría General Técnica, MINER, February 1986).

Another aspect considered a handicap for entrepreneurship has been the rigidity of labour legislation. Government policy, inspired partly by high levels of unemployment, has been to gradually introduce greater flexibility, with measures to allow the employment of part-time workers, workers for special production requirements, temporary workers, or for the launching of a new business activity. National measures have been supplemented, where appropriate, by regional ones.

The theoretical orientation given to education in Spain from many years ago was emphasized in the sixties and seventies by the massive access of Spaniards to all levels of education and the endemic budget shortages. In addition, the major public funded laboratories focussed their activity on basic research with little interaction with industry. In addition, the social evolution that was particularly felt in the university movements of the late sixties coincided in Spain with the last years of the dictatorship and the general climate within the educational system and even in the mass media, was not particularly favourable to business. Because of these things, neither the educational nor the public research systems contributed to favour entrepreneurship.

Being protected with important tariff barriers, the growing Spanish market posed relatively fewer challenges for innovation than the more competitive markets of the EEC. The banking system, also very protected, behaved in an oligopolistic way, with emphasis on short term financing provided strong collaterals were available, rather than on project financing. Venture capital was virtually non-existent. Therefore neither the market nor the financial community provided stimulus for entrepreneurship.

The easy access to purchased foreign technology has generally been considered positive for the economic development of Spain during the sixties and early seventies, but it did not stimulate domestic innovation and entrepreneurship. The influence of the political regime favoured a certain degree of introversion and Spain was slow in participating in the international flows of information and particularly in establishing links with information networks. Government purchasing did not favour, in general, domestic manufacturers, especially in technology intensive products, and it tended to be reactive rather than proactive with little long term programming and strong supplier influence. Until the late seventies, therefore, there were few incentives for entrepreneurship in the technology intensive fields.

The fiscal laws have also been perceived as a disincentive for entrepreneurship and the various associations of small businesses have pointed this out

repeatedly. Until 1986 capital gains are penalized by tax laws and risk capital investments receive worse fiscal treatment than government guaranteed bonds. The need to finance the public deficit that grew during the 1980-85 period forced the government to give priority to tax collection. In 1986 several measures have been announced to reduce the tax pressure on capital gains and to reverse the current situation, allowing some tax deductions for risk capital investments and eliminating deductions in government debt financing instruments. According to employer's associations, Spanish tax laws are amongst the less favorable to entrepreneurship and innovation in the EEC (1). Of the seven lines of action to improve the fiscal treatment of entrepreneurship and innovation suggested by P. Weckel (2), only two seem likely to be used in Spain in the near future: better fiscal treatment of risk capital and capital gains, and some tax allowances for investments under certain conditions that will be described elsewhere in this report.

The stock market has not been a major force in the financing of medium size enterprises in Spain. Secondary markets are just starting to operate in Barcelona and Madrid but there is not enough experience on their activity to evaluate them.

The high level of social security payments, the traditional rigidity of the labour market and the inefficiencies alluded to above can all be cited as reasons for the existence of a substantial underground economy. Estimates of its size range between 10-15 per cent of the total economy. While this of course means that real unemployment is probably substantially lower than the official figure (15 per cent according to estimates of the Ministry of Economy in the Summer of 1986), it is also true that the level of effective support offered by the government is affected, including its efforts to improve technological standards. As a rule, in order to benefit from official aid, a company would need to demonstrate that its tax and social security obligations have been fulfilled. Officials interviewed in some regions were of the opinion that a reasonable reduction in social security contributions would lead to more companies legalising their situation and thus becoming eligible to benefit from government measures.

---

(1) Studies made by the Spanish Confederation of Employer's Associations and small business associations like the Small and Medium Size Catalan Enterprise Association have claimed this several times (Josep L. Rovira, "Más Empresarios", *El País*, October 4, 1986 p. 36).

(2) P. Weckel, "*La fiscalité et la stimulation de l'innovation industrielle dans la Communauté*", (Luxemburg, Commission of the European Community, 1983).

## 2.5. The Process of Regionalization

The process by which Spain has evolved from being a heavily centralised to a decentralised state has without doubt added complexity to the supporting infrastructure available to the business community. Started in 1978, this process has led to the creation of seventeen autonomous communities, each with their own government, parliament and civil service. This study covers five of the autonomous communities: Catalonia, the Basque Country, Galicia, Andalusia and the Community of Valencia. The infrastructures of Catalonia and the Basque Country, which are the most developed, will be considered in some detail, while a summary will be presented on the situation in the other three.

It is not the purpose of this study to offer a detailed analysis of Spain's regionalization process. Nevertheless, we feel it is essential to highlight some of the key political facts related to the process as a background to our study.

It is clearly true that the level of autonomous power varies from community to community. A number of efforts have been made to classify the communities according to the level of their influence. It should be understood that this is a function of a series of variables: powers written into the statutes of autonomy of each community, financial capacity to develop them, level of local autonomous feeling, date of adoption of the statutes and the subsequent development of supporting measures.

Of the five autonomous communities under consideration, the first statute to be adopted, was that of Catalonia (December 1978), followed by the Basque Country (March 1979), Galicia (November 1980), Andalusia (October 1981) and Valencia (July 1982). The Spanish Constitution (1978) establishes a qualitative difference between the "historic" communities, Catalonia, the Basque Country and Galicia, and the others; whilst recognising the right for all provinces to become an autonomous community the "historic" communities are considered to have already manifested such a desire, while the rest are obliged to positively demonstrate it. In addition, nationalist parties are in government in both Catalonia and the Basque Country, and another is an important political factor in Galicia.

Specific powers relating to our study laid down in the statutes, albeit with different wordings, cover the following areas:

- 1) Exclusive competence in research.
- 2) Planning of economic activity.
- 3) Industry.

An important variable in the autonomy picture is that of finance. Two different systems are in operation (1). That of "Régimen Foral" is essentially financed by income and is only in the Basque Country and Navarra. The system applied in all other communities is known as the Régimen Común, which is a system of finance by expenditure. The legal basis of this latter system is the Ley Orgánica de Financiación de las Comunidades Autónomas (LOFCA - Autonomous Community Financing Act) of September 1980.

In the Régimen Foral, resources available to the Basque Country (and Navarra) are not necessarily related to the cost of exercising the powers transferred. The Basque Country has revenue-raising powers for almost all taxes (excluding customs duties) and contributes to general expenditure in Spain by payment of a contribution to the central authorities, in line with the Convenio Económico (Economic Agreement) agreed between Basque and central government authorities and valid until 2001.

Under Régimen Común, finance available to the autonomous communities is related to the cost of exercising the powers transferred, in the form of a percentage participation in national tax revenues. This corresponds to a 6 year transitional period for the years 1980-86. Under the definitive arrangement, the percentage participation will depend on variables such as population and per capita income. The percentage will be negotiated between the central administration and each autonomous community and will be subject to five-yearly reviews.

Comparing the Spanish autonomy process with what has happened elsewhere in Europe, some parallels can be drawn with past experiences in Italy. On the basis of the regionalization process in that country (2), differing interpretations abound as to the aim of regionalization, whether the autonomous communities are intended to bring about political autonomy in the regions, or whether the prime objective is to bring government closer to the citizen. As in Italy, central-autonomous government relations have been marked by a series of conflicts requiring the arbitration of the constitutional court.

---

(1) Departament d'Economia i Finances de la Generalitat de Catalunya, *Llibre Blanc del Govern de la Generalitat de Catalunya sobre el Finançament Autonòmic* (Barcelona: Generalitat de Catalunya, May 1985).

(2) Yves Many, *Dix Ans de Regionalisation en Europe: Bilan et Perspectives 1970-1980*, (Paris: Editions Cújas, 1982).

The practical consequences for industry have been the following:

- 1) Transfer of administrative tasks (documentation, homologations, etc.) from the provincial departments of central government to the regional government.
- 2) The creation of an extra layer of bureaucracy. Hence the demand from the country's main employer's federation, the CEOE, for the establishment of a "ventanilla única" (single window) whereby a single source would be established in each community for formalities, information on aids, etc. whether pertaining to national or autonomous authorities.
- 3) Individual autonomous communities establish different policies, especially with regard to aids granted to business. In the opinion of Juan Ortega Galán (1): "From the point of view of the unity of the internal market, the official aids granted by each Autonomous Community are generating differentiated situations for businesses, especially in terms of costs, thus affecting the above-mentioned unity". The policy makers in the regional governments argue however that the inventory of schemes that their governments offer are intended to compensate the specific handicaps of their regions with regard to others.

---

(1) Juan Ortega Galán, *La Integración de España en las Comunidades Europeas y las Competencias de las Comunidades Autónomas* (Barcelona: Patronat Català Pro-Europa, 1985).

### 3. THE SPANISH INFRASTRUCTURE FOR DEVELOPMENT OF TECHNOLOGY AND ENTERPRISE CREATION

The infrastructure will be studied using the matrix framework shown in Figure 1. The most important part of the infrastructure under study is accounted for by the upper-left square of the matrix, public funded research at national level but the regional level is also very important in Spain, as it will be shown in this study. The private component of the infrastructure is underdeveloped with relation to other European countries.

	<b>PUBLIC SECTOR</b>	<b>PRIVATE SECTOR</b>
<b>NATIONAL LEVEL</b>	Policies, Institutions and programmes of the government or the government's institutions, applicable to businesses or individuals from any region of Spain.	Private institutions or their programmes, applicable to businesses or individuals from any region of Spain.
<b>REGIONAL LEVEL</b>	Policies, Institutions and programmes of the regional government's institutions, applicable to businesses or individuals from the region.	Private regional institutions or their programmes, applicable to businesses or individuals from the region.

Figure 1. Framework for the study

#### 4. THE NATIONAL LEVEL

According to published sources of the Ministry of Science and Education, government funded research has the breakdown shown in figure 2. As shown in this figure, the ministries of Science and Education and Industry and Energy have a direct influence over 71 per cent of all public R&D funds, these two ministries have always controlled the largest share of public financed research. In recent years, the Ministry of Defense is emerging as a big spender in R&D; from a negligible amount spent in R&D in 1980, it has reached 10 per cent of all public research in 1985 and estimates of the Ministry of Science and Education indicate that the R&D expenditures controlled by this ministry might grow 75 per cent between 1985 and 1986 reaching 13.6 per cent of the total public R&D budget in 1986.

The Ministry of Agriculture and Fishing spent in 1985 5.6 per cent of the R&D budget and the mentioned estimates indicate that this Ministry will spend only 4.4 of the total public funded R&D in 1986. The ministries of Public Works, Transportation and Health have small R&D budgets and nothing indicates that this situation will change in the near future.

The statistics published by different ministries regarding R&D expenditures show important differences, although they are consistent with regard to the annual trends. These differences can be explained by the use of different criteria to define R&D expenditures. The figures of the Ministry of Science and Education have been selected for this study because this ministry has recently published a detailed and comprehensive input-output scheme of public funded R&D for 1985 and estimates for 1986.



SOURCE APPLICATION	MINISTRY OF SCIENCE AND EDUCATION	MINISTRY OF INDUSTRY AND ENERGY	MINISTRY OF DEFENSE	MINISTRY OF AGRICULTURE AND FISHING	ALL OTHER PUBLIC SOURCES	TOTAL
PROGRAMMES MANAGED BY SOURCE ITSELF	961,3	9.026,0	2.244,1	283,7	5.444,9	17.960,0
CAICYT (1) PROGRAMMES	8.669,5					8.669,5
CDTI (2) PROGRAMMES		6.834,2				6.834,2
PUBLIC UNIVERSITIES	15.448,0					15.448,0
INTA (3)			6.921,4			6.921,4
CSIC (4)	16.367,1					16.367,1
JEN (5)		5.281,3				5.281,3
INIA (6)				2.671,7		2.671,7
IEO (7)				2.199,5		2.199,5
OTHER	1.854,8	616,7			7.165,4	9.636,9
						91.989,7

FIGURE 2. Distribution of Public Funds for R&D in Spain. 1985. (Millions of Pesetas)

(1) Advisory Committee for Scientific and Technical Research.

(2) Center for Industrial Technology Development.

(3) National Institute of Aeronautic Technology.

(4) Superior Council for Scientific Research.

(5) Nuclear Energy Council.

(6) National Institute of Agricultural Research.

(7) Institute of Oceanographic studies.

CAICYT and CDTI can be considered administrative agencies that distribute funds for research.

INTA, CSIC, JEN, INIA and IEO could be considered major public laboratories that perform research.

Source: Ministry of Science and Education.

The organizational model has been based on financial resources assigned to Ministerial Departments. Scientific policy has been controlled by the Ministry of Education and Science, although other Ministerial Departments have developed sectoral actions in parallel, and technological policy has been managed by the Ministry of Industry and Energy. The degree of coordination between these two Ministries has been low and the interrelation between business and the official research system very limited. Figure 2 shows therefore the framework of the infrastructure under study.

## 5. PROGRAMMES OF THE MINISTRY OF SCIENCE AND EDUCATION

The influence of this ministry in the development of scientific knowledge and technology in Spain is executed through three channels: the Scientific and Technical Research Advisory Committee (CAYCIT), which is an agency that evaluates, provides support and administers research projects implemented by companies and/or laboratories; the Public University System, which has its own laboratories and can establish contracts with companies or other institutions, and the Superior Council for Scientific Research (CSIC), which can be considered a major public laboratory.

### 5.1. The CAICYT

This is a government advisory body for research promotion and development attached to the Ministry of Education and Science. Through its Interministerial Programming Committee, all the industrial departments concerned with scientific and technological research and development are represented. The plenum of the CAICYT is chaired by the Minister of Education and Science and its Secretary is the Ministry's Director of Scientific and Technological Policy.

The CAICYT's mission is to promote scientific and technical research, setting priorities in scientific policy and proposing the financing of programmes that would enable these priorities to be achieved, instituting joint basic and applied research plans to be implemented in companies.

In 1984, the resources of the CAICYT amounted to 8.090 million pesetas, which represented approximately 8 per cent of public expenditure on R&D. Percent distribution of these resources between the various programmes in 1984 was as follows:



1. Research Projects (University and Public Research Institutions) ....	50
2. Special Programmes (Agroenergy, Aquaculture, Microelectronics, Biotechnology, High Energy Physics) .....	19
3. Autonomous Community Infrastructure (Basically research infrastructure of Universities and Public Research Institutions) .....	13
4. Joint Plans with Companies (Loans up to 50 per cent of the research budget which are paid back only in case of success) .....	12
5. Associations (To sponsor the formation of Research Associations amongst companies in the same industry) .....	3
6. Scientific Policy Actions (Expert panels in different scientific areas) .....	3

## 5.2. The role of the Spanish University System in Research

The Spanish University System and its associated institutions, under the control of the Ministry of Science and Education, plays also a role in the development of technology. Its impact on enterprise creation is limited and practically restricted to the business schools where in the last few years there have been a lot of initiatives in this direction. The Spanish University System is 90 per cent controlled by the government and consists of 34 universities. The legal framework of the University System is relatively new since the University Reform Act (Ley de Reforma Universitaria, know as L.R.U.) was passed in November, 1983. Before that, the laws did not provide any incentive -and as a matter of fact produced a practical effect of disincentive- for university R&D.

The L.R.U. aims at structuring a democratic university system where universities have a wide degree of autonomy and the whole system is coherent with the process of regional political autonomy going on in Spain. The law has two articles directly related to university R&D: one of the articles allows faculty members and departments to sign research contracts with public and private institutions; the other article allows universities to contract on a part-time basis well-known specialists from outside the university. Together with the Science Act, that will be analyzed later in this report, the L.R.U. sets the foundations for the updating and further development of R&D within the public sector.

The Spanish university education has traditionally had a theoretical orientation. The rapid increase of enrollment has prevented the appropriate procurement of equipment and staffing of laboratories. In recent years, however, this situation is starting to

change. Increasing numbers of faculty members with graduate degrees earned abroad and the growing concern for meeting the needs of the Spanish society in the high ranking officials of the Ministry are contributing to this change.

It is difficult, however to determine the budget that is allocated to R&D within the university system. The Administration has just completed a matrix of funds flows for 1984 and 1985 which is the first attempt to determine sources and applications (institutions carrying out R&D activities). The authors of this study indicated that, in addition to funds going to specific programmes with an associated budget, the assumption was made that a certain percentage of the funds allocated by the government to the university system went to R&D activities. This percentage was 20 per cent for 1984 and 15 per cent for 1985. The results of the study suggest that the 30 public universities spent 13,803 million pesetas in R&D in 1984, and 15.448 million pesetas in 1985.

Some universities, particularly those in fields of knowledge closer to industry and technology (basically the polytechnic universities) have established their own particular arrangements with companies. This is the case of the polytechnic universities of Madrid and Barcelona. The volume of this R&D is related to the entrepreneurial spirit of the faculty and the deans of the different schools, and the funds involved are not included in the figures given above. The Polytechnic University of Barcelona, for example, established 226 research agreements with outside entities from 1980 through April, 1985; of these, 28 per cent were with private companies. These agreements had a total budget of 590 million pesetas.

### 5.3. The CSIC

The other important R&D arm of the Ministry of Science and Education is the Superior Council for Scientific Research (Consejo Superior de Investigaciones Científicas). This institution is one of the oldest and most reputed research institutes in Spain; it has its own laboratories. The total budget of CSIC in 1985 was 16,367 million pesetas, of which 14,625 came from the Ministry of Science and Education. The CSIC performs basic research. Lately it has launched "stimulating" programs in high technology areas aiming to catalyze the incorporation of researchers and laboratories to research in areas with promising potential; in some cases, CSIC makes contributions of 50 per cent or more to the budget of other institutions working in research areas considered important. CSIC publishes detailed and updated information on its research activities as well as that of the centers involved in the "stimulating" programs.

The CSIC has evolved in late years approaching the needs of industry and the research priorities of the country. It started in the 80's to actively promote research with outside entities and business; in 1982, 7 per cent of its budget came from research contracts with other institutions or private companies, while in 1985 it reached 16 per cent. In the last four years, CSIC in putting emphasis on setting research objectives and developing specific programmes to reach them. This programming by objectives attempts to coordinate the overall effort of the institution within itself and with other centres, as well as to make it more relevant vis a vis the priority needs of the country.

The largest share of the R&D performed under the Ministry of Science and Education, however, still does not find a direct way towards industrial utilization, and even less to enterprise creation. This research can be considered to a great extent an enrichment of the teaching activity as well as a training ground for researchers. But these objectives are positive since Spanish education has always had a theoretical bias. As a result of the higher budgets allocated to research by the Ministry of Science and Education, the quality of the education in general is growing and the university system is delivering better researchers. The diffusion of scientific knowledge through publications is still very limited in Spain however. According to CSIC, 90 per cent of the Spanish production of scientific publications listed in international data banks in CSIC, has its source either in the University System or in CSIC, with a breakdown of 60 per cent from universities and 30 per cent from CSIC.

#### 5.4. University - Enterprise Cooperation

The major facilitator of university-enterprise cooperation is the University Enterprise Foundation (Fundación Universidad Empresa, FUE). It was established in 1973 by the four universities of Madrid and the Madrid Chamber of Commerce and Industry with the objective of channelling the collaboration between companies and university. The FUE acts in four areas:

- Information and Publications
- Employment
- Continued Education
- Research

Information and publications accounts for the major part of FUE's efforts. The most important activity under this heading is the organization of forums to facilitate contacts and relevant information which might lead to contacts between industry and university. The FUE also publishes catalogues of doctoral theses, books, and reports on aspects of collaboration between business and universities.

In the area of employment, the FUE works through Centres of Employment Information, associated to the Ministry of Labour. In 1982, 7,646 university graduates registered in these centres to find a job; the centres received 525 job offers.

In the area of continued education, the FUE has organized short courses in areas such as electronics, energy and informatics. The total amount spent by FUE on courses during its first 12 years of existence is 350 million pesetas.

Finally, the FUE acts as an agent between companies and university researchers identifying the appropriate laboratory or scientist within the university system to carry out a certain project brought to FUE's attention by an enterprise. Up to 1986, 500 projects have been handled with a total budget of 200 million pesetas. Currently 200 projects are being intermediated by FUE ranging in budget from 3.5 to 5 million pesetas.

The annual budget of FUE is close to 100 million pesetas. Similar organizations have been created in other universities and/or regions. In Barcelona, the Barcelona Design Centre (BCD), also carries an intermediary function between business and university. According to the Polytechnic University of Catalonia (UPC) 7 per cent of the agreement established between centres of the UPC and companies (226 in 4 years and a half) came through the university-enterprise foundation role played by BCD.

## 6. PROGRAMMES OF THE MINISTRY OF INDUSTRY AND ENERGY

The current situation contains a combination of horizontal (applicable to all companies) and specific (for companies meeting certain criteria) measures which aim to rationalize companies operating in mature industries, strengthen companies capable of upgrading their technological base, and/or create new companies.

### 6.1. Rationalization of mature industries

Spain has been relatively late addressing the rationalization of companies in mature industries (textile, shipbuilding, steel, etc.). In 1986 there are still negotiations going on to reduce important excess capacity in certain industries. To facilitate the adjustment, many measures have been available through the "Industrial Rationalization Act" (Ley de Reconversión Industrial). Most of these measures have been aimed at subsidizing labour or labour-associated social security costs; in some cases, economic incentives have been granted to closing facilities. Funds have also been made available to improve the capital structure of certain companies (heavily indebted). The Ministry of Industry and the government's Banco de Crédito Industrial, have been the major instruments for implementation of these programmes.

In connection with the rationalization, measures have been taken to facilitate the technological improvement of industrial facilities through "de-maturing" (1) investments. For example, companies in mature industries could benefit from corporate tax rebates up to 95 per cent of the interest on loans to finance new investments for technological upgrading of facilities; subsidies to innovative investments (viability studies, economic and financial consulting); in addition, funds have also been available for recycling of workers and middle managers to help them cope with the demands of more sophisticated facilities.

Table 5 shows the loans and guarantees by Banco de Crédito Industrial in 1984 for investments in mature industries undergoing rationalization.

---

(1) The concept of de-maturing as suggested by William Abernathy in W. Abernathy, *Industrial Renaissance*, (New York: Basic Books, 1983).



TABLE 5. Loans and guarantees granted by Banco de Crédito Industrial in 1984 for investments in mature industries undergoing rationalization.

(Millions Pesetas)

	Article 4 *	Loans	Guarantees	Total
Integrated iron and steel	15,680.0	-	-	15,680.0
Textiles	317.5	1,810.5	4,978.0	7,106.0
Electronic equipment for the automobile industry	-	-	2,050.0	2,050.0
Electronic components	-	47.0	1,724.0	1,771.0
Non-integrated iron and steel producing	2,250.0	-	-	2,250.0
White line domestic appliances	-	207.0	2,827.0	3,034.0
Copper semi-finished products	-	-	463.0	463.0
Special steels	4,185.0	-	4,000.0	8,185.0
Individual companies (several sectors)	-	2,100.0	-	2,100.0
<b>TOTAL</b>	<b>22,432.5</b>	<b>4,164.5</b>	<b>16,042.0</b>	<b>42,639.0</b>

Source: Ministry of Industry

\* Article 4: These are loans granted directly by the Government in accordance with Article 4 of the Industrial Reconversion Act 21/1982, with the BCI acting as delegated financial agent.

De-maturing programmes also included subsidies for the creation of R&D units to serve sectors undergoing rationalization, although their impact has not been relevant, and specific plans for the machine-tool, automobile and motorbicycle industries which were not included in the general Rationalization Act.

## 6.2. Strengthening of the technological base

In this section we will consider the actions aimed at the development of technology not directly linked to mature industries undergoing rationalization. The following categories can be established:

- a) Incentives addressing sectoral technological and industrial innovation programmes.
- b) Incentives and aids for small and medium sized companies.

a) **Incentives for sectoral technological programmes.** These are: The National Electronics and Data Processing Equipment Plan (PEIN), The National Energy Plan (PEN), The Textile Intangible Plan, as well as several specific Research and Development Programmes, and Regional Programmes.

### *The National Electronics and Data Processing Equipment Plan.*

Its general objectives are: to increase the demand and consumption of electronic and data processing products at an accumulate annual growth rate of 8.7 per cent; to increase the value of domestic production with an accumulative annual growth rate of 15.5 per cent; to increase exports by 29.4 per cent and imports by 7 per cent; to reduce the level of technological dependence with R&D expenditures of 4.5 per cent of the value of production.

The duration of the plan will be from 1983 to 1987, establishing the volumes of apparent consumption of electronic products (in relation to 1982) shown in Table 6.

TABLE 6. Objectives of the national electronics and data processing equipment plan.  
(Million Pesetas)

	1982	1987
Consumer electronics	124,100	165,000
Professional electronics	169,600	250,800
Data processing equipment	134,300	290,200
Electronic components	72,000	172,000

Source: Ministry of Industry. PEIN

Among the incentives established by the plan, in addition to those of a general nature, are: granting of official credits for investments, subsidized interested rates, favourable interests for exports financing, tax allowances, tax rebates for R&D, grants for standardization and homologation, etc.

The PEIN provides for actions in a series of specific areas: Microelectronics, Consumer Electronics, Electronic Components, Telecommunications, Data Processing, Electronics for Defense, Industrial Electronics, and Health Care Electronics. Table 7 shows a summary of the investment planned for the PEIN during the 1983-1987 period.

TABLE 7. PEIN planned investments 1983-1987  
(Millions of Pesetas)

Microelectronics	8,200
Consumer Electronics	7,200
Electronic Components	9,800
Telecommunications	13,950
Informatics	23,040
Industrial Electronics	21,500
Electromedicine	3,300
	86,990

Source: Ministry of Industry. PEIN

### *The National Energy Plan (PEN).*

Approved in 1984, the priority goals are: reduce the vulnerability of the energy supply; increase efficiency in the power consumption and transformation; and adjust energy supply and demand, optimizing the resources used. In 1985, the energy sector's sales were over 2.5 billion pesetas and its investment volume accounted for about 50 per cent of total industrial investment. It is a major consumer of technologies existing or feasible in Spain. Table 8 shows the annual average real investment forecast for the three-year period 1984-1986.

TABLE 8. National Energy Plan. Investments considered  
(Millions of Pesetas)

	Average 81/83	1984	1985	1986	Period 84/86	Period 87/89	Period 90-92
Coal	25,320	20,600	23,100	25,300	69,000	60,400	49,300
Nuclear Fuel	3,542	1,607	446	1,964	4,017	3,537	4,017
Petroleum	107,903	86,115	92,835	85,220	264,170	-	-
Natural Gas	12,893	14,871	20,544	20,496	55,911	-	-
Electricity	325,284	191,676	149,100	156,916	497,692	-	-
Conservation	4,219	21,400	48,800	69,800	140,000	132,600	72,250
R&D	8,960	10,714	12,000	13,439	36,153	50,791	71,359
<b>TOTAL</b>	<b>488,120</b>	<b>346,983</b>	<b>346,825</b>	<b>373,135</b>	<b>1.066,943</b>		

Source: Ministry of Industry. PEN

### *Textile Intangibles Plan*

Its aim is to encourage the promotion of Design and Fashion in order to improve the competitiveness of companies and institutions concerned with design, fashion, image, research and teaching. The Plan considers three types of intangibles: individual intangibles, addressed to individual enterprises; collective intangibles, addressed to groups of companies; and institutional intangibles, addressing areas such as fashion, image, research, information, and teaching. Table 9 shows the breakdown of investments considered in the Plan.

TABLE 9. The Textile Intangibles Plan. Breakdown of investments  
(Million of Pesetas)

Programme title	1984	1985	1986	1987	1988	TOTAL
Design schools	5	170	290	400	265	1.130
Promotion of designs and their integration in industry	-	170	230	275	305	980
Creation of design infrastructure	-	100	180	215	300	795
Promotion through trade fairs and competitive exhibitions	145	950	1.450	1.800	2.200	6.545
Promotion of research and standardization	15	155	210	275	285	940
University courses, vocational guidance and ongoing training	-	70	75	105	115	365
Textile industry information and promotion systems	-	175	155	125	140	595
Fashion promotion through communications media	15	415	615	725	870	2.640
<b>Total Institutional Intangibles</b>	<b>180</b>	<b>2.205</b>	<b>3.205</b>	<b>3.920</b>	<b>4.480</b>	<b>13.990</b>
<b>Investments in Collective Intangibles</b>	<b>650</b>	<b>300</b>	<b>600</b>	<b>1.000</b>	<b>1.500</b>	<b>4.050</b>
<b>TOTAL</b>	<b>830</b>	<b>2.505</b>	<b>3.805</b>	<b>4.920</b>	<b>5.980</b>	<b>18.040</b>

Source: Ministry of Industry

### *Specific Research and Development Programmes*

These are specific Government inspired R&D programmes directed at areas that are considered key for the access of Spanish companies to the new technologies. These programmes are the following:

- Special aquaculture R&D programme.
- Special agroenergy R&D programme.
- Special microelectronics R&D programme.

- High energy physics promotion programme.
- Biotechnology promotion programme.
- Pharmaceutical industry promotion programme.
- National new materials programme.
- Sectoral foods programme.
- Energy research plan.

Those programmes are in addition those included in PEIN and PEN and in most of them private enterprises are expected to implement the R&D effort, although in some cases government institutions might also be involved. The financing of these programmes is provided from institutions like CDTI and CAYCIT.

These special programmes are different in nature and objectives. In some cases, the main objective is to facilitate the incorporation of Spain to supranational programmes, like the High Energy Physics Programme which is basically designed for the incorporation of Spain to CERN (European Organization for Nuclear Research), with a budget of 3,700 million pesetas. The Biotechnology programme seems to be addressed to stimulate Spanish companies to explore the potential of processes based on biotechnology; the Administration takes a proactive role in this programme, outlining the areas where there might be some potential for Spanish industry and making funds available for R&D in these areas. A similar situation can be found in the National New Materials programme. With a larger budget, 42,850 million pesetas, the Pharmaceutical Industry Promotion programme aims to increase research expenditure in the Spanish pharmaceutical industry from 2.5 per cent to 4.5 per cent by 1989; this programme intends to strengthen an important industry that has suffered a lot due to various changes in the government regulation of products and prices. The Energy Research Plan includes the creation of a new type of agency, the OCI (Office of Coordination of Research). The OCI's will coordinate research in each energy subsector (coal, oil, electricity, etc.); the companies of each sector will have to assign a certain percentage of their turnover to R&D and, in fact, will "pay" this amount to the OCI which will administer the research effort. These specific programmes are either in preparation or in early stage of development but they might be very influential in the area of new technologies.

### *Specific Regional Programmes*

There are several regional programmes aimed at the stimulation of economic activity in less industrialized areas or in areas that have been affected by severe disindustrialization. The programmes are:

- Greater Industrial Expansion Areas  
(There are five: Andalusia, Galicia, Extremadura, Castille-Leon and Castille-La Mancha).
- Preferential Industrial Location Areas  
(There are twenty one).
- Development Areas (Oviedo).
- Preferential Agricultural Product Processing Industries Location Areas (There are seven).
- Urgent Reindustrialization Areas (Zona de Urgente Reindustrialización, ZUR).  
(There are seven).
- Industrial Development Corporation (Sociedades para el Desarrollo Industrial, SODIS).

Table 10 shows the 1982-1984 evolution of some of these programmes. The average subsidy ranges between 15 per cent and 20 per cent. Many of these projects are new activities of existing companies, some correspond to new establishments (in some cases foreign companies attracted to the area in their search for a location in Spain); a few projects are new enterprises. In a few cases, the incentives might have made it attractive for a company to relocate its facilities or part of them -closing facilities in one place and opening in another with basically the same equipment-; light industry like apparel, packaging, bottling might have been involved and therefore one has to look carefully to these figures when studying the strengthening of the technological and new enterprise creation infrastructure.

TABLE 10. Evolution of some Regional Programmes

PROJECTS (Number)	1982	1983	1984
Greater Areas	441	341	812
Pref. Ind. Loc. Areas and Estates	40	72	151
Oviedo Development Area	11	24	61
<b>TOTAL</b>	<b>492</b>	<b>437</b>	<b>1.024</b>
<b>INVESTMENTS (Million Pesetas)</b>	<b>1982</b>	<b>1983</b>	<b>1984</b>
Greater Areas	90.895.9	36.012.8	115.268.7
Pref. Ind. Loc. Areas and Estates	3.559.3	6.101.2	27.241.5
Oviedo Development Area	389.5	578.5	4.961.1
<b>TOTAL</b>	<b>94.844.8</b>	<b>42.692.5</b>	<b>147.471.4</b>
<b>JOBS CREATED (Number)</b>	<b>1982</b>	<b>1983</b>	<b>1984</b>
Greater Areas	8.807	5.727	10.962
Pref. Ind. Loc. Areas and Estates	655	1.562	2.812
Oviedo Development Area	124	201	655
<b>TOTAL</b>	<b>9.586</b>	<b>7.490</b>	<b>14.429</b>

Source: Ministry of Industry

The ZUR Programme is also very important, with investments of 52,501 million pesetas until February 1986 and subsidies up to 30 per cent of the investment approved plus many other benefits.

TABLE 11. Results of the ZUR Programme until February 1986

	Projects approved	Investments approved (Mill. Pts.)	Jobs created
Asturias	48	5,932	713
Barcelona	14	8,873	649
Bahía de Cádiz	16	1,987	396
El Ferrol	20	4,667	1,058
Vigo	37	5,761	1,025
Madrid (1)	27	10,304	1,187
Nervión-Bilbao (2)	23	14,977	736
<b>TOTAL</b>	<b>185</b>	<b>52,501</b>	<b>5,764</b>

(1) Does not include the installation of the ATT factory.

(2) Does not include the installation of the Sener Turbo Propulsion factory.

Source: Ministry of Industry.

As with the other regional programmes, a wide variety of projects have benefited from the ZUR's incentives, from new high-technology based start-ups, through capacity expansions with technologically updated equipment.



The SODIS were created with the prime objective of industrial promotion within their allocated area, creating new enterprises or participating in existing enterprises. Table 12 summarizes the activity of SODIS until June 30th, 1985.

TABLE 12. Summary of the activity of SODIS until June 30, 1986

SODIS (Year of foundation)	Nº of companies invested in	Total share capital of companies invested in (mill. Ptas)	Total jobs created
Sodiga (1973)	79	9,516.5	3,818
Sodian (1977)	122	11,312.6	3,729
Sodican (1977)	36	4,489.3	,995
Sodiex (1977)	61	5,261.1	1,679
Sodical (1982)	19	1,240.9	,646
Sodicaman (1984)	10	,697.0	,252
Sodiar (1984)	4	,39.0	0,045
<b>TOTAL</b>	<b>331</b>	<b>32,556.4</b>	<b>11,164</b>

Source: Ministry of Industry.

Again, there is a lot of variety in these instruments, where it is possible to find start-ups in advanced technologies and, at the same time, equity contributions to ailing companies to prolong their life.

**b) Incentives and aids for small and medium size companies.** Small and medium size companies can benefit from most schemes of help available. The Institute of the Small and Medium-sized Industrial Enterprise (Instituto de la Mediana y Pequeña Empresa Industrial, IMPI), however is the main government agency that specializes in supporting the promotion and development of small and medium size enterprises (SME's). The IMPI is an autonomous body of the Ministry of Industry and Energy and operates by cooperation agreements with the Autonomous Communities. One of the aims of IMPI is to stimulate technological innovation by participating in groups of companies so that a collective solution can be found for technological problems that are common to an industrial subsector; in some cases, the IMPI will secure the cooperation of other government agencies such as CDTI, for instance.

Another important line of support of IMPI is the help it provides for the establishment of Corporations of Mutual Guaranty (Sociedades de Garantía Recíproca, SGR's) as a vehicle for SME's to get easier access to financial credit. Basically an SGR is formed by a large group of SME's, often in the same industry or geographical location; through a small percentage over the loans channelled from banks to its members, the SGR builds a guaranty fund which acts as a collateral for the loans.

The IMPI also offers a variety of services: studies, training programmes, data bases, and consulting. The IMPI can invest in the share capital of corporations formed by a group of companies to achieve collectively a common goal (to organize a Research Laboratory for the group, to establish an exporting consortium, for instance). The IMPI can reach a maximum of 45 per cent of the share capital of the association of companies for a period of three years, renewable for a second three years term at the end of which it must divest selling its shares to the associated companies. At the end of 1984, the IMPI held an interest in 57 companies, with an investment of 635 million pesetas, out of a total investment of 1924 million pesetas. In 1986 it will hold investments in 60 companies, 14 of which will be in process of divestment.

### 6.3. Incentives for Research and Development in general. The CDTI.

The Centre for Industrial and Technological Development (CDTI). This is a public law institution, attached to the Ministry of Industry and Energy, which is bound by private law in its dealings with third parties. Its basic goal is to act as an instrument for the execution and development of the technological innovation policy defined by the Department of Technological Innovation of the Ministry of Industry.

The basic functions of the CDTI are to: identify priority areas of technology; promote cooperation between industry and research and technological development institutions and bodies; promote the industrial implementation of the technologies developed by the centre or by other public or private centres, and support the manufacture and marketing of new products and processes, especially on foreign markets.

The cooperation between companies and the CDTI starts with an assessment of the project presented, considering especially its technical, budgetary and commercial aspects. The CDTI can use three different approaches to support a technological innovation project:

- Financing the project when there exists technological and commercial risk: the CDTI allocates set quantities to the project which are conditional upon attaining certain previously defined stages. These quantities are repaid at a set rate related to foreseeable sales. The amount to be paid corresponds to the CDTI's contribution, after adjusting to an interest determined beforehand (between 8 per cent and 12 per cent), over a period between 1 and 6 years. In 1986 the normal interest rates paid by small enterprises would go from 15 per cent to 17 per cent.
- Preferred loans: when there only exists technological risk. The duration of the loan is adjusted to the project's requirements of funds at an interest rate of 10-14 per cent and a term of 2-6 years.
- Venture capital financing for the development of emergent technologies. The investment in shares or securities is always less than 50 per cent and for a limited period.

Table 13 summarizes the projects approved by the CDTI up to 1985:

TABLE 13. Projects approved by CDTI. 1977 to 1985

	1977/83	1984	1985	TOTAL
Nº projects approved	216	82	216	514
CDTI investment (Million Pts.)	4,431	3,827	11,416	19,674
Total investment (Million Pts.)	8,116	9,395	23,167	40,678

Source: CDTI

Table 14 shows the distribution by area of the projects approved by CDTI in 1984 and 1985.

TABLE 14. Projects approved by CDTI in 1984 and 1985

Area	N° of projects		Total budget (Millions Pts.)		CDTI contribution	
	1984	1985	1984	1985	1984	1985
Food and agriculture	17	39	956	4,168	345	2,122
Biotechnology, medicine, chemistry	14	51	1,155	5,678	532	2,682
Electronics computing	28	41	4,394	4,789	1,587	2,312
Energy and others	8	41	850	3,262	491	1,735
Mechanics and processes	15	41	2,040	5,054	871	2,549
Other Programmes	-	3	-	216	-	-76
	<u>82</u>	<u>216</u>	<u>9,395</u>	<u>23,167</u>	<u>3,826</u>	<u>11,476</u>

Source: CDTI

### *Specific support for enterprise creation*

Many of the programmes and instruments studied so far can provide support for enterprise creation. CDTI, for example, created 530 new jobs in 1984, and 456 in 1985, in new companies; since one can expect these companies to be small, these numbers suggest that CDTI has been an important catalyst of relatively high technology based enterprise start-up.

#### 6.4. Official Venture Capital (1)

There are specific approaches however which focus on the problem of promoting new enterprises. The most important are ENISA and the recently set in operation (July 1986) venture capital arm of the government's Industrial Credit Bank (Banco Industrial de Crédito, BCI).

(1) In page 42 there is information about private venture capital firms.

**a) National Innovation Enterprise (Empresa Nacional de Innovación. ENISA).**

Founded in 24-2-1982, its share capital amounts to 1,614 million pesetas and its sole partner is the INI. It operates as a venture capital company and as an instrument of the INI for investing in the share capital of new companies. In all cases, ENISA's interest is minority (maximum 45 %) and temporary (normally 5-7 years), an agreement being made with the project's promoters to buy back the shares under conditions that are established individually for each case. ENISA does not participate directly in the technical part of the management of the companies in which it has an interest; it limits its role to evaluation and requiring that the companies invest in R&D. It monitors and controls the companies it has invested in through its presence in the Board of Directors and offers them, if they require it, management support and financial assistance. In addition to its participation as partner, ENISA can also grant loans to the companies or assist in the obtainment of official credit. The type of aids given by ENISA are not incompatible with those given under the ZUR or other schemes.

Since its foundation, ENISA has participated in nine projects-companies; one was abandoned and for the remaining eight, four are still in progress while in the other four, ENISA sold its interest to other investors after the initial launching phase. The sectors-projects in which ENISA has participated are: aromatic plants, biotechnology, electronics, computing, fine chemistry, laboratory animals and food. Total investment by ENISA in the projects in which it has participated amounts to 900 million pesetas.

**b) Society for Enterprise Promotion, Industrial Credit Bank (Sociedad de Fomento Empresarial Banco de Crédito Industrial).** The Banco de Crédito Industrial: that it is a government bank, will manage under this name a venture capital company, approved by the Council of Ministers on 19-2-1986, with an initial capital of 5,000 million pesetas, with the purpose of forming joint ventures in industrial projects. The venture capital will be preferentially directed towards financing projects which both favour job creation and technological innovation.

## 6.5. The Nuclear Energy Committee (JEN)

This is the major laboratory under the direct control of the Ministry of the Industry. Its research activity, concerned primarily with nuclear energy and radioactive materials has traditionally had, like in other public laboratories, a theoretical orientation. This situation is changing in the eighties and the JEN is opening to cooperation with industry, to joint-ventures and to research in aspects closer to the industrial needs of the country. The budget of the JEN is expected to grow 30 per cent from 1985 to 1986 with 50 per cent of the total budget spent in personnel and 12 per cent being investments.

The JEN worked in 45 R&D projects in 1985. These projects were in the following fields:

Energy:	Nuclear Fission	15	projects
	Nuclear Fusion	3	projects
	Renewable Energy	7	projects
	Subtotal	25	projects
Environment:	Radiology	3	projects
	Conventional	1	projects
	Biologic Effects	1	projects
	Protection	4	projects
	Subtotal	9	projects
Other:	Energies	3	projects
	Irradiation and its Measurement	5	projects
	Other	3	projects
	Subtotal	11	projects
	TOTAL	45	projects

The JEN has established joint ventures with the government industrial holding National Institute of Industry (INI). The National Enterprise of Uranium (ENUSA) is a 40 per cent JEN, 60 per cent INI venture involved in mining and fabrication of radioactive fuel. ENRESA is a 80 per cent JEN, 20 per cent INI venture involved in handling and storing nuclear waste. According to 1985 JEN estimates, this laboratory produced direct billings to industry for 385 millions. This is still a small amount but it indicates a growing concern for being useful to industry.

## 7. THE FUTURE: THE SCIENTIFIC AND TECHNICAL RESEARCH PROMOTION AND COORDINATION ACT.

The future of Science, Technology and Enterprise Creation, to the extent it is based on science and technology, in Spain will be strongly influenced by a new law, the Scientific and Technical Research and Coordination Act. The Government's Official Gazette published this Act the 18th of April, 1986, (Appendix 1). In June, 1986, however, some political parties were still claiming that parts of the law were unconstitutional and they should be modified. The new Act is intended to be the answer to the lack of programming and coordination, the functional overlapping between various bodies with jurisdiction in the field of scientific research and technological innovation, and the dispersal of activities between different ministries and official bodies. The aim of this Act is to achieve a globally effective research programme, improve the management of the various programmes, streamline the performance of research and improve the official research bodies.

An Interministerial Science and Technology Commission will programme the research activities of the State-controlled bodies by means of a National Scientific Research and Technological Development Plan. This Commission will be the supreme body for scheduling and setting priorities. The plan will establish the main objectives in science and technology, covering periods of several years, and will direct the activities aimed at fulfilling them in the national programmes, sectoral programmes developed by the Autonomous Communities financed in part or wholly by state funds. The National Plans will include the budget forecasts for operating, investment and personnel (both training and recruitment) costs.

The Act estipulates a minimum uniform structure for five major public research bodies (Scientific Research Council, Atomic Energy Board, Spanish Institute of Geology and Mining, National Institute of Aerspatial Technology and Spanish Institute of Oceanography) which will become autonomous state bodies with authority for signing cooperation agreements with the Autonomous Communities for the implementation of or collaboration in R&D projects.

The National Plan will encourage basic research by means of regular financing which will enable quality research equipment to be maintained and promoted both in the universities and in the other public research centres. It will contain provisions for

encouraging scientific research and technological development in companies and will promote communication between public and private research centres and companies and also joint projects between universities and public research centres and companies.

The Interministerial Science and Technology Commission, the supreme body for the planning, coordination and monitoring of the National Plan, will be composed of representatives of the Ministerial Departments appointed by the Government, who will also designate the presiding Minister. The Government will appoint a Standing Committee from among the members of the Interministry Commission. The Interministry Commission will be responsible for coordinating and monitoring international scientific research and technological development programmes with Spanish participation, distributing the budgetary credits obtained from the corresponding international programme, and administering and implementing, in whole or in part, said programmes.

A Science and Technology Advisory Council is constituted with the following functions: evaluate the technological and financial content of projects with industrial company involvement, promote industrial scale use of the technologies developed by the universities and public research bodies, manage and implement international programmes with Spanish participation, ensuring sufficient scientific, technological and industrial returns, manage its own resources in accordance with the guidelines and criteria determined in the National Plan.

A General Science and Technology Council is created to promote the general coordination of scientific and technical research. This Council is presided over by the chairman of the Interministry Commission and is made up of a representative of each Autonomous Community and by the members appointed by the Government. The representative of the Central State will be given an equal number of votes to the representatives of the Autonomous Communities.

The General Science and Technology Council will propose, on the basis of their interest, the inclusion in the National Plan of research programmes developed by the Autonomous Communities. It will also request the Autonomous Communities for information about their research programmes so that these programmes and those included in the National Plan can be suitably coordinated.



The National Research Plan does not include national defense research carried out by bodies attached to the Ministry of Defense. However, provision is made for the Ministry to include, wholly or partly, some of its projects in the National Plan.

Although the Scientific and Technical Research Promotion and Coordinating Act might shape the Spanish infrastructure for development of Technology and creation of new enterprises in a rational way, the process might take several years and the changes will most likely be incremental steps forcing the evolution of the current institutions and programmes in a certain direction. The incorporation of Spain to the EEC will also contribute to shaping the infrastructure under study consistently with the existing infrastructure of the other EEC members, but this process is also a slow one. Neither the new Act, nor EEC membership, however, have so far had a relevant impact in the Spanish infrastructure for technological development and creation of new enterprises which is addressed by this study as it stands in the first half of 1986.

## 8. THE MINISTRY OF DEFENSE

With close to 10 per cent of the public R&D budget, expected to grow substantially in the near future, the Ministry of Defense is becoming a relevant force in the process of development of technology in Spain. Most of the Ministry's budget goes to the National Institute of Aeronautical Technology (INTA). The technology strategy of this Ministry is related to the general strategy of arms supply of the country. This strategy has three phases: the first phase consisted of buying most of the needs of armament of the country abroad, particularly all needs of sophisticated weapons and weapons systems; the second phase still contemplates imports of weapons but using a countertrade approach, this is to say, the foreign suppliers of weapons must purchase Spanish products and /or technology for an amount equal to the cost of the arms imported by Spain; the third phase, that is now starting, consists of co-producing and co-developing weapons systems with foreign suppliers and hence the increase in the R&D budget.

The major laboratory of the Ministry of Defense is INTA, with 707 people working in R&D activities at the end of 1984. The distribution of this personnel by area of research activity was as follows:

Avionics and electro-optics	26	per cent
Structures and structural materials	19	per cent
Aerodynamics and navigation	14	per cent
Aeronautic weapons	12	per cent
Energy and propulsion	10	per cent
Fuels and material	10	per cent
Other	9	per cent

The collaboration of INTA with manufacturers of armament is growing substantially contributing to the dynamism of a promising industrial sector of the Spanish economy.

## 9. THE MINISTRY OF AGRICULTURE AND FISHING

The objectives of this ministry's sponsored R&D are:

- Improvement of the Spanish balance of trade in food products.
- Development of integrated production systems.
- Adjustment of the agricultural enterprise to the increase in the cost of inputs.
- Rationalization of the processes of transformation and commercialization.
- Conservation of natural resources.

The Ministry is aware that Spain has been lagging behind in agricultural research since the major research arm of the ministry, the National Institute of Agricultural Research (INIA) spends an amount equivalent to about 0.2 per cent of the agricultural production, while in more developed countries the research budgets range between 1 and 2 per cent. In addition, the Ministry accepts that the percentage of the INIA's budget that could be properly called R&D is very small.

The budget of INIA in 1986 will practically stay at the same level as in 1985. As other major public laboratories in Spain INIA is making an effort to link its activity with other institutions, laboratories and enterprises.

The National Institute of Oceanography (IEO) is another laboratory of the Ministry of Agriculture. It is undergoing a reorganization in 1986 and has a decreasing budget. Its research is concerned with fishing. Given the importance of the fishing industry in Spain, and the potential of marine technologies, it would seem reasonable to expect a substantial growth of R&D expenditure in this area in future years.

## 10. PRIVATE SECTOR HELP TO TECHNOLOGICAL INNOVATION AND ENTERPRISE CREATION.

At national level, the private sector help to technological innovation and enterprise creation is provided almost exclusively by private banks and venture capital firms. In addition, secondary stock exchanges, for medium-size companies, are in their early stages of development.

### 10.1. Venture capital firms

Up until the beginning of the 80's, the only channel available for companies to obtain additional financing to increase their equity capital was the stock market. In order to provide incentives for the creation and promotion of enterprises, the Royal Decree of 29-12-1979 regulated the Enterprise Promotion Corporations (Sociedades de Promoción de Empresas, SPE), which are entities similar to the venture capital firms. The SPE must have a minimum fully paid-up share capital of 500 million pesetas and specialize solely in the promotion and assistance of companies by means of temporary equity investments in them. The Royal Decree lays down a special tax treatment consisting of a rebate of 95 per cent on the corporation tax payable on the capital gains obtained from the disposal of shares or the holdings remaining of companies promoted within the first 8 years from the date of purchase of the holding, decreasing progressively in subsequent years to nothing if the operation is performed more than 11 years after the date of purchase of the holding. Within this legal framework only two private venture capital firms exist in Spain: Sefinnova and Sociedad Bancaya de Promoción Industrial.

#### a) Sefinnova

Its share capital amounts to 500 million pesetas and its founder partners are the Banco de Bilbao, Sofinnova (France) and the World Bank. As private shareholders, there are also 4 banks, 20 saving banks, 6 Spanish companies and

4 overseas investors, holding 10 per cent of the share capital. Sefinnova's field of action is multisectoral, specialising in emergent technologies and with a preference for the SME. The promotion and search for investment projects is done through the network of bank branches of the Banco de Bilbao, independent professional people (consultants, specialised lawyers, etc.), presence in trade fairs and through public bodies (CAICYT, CDTI, SODIS).

Sefinnova has analysed 1,080 investment projects and participated in 53, of which it has already withdrawn its investment in 26 and 6 projects were unsuccessful. It currently participates in 21 projects with a volume of investment of 300 million pesetas.

Sefinnova has capital or investment links with other companies in Europe (Sofinnova, Batinnova, Sofinindex, Sofinnova Nederland), in the USA (Sofinnova Inc., Innova N.V.), in Brazil (Brasilfar) and in the Philippines (Vibes). It has also been the promoter of the first Association of Venture Capital Companies (ASCRI) in Spain, which incorporates all the public and private companies that operate in Spain using the venture capital formula (Sodis - Enisa - Bancaya) under the Royal Decree of 29-12-1979 which regulated the officially denominated SPE.

#### **b) Sociedad Bancaya de Promoción Industrial**

Founded in 1983, it is a 100 per cent subsidiary of the Banco de Vizcaya, one of the largest Spanish private banks, although it operates with complete independence. Share capital is 1,000 million pesetas, with resources of 10,000 million pesetas. It initially specialised in the promotion and financing of projects in advanced technology sectors, mainly the electronics, computer science and food sector. However, at present, it will consider any sector of activity providing that there exists a significant development potential.

Promotion and search for projects is performed mainly through the banking network of the Banco de Vizcaya, contacts with large companies that are in the process of diversifying, through independent professional people in the business field, and through public bodies and institutions (CAICYT, CDTI, SODIS, ZUR).

Since it started operations in October 1983, Bancaya has participated in 49 projects, and withdrawn from two. The sector in which it participates are: electricity, electronics and computer science, food, aquaculture, engineering and computing services, pharmaceuticals, medical products, textiles, chemicals, energy, engineering and miscellaneous products.

Bancaya has also led the search for opportunities on the international market by participating in a French-Spanish venture capital firm (Bancaya - Bayonne Chamber of Commerce - Crédit Nationale and Crédit Industrielle et Commerciale) and in a Boston (USA) venture capital fund. It also belongs to the EVCA (European Venture Capital Association).

## 10.2. Industrial Associations

Associationism was relatively weak in Spain until the advent of democracy. In recent years, however, several associations have grown and gained vitality. Most associations have limited their role to providing an opportunity for meeting economic counterparts. Some associations of national scope, like the Association for Management Progress (APD), have done a good job in helping businessmen to better appraise the Spanish changing economic environment and reflect about strategic priorities. Sectoral associations have limited their activity, in most cases, to gathering statistical data and /or acting as a lobby vis a vis the Administration. Some associations have gone beyond these activities providing management development opportunities to their members.

Few associations however have made inroads in providing help for the access to new technologies and to industrial innovation to their members. One of the leading exceptions is the Association for Industry of Navarre (AIN), an aggressive association that has opened well equipped and staffed centers for CAD/CAM, laser and others advanced technologies. The laboratories of AIN are being used by enterprises from all over the country.

AIN has been able to benefit from funds available from government institutions at national and regional levels in order to build the technology promotion infrastructure that this association offers to the industry of Navarre and other regions.

### 10.3. Commercial Data bases

According to the Foundation for the Promotion of Automated Information (FUINCA) there are in Spain eighteen distributors of data bases that offer a total of seventy data banks. The geographical location of these distributors is the following:

Madrid	35
Barcelona	2
Bilbao	1
Valencia	1

A number of subscribers to these bases (research centres, business schools, industrial associations) offer in turn the services to their members or associates. It can be said therefore that it is possible today for a Spanish researcher to have access to practically any reference contained in the world's leading data banks for a reasonable cost. The use of data bases is still relatively limited however and this might be the result of lack of skilled personnel in the operation of the access to the data banks and insufficient diffusion of information about the availability of easily accessible data bases and their potential as a tool for research and development.

### 10.4. Business Schools

The business schools, all of them private, have been actively promoting enterprise creation through specific programmes addressed to entrepreneurs or potential entrepreneurs. A study conducted by IESE, a 28 year old business school located in Barcelona, covering all the graduate Alumni of its MBA programme, shows that 30 per cent of them started their own company at some point. IESE and ESADE, the other business school of Spain, have established agreements with the Institute for the Small and Medium Size Industrial Enterprise (IMPI); through these agreements the IMPI funds young graduates with promising business plans in the process to bring their plans to reality.

## 10.5. Consultancy firms and other services

Practically all major international consulting firms have established an office in Spain or have a correspondent organization. In addition, many Spanish consulting companies provide services, particularly to the small enterprise segment. The bulk of consulting has taken place in feasibility and strategic planning, turn-arounds, and major reorganization. In the recent years, however, some companies are becoming increasingly concerned with technology strategy and it is known that the major consulting firms are currently engaged in projects aimed at strengthening the technological base of several Spanish companies.

Nevertheless, CDTI sources, as well as companies involved in high technology projects, indicate that there is an insatiable need in Spain for organizational and managerial skills in the area of management of the innovation process.

The service of technology broker (patents, joint-ventures, etc.) is still underdeveloped in Spain, both in terms of offer and demand. This service is provided today by some government bodies, like CDTI, which have been able to establish good international connections and visibility, and by individual experts, often entrepreneurial professors and scientists.



## 11. THE REGIONAL LEVEL

For the purpose of this study, the programmes of five regional governments have been studied in detail through exhaustive interviews. These are: The Basque Country, Catalonia, Andalusia, Galicia and Valencia.

The degree of development of the regional government structure of the Basque and Catalan regions is much higher than in all the other regions. Most regions, however, have created some specific local programmes, but, to a great extent, they act as agents of programmes available from the institutions of the central government. In this report, only the measures of the Basque and Catalan governments will be considered in detail. A summary of the other regions will be included also.

### 11.1 The Basque Country

Decentralisation to the Basque Country is regulated by the statute of autonomy of March 1979. In accordance with this statute the Basque autonomous community has exclusive competence in 1) scientific and technical research, in coordination, where appropriate, with that of the state, 2) the planning of economic activity in the Basque Country, also in coordination, where appropriate, with that of the state and 3) promotion and development of the economy.

A characteristic of the autonomy process in the Basque Country is that responsibility for the powers conferred upon the community is shared by the Basque Government (located in Vitoria) and the three provinces (Alava, Guipuzcoa and Vizcaya) which comprise the community, in accordance with the Historical Territories Act.

As with the national level, the most important measures for technology development and enterprise creation come from the departments of Industry and Education.

### *Measures of the Department of Industry.-*

- a. **Financial measures.-** The most significant measure is the agreement signed between the Basque government and sixteen financial institutions (banks and savings banks) for the financing of productive investments by SME's within the autonomous community. A SME is defined as a company with an equity capital of less than 750 million pesetas and fewer than 400 employees. The aid, in the form of subsidized interest rates, is available to businesses operating in certain sectors, particularly processing industries and companies specialising in research or business services. In 1985, the maximum interest rate, including commissions and charges, was fixed at 15.5 per cent and 16.5 per cent for fixed and current assets respectively. Government policy is thus to reduce the subsidy over a period of time, being 6 per cent in 1984, 4.5 per cent in 1985 and 3.5 per cent in 1986. Slightly more favourable terms are offered to the Sociedades de Garantía Recíproca (Mutual Guarantee Societies) established in the Basque Country. For 1985, the volume of credit was fixed at 15,000 million pesetas and increased to 17,500 in 1986.
  
- b. **Promotion of R&D Units in Businesses or Business Groupings.-** In 1985, the Basque government granted subsidies to R&D units amounting to up to 40 per cent of the annual costs of such a unit, with a maximum of 25 million pesetas, and a subsidy of up to 25 per cent for an additional bracket of 15 million. The aim of the programme is to create a more dynamic approach to technological innovation within the business community.
  
- c. **Support for Industrial Investment.-** Support for industrial companies is given both by the Vitoria (capital of the Basque Government) and by the provincial administrations, known as "Diputaciones Forales". In order to avoid a loss of efficiency due to the duplication of resources, an agreement has been established whereby the Vitoria government restricts its action to larger companies (defined as being those with over 750 million pesetas in equity capital and more than 400 employees), leaving the support of SME's to the Diputaciones. Thus, in 1985, the Basque government made available the following aids for larger companies:
  - a) For existing firms: up to 25 per cent of total investment in fixed assets.
  - b) For new businesses: up to 30 per cent of total investment in fixed assets.

- d. **Exceptional Revitalization Plan (Plan de Relanzamiento Excepcional).**- Extended for three years from 1986 onwards, with a total budget of 30.000 million pesetas, the objective of this plan is to protect employment in specific crisis sectors, namely metallurgy, paper, machinery and spare parts for motor vehicles. The aids available come under two classes, one granting a subsidy of up to 400.000 pesetas per job maintained (thus helping to finance compensation paid to those workers made redundant) and a second class containing incentives such as investment in fixed assets (up to 30 per cent of total investment) and R&D. The aids granted are coordinated with the Diputaciones Forales through a committee.
- e. **Society for Promotion and Industrial Rationalization. (Sociedad para la Promoción y Reconversión Industrial, SPRI).**- The SPRI was founded by a Basque government decree in late 1981 to act, on the one hand, as a private organisation operating with the flexibility required in the business world and, on the other hand, as a policy instrument of the government. The Basque government, is a majority shareholder along minor shareholders (six local savings banks). Cooperation between the SPRI (located in Bilbao, with a branch in San Sebastian) and Vitoria is close, with the Industry Department being represented on the board.

The objective of the SPRI is to set up the necessary instruments, programmes and structures to fill the gaps in the Basque industrial structure which private initiative is unable to develop. This action has covered four fields, namely Technology, Finance, Training and Physical Infrastructure.

The most important programmes under SPRI are: IMI, with the objective of incorporating microelectronics in the production processes of Basque companies; ECTA to promote investment in high-tech process equipment (CAD/CAM, robotics, for example); TEKEL, S.A., to provide training; INDUSTRIALDEAK to develop industrial sites for medium and small companies. The total subsidy granted in 1985 by the IMI programme was 53.7 million pesetas; the ECTA programme granted 173.7 million pesetas. At the end of 1985, the INDUSTRIALDEAK programme had received 897.6 million pesetas of subsidy.

Some of these measures can not be considered as directly addressed to promote technology or new enterprises; rather, they are aimed at prolonging the life of sick enterprises in mature industries. Nevertheless, some of the investments supported by these measures involve projects which contain innovations and sophisticated technologies which did not exist before in the companies supported or in the country. It would be very difficult, however, to estimate the percentage of the support of the Department of Industry going to innovative versus stagnant activities.

### *Measures of the Department of Education.-*

Scientific research within the Basque Country (the responsibility of the Department of Education) suffers from the same malaises that prevail in Spain in general. The Autonomous University of the Basque Country, whose faculties are located in the main centres of the community, is of recent creation. Its shortlife has so far prevented it from building up a research reputation, and its staff is in general more concerned with teaching than with research.

Of special interest are the five private technological centres located in the community (LABEIN, INASMET, IKERLAN, TEKNIKER, and CEIT) which benefit from Basque government subsidies for specific projects. A major effort has been made within the community to develop these centres in recent years, placing them in the forefront of technological development in Spain. As a result, the percentage of GDP devoted to research in the Basque Country rose from 0.35 per cent in 1981 to 0.7 per cent in 1984, whilst between 1982 and 1986 the overall budget of the centres rose by 600 per cent. Each centre is specialised in a specific industrial sector. The centres perform generic projects – e.g. in 1986 Ikerland is planning to participate in an Esprit project to develop a flexible cell to be incorporated in machine tools, whilst CEIT is working on a research project for the European Space Agency. These centres have been born from private initiative and the current situation shows a good example of public-private cooperation in the field of technology development.

The centres play an important role in the transfer of technology towards the Basque Country, especially through their international connections. In order to be ahead of the firms it is their role to help, the centres strive to remain abreast of new technologies as they are developed outside Spain, to assimilate them and then disseminate them among the local business community.

The 1986 cooperation agreement between the centres and the Basque government was signed in February 1986, allowing for a total subsidy of 815 million pesetas out of a total budget of 1.621 million pesetas (the subsidies covering specific programmes, not the operating costs of the centres). Thus the development of joint projects with businesses and institutions (103 in all) allows the Basque centres to be self-financing up to 50 per cent, compared to a national average of 10 per cent.

*The Province Level.-*

In the Basque Country, each of the three provinces has specific measures for the promotion of technology and new enterprise. Of particular significance are the measures adopted by the province of Vizcaya. The Department of Economic Promotion and Development of the Diputación Foral de Vizcaya, the province's government, has developed a series of 26 interrelated programmes within its 1984-87 plan for economic action. Table 15 shows the most important programmes and their evolution in 1984 and 1985:

TABLE 15 - Summary of Main Programmes of Diputacion de Vizcaya

**Business Creation Programme**

1984	Firms	Investment (million Pts.)	Subsidy (million Pts.)	Jobs Created
Primary Sector	16	571	107	111
Industrial Sector	112	3,297	647	1,159
Construction	10	18	26	69
Services	286	4,721	719	930
<b>TOTAL</b>	<b>424</b>	<b>8,771</b>	<b>1,500</b>	<b>2,269</b>
1985 (as of February 1986)				
Primary Sector	16	3,829	380	257
Industrial Sector	95	1,727	327	598
Construction	7	158	30	44
Services	419	5,445	653	1,008
<b>TOTAL</b>	<b>537</b>	<b>10,159</b>	<b>1,390</b>	<b>1,907</b>

**Development of Existing Businesses**

	Firms	Investment (millions)	Subsidy (millions)	Jobs Created	Jobs Consolidated
1984	632	12,400	2,150	553	11,650
1985 (applications)	1,650	25,460	n.a.	1,818	28,059

**Business Productivity Programme**

	Firms	Number Projects (millions)	Project Cost (millions)	Subsidy
1984	74	83	238	99
1985	105	155	464	154

**Technological Promotion Programme**

	Firms	Project Cost (millions)	Subsidy (millions)
1984	31	442	155
1985	69	980	280

SOURCE: Diputación Foral de Vizcaya.

### *The Private Sector in the Basque Regional Level. DENAC.-*

From the analysis offered before, it can be seen that the public sector in the Basque Country benefits from support from private sector organisations such as financial institutions, the Chambers of Commerce and Employer's Organisations.

One wholly private initiative, DENAC (Desarrollo de Nuevas Actividades, S.A.), located in Bilbao, is particularly worthy of mention in that it constitutes a unique phenomenon in the Spanish infrastructure under analysis. This company has its roots in the specialty steels sector, where companies were interested in finding new outlets for their financial resources. The company acts as a completely private and independent business, though in objectives its closest equivalent, in the view of DENAC's management, within the EEC would be the British Steel Corporation Industry (a subsidiary of BSC).

DENAC's general philosophy is to develop new business activities in new or existing companies from a purely professional and private point of view. Its goal is thus not to create jobs. DENAC attempts to fill the gap between the conception stage of a business and its putting into practice which circumstances often prevent. Its role is therefore as a backup to the entrepreneur in any sector. This management support consists of five stages:

- 1) Prospection of promising ideas which for one reason or another remain undeveloped.
- 2) Drafting of a business plan – in this help is offered, but the entrepreneur retains final responsibility for it.
- 3) Search for resources: human, technical, financial.
- 4) Support in logistics and administrative procedures.
- 5) Location in a Business Centre.

Since DENAC started operations in May 1984, 42 firms have used its services and three Business Centres have been set up through the Basque community. DENAC's human resources include 10 high-level, experienced consultants.

In addition to consolidation of current activities, DENAC is considering the development of three further lines: firstly, a scheme to link the originators of ideas and "champion" entrepreneurs, in the belief that the two are not necessarily found in the same person, and that by bringing them together, a profitable synthesis can be achieved. Secondly, DENAC is examining investment in specific projects as a venture capital fund, using the

financial resources of its shareholders. 500 Million pesetas have been set aside by the steel producers for this purpose. The only criterion to be employed is profitability and an identifiable market niche, thus attempting to demystify the importance attached to high technology in venture capital circles in Spain. Finally, DENAC is thinking of extrapolating its concept to a national setting, by founding a subsidiary to operate from Madrid.

## 11.2 Catalonia

Of the autonomous communities studied, it is in Catalonia that tension between the central/regional levels of power is at its greatest. The ruling coalition of *Convergència i Unió* (reelected to office in 1984) represents a centre-right economic policy option from a nationalist perspective and has been particularly critical of central government policy with respect to the regional finance issue. Disquiet has been voiced from the Catalan side over a slow process of effective transfer of powers laid down in the statute (for example, 1986 is the first year in which the Catalan administration will administer the budget of universities located in Catalonia) and a large grey area of "shared powers" requiring decisions from the Constitutional Court. The statute grants powers for planning 1) economic activity in Catalonia, 2) industry (specifically excluding authorisations for the transfer of foreign technology), and 3) research.

For the purpose of this study, the primary force within the Catalan regional government known as the *Generalitat*, is the *Conselleria d'Industria*. Within this department of particular significance is the *Centre d'Informació i Desenvolupament Empresarial* (Information and Business Development Centre, CIDEM), playing a role not dissimilar to the SPRI in the Basque Country. Whilst industry policy can be fairly well circumscribed, research policy, although specifically transferred in the statute, is fragmentary in nature. In addition to Catalan government initiatives, major projects are being prepared by both the *Ayuntamiento* (City Council) de Barcelona, and the *Corporación Metropolitana de Barcelona* (Greater Barcelona Authority) both held by the Socialist Party of Catalonia. Whilst, as elsewhere in Spain, the private sector infrastructure is weak, the Barcelona Design Centre (BCD) and the Barcelona Chamber of Commerce offer interesting initiatives.



### ***Industrial Promotion Policy of the Generalitat.-***

Industrial Policy within the Catalan Administration can be divided into two phases. In the earlier phase, until 1984, stress was placed on 1) financial aids through interest rate subsidies of up to three points on loans and 2) industrial rationalization. For this purpose, the instrument devised was the Comisión Interdepartamental de Ayuda para la Reconversión en Cataluña (CARIC), (Interdepartmental Council for the Industrial Rationalization of Catalonia). The support granted by the CARIC was in the form of guarantees for loans applied for by groups of companies. Current work of the CARIC is restricted to following up previously granted loan guarantees.

The second phase put the emphasis on stimulation and reindustrialization measures. The Catalan industrial structure is characterised by the presence of a large number of small and medium-sized companies. In order to achieve higher levels of competitiveness, a considerable effort is required to improve the technological level of these small companies. The industrial promotion policy has a part to play within this context. Table 16 indicates the most significant programmes implemented in this field:

TABLE 16 - Aids for Innovation Available to Catalan Business

- A. Advanced Technologies:** Investment subsidy for fixed assets up to a maximum of 20 per cent of the total investment (maximum subsidy 6 million pesetas). Available to both existing and new businesses.

1985 Results:	Budget	270	millions
	Applications received	64	
	Applications approved	49	

- B. Microelectronics:** Incorporation of microelectronics into businesses. Subsidies for industrial applications of microelectronics, directed at either processes or products. Subsidies are granted up to 45 per cent of the investment, subject to a maximum of 3.5 millions.

1985 Results:	Budget	97	million
	Applications received	156	
	Applications approved	67	

- C. Robotics and Production Rationalization:** Stimulation of application of robots and automation of production processes, subsidizing up to 30 per cent of the cost of the robot, with a maximum of 3 millions (4 millions in the case of multiple plants).

1985 Results:	Budget	37	million
	Applications received	33	
	Applications approved	21	

- D. Numerical Control:** Aid for the incorporation of numerical control into the production process to cover a maximum of 20 per cent of the investment. Maximum subsidy of 5 millions per project.

1985 Results:	Budget	157	million
	Applications received	774	
	Applications approved	157	

As can be seen from Table 16, a total of 561 million pesetas went to finance 294 projects (an average of 2 million). Given the size of the firms concerned, this would appear logical, although it raises the question of the possibility of supporting an ambitious technological upgrading. In addition, there seems to be a certain lack of proportion in the need to evaluate more than 1000 applications in high technology fields to grant only 561 million pesetas, and this raises the question of the efficiency of the process of evaluation.

The main component of reindustrialisation policy consists of the Urgent Reindustrialisation Area (ZUR) made up of 22 municipalities located in the Barcelona industrial belt. The Zur scheme was described earlier in this study. The coordination between the Ministry of Industry, at the central government level, and the Generalitat takes place through a Joint Management Committee.

As of March 1986, of the 104 projects which had been presented, 14 had been approved, all adopted unanimously by the Joint Management Committee. These projects represented a total investment of 8,875 million pesetas, and the creation of 654 jobs.

### *The CIDEM.-*

The main objectives of the CIDEM are to stimulate industrial development in Catalonia and to make available the information and means necessary to improve the technological level, competitiveness and productivity of Catalan businesses. Among its declared functions are the following:

- 1) Stimulate the creation of new business.
- 2) Stimulate cooperation between business, universities, laboratories and research centres.
- 3) Coordinate the functions of those bodies specialising in industrial promotion and technological development.
- 4) Perform structural studies of Catalan industrial sectors.
- 5) Rationalise aids directed at industrial firms, whether of a public or private nature.
- 6) Contribute to the dissemination of information concerning supranational economic organisations, especially the EEC.

The CIDEM is the agent of CDTI in Catalonia as it is also the agent for other support programmes of the Ministry of Industry and Energy of Spain. In 1985, the CIDEM, previously an integral part of the Conselleria d'Industria (Department of Industry), was transformed into an autonomous body governed by public law and with its own legal framework; this was aimed at making this institution more efficient. Recently, the CIDEM has launched a venture capital corporation, "La Sociedad Catalana de Capital a Risc, S.A.", where it holds 40 per cent of the total start-up capital of 500 million pesetas, the remainder being contributed by nine local saving banks. The CIDEM has also been the catalyzer of the creation of several business grouping to improve economies of scale in several activities; the CIDEM will participate in these groupings as a partner and has scheduled 300 million pesetas for this purpose in 1986. Table 17 shows the 1986 budget of CIDEM:

TABLE 17 - 1986 Budget of the CIDEM  
(Million Pesetas)

Creation of Services		97
Other Services and Promotions		102
Contributions		
- Venture Capital	200	
- Promotion Loans	300	
- ZUR office	40	
		540
Fixed Assets		15
Personnel & Miscellaneous		88
TOTAL		842

SOURCE: CIDEM

*The CIRIT and the Department of Education.-*

The CIRIT, Comissió Interdepartamental d'Investigació i Innovació Tecnològica (Interdepartmental Committee for Research and Technological Development), is the body officially created by the Generalitat to draw up an appropriate scientific policy for Catalonia and to support and stimulate technological research. The main formal tasks of the CIRIT are to coordinate the various activities and projects of the different departments of the

Generalitat in order to achieve the greatest efficiency, to propose the most rational distribution of resources devoted to research in Catalonia, and to promote the implementation of research projects, improve the scientific level of Catalonia, and give general support to scientific activities within the community.

Concerning university research, the responsibility of the Department of Education of the Generalitat, 100 million pesetas were budgeted in 1985 for investment in research material, and a further 30 million for postgraduate grants and aids for research. From 1986 the Department of Education will administer the universities located in Catalonia; transfer of finance for this has resulted in a 20.7 per cent increase in its budget for 1986. However, as the Generalitat is expected to allocate the funds to established activities, the situation whereby a large proportion of the budget is for current expenditure and salaries is likely to remain unchanged. As a result, there appears little prospect of the level of research performed in Catalan universities increasing significantly in the near future.

As in the rest of Spain, there is a dearth of contracts between universities and business. Such initiatives tend to be taken on a personal basis. Some impetus for these personal initiatives has been provided in recent years by the return of a number of researchers from abroad, in particular from the USA, where they have become aware of the need for more dynamic links between the academic and business communities. Catalonia currently boasts three "University-Business Foundations", the most successful of which is operated by the Barcelona Design Centre.

As well as the university system, there exists in Catalonia a plethora of sectoral institutes, many of them carrying out some form of applied R&D activity in their particular field. The Conselleria d'Industria grants subsidies to a number of these institutes. These subsidies are, however, marginal in nature – in 1985, 21 institutions received a total of 21.4 million pesetas. It would not appear that there exists any real government coordination of the activities of these mainly private institutes nor any real form of control to ascertain whether the research carried out is being harnessed to the needs of the business community.

An exception to this situation is represented by the "**Laboratorio General de Ensayo e Investigaciones**" (General Laboratory for Testing and Research). In 1984 the laboratory was granted the status of an autonomous body under public law and in 1985 the Conselleria d'Industria made available 374 million pesetas for specific research projects.

### *Other Public Initiatives in Catalonia.-*

Recent initiatives at public level are not confined to the Generalitat. In particular, two projects in Barcelona are of special interest. The balance of political forces within the community, with the Ayuntamiento (City Hall) and Corporación Metropolitana de Barcelona (Greater Barcelona Authority), both having Socialist majorities is not completely without its impact on this situation.

a) **Iniciatives, S.A.-** Iniciatives, S.A. is a venture capital company started by the Ayuntamiento de Barcelona (Barcelona City Hall) with the objective of promoting private projects of public interest. It is expected that the company, with a start-up capital of 1,000 million pesetas, will confine its activities to the metropolitan area of Barcelona. Participation in projects is likely to be of the order of 10-25 per cent, with an absolute ceiling of 49 per cent. The maximum contribution will normally be 100 million pesetas, although an "exceptional limit" of 300 million has also been established. Iniciatives, S.A. participation in projects will be for a period of 3-6 years, based on the following criteria: advanced technology, clear social interest, and multiplier effect on the economy.

- Five main areas have been chosen which fit into the basic objectives of Iniciatives, S.A.:

- 1) New services for the city of Barcelona.
- 2) Services requiring improvement.
- 3) Services generating vitality for the economic and social life of the city.
- 4) New technologies, especially those which equip the city with an infrastructure allowing for progress and modernization.
- 5) Areas of industrial products using new technologies.

The most likely sectors for action are town-planning, culture, communications, commercial and industrial sectors, sport and leisure. As of March 1987, two projects had been approved, one for a communications tower and another for the installation of an optical fibre cable transmission network.

b) **Technology Park of Barcelona.-** The technological park is an initiative of the Corporación Metropolitana de Barcelona (Greater Barcelona Authority) to be situated in the Vallés area near Sabadell and Terrassa, north of Barcelona. It is

hoped that this will be seen as a bold answer to the challenge of economic and technological change within Catalonia. The project includes urban development and activity plans, and the park, to cover an area of 40 hectares, is likely to be ready at the beginning of 1987.

The objective is to promote links between institutions and between the public and private sectors. A company specialized in business and technological centres, Control Data, was commissioned to perform the feasibility study.

### *The Private Sector at the Catalan Regional Level.-*

- a) **The Barcelona Design Centre (BCD).**- The primary goal of the BCD is to promote industrial design and technological innovation, with departments to cover these respective areas. The centre was originally founded in 1973 by the Barcelona Chamber of Commerce; in 1974 it became a member of the International Council of Industrial Design Associations (ICSID), and in 1976 was transformed into a legally non-profit making cultural foundation.

As regards the scope of BCD's activities, as far as technological innovation is concerned, the radius of action is mainly confined to Catalonia. However, the design activities are national, and the centre hopes to be a key element in central government design promotion.

In the field of technology, actions are oriented towards the creation of a technological infrastructure, particularly activities with multiplicative effects. By promoting industrial innovation, it is hoped to raise the technological level of Catalonia. BCD works in cooperation with CDTI, making visits to companies to assess their technological status and offering finance to those companies interested in new products or processes. Between June 1984 and June 1985, BCD stimulated 49 industrial innovation projects worth a total investment of 3,000 million pesetas.

In February 1985, BCD opened a CAD/CAM centre, supported both by central and regional governments. The centre has been incorporated into the Integrated

Electronics Services Network, created by the National Electronics Plan of the Ministry of Energy. BCD provides the largest centre of this network.

**b) Barcelona Chamber of Commerce – New Business Creation.-** In late 1985 the Barcelona Chamber of Commerce opened the first Department of New Business Creation of any chamber in Spain, with the aim of helping would-be new entrepreneurs. As such, this initiative follows similar ones existing in France, Germany and Italy. The department offers the following services:

- 1) Information on administrative formalities required to legally set up a company or opening premises.
- 2) Guidance as to the various government aids offered.
- 3) List of possible sources of finance.
- 4) Help in drawing up and assessing a business plan.
- 5) Technical follow-up of operational phase of set-up.

The department has as its director a specialist in marketing, assisted by experts in the other functional areas of business. Aware that in order to fulfil its task, adequate links with other institutes are necessary, contacts have been established with the CIDEM, the Corporación Metropolitana, the Ayuntamiento de Barcelona, as well as local business schools.



## 12. OTHER REGIONS: VALENCIA, ANDALUSIA AND GALICIA

These three autonomous communities located in the East, South and North-West of Spain respectively have developed also certain instruments for support of technology development and enterprise creation.

### 12.1 Valencia

The Autonomous Community of Valencia consists of three provinces: Castellón, Valencia and Alicante. In accordance with its Statute, which came into force in 1981, it has its own parliament (the Cortes Valencianas), government (the Consell) and civil service (the Generalitat).

The most important body acting in the field of industrial and technological promotion is the Instituto de la Mediana y Pequeña Industria Valenciana (IMPIVA - Institute for the Small and Medium-Sized Valencian Industry) (1).

The IMPIVA's policy is geared towards three basic goals: Diversification of the industrial fabric; incorporation of new technologies in the ageing sectors and the creation of Technological Institutes in the most important sectors of the Valencian economy.

The measures to stimulate industry can be classified into four main groups:

**1st group.**- Creation of new companies (including services companies that supply intangible goods to the industrial sector) and aids for new products or processes.

**2nd group.**- Subsidy of the cost of the S.G.R.'s guarantee (Mutual Guaranty Society).

**3rd group.**- Aids for technological improvements, including design promotion, R&D units, and incorporation of new technology in the process and products.

---

(1) With the exception of energy-related matters which are run directly by the Council of Industry.

4th group.- Support for the carrying out of activities to revitalize the industrial environment, in line with the content of groups 1, 2 and 3.

The measures to stimulate Valencian industry in 1985 required expenditures of 716 million pesetas by the IMPIVA. The IMPIVA is the administrative body for the IMPI and the CDTI through the agreements it has made with these two organizations.

The IMPIVA's technology policy consists of encouraging the incorporation of modern technology in Valencian industries and to improve management and quality, and, in short, to make Valencian industry more competitive. This policy is channelled through the sectorial Technological Institutes, whose legal framework is that of a Research Association. Created with the cooperation of businessmen from the different sectors and located in the respective production areas, the Institutes' function is to liaise between the government and companies, provide market and technical advice and enable applied research activities to be performed, and other services which could not be implemented individually by the small and medium-sized industries.

There currently exist five Technological Institutes: Ceramics (Castellón); furniture (Valencia); textiles (Alcoy); toys (Ibi); footwear (Elda).

The activities performed cover the following areas:

- Technical advice
- Standardization and homologation
- Technological development
- Advertising
- Information
- Training
- Improvement of the level of design
- Utilisation of possibilities of fashion

The IMPIVA has signed cooperation agreements for the development of concrete action plans proposed by the Institutes.

Another instrument of the Valencia Autonomous Community is the Comissió de Promoció Económica de Sagunt, (Sagunto Economic Promotion Committee, CPES). The CPES has implemented an investment promotion policy.

This measure constitutes a direct response to the specific problem of Altos Hornos del Mediterráneo (AHM) which was directly affected by the Reconversion Plan for Iron and Steel Producing of 1981. As this company employed 43.4 per cent of the industrial population of Sagunto, it was imperative to put into motion compensatory economic policies. Thus, the Area of Preferential Industrial Location was created, with a series of benefits for new investments.

The CPES started operations in November 1983; its specific task was to create alternative jobs. The CPES is composed of representatives of the Generalitat and central government (Ministry of Industry and Energy, Ministry of Agriculture, Fisheries and Food, and Ministry of Public Works, National Institute of Industry, and Institute of Official Credit). The Area of Preferential Location covers 350 km<sup>2</sup> and includes 17 municipalities in the province of Valencia and 4 in the province of Castellón.

Research and Science policy in Valencia is the responsibility of the Council of Culture, Education and Science of the Community. In 1985, the Council of Culture, Education and Science took preliminary steps to improve the material and human resources of the three universities and the research centres within the Autonomous Community, advised by the Council of Scientific and Technological Policy. At the same time, an Interdepartmental Committee was created to define the priority areas in research promotion. The policy's goal was to stimulate and enhance the training of teaching and research personnel and also to provide the research centres and universities with a more efficient infrastructure by improving their level of equipment. In 1985, the first year of the policy, programmes were developed centred on teaching personnel and equipment:

- grants for study periods in Spain or abroad
- grants for organizing scientific and technological conferences
- grants to attend conferences
- grants for doctoral theses
- grants for the purchase of infrastructure in the three universities

The total budget for research promotion in 1985 reached 300 million pesetas.

In 1986, the Valencia Chamber of Commerce, following the example of the Barcelona Chamber of Commerce, formed a "New business creation" service, with the same philosophy and characteristics as the Barcelona service, although at present in a lower stage of development. Its purpose is to:

- Inform on the legal aspects and official procedures for creating a new company.
- List of possible financial resources.
- Technical advice on business plans.

## 12.2 Andalusia

The Andalusian Government's sphere of action in economic matters is defined in the Economic Plan drawn up by the Council of Economy, Planning, Industry and Energy. This Council implements most of the measures designed to support and create enterprises and also the measures promoting technological development through the Department of Industry. However, we will also analyse what has been achieved by the following institutions:

- Council of Agriculture, Fisheries and Food
- Council of Education and Science

### *Department of Industry, Energy and Mining.-*

This is one of the branches of the Council of Economy, Planning, Industry and Energy. In the field of technology, development and research, this department has still not yet gone beyond the prebirth phase. Consequently, the main Andalusian industries find themselves forced to work together with the universities and central government bodies for technological development. Of the 700 million pesetas that this department spends each year on helping SME's, only about 10 per cent have gone to subsidising technological innovation or development projects.

Through agreements signed with SADIEL, Sociedad Andaluza para el Desarrollo Informático y Electrónico (Informatics and Electronics Development Andalusian Corporation) and the Ministry of Industry, it is participating in the financing of a CAD/CAM centre in Prodiel and in the creation of a robotics centre.

### ***Institute for Industrial Promotion in Andalusia (IPIA).-***

This is the other branch of the Council of Economy, Planning, Industry and Energy. IPIA was brought into being by the Act of March 3, 1983 and is responsible for all industrial promotion matters transferred to the Andalusian Autonomous Government. The overall goal of this institution is to increase the involvement of industry in the Andalusian economy as a whole, thus achieving a balanced development of the industrial sector. It has implemented three types of measures:

**1.- Sectoral and territorial action plans.** The sectors in which action plans have been performed are extremely varied: industrial ceramics in Bailén, leather-working in Ubrique, etc. In general, it can be said that they are traditional sectors composed of a large number of small companies with organization, marketing and financing problems.

#### **2.- Measures aimed at aiding and promoting SME's.**

**Information:** As in the other four Autonomous Communities and in cooperation with the IMPI, it has opened a computerised business information service. The IPIA is also able to perform feasibility studies, audits, etc., for the SME's that request them. At present, this service is overloaded with work.

**Financing:** Management of the agreements signed between the Council of Economy and the Andalusian savings banks. These agreements amount to a value of 2,500 million pesetas a year. It also manages the agreements signed between the Council of Agriculture and the rural savings banks and takes part in the executive committees of the Mutual Guaranty Societies (SGR's) SURAVAL and CORAVAL.

**3.- Measures aimed at supporting technological innovation.** The IPIA is the body responsible for channelling the activities in Andalusia of the CDTI and the Ministry of Industry's Department of Industrial and Technological Innovation. Due to the low level of entrepreneurial development in Andalusia and the size of the companies operating in the region, the philosophy of the Autonomous Government has been to direct R&D towards the SME. The activities carried out have been the following:

**Technical assistance and consultancy service:** An Andalusian technological inventory has been published which includes the public and private companies and centres specialising in applied scientific research and technological development. Also, feasibility studies are currently under way (1986) on the creation of institutions to give technical support in the agriculture and biotechnology sectors.

**Promotion of industrial design and innovation projects:** Its purpose is especially to help in administrative formalities and propitiate contacts between the companies that might be interested in taking part.

50 per cent of the projects presented were in the food processing sector. Other representative sectors have been aquaculture, computer science, energy use and biotechnology.

*Sociedad para la Promoción y Reconversión Económica de Andalucía, (Andalusian Promotion and Rationalization Corporation), (SOPREA).-*

This public company is also an agency of the Council of Economy and was created in 1983. Its initial share capital was 3,000 million pesetas. Its activity ranges from investing in the share capital of an Andalusian company, to granting loans and/or guarantees. Up until April, 1986, SOPREA has participated in 164 projects presented by 154 companies.

The investments made by the SOPREA in private companies average about 6 per cent of total share capital and, in many cases, has only served to bind together the other partners. Two interesting ratios that can be used to evaluate its performance are the investment generated and the time taken from application to formalization. As regards the former, the investment generated has been approximately three times that contributed by SOPREA. However, as regards the latter, the time taken varies considerably from company to company.

## COUNCIL OF AGRICULTURE, FISHERIES AND FOOD.-

**Department of Agricultural Policy.-** The prime goal of this Department is to promote and attract investment, while technological innovation and development is a secondary objective. Therefore, the Department's current policy is oriented towards creating stimuli for private initiative and attracting final processing industries, which are currently located in the consumer centres.

Subsidies and grants may total up to 50 per cent of the investment. In the last three years, investments have amounted to 10,000, 30,000 and 40,000 million pesetas.

In general, the level of the technology used in the sector is similar to that found in its European homonyms. However, due to the low level of R&D, this technology must be acquired from other countries or Autonomous Communities.

On sporadic occasions, public competitions have been organised for innovative projects. One such competition is presently in progress on cereal processing with a prize of 1,500,000 pesetas for the best project.

This Department also runs research centres. For example, the **enology and viticulture stations** in Jerez and Montilla-Moriles, which, in cooperation with SOPREA, have performed studies on the adoption and development of wine-making technologies in the Huelva area to produce quality full-bodied wines. There are also **agricultural laboratories** which perform quality controls and analyses. Furthermore, feasibility studies are under way for the creation of an **Andalusian Agricultural Technology Institute** which would coordinate relationships between the various organizations involved in agricultural research and which at present are highly uncoordinated, such as the Fats Institute, the Cordoba School of Agricultural Engineers, the former National Institute of Agricultural Research -today the D.G.I.E.A.- and the other bodies which have already been mentioned.

**Department of Agricultural Research and Expansion (D.G.I.E.A.).-** It directs its basic and applied research mainly towards agriculture and, to a lesser extent, livestock breeding. The research budget, excluding personnel costs, amounts to 120 million pesetas. Work is currently in progress on 90 projects of which agriculture accounts for 72 per cent, infras-

structures 12 per cent and livestock 8 per cent; 15 projects are financed by the CYACIT or other national and international bodies. The number of research workers per project is three although each researcher is generally involved in several projects. There are 9 centres, distributed throughout Andalusia, the most important one (with the highest number of projects) being the Córdoba centre.

**Department of Fisheries.-** This Department has the PEMARES (Plan de explotación marisquera y de cultivos marinos de la región suratlántica - Plan for shellfishing and seafood farming in the South Atlantic region) which is the focal point for technological development and innovation. It specialises in applied research, evaluation of natural resources, counselling of companies and cooperatives and mass production of fish fry or shellfish and other invertebrate spawn. Current investment amounts to 250 million pesetas and it has developed its own techniques for invertebrates and has improved and transferred technologies, mainly from Japan. It has two research centres.

There are four companies in the sector with a high level of technology and a further seven are spending large amounts on R&D. There are also an additional 30 companies with virtually pre-industrial level technology. Subsidies and official credits amounted to 710 million pesetas in 1985. For this year, 22 projects have been submitted to the FOEGA for approval, with a total investment value of about 4,400 million pesetas.

#### COUNCIL OF EDUCATION AND SCIENCE.-

**Department of Science and Education.-** The Department of Universities and Research is responsible for basic scientific research tasks in the Andalusian universities of Granada, Seville, Córdoba, Málaga and Cadiz. Ten priority areas have been established of which the most important are: aquaculture, biotechnology, microelectronics, natural resources and livestock raising. However, agricultural food products growing, in spite of the fundamental role it plays in the Andalusian economy, is not included.



The Department's budget is distributed as follows: 240 million pesetas for infrastructure, 85 million for aid to the 400 university departments in Andalusia, 120 million for grants (1) and 260 million for the 1,900 projects presented each year.

However, its low budget, the wide scatter of its sphere of action, the lack of coordination between the university departments and this Department, and also with the other research promotion bodies existing in Andalusia, inevitably make for a high level of inefficiency.

### 12.3 Galicia

The most relevant programmes of the Xunta de Galicia, as the autonomous government of this region is called are:

- Programme for the promotion of investment in SME's
- Aids for the improvement of the technological infrastructure
- Aids for the energy rationalization of SME's
- Aids for development of innovative energy-saving projects
- Aids for rationalization and reindustrialization measures associated to the shipbuilding industry.

Aids to investments in SME's are through interest subsidized loans up to 20 million pesetas and/or 75 per cent of the investment (whatever is smaller). The pay-back period is up to seven years with one of grace. In 1985 the Xunta granted loans to SME's for a total amount of 11,019 million pesetas. The Department of Industry of the Xunta offers also subsidies for the following investments:

- Renovation of equipment
- Improvement of productive processes
- Acquisition of equipment to complement existing installations
- Creation of new production lines
- Improvements of equipment to increase efficiency and productivity.

---

(1) Only 41 per cent is spent on the ten key areas.

Subsidies amount to 20 per cent of the investment for investments up to 10 million pesetas, 15 per cent for investments between 10 and 20 millions, and 10 per cent for investments up to 30 million pesetas. A similar schedule of subsidies is available for energy-saving investments.

Galicia, like other backward regions of Spain has put the priority on attracting new investments and helping companies established in the region to survive. The main instruments to implement these policies are the Zone of Priority Location for Agricultural Enterprises, the Zone of Urgent Reindustrialization of Ferrol, and the Industrial Development Corporation for Galicia (SODIGA). The accomplishments of these programmes in the innovative or entrepreneurial area of the economy are modest, but those instruments might become important in the future since, as one of the less developed areas of Spain, Galicia qualifies for help in the regional development programmes of the EEC.

Galicia has also an Industry-University Foundation that sponsored 36 projects in 1985 with a total budget of 274 million pesetas.

### 13. CONCLUSION AND RECOMMENDATIONS FOR ACTION

The preceding picture of the current situation of the Spanish infrastructure for development of technology and enterprise creation intends to be more a descriptive inventory than an evaluation of the major programmes available. This infrastructure can be further analyzed from different perspectives: intrinsic, (its efficiency and effectiveness) and extrinsic, (in relation to the infrastructure of other EEC countries). The purpose of this study is not to perform an indepth evaluation of the infrastructure described. During the data gathering, however, many of the officials interviewed offered their own frank criticism of aspects of the infrastructure under consideration. Also, several employer's association -including regional and national, small and big companies- were interviewed and their opinions on the performance of the Spanish system of support to technology and entrepreneurship were obtained. From this information it is possible to draw some tentative conclusions. Also, it is possible to suggest actions that could improve the situation where the gaps identified are bigger. These tentative conclusions and recommendations are presented in the following paragraphs:

#### *Efficiency and effectiveness of the Spanish infrastructure for development of technology and enterprise creation.-*

- a. The variety of programmes, agencies and incentives available are not the result of a thorough assessment of the needs of Spain with regard to technology and new enterprise. No formal extensive appraisal of industrial strengths -to be exploited- or weaknesses -to be potentiated- has served as a basis for the development of the current infrastructure. There are symptoms, however, that might lead to suspect that the various components of the Spanish infrastructure have been patterned after existing concepts operating in other countries.
- b. The fact that the infrastructure has two main pillars of support -the Ministries of Industry and Education- leads to a certain degree of parallel structures with little coordination. Lack of coordination seems to be the major problem of the whole

system. The new Scientific and Technical Research Promotion and Coordination Act (Law of Science, in short) is addressing this problem in a very direct way; it can therefore be expected an improvement in this area in the coming years.

- c. The many incentives, support agencies, programmes, etc. overlap to a great extent. Particularly in high technology areas, it is possible to simultaneously apply to many different support schemes, both at national and regional levels. The lack of coordination mentioned makes it possible for applicants to receive benefits from different sources. The combination of variety and overlap creates in some cases a certain confusion since the applicant does not know where it is better to submit a project. The system has a tremendous fertility for the creation of new schemes that is fed by the implicit competition between regional governments.
- d. The fragmented nature of the infrastructure leads to small budgets which, in turn, are split in small allocations. Evaluation of proposals for either technology development or enterprise creation is not an easy task and it is unrealistic to expect that all the agencies that form the Spanish infrastructure studied have the teams of experts or the contacts with them to make a good evaluation of the proposals submitted. The result seems to be, in many cases, that the criterion of distribution of the budget amongst applicants prevails over that of selection of the most promising projects, with often very small funding going to every project. This, in turn, leads applicants to adopt a short term perspective and to avoid ambitious research efforts.
- e. There is a certain discontinuity in the life of some programmes and institutions which might undergo ups and downs in their support activity, probably as a result of political trade-offs. This has an effect on research projects with long term orientation.
- f. The fiscal system has not favoured risk capital investments or capital gains, while investment in government deficit financing instruments has enjoyed fiscal advantages. This situation might change in the near future as the government controls public spending.

- g. The degree of concertation, combination of public and private funding for technological research and enterprise creation, is still small, although it is a positive fact that it is growing fast.
- h. There is an almost complete lack of information on what the private sector is doing in terms of Research and Development: budgets, general areas of research activity, etc. Some catalogues of technologies and sectorial samplings have been made, particularly by autonomous governments, but these studies are far from comprehensive and lack homogeneity.
- i. The information infrastructure of Spain and its links with international information networks has improved substantially in recent years. Access to it is limited however by lack of knowledge and trained specialists.
- j. University education has a theoretical orientation and the budgets allocated to R&D by the University System are still small. The focus of the University System is on teaching, turning out informed generalists rather than practically oriented specialists.
- k. In Spain, private associations (industry associations, chambers of commerce, etc.) are in general weak and have done very little to promote adoption of new technologies by its members, creation of new companies by entrepreneurs, or networking by groups of common interest to promote initiatives with certain economies of scale.
- l. Venture capital is relatively new and its legal regulation has not yet been finalized. Secondary stock markets are also in the early stages of development. The whole capital market is underdeveloped in Spain with the majority of the financial institutions being reluctant to project evaluation and project financing. This creates an important barrier for entrepreneurship.
- m. There are many instruments for upgrading the technological level of mature industries (de-maturing), as well as for development of new technology. There is, in general, less support for the introduction of advanced technologies in traditional industries with intermediate levels of technology. This is important since the majority of the Spanish industrial tissue is made of medium size companies in this intermediate level.

- n. There is a lack of efficient frameworks which could facilitate the promotion of important, large-scale, research efforts in Spain, pooling the resources of groups of companies and/or institutions with interests in certain technological areas.
- o. The link university-industry is still very weak. University research does not have a practical orientation and companies undervalue the research potential of universities.
- p. Technology and enterprise creation in the sectors of new materials, health care, and food (agriculture, fishing, food-processing) seem to receive less attention in the variety of Spanish support schemes that would be reasonable given their impact on the overall economy.
- q. Spain seems to be putting emphasis on electronics and automation technologies for industrial automation applications today. Another area of priority in future years will be defense oriented R&D.
- r. The degree of Spanish R&D cooperation at international level is very small. Participation of Spanish companies and institutions in EEC research programmes is obviously very limited given the recent incorporation of Spain to the Community. There are symptoms however that many researchers and research units do not know how to apply to EEC programmes. Lack of previous international R&D cooperation makes it difficult for some research units to coordinate their R&D with centres of other nations to submit joint proposals to the EEC.
- s. Many public and private institutions have been actively seeking foreign investors. This mechanism of enterprise creation has been used by the Ministry of Industry, directly and through public companies (INI for instance) and institutions (CDTI, for example). Autonomous governments have also been active in this area. This has been a positive phenomenon that has helped public institutions to get in direct contact with the needs of industrial start-ups. Some public initiatives can be related to this learning process. Foreign investments have played an important role in enterprise creation in Spain.

..

*The Spanish infrastructure for technological development and enterprise creation with relation to the existing infrastructure in the other EEC countries.-*

Published information (1) as well as interviews held in Brussels with EEC expert officials made possible the gathering of an inventory of incentives, agencies and programmes available in EEC member countries to promote technology and new enterprise. Previous research (2) provides some understanding of the process of technology decision making in the EEC. A contrast of this information with the Spanish infrastructure described in this report would lead to some tentative conclusions as well as to the identification of certain areas with promising potential for action.

- a. The Spanish infrastructure contains most schemes available in other EEC members. The major difference seems to be the size of both the total budget of the support body and the average amount of each support action.
- b. Most Spanish schemes are still in the early stages of their life cycle. Most have been launched in the eighties and some, like public venture capital institutions are completely new. The accumulated experience is thus very limited and much smaller than with the instruments available in other EEC member countries. Some evaluation of the performance of the Spanish infrastructure will probably come naturally in the country's budgeting process. This will undoubtedly contribute to reshaping the infrastructure in a more rational way, eliminating inefficient schemes.
- c. There seems to be a commonality of priorities with other EEC member countries. This leads to suspect that this is more the result of replicating support schemes available elsewhere than the outcome of an in-depth evaluation of the opportunity to provide certain niches of Spanish industry with real long term technology-based comparative advantages. Only in recent years and in a few institutions (mainly the CDTI), this "fitting" seems to have received careful attention; the aquaculture programs would be a clear example of this.

---

(1) See for instance, Commission of the European Communities, *Incentives for Industrial Research, Development and Innovation*, (London: Kogan Page Ltd., 1985); A. Piater, *Barriers to Innovation*, (London: Frances Pinter Ltd., 1984); OECD, *Science and Technology Policy Outlook, 1985*, (Paris: OECD, 1985) Sociedad para la Promoción y Reconversión Industrial, S.A. *Medidas Públicas de Apoyo a la Innovación y al Cambio Industrial en Europa*. Servicio de Estudios de la Sociedad; Febrero, 1986.

(2) Pedro Nuño and Jan P. Oosterveld, "The Status of Technology Strategy in Europe". *Technology in Society*, Pergamon Press, Volume 7, Number 2/3, 1985.



- d. The processes of application for support and evaluation of proposals seem to be more rigorous in other EEC members than in Spain. Again, the degree of fragmentation in Spain, combined with the lack of experience might contribute to explain this circumstance.
- e. There is a clear opportunity for an assessment of technological priorities for Spain. Spain has certain industries that face competition from emerging nations, particularly in the Pacific Rim area (machine tools, forgings, toys, automotive components, shoes, apparel, etc.) These industries could benefit from product and process innovation. In the current infrastructure there are few schemes to support in a practical way the technological upgrading of companies in these industries.
- f. There is also an opportunity for schemes that encourage linking and networking. The relatively smaller size of Spanish companies and their research efforts (compared to companies in other EEC members) as well as the smaller size of support incentives in Spain indicate that linking efforts would yield economies of scale. Scarce researchers and laboratories would be better used. Intra-industry links between companies would make possible the specialization of different companies on different phases of a research effort and the submission of joint applications for research support.

A few examples exist of these links: a Spanish company in the advanced machine tools industry specializes on the mechanical/materials side and a British firm specializes on the electronics side. These linkings could have the positive side effect of generating intra-industry international trade.

To favour this process, an effort has to be made to further develop the Spanish infrastructure of information. Probably, a first stage would require the establishment of centres that would help companies to locate partners. A second stage would require the utilization by Spanish companies of available data banks and, in turn, this would be favoured with an effort of diffusion of information about the existence, access and benefits of these sources.

Today, this function of providing information useful for establishing links is supplied by certain public and private organizations (CDTI, CIDEM, AIN, etc.)





which have taken the initiative in this direction, but the industrial coverage is insufficient.

- g. A particular case of linking with specific influence on enterprise creation is syndication amongst venture capital corporations at the international level. Spanish venture capital firms have very limited experience, but most of the projects under study are small and domestic while it is wellknown that innovative businesses must be born with international perspective.
- h. An opportunity also exists for transferring project evaluation skills to Spain. The whole effort of project evaluation needs a great deal of rationalization. A certain set of guidelines for the definition for the "quantum" of support (amount and timing) is adequate to avoid subsidies that are completely insufficient to approach certain technological efforts. Also, since it is not possible to guarantee that Spain has experts in the many organizations that deliver support who have the qualifications to make a rigorous evaluation of proposals concerned with a wide variety of technologies, a certain bank of experts or consultancy service would be of great help.
- i. Industry-university interaction is another area that needs improvement in Spain. Research is not evenly distributed through the university system. As it was pointed out earlier, some of the newest universities do very little in terms of research. Other universities use research as an instrument to improve teaching and to develop faculty. Only the bigger and older universities (Madrid and Barcelona, primarily) get involved in a substantial level of industry-related research. Universities should create a "contracting" or "industry liaison" body that would be a contributor to the budget of the university and would be in charge of actively selling the research capabilities of the university. The researchers involved in a certain project should receive a share of the university revenues associated with the project.

In general, it can be said that the Spanish infrastructure suffers from the problems of fast growth, since the effort that the country is making to catch up with other EEC members is important. This fast growth is taking place in parallel with a process of political decentralization and this adds complexity. Furthermore, everything happens within a certain absence of legal framework because the formulation of the Law of Science has been around for several years

and, although it has been recently approved, the development of all the articles and regulations necessary to implement the law is still pending. In summary, the recommendations suggested above could be grouped in the following major areas of action:

- 1) The assessment of the technological needs of Spain given the specific nature of its industry, agriculture and services sectors as a prerequisite for the formulation of a technology strategy for the country.
- 2) The strengthening of R&D emphasis at the university level, shifting the theoretical focus of Spanish universities towards a more practical orientation.
- 3) The improvement of coordination amongst the various ministries with important R&D budgets.
- 4) The improvement of the information infrastructure particularly with regard to links with the EEC at all relevant levels.
- 5) The creation of a more favourable climate for entrepreneurship through horizontal measures such as a more favourable fiscal treatment for risk capital.
- 6) The improvement of central-regional and inter-regional coordination in order to apply the resources more efficiently supporting projects with more potential.
- 7) The improvement (perhaps the specialization) of the overall evaluation infrastructure in order to make sure that public funds are spent efficiently.
- 8) The increase in the level of public-private, national-international, research institution – industrial organization, concertation through the appropriate incentives and channels.
- 9) The development of frameworks for the stimulation of research projects of relevant size in Spain and for the participation of Spanish firms in EEC projects of relevant size.

#### 14. BACKGROUND TO INDUSTRIAL PROMOTION IN PORTUGAL

In comparison with other European countries, industrialization began very late in Portugal. In 1930, the only industries existing in the country were craft industries that were heavily dependent on natural resources.

The decision to industrialize was made between 1950 and 1960 and was the result of a series of internal and external factors, chief of which were Portugal's becoming member of EFTA and its affiliation to the GATT. These two events opened the doors of foreign markets, especially European markets, to Portuguese products.

In the 60's, rapid industrial growth and low labour costs attracted a significant number of foreign companies; this resulted in an increase in foreign investment at the rate of 12 per cent a year between 1960 and 1970.

Problems started to appear at the beginning of the 70's. The first oil crisis, the general increase in the cost of raw materials and the 1974 Revolution, which caused profound changes in the economic structure, as well as nationalization of several sectors and state intervention in a number of companies, all contributed to the large-scale industrial projects inherited from the previous political era being discontinued, interrupted, delayed and/or stopped altogether and that no new ones were started.

The 1982 constitutional reform and the 1983 amendment to the Sector Delimitation Act, both represented important, albeit insufficient, steps forward in the return to economic stability. There still exists a lot of State intervention, sanctioned by inadequate legislation and directed by a highly bureaucratic State machinery.

To this is opposed a private sector that is highly disenchanted, undercapitalized and entangled in a complex system of incentives. As far as the industrial sector is concerned, a great heterogeneity in technological level is observed. Modern companies in which sophisticated technology has already been incorporated exist side by side with companies in which even the most elementary steps towards rationalization have never been considered.

Between these two extremes attempts are being made to develop a sector that is floundering in serious financial problems and highly dependent on the outside world for imports of raw materials and energy and for capital goods (31.5 per cent and 25 per cent of the country's total imports respectively). There is also a strong technological dependence, as can be shown by at least two indicators:

- a) Between 1977 and 1981 only 5.8 per cent of the applications for patents and 4.2 per cent of the patents granted involved Portuguese individuals or companies.
- b) The technological balance of payments (licences, patents, trademarks, know-how, etc.) is firmly in the red. In the period 1977-1980, receipts covered only 12.2 per cent of total payments. In 1980, total payments for imports of technology by industry were 3.5 billion escudos (1).

There is no industrial policy in Portugal. It is true that there have been attempts to outline one, but, because of the constant changes of government, such a policy has never been given legal status. However, there is a general consensus of agreement as regards the needs of Portuguese industry. One important premise is that Portuguese industry cannot be developed on the basis of its small domestic market. The question then arises of Portugal's competitiveness in the foreign market, and this includes a series of aspects linked to product and process innovation, and other manufacturing related variables.

The new Government which came to power in October 1985 traced some broad outlines for action in certain sectors. As far as industry is concerned, the government plan states that: "The modernization of manufacturing structures which is being implemented by the Government is based on a development model which places special emphasis on the most adequate management of natural resources, the modernization and restructuring of the manufacturing sector, the creation of companies with a high degree of technological autonomy, and on regional development". This model of development presupposes an intensification in the process of qualifying and specializing administrations, management staff and workers as well as a significant improvement in organization and administration, namely by means of the introduction of new technologies. Industrial innovation is, within the context of this policy,

---

(1) J.M. Rolo et al. *A Componente Tecnológica Estrangeira da Indústria Transformadora Portuguesa* JNICT, Lisboa, 1984.

one of the principal challenges faced by Portuguese companies in their pursuit of modernization and improved competitiveness.

On the other hand, the Government recognizes that modernization of the production system depends on the adoption of new technology through the creation of a climate that is conducive to modernization and the encouragement of technological research.

Apart from this, and as a result of negotiations with the IMF, a plan to stabilize the Portuguese economy has been in effect since 1983. Since that year, the Government has been acting to reduce the balance of payments deficit, public expenditures and inflation. These objectives have certainly been achieved in part but, on the other hand, there has been a drop in investment and there still exists a high rate of unemployment.

Thus, in addition to the modernization of existing industry, government authorities are determined to foster the creation of new companies as their best weapon against unemployment. Consequently, several initiatives aimed at stimulating the creation of new companies can be identified. Moreover, some of these initiatives favour the association of both these objectives, that is to say, the creation of companies in which there exists a notable innovative force.

### ***Barriers to entrepreneurship and development of technology in Portugal.-***

Perhaps the most important barrier is the theoretical emphasis of education both at high school and university levels. Also, the tradition of a large bureaucracy, needed in the recent past to administer the colonies, created a certain inertia in talented people towards the civil service. In addition, the nationalizations that took place in the early stages of the advent of democracy led many entrepreneurs and good managers to leave the country (most going to Brazil).

The rebuilding of the economy has forced the government to put a general emphasis on tax collection with little discrimination so far for activities with higher future potential. There are signs however indicating that the government is sensitive to this problem and new tax regulations, more favourable to risk capital and entrepreneurship, will soon be available.

The relatively smaller size of the Portuguese market and its geographical location have kept this country somewhat isolated in the past. The poor logistical infrastructure has further contributed to this isolation. International perceptions of priorities flow from country to country through international links (institutional, information). Perhaps because of this isolation, the perception of priority associated to technology and entrepreneurship have only reached Portugal in the eighties.

## 15. THE PORTUGUESE INFRASTRUCTURE FOR DEVELOPMENT OF TECHNOLOGY AND ENTERPRISE CREATION

The Portuguese infrastructure is easier to study because it is smaller, centralized and to a great extent closely knitted to the public sector. The study reviews the existing policies, more or less explicit, the institutional framework and the most important programmes and institutions that deliver them.

### 15.1 The Portuguese Scientific and Technological System

**Institutional Framework.**- Major political and legislative decisions on matters of science and technology are taken in the Assembly of the Republic, which has its own Committee on Education, Science and Culture. At government level, overall decisions on science and technology are taken by the Council of Ministers, presided over by the Prime Minister. However, administrative control of scientific and technological activities is for the most part exercised at ministerial level.

Supervision and coordination of Research and Development activities is the responsibility of the National Board for Scientific and Technological Research (Junta Nacional de Investigaçao Científica e Tecnológica, JNICT) acting as staff body of the newly created Superior Council of Science and Technology (Conselho Superior de Ciência e Tecnologia), made of representatives of all sectors, public and private, interested in Science and Technology and aimed at being the top advisory body of the Government in matters of Science and Technology. Launched under the Prime Minister's office, it is attached to the Minister of Planning and Territorial Management, directly reporting to the Secretary of State for Scientific Research.

The predominant characteristic of the structure of the Portuguese scientific and technological system is the sectoral division of Research and Development activities. Each ministry has a Planning Department which is responsible for the analysis of proposals for the allocation of resources to these activities. Some ministers have special institutions directly

responsible for the coordination and activities of the various departments, institutes, laboratories, centres and field stations that are attached to them.

Research and Development for the Ministry of Industry and Trade is coordinated by the National Laboratory of Engineering and Industrial Technology (Laboratório Nacional de Engenharia e Tecnologia Industria - LNETI), responsible for research in energy and industrial technology.

A number of enterprises in basic production sectors have been nationalized, so that their respective ministries now have overall charge of their own Research and Development activities.

**Scientific and Technological Policy.-** To say that there exists a scientific and technological policy in Portugal is without doubt an exaggeration. This is because, in spite of the fact that much is said in the scientific community about the need for one to exist, the successive changes in government and the lack of definition as to who would be responsible for implementing this policy have so far prevented a body of guidelines from being traced which could lead to the efficient promotion of scientific and technological activity in the country.

The present government has just created the "Conselho Superior de Ciencia e Tecnologia" (CSCT), whose functions are to coordinate and systematize the plans, programmes and financial resources to be approved by the government in the field of scientific research, formulating proposals for the definition of national scientific and technological policy to be integrated in the other policies. With the creation of the CSCT, the recently formed Ministry of Territorial Administration becomes responsible for scientific coordination and international cooperation in this context.

These recent measures are aimed at reversing a very worrying trend: R&D expenditure in Portugal has traditionally been very small. In 1978, it represented 0.32 per cent of the GNP, placing the country very close to the levels found in Third World countries which, however, show a trend towards yearly growth in this area. In that year, the OECD's Portuguese Pilot Team recommended that in 1980 this percentage should reach 1 per cent. This did not occur; in 1980 it was only 0.34 per cent, in 1982 0.35 per cent and the provisional data for 1984 indicate that at most it will reach 0.38 per cent. In addition to this critical



situation, human resources working in research, expressed as a percentage of the active population, are extremely low in comparison with the percentages currently to be found in Europe.

**The "Junta Nacional de Investigaçao Cientifica e Tecnologica".-** The "Junta Nacional de Investigaçao Cientifica e Tecnologica" (JNICT) is the executive body of the "Secretaria de Estado da Investigaçao Cientifica" and its functions are to coordinate and promote scientific and technological research in Portugal.

With the recent changes introduced by the new government, delegating to the Ministry of Territorial Administration the management and coordination of the research activities, the JNICT has been encharged with stimulating applied research. It is hoped that the JNICT will play a much more active role in the scientific and technological scene. As a result, the budget for project financing has been increased from 100 million escudos in 1985 to 900 million in 1986.

The research projects are presented by companies, universities, research centres or state laboratories. The subsidy is not given to individuals but to institutions. The JNICT has an advisory council which covers the different scientific areas and which gives an opinion on the projects' scientific merit. Preference is given to applied research and experimental development projects which establish a "link" between companies and the research centres of the universities or state laboratories.

The subsidies are granted "à fonds perdu". A check is kept on the progress of the projects by means of the analysis of regular reports. Any non-fulfilment of the deadlines or project phases could mean the withdrawal of the support the JNICT gives to the institution; in other words, the JNICT expects the institution to supervise the activity of its researchers.

Another facet of the work of the JNICT is to promote and carry out seminars, workshops, etc., bringing the scientific and business communities together to define priority areas and determine the specific lines of action in each area in terms of research needs. For 1986, for example, some of these priority areas are: biotechnology, water and forestry resources, automated production control systems, analysis of the impact of new production systems and information technology.

As has already been stated, the JNICT has taken on a whole new dimension in 1986, thanks to the considerable increase in its budget. It was not therefore considered relevant to give figures referring to previous years or describe the types of contracts signed by the JNICT with the various applicant institutions. Finally, the JNICT also has an important role to play on the international scene after the entry of Portugal in the EEC, as a channel for Portuguese involvement in EEC research programmes.

## 15.2 Science and Technology in Portuguese Companies

The lack of R&D activities in the Portuguese industrial sector is one of the shortcomings of the country's scientific and technological system. The State is the main source of finance for R&D and it is also the State that performs the greatest amount of research activity. Companies hold very much a background position although their share is increasing year by year. Tables 18, 19, 20 and 21 show the scientific and technological situation in Portugal, as shown by various indicators.

TABLE 18 - Evolution of total R&D expenditure in Portugal  
(1976-1982)

Year	Total R&D expenditure		R&D/GNP (en %)
	(In 10 <sup>6</sup> escudos current prices)	(In 10 <sup>6</sup> US \$)	
1976	1,279.6	62.63	0.27
1978	2,521.1	91.38	0.32
1980	4,118.5	125.87	0.34
1982	6,541.2	160.28	0.35

Source: JNICT

TABLE 19 - Application and financing of R&D expenditure, in 1982  
(Amounts in Millions of Escudos)

Application of Funds

Source of financing	Companies	State	Higher Education	Non-profit making institutions	Total financing
Companies	1,898.4	5.8	0.1	55.5	1,959.8
State	32.0	2,756.1	1,262.1	1.1	4,051.3
Higher Education	--	--	20.3	--	20.3
Non-profit making institutions	--	11.2	39.8	240.4	291.4
Foreign	113.2	78.8	25.4	1.0	218.4
Total application	2,043.6	2,851.9	1,347.7	298.0	6,541.2

Source: JNICT

TABLE 20 - Evolution of R&D expenditure in Portuguese companies  
(1976-1982)

Year	R&D expenditure at current prices (millions of Escudos)	R&D expenditure (millions of Dollars)	% of total national R&D expenditure	% biannual growth rate (in dollars)
1976	269.6	13.2	21.1	--
1978	331.7	12.2	13.1	- 7.5
1980	1,179.6	36.1	28.6	+196
1982	2,043.6	50.1	31.2	+ 38

Source: JNICT

TABLE 21 - Human R&D resources in 1982

Number of people in R&D activities in 1982:	8,553 EFT*
Average annual rate of increase, referred to 1980	5.3%
Proportion of R&D personnel out of total national active population	0.2%
Total number of researchers	3,019 EFT*
Average annual rate of increase, referred to 1980	6.5%
Proportion of researchers out of total national active population	0.6%

\* EFT: Equivalent to full-time

Source: JNICT

### 15.3 Supportive Instruments for Technological Innovation

Several institutions have established support programmes for technological innovation. One of the State laboratories has started to act as an innovation financing body. More recently, another instrument has appeared: the European funds and programmes. Finally, several institutions are considering to launch venture capital firms. Following, the most important instruments of support will be described. These are:

- The Laboratorio Nacional de Engenharia e Tecnologia Industrial (LNETI).
- The Banco de Fomento Nacional (BFN)
- The Caixa Geral de Depósitos (CGD)
- The Instituto de Apoio as Pequenas e Medias Empresas (IAPMED)
- The European Programmes
- Venture Capital
- Data Bases

*Laboratorio Nacional de Engenharia e Tecnologia Industrial (LNETI).-*

The National Laboratory of Industrial Engineering and Technology (LNETI) is a body attached to the Ministry of Industry and Trade. Its activities are grouped into three different but interdependent activities:

- a) applied technological research activities for industry, especially in the field of new technologies.
- b) activities related with the implementation of the Ministry of Industry and Trade's technology policy, in terms of the creation of new support infrastructures for certain industrial sectors and in terms of the management of programmes for financing technological innovation projects.
- c) technical training activities for industry through the Industrial Technical Training Centre, which is maintained and operated by the LNETI.

These activities are interdependent because the 350 scientists and engineers employed by the LNETI can work on the projects developed in any one of the three areas.

Research activities are industry-oriented, that is to say, the users of these activities are industrial companies. The LNETI signs research contracts with the companies and in these contracts, there is a provision that states that the Laboratory will share the revenues from commercial application of the technologies developed.

It is interesting to note the way in which the LNETI establishes contacts with the companies. It is the LNETI's researchers that try to "sell" their research ability, identifying companies that might be interested in an idea that the laboratory wishes to research or is currently researching with its own resources. The LNETI's philosophy is to make the researcher aware that his work must have industrial or commercial interest, in other words, he will not be given funds to finance his project unless he can find a business partner who is interested in the result of that project. When he finds a "partner", the contract is signed between LNETI and the interested company. The researcher earns nothing on the value of the contract as he receives a regular salary from the Laboratory.

Unfortunately, no statistics are available on the number of contracts signed, and, more importantly on the results in terms of technological innovations introduced into the Portuguese industrial system by means of these contracts. What does exist is a list of companies with which contracts were signed and a reference/title of the project done or being done. The LNETI has never been concerned to find a numerical indicator which could define the degree of research activity. The number of projects, for example, is meaningless because it includes projects of different size and complexity, thereby precluding any attempt at comparison. Neither is the number of companies with which agreements are or were made as several projects may be performed in one company.

An important aspect of LNETI's activity is its role as agent for the Ministry of Industry's technological policy. LNETI acts as a manager of technical and financial programmes to support technological innovation promoted by the Ministry. These programmes, known as Industrial Development Contracts (CDI) are the formalization of experimental support measures for industrial innovation projects.

In the first 18 months of existence of these CDI's, finance worth 3,462 million escudos was given to a total of 104 projects. Table 22 gives a breakdown of the number of projects and the amount of financing given.

TABLE 22 - Industrial Development Contracts. Number and Funds

TABLE I			Number
PROGRAMME	1984	1985	TOTAL
Acquisition and assimilation of new technologies	22	17	39
Industrial innovation aid programme	40	25*	65
	<u>62</u>	<u>42*</u>	<u>104</u>

TABLE II			(Val. 10 <sup>6</sup> Esc.)
PROGRAMME	1984	1985	TOTAL
Acquisition and assimilation of new technologies	599	348	947
Industrial innovation aid programme	1,958	557*	2,515*
	<u>2,557</u>	<u>905*</u>	<u>3,462*</u>

\*Up to June 1985

Source: LNETI

In parallel with the CDI's, the Ministry and the LNETI set up support programmes for university research. Through these programmes, the Laboratory can finance research projects in new technologies which prove to have clear industrial interest. These projects may be carried out within a period of two or three years and financing is "à fonds perdu". However, if some time in the future the results should be put to commercial use, the company so doing must pay a royalty on sales.

*Banco de Fomento Nacional (BFN).-*

The Banco de Fomento Nacional (National Industrial Promotion Bank) is a special credit institution legally and structurally geared towards supporting the modernization and development of the domestic economy, by means of the medium and long-term financing of investment projects.

The BFN's position within the Portuguese banking system is that of an investment bank. As such, its function is to direct savings and other funds towards financing direct investments for the production and sale of capital goods and services in the domestic and international markets.

The BFN does not have any fixed specific programme for providing financial support for the creation of companies and technological innovation. However, its industrial credit lines may consider projects that introduce new technologies. Additionally, its role as promoter of joint ventures between Portuguese and foreign entrepreneurs is viewed in Portugal to be a major catalyst of technology transfers.

The changing nature of the BFN's programmes can be illustrated by an initiative in support of innovation and research launched during the first International Technology and Innovation Fair held in February 1986. This initiative is a special credit line for Portuguese companies holding projects related with research and development, and technological innovation (the purchase of foreign technology or its mere transfer to the purchasing company's production process are not eligible for inclusion in the scheme).

The credit line has a budget of 250 million escudos. Up to 70 per cent of the cost of the project (excluding land and other infrastructures) may be financed, with a ceiling of 25 million escudos. The interest rate will be that fixed by the Bank of Portugal (market rate) with a 25 per cent reduction for the first two years and a 15 per cent reduction for the next three years. The maximum term for the operation is 10 years.

The BFN's credit lines come from foreign banks (World Bank, European Investment Bank, Kreditanstalt für Wiederaufbau, etc.) and their purpose is to finance the importation of goods and technology. One advantage that the BFN offers to entrepreneurs in these credits is protection from changes in the exchange rate, i.e., the contract is signed on the



basis of the exchange rate then in force and any possible devaluation of the escudo against foreign currencies will not have any repercussion on the entrepreneur.

As administrator in Portugal of the "EFTA Fund", composed of contributions by Austria, Finland, Norway, Portugal, Sweden and Switzerland and aimed to contribute to industrial development, the BFN has financed specific projects that especially benefit small and medium-sized companies in the public and private sectors. The loans granted from the "EFTA Fund" can be used to create new companies, expands or reshape existing companies, perform research work and studies, purchase know-how and contract consultancy services. The loan conditions provide for reductions in the interest rate according to the system of financial incentives in force, availability of fluctuation risk-free foreign currency, preferential treatment under the tax incentive system currently in force and special benefits according to the characteristics of the project. Apart from a complete dossier on the technical, commercial, economic and financial aspects of the project, it is required that a significant part of the loans to be granted by the fund be used to purchase goods or services from the countries that make up the "EFTA Fund". In eight years of activity, 286 projects were approved, with loans amounting to a total of 11,248 million escudos and investments worth a total of 22,777 million escudos. Companies (92 per cent of them being private companies) in all parts of the country were able to benefit from the Fund and 3,530 new jobs were created.

For evaluating projects, the BFN uses all the project analysis tools of the World Bank model. This is because many of the projects are refinanced by the World Bank, which reanalyzes the projects on the basis of its own criteria.

Technical support is also given by the BFN by monitoring the start-up of the project. This monitoring additionally serves as a control activity as the funds are released as the monitoring team reports that the stages scheduled in the timetable are being fulfilled.

With the entry of Portugal in the EEC, the BFN has been attempting to channel EEC resources for industrial development projects. Thus, during January 1986, the European Investment Bank granted loans, through the BFN, worth 5.9 thousand million escudos, which were distributed among 111 projects, whose total value amounts to 2.9 thousand million escudos. These funds are used to aid small and medium-sized enterprises in several fields: R&D, new technology introduction, pollution control, environmental protection, quality control, energy saving, etc.

### *Caixa Geral de Depósitos, C.G.D.-*

As regards the support of technological innovation, the C.G.D. (General Deposits Savings Bank) is promoting the first public competition of innovative ideas – new products or new industrial technologies. The aim is to provide incentives for innovative ideas with potential for contributing to the modernization and technological development of Portuguese industry.

The innovative ideas selected will be proposed by the promoting bodies, within their respective fields, for the aids and incentives provided for in current legislation so that they can be developed and applied through the creation of new companies or implemented in companies already existing.

In addition to creating a challenge for technological innovation and industrial modernization, the competition aims to help fill a gap that has long been felt in Portugal: the lack of good ideas for investment. Considering the wide definition given to innovation in this competition, it is hoped that it will produce a significant body of valid ideas capable of attracting potential investors.

### *Instituto de Apoio as Pequenas e Medias Empresas (IAPMEI).-*

IAPMEI's small and Medium Enterprise Support Institute aid programmes consider both the creation and the expansion/restructuring of existing companies, providing that the projects include the introduction of new technologies. Its role, however, is more focussed on the first objective and it will be studied later in more detail.

### *The European Programmes.-*

As regards the EEC programmes (ESPRIT, BRITE, etc.), it is the "Junta Nacional de Investigaçao Cientifica e Tecnologica" (JNICT) who acts as link between the programmes and possible Portuguese applicants. The role of the JNICT is as a source of

information, attempting to create the maximum amount of opportunities for companies and research centres to take part in these programmes.

According to the JNICT's management, the difficulties that Portuguese companies and universities face in gaining access to these programmes lie in the distance between the goals of EEC programmes and those of Portuguese organizations. The objective of both the 1984-1987 plan and the 1987-1991 plan is to respond to the challenge confronting Europe with the United States and Japan. Then, countries with a relatively less developed technology system have fewer chances of winning contracts. The difficulty lies not only in formalities and access to information but in the characteristics of the national scientific and technological system.

As far as organization for international cooperation is concerned, JNICT has an interministerial committee for scientific and technological cooperation with the EEC. Portuguese delegates from this committee take part in the management and coordination committees of each one of the EEC programmes. The task of these delegates is to represent Portuguese interests in the formulation of programmes.

#### *Venture Capital Companies (VCC).-*

On the initiative of the Banco Portugues do Atlantico, with the support of the Associação Industrial Portuense (Industrial Association of Porto), the constitution of the first VCC in Portugal has begun. No less than 40 companies and individuals will be shareholders of this company. The initial share capital will amount to 500 million escudos, over 60 per cent of it being provided by private sources. The launching of this VCC now only awaits the authorization of the Ministry of Finance. The legislation regulating the functioning of the VCC is very recent (Decree 17/86), dating from February 5, 1986.

In the Government's opinion, the purpose of the Portuguese VCC's will be to promote investment and technological innovation. The creation of these companies is in line with a policy to encourage the use of company capitalization instruments and will therefore also add considerable dynamism to the capital market.

The Government intends to combine the various presently existing systems of tax incentives in order to establish a tax system applicable to the VCC and

compatible with the aims it is hoped to achieve, among which is the revitalization of the capital market.

According to Decree 17/86, for a VCC to be constituted, a minimum initial capital of 300 million escudos (approximately 2 million dollars) is required. At least half of this amount must be deposited in the Caixa Geral de Depósitos, expressly stating the amount subscribed to by each shareholder. The authorization granted by the Government will be null and void if the memorandum of association of the VCC is not executed within 120 days.

#### *Data Bases.-*

A national system of terminals connected to the Centre of Scientific and Technical Documentation (Centro de Documentação Científica e Técnica, (CDCT), is in operation in Portugal. The CDCT is an agency of the National Institute of Scientific Research (Instituto Nacional de Investigação Científica, INIC) of the Ministry of Education.

Through the terminals, the user can have access to the information available at INIC which is basically anything published by scientists and researchers in Portugal. The network of CDCT terminals do not have direct access to foreign data bases. The INIC, however is connected to many international data banks and researchers can request information to INIC. This centre will then obtain the information and will send it via terminal to the user that made the request.

#### **15.4 University Research and University-Industry Cooperation**

University research in Portugal is coordinated by the Instituto Nacional da Investigação Científica. As it was said earlier the Portuguese University system has always had a theoretical focus and the typical role of the faculty has been teaching theory to generalists rather than training specialists. According to JNICT, the higher education system spent 1,347 million escudos in 1982 in R&D activities, equivalent to 20 per cent of the country's computed R&D expenditures. Most of these funds went to finance basic research with little practical application to Portuguese industry. In recent years, the improved prospects of Portugal have

attracted Portuguese researchers and scientists trained abroad who are stimulating a change towards a different kind of applied research and concerted university-industry research.

Research cooperation programmes between University and Business is still a recent phenomenon in Portugal. In spite of this, it is already possible to identify a number of highly significant experiences in the universities and research centres where an attempt is being made to carry out meaningful work in the development of research projects with a certain degree of university-enterprise integration.

It is possible to identify two types of supportive mechanisms for this integration process: the informal mechanisms, in which bodies act as intermediaries between companies and university research centres, and the formal mechanisms, consisting of financing programmes for applied research and the subsequent search for industrial partners to exploit the ideas generated by the research.

Among the former, the Associação Industrial Portuguesa (Portuguese Industrial Association), plays a leading role. For many years, this Association has been drawing attention to the need for bringing together its associates and universities. Its managers are constantly being invited to give lectures in universities and they always seek to convey the importance of applied industrial research. Cooperation opportunities between universities and companies are usually identified during these contacts. Furthermore, the Association is constantly being approached both by employers and by researchers. It is possible that the Association will create a department to give official status to this contact-establishing activity.

Also worthy of mention is the Associação Industrial Portuense (Industrial Association of Porto, AIP), which is the association that groups the industries of the north of Portugal, the main region as regards number of companies. At present, the AIP plays a major role as channel between the universities in the north part of the country and EEC institutions such as the European Investment Bank, obtaining funds for technological research which will be subsequently applied in local industries.

Formal instruments include the LNETI and the JNICT. The goal of the LNETI is to promote research in new technologies, providing that the projects show clear industrial interest. The LNETI finances these projects "à fonds perdu". During the development of the project, the LNETI looks for companies who might be interested in the innovation so as to obtain some return on the financing it has granted through possible future royalties.

As regards the JNICT, its role as financing body for research activity in Portugal includes participation in joint research projects between companies, research centres and universities. In the 1984 report, which summarises its research financing-related activities, it is possible to read that only 11 contracts were signed for the coparticipation of the JNICT in University/Business cooperation projects. In the face such a small number, the report concludes that this is because there does not exist a sufficient level of contact between the production sector and the university to enable a better use to be made of the resources of the academic world through research units specializing in applied research and experimental development.

To conclude, cooperation between University and Business is still only just beginning in Portugal and it is too soon to evaluate it.

### 15.5 Creation of New Enterprises in Portugal

All the initiatives to encourage the creation of new companies are taken by public institutions, although private institutions take part in some of them.

Associated with the process of creating new companies is the system of fiscal and financial incentives established by the Government. However, at the time of writing this report, this system is under review not only because of the imperfections observed in its application but also in order to adapt the legislation to the new situation which exists in Portugal as a result of the country's entry in the EEC. Following, the leading enterprise creation instruments will be described. These are:

- The Caixa Geral de Depósitos (CGD)
- The Instituto de Apoio as Pequenas e Meias Empresas Industriais (IAPMEI)
- The JEEP project
- The Fundo de Turismo
- Foreign Investment

### *Caixa Geral de Depósitos (CGD).*

The Caixa Geral de Depósitos (General Deposits Savings Bank) is the most important credit institution in Portugal; it handles one fifth of all deposits and total domestic credit balances granted by the banking system. Since its foundation, it has been a public sector credit institution with the characteristics of a nationwide savings bank. It thus holds public sector deposits and private savings, investing them in credit operations designed to encourage economic activity in the country.

The CGD grants loans for projects in the industrial, agricultural and tourist sectors, which are the chief sectors in the Portuguese economy. Its fundamental business is medium and long term financing. The CGD's interest rate is usually two points lower than that of commercial banks.

From 1974, the CGD stopped financing big Government projects and turned its attention to a heavily neglected segment of enterprises: the small and medium-sized companies. Since then, the CGD, in cooperation with the IAPMEI (Institute for the Assistance of Small and Medium-sized Industrial Companies) has been playing an important role in the process of creating new companies and, more recently, in the introduction of new technology.

With respect to the creation of new companies, the industrial project competitions which the CGD and the IAPMEI have been promoting since 1980 are well known in Portugal (1986 has seen the fourth such contest).

According to the rules of this fourth contest, entitled "Bet on the future, build your company", it is open to any person (Portuguese or EEC citizen) who intends to start an industrial company legally classified as small or medium-sized (less than 400 employees and annual sales no greater than 500 million escudos). Participants must draw up a "business plan" according to the guidelines established by the promoting bodies. The information set out in that plan enables the jury to evaluate the projects according to the following criteria:

- entrepreneurial potential of the candidates;
- innovative character of the project;
- regional and sectorial impact;
- exploitation of natural resources;
- use of national technology;
- contribution to improving the country's balance of trade;
- creation of jobs.

For the purposes of this competition, the country has been divided into seven regions and the projects are allocated to the region where it is planned the factory will be installed. There is no limit on the number of projects that will be approved. This will depend exclusively on the nature of the "business plan". Assistance will be given to the approved projects by the promoting bodies within the limits of their field of operation (financial for the CGD and technical for the IAPMEI) and the projects will be nominated for the tax incentives provided for by current legislation. With respect to the three contests already held, a total of 367 projects were judged, 157 of which were selected for financing. These represented an overall investment value of 8.3 thousand million escudos and meant the creation of 4,000 jobs.

*Instituto de Apoio as Pequenas e Meias Empresas Industriais. (IAPMEI).-*

The IAPMEI, is a public body, linked to the Ministry of Industry and Energy. In collaboration with other institutions, its task is to study, promote, and coordinate the application of the measures that comprise the SME assistance policy. 16,000 companies are registered with the IAPMEI of which at least ten thousand have already benefited from action by the Institute.

The IAPMEI grants the registered companies both technical assistance (business management counselling, personnel training, guidance in matters of organization, marketing research, etc.) and financial aid by means of programmes in which both its own technicians (approximately 150 engineers and economists) and people on contract from outside the Institute take part. In order to finance its operations, the IAPMEI has its own budget which, for the year 1985, amounted to 4 thousand million escudos.

The objectives of the aid programmes for the creation and expansion of new technology-based companies are:



- to encourage and strengthen investment in new industries and new technologies;
- to increase technological innovation;
- to encourage innovative projects with high development potential;
- to provide employment opportunities for the highly qualified.

The financial assistance provisions include:

- up to 45 per cent of the fixed capital investment, which must not exceed 60 million escudos, excluding land;
- no interest charged;
- maximum term of five years, with a maximum grace period of two years;
- prearrange half-yearly payments to number not less than six.

For companies that are to be created for a greater and more rational use of natural resources, the provisions for financing are the following:

- up to 35 per cent of the total fixed capital investment and research costs, up to a maximum of 45 million escudos per company;
- no interest charged;
- a pay-back period of three years in six half-yearly instalments.

In addition to these programmes, the IAPMEI, in cooperation with the Caixa Geral de Depósitos, organizes the industrial project competitions already referred to in this study.

Another instrument for fostering the creation of companies is the Bolsa de Oportunidades de Inversión (Investment Opportunities Exchange). In other words, the IAPMEI holds a portfolio of projects for new enterprises which it places at the disposal of investors who approach the Institute looking for possible new investment opportunities. This initiative is still in its early stages without specific results worth mentioning.

On an international level, the IAPMEI is the equivalent of the Bureau de Approchement d'Entreprises, a body attached to the European Commission. Thus, the IAPMEI serves as a link between Portuguese companies and foreign companies that wish to establish some sort of joint venture.

### *The "JEEP" project.-*

The JEEP project (Jóvins Empresários de Elevado Potencial, Young Entrepreneurs with High Potential) is a joint initiative of three institutions, one public and two private: the Banco Portugues do Atlantico, the Associação Industrial Portuense and the Conselho, Gestao e Investimentos das Sociedades Anónimas de Responsabilidade Limitada.

Unlike the industrial project competitions promoted by the Caixa Geral de Depósitos and the IAPMEI, in the JEEP project the emphasis is on granting opportunities to people rather than to the "business plan". The promoters believe that the best projects can fail if the people behind them do not have the necessary capabilities. Having identified people who have potential management ability, the promoters ensure that these people can increase the chances that their future companies will succeed, by training them under the JEEP scheme, helping them to draw up a "business plan" and assisting them in the setting up of the company.

Thus, the aim of this project can be expressed as follows: to find and encourage young people (up to 35 years of age) who meet the promoters' requirements and have developed an idea/enterprise, providing them with a degree of training, as well as the financial and technical assistance for the launching of their projects. In 1986 the second JEEP programme will be promoted. The result of the first programme was that 19 young people were declared JEEP's in 1985.

In practice, the programme is organized in three stages:

- Curriculum vitae analysis and psychological tests
- Training
- Drawing up the Business Plan

The costs of this initiative are met by the three promoting bodies and by a few public and private institutions. The programme is run by four members of the Bank's Economic and Marketing Research Office. In the course of the three stages, other persons from the promoting bodies or from other institutions assist in the project.

*Direção Geral de Turismo (DGT), and Fundo de Turismo (General Directorate for Tourism, and Tourism Fund).-*

The contribution that the tourist sector makes to the Portuguese economy is very important. In 1984, for example, revenue from tourism covered more than one third of the country's balance of payments deficit. In comparison with other countries, according to OECD data, in 1983 income from tourism Portugal accounted for 3.2 per cent of the country's Gross Domestic Product, which places Portugal ahead of countries such as Spain, Switzerland, Greece and Italy, where, as is well known, tourism plays a major role.

Aware of this importance and that the tourist potential of the country is far from being fully exploited, the Portuguese Government has introduced a series of incentives with a view to developing new tourist enterprises and improving the existing infrastructure.

The incentives for creating new enterprises follow a programme of priorities established by the Secretary of State for Tourism. At the moment, these priorities are for the creation of hotels or similar establishments (anything that could increase the number of beds) and for the creation of enterprises capable of increasing the number of hotel guests in the low season.

The incentives for the creation of tourist-related companies are technical, fiscal and financial. Technical assistance is provided by the Direção Geral de Turismo (DGT) before the project preparation phase. The degree of fiscal aid, consisting of exemption from tax payment for a number of years, is influenced by the DGT, who assesses the utility of the project for the tourist trade. Financial assistance is granted by the Fundo de Turismo or by the Caixa Geral de Depósitos, depending on the cost of the project. In any case, the amount of assistance will depend on the importance of the project for tourist trade and this aspect is decided by the DGT.

The Fundo de Turismo (Tourism Fund) is a body linked to the Department of State for Tourism and its purpose is to finance tourism projects in accordance with the priorities set by the Secretariat. The loans granted by the Fundo de Turismo are used to finance projects which have been accorded top rating in tourism importance, or which, in the case of those with second or third class ratings, have been declared to be of touristic value. Once the technical viability of the project has been approved by the DGT, the Fundo de Turismo evaluates its economic/financial viability.

Financing does not exceed 60 per cent of the total investment and the general terms of the loan are summed up in Table 23.

TABLE 23 - Financial Benefits offered by Fondo de Turismo

Objectives	Maximum Financing	Maximum Term	Annual Grace Period	Annual Interest Rate	Reductions in the First Years
Construction and equipping of Hotels	60 Million Escudos	15 Years	5 Years	21.5%	1st Year: 7.5% 2nd Year: 5.0% 3rd Year: 2.5%
Construction and equipping of Restaurants and other Tourist-Oriented Establishments	60 Million Escudos	5 Years	1 Year	21.5%	1st Year: 2.5%
Tourist Complexes, Camp Sites, Sports Facilities	40 Million Escudos	10 Years	3 Years	15.5%	---
Tourist Oriented Projects Designed to Increase Number of Hotel Guests in the Low Season	50% of investment	5 Years	1 Year	21.5%	1st Year: 5%

Source: Fondo de Turismo

In 1984 the Fondo de Turismo examined 142 projects for financing and approved 104. The credits granted amounted to one thousand million escudos.

### ***Foreign Investment in the Creation of Companies.-***

The inclusion of the Foreign Investment Institute (FII) in this study is justified by the fact that in recent years Portugal has managed to start new companies and introduce new technology using foreign capital, and the Foreign Investment Institute is the official body responsible for the handling of matters connected with the entry of this capital into the country. Although the FII does not give financial assistance for projects, it plays a very important role since its function is to help the investor to take advantage, in the same way as the Portuguese entrepreneur, of all the mechanisms available in the country to assist in the creation of companies and in the introduction of new technology.

Conscious of the limited domestic investment capacity, the Portuguese Government has been encouraging the attraction of foreign investments in order to create new companies and modernize the country's production structure by means of the introduction of new technologies. To achieve this, it has created a series of attractive conditions, in the form of fiscal and financial incentives, for the foreign investor who, moreover, enjoys other advantages such as low labour costs and a fairly liberal foreign investment law which allows free repatriation of profits and capital. The Foreign Investment Institute was created at the end of 1977 to promote, inform, negotiate and advise on matters connected with foreign investment.

The FII is linked to the Ministry of Finance but is financially and administratively autonomous. The function of the Institute is to assess foreign investments and authorize projects worth up to 250 million escudos (about 1.7 million dollars). Projects whose value exceeds this figure must be approved by the Ministry of Finance.

Assistance given to the investor by the FII is not financial, technical, or fiscal. The Institute is a body that advises on and negotiates the various types of assistance that other Government institutions may provide. It arranges all the contacts and provides all the information that the investor needs in order to take advantage of the mechanisms available for aiding his company.

Of the total foreign investments of 1984, only 20.7 per cent (39 million dollars) went to create new companies or to open branches or agencies of companies already established. The highest percentage (28.9 per cent) corresponds to share capital increases of companies already established.

As regards the creation of new companies, the investment of 3.64 million dollars in 1984 was distributed among the following sectors:

### Creation of new enterprises

SECTORS	Total of created enterprises Percentage Value
Hotels and Tourism	35%
Food, Beverages and Tobacco	11%
Metalworking, electric and electronic industry	9%
Textiles, Clothing and Footwear	9%
Agriculture	8%
Industrial and Office machinery (Trade)	5%
Electrical Appliances (Trade)	4%
Others	19% (1)

(1) Wholesale trade totals 18.3 per cent.

Source: F.I.L.

## 16. CONCLUSION

The Portuguese infrastructure for development of technology and enterprise creation is still young and lean. It lacks, like in the case of Spain, an assessment of the specific priorities which should be established given the characteristics of Portugal. The way this infrastructure seems to be developing, with a variety of programmes, not all of them rigorous enough, might lead to fall in many of the problems that were found in the case of Spain: overlapping, fragmentation, insufficient support for certain projects, short term orientation, superficial evaluation, lack of coordination and lack of concertation public-private. Moreover, some of the support instruments found in Portugal do not follow the philosophy of EEC support programmes, as it would be the case with the programmes of the Caixa Geral de Depósitos, the JEEP project, etc.

Portugal has though strong institutions like the JNICT, the LNETI and the IAPMEI that can be the basis for the development of a rational infrastructure.

With relation to other EEC member countries one aspect must be taken into account. Most European countries attach great priority to technology strategies which might give them a comparative advantage or at least a differentiation vis a vis the USA and Japan. Portugal is probably in a different strategic play. Portugal still needs to incorporate intermediate technologies to its industry to put it in the position to supply both, the domestic and the export markets. The programmes addressed to develop the tourism sector seem to fit very well the country's priorities and opportunities.

Regarding opportunities, everything said for Spain applies also to Portugal. More emphasis should be put however on university research which seems to be lagging behind dangerously.

The risk of imitative approaches always exists and this might produce waste of resources and loss of precious time. Today, it is possible to find emphasis on enterprise creation through venture capital and emphasis on advanced technologies throughout Europe. Emphasis on creation of new enterprises makes more sense where large sectors of mature industries have been destroyed, as it is the case with steel, textiles, appliances, shipbuilding, etc., in the more developed countries of the world. Emphasis on venture capital

makes sense when the financial market has developed to the point that short term and medium term funds are relatively easy to access. Emphasis on high technology makes sense when there are scientists, sophisticated customers, global distribution networks, strong industrial basis. Therefore, each country must reach a specific trade-off tailor made to the nature of its industrial base and the level of development of its technological resources.

If these considerations are taken into account, Portugal, and to a certain extent Spain, must probably attach great importance to the development of that segment of their technological infrastructure which addresses the support of medium sized enterprises competing with differentiated products. This means a lot of process technology and design.

In summary then the following lines of action can be recommended for Portugal, many of them similar to what was considered appropriate in the case of Spain.

1. An effort must be made to strengthen the education system with emphasis on the training of practitioners. University research must shift its focus from basic to applied research and the hours of contact of students with laboratories must increase. The equipment of public laboratories must be renovated with the same focus, application.
2. The country needs an assesment of technological needs and priorities as the basis for the development of a technology strategy that can perhaps be given the status of a law. Imitation of other country priorities is dangerous to the extent that Portugal has wide economic differences with most EEC member countries.
3. Foreign direct investment in Portugal can be a strong locomotive of technological advance and, of course, enterprise creation. Portugal has a lot to offer to the foreign investor: location in the EEC, very low labour costs, reasonably good labor, a domestic market that is small but has enormous growth potential, etc. Different mechanisms can help in this task: specific incentives, industrial and technological parks, improvements of the infrastructure, etc.
4. Portuguese institutions have launched a variety of instruments of support of technological innovation and enterprise creation. Some of these instruments are different from what is available in to her EEC countries to accomplish the same objectives. Following the assessment recommended in point 2, an effort must be



made to shape these instruments along the lines of more EEC – wide standards. This will facilitate the linking of Portuguese programmes to those of the EEC.

5. The flow of information relevant for development of technology and entrepreneurship in Portugal should be increased. As a first step more published information of the available resources (particularly in the public sector) is needed. Information about the use and access to data bases should be disseminated.
6. The total R&D expenditure of Portugal must increase, as international agencies have so often recommended, to reach the 1 per cent of the GNP as soon as possible. This expenditure must be related to the assessment recommended in point 2, but, in order to get the maximum multiplier effect possible, and following the example of EEC programmes, Portuguese authorities should establish criteria like concertation and networking to give priority to the allocation of funds.
7. Venture Capital should be deployed in Portugal as soon as possible. It can not be expected that Portugal will be able to generate massive amounts of ideas which could be candidates for this funding approach. Nevertheless, some of the enterprise promotion experiences implemented so far indicate that there is a market for the Venture Capital concept.



APPENDIX I

THE SCIENTIFIC AND TECHNICAL RESEARCH PROMOTION  
AND COORDINATION ACT

(The Government's Official Gazette; Friday, April 18th, 1986)



# I. Disposiciones generales

## JEFATURA DEL ESTADO

9479 LEY 13/1986, de 14 de abril, de Fomento y Coordinación General de la Investigación Científica y Técnica.

JUAN CARLOS I,  
REY DE ESPAÑA

A todos los que la presente vieren y entendieren,  
Sabed: Que las Cortes Generales han aprobado y Yo vengo en sancionar la siguiente Ley:

### EXPOSICION DE MOTIVOS

La investigación científica y el desarrollo tecnológico se han desenvuelto tradicionalmente en España en un clima de atonía y falta de estímulos sociales, de ausencia de instrumentos que garantizaran la eficaz intervención de los poderes públicos en orden a la programación y coordinación de los escasos medios con que se contaba, falta de conexión entre los objetivos de la investigación y las políticas de los sectores relacionados con ella, así como, en general, entre los centros de investigadores y los sectores productivos. No es de extrañar, por ello, que la contribución española al progreso científico y tecnológico haya sido, por lo general, escasa e impropia del lugar que en otros órdenes nos ha correspondido, y que, cuando ello no ha sido así, como en algunos periodos del siglo actual, las más valiosas aportaciones hayan procedido del esfuerzo aislado de relevantes personalidades.

Si conocidos son los males que esta situación ha acarreado para las posibilidades de progreso técnico, modernización y racionalización de los hábitos y actitudes de la sociedad española, en el pasado, los riesgos que en el inmediato futuro derivarán de la persistencia de un estado de cosas semejante apenas precisan ponderación. En efecto, los nexos que unen la investigación y el desarrollo socio-económico, asumidos de antiguo en los países avanzados, resultan en nuestra época, caracterizada por una sostenida crisis económica y una intensa competencia industrial, más evidentes que nunca. El reto de la llamada tercera revolución industrial exige, y de hecho está produciendo en aquellos países, un aumento constante de inversiones en investigación e innovación a fin de mantenerse en la vanguardia del cambio tecnológico.

La necesidad de corregir los apuntados males tradicionales de nuestra producción científica y técnica, básicamente centrados en la insuficiente dotación de recursos y desordenada coordinación y gestión de los programas investigadores, así como la de asegurar que España participe plenamente en el proceso en que están inmersos los países industrializados de nuestro entorno, justifican ampliamente la promulgación de una normativa que, dentro de los objetivos ya marcados por la Constitución, establezca los necesarios instrumentos para definir las líneas prioritarias de actuación en materia de investigación científica y desarrollo tecnológico, programar los recursos y coordinar las actuaciones entre los sectores productivos, centros de investigación y Universidades. Son estos los grandes principios que inspiran la presente Ley, como garantía de una política científica integral, coherente y rigurosa en sus distintos niveles de planificación, programación, ejecución y seguimiento, con el fin de obtener del necesario incremento de recursos para la investigación la rentabilidad científico-cultural, social y económica más adecuada a nuestras exigencias y necesidades.

Se da cumplimiento de este modo al mandato constitucional que atribuye a la Administración del Estado la competencia sobre el fomento y la coordinación general de la investigación científica y técnica (artículo 149, 1.15, de la Constitución) y en conformidad con el «interés general» que obliga a todos los poderes públicos (artículo 44, 2, de la Constitución). Por otra parte, los distintos Estatutos de Autonomía han ido estableciendo las competencias que en esta materia posee cada Comunidad Autónoma. Surge así la necesidad de coordinar la actuación, en el campo de la investigación, de las diferentes Comunidades Autónomas entre sí, y de éstas con la

Administración del Estado. A tal exigencia responde la creación por esta Ley de un Consejo General de la Ciencia y la Tecnología en el que participarán representantes de la Administración del Estado y de las Comunidades Autónomas.

La Ley encomienda a una Comisión Interministerial de Ciencia y Tecnología, la programación de las actividades de investigación de los organismos dependientes de la Administración del Estado, mediante el Plan Nacional de Investigación Científica y Desarrollo Tecnológico. Se establece así un nuevo e integrador mecanismo, de programación ágil y eficaz, y, conjuntamente, una metodología adecuada y moderna para hacer frente al complejo proceso de planificación, coordinación y gestión. El Plan Nacional, cuya aprobación corresponde al Gobierno y cuyo seguimiento y valoración llevará a cabo el Parlamento sobre la base de las comunicaciones que le sean remitidas periódicamente por el Ejecutivo, establecerá los grandes objetivos en investigación científica y tecnológica para periodos plurianuales, y ordenará las actividades dirigidas a su consecución en programas nacionales, programas sectoriales, a realizar por los distintos Ministerios con responsabilidades en esta materia y programas de Comunidades Autónomas, que sean financiados en todo o en parte por fondos estatales.

La previsible, a la vez que imperativa, expansión de la investigación científica y técnica española en los próximos años exige un aumento correlativo en el número de nuevos investigadores, así como un aprovechamiento intensivo de la experiencia de los maestros de investigación. Al consiguiente esfuerzo formativo, que de ello se desprende, contribuirán los programas de formación, cuya inclusión está prevista en el Plan Nacional, y que atenderán a las exigencias generales de la investigación científica y el desarrollo tecnológico, y, en particular, a aquellas áreas científicas y técnicas en las que sea mayor la necesidad de personal especializado. La Ley contempla asimismo las medidas oportunas para el fomento de la productividad del personal investigador.

Elemento clave de la eficacia programadora del Plan Nacional es la inclusión en el mismo de evaluaciones presupuestarias plurianuales que integren las de los distintos organismos públicos de investigación, tanto de gastos corrientes como de inversión, superando de este modo la tradicional separación de unos y otros y las frecuentes distorsiones que de ella se derivan.

La necesidad de promover un clima social estimulante para la investigación científica motiva la creación por la Ley de un Consejo Asesor para la Ciencia y la Tecnología, que constituirá el vínculo efectivo entre la comunidad científica, los agentes sociales y los responsables de programar la actividad científico/investigadora, garantizando así que los objetivos de esta programación se adecuen a los distintos intereses y necesidades sociales. Tal vinculación aspira a superar el tradicional aislamiento de la ciencia española, y facilitar, al mismo tiempo, la incorporación de los sectores privados a la tarea de planificar y ejecutar actividades de investigación científica y técnica.

La Ley establece, por último, un marco común para los organismos públicos con funciones de investigación, complementándolo con una mayor integración de cada organismo en la política sectorial del Departamento al que se encuentra adscrito, lo que permitirá una mejor coordinación y, en consecuencia, una más adecuada ejecución del Plan Nacional. Asimismo, la Ley introduce importantes reformas en el funcionamiento de estos organismos -flexibilizando sus estructuras de gestión y abriendo la participación en sus órganos de gobierno a representantes de otros organismos con intereses en el campo de la ciencia y la tecnología-, con el fin de posibilitar una gestión más ágil y adaptada a sus respectivas atribuciones. En cuanto a las funciones específicas, no afectadas por la presente Ley, que los organismos tienen o puedan tener, serán recogidas en sus respectivos reglamentos de funcionamiento. De esta forma, se establecen por primera vez una estructura homogénea mínima y una vinculación funcional entre ellos, congruentes con el principio de coordinación que inspira la presente Ley. Sin duda, ambas condiciones constituyen la garantía de un funcionamiento más integrado y, por tanto, más eficaz de nuestro centros públicos de investigación.

## CAPITULO PRIMERO

## Del Plan Nacional de Investigación Científica y Desarrollo Tecnológico

*Artículo primero.*

Para el fomento y la coordinación general de la investigación científica y técnica que el artículo 149, 1.15, de la Constitución encomienda al Estado y, en cumplimiento de lo establecido en el artículo 44, 2, de la misma, se establece el Plan Nacional de Investigación Científica y Desarrollo Tecnológico, que se regirá por la presente Ley.

*Artículo segundo.*

El Plan Nacional se orientará fundamentalmente a la realización de los siguientes objetivos de interés general:

- a) El progreso del conocimiento y el avance de la innovación y desarrollo tecnológicos.
- b) La conservación, enriquecimiento y aprovechamiento óptimo de los recursos naturales.
- c) El crecimiento económico, el fomento del empleo y la mejora de las condiciones de trabajo.
- d) El desarrollo y el fortalecimiento de la capacidad competitiva de la industria, el comercio, la agricultura y la pesca.
- e) El desarrollo de los servicios públicos y, en especial, de los de vivienda, comunicaciones y transportes.
- f) El fomento de la salud, del bienestar social y la calidad de vida.
- g) El fortalecimiento de la defensa nacional.
- h) La defensa y conservación del Patrimonio Artístico e Histórico.
- i) El fomento de la creación artística y el progreso y difusión de la cultura en todos sus ámbitos.
- j) La mejora de la calidad de la enseñanza.
- k) La adecuación de la sociedad española a los cambios que conlleva el desarrollo científico y las nuevas tecnologías.

*Artículo tercero.*

En la definición de los programas que integran el Plan Nacional de Investigación Científica y Desarrollo Tecnológico, así como en la determinación de los instrumentos necesarios para su aplicación, se tendrá en cuenta:

- a) Las necesidades sociales y económicas de España.
- b) Los recursos humanos y materiales existentes en la comunidad científica y tecnológica española y sus necesidades de futuro.
- c) Los recursos económicos y presupuestarios disponibles, así como la necesidad de una financiación regular para el mantenimiento y la promoción de una investigación científica y técnica de calidad.
- d) La necesidad de alcanzar una elevada capacidad propia en ciencia y tecnología.
- e) La conveniencia de acceder a tecnologías externas de calidad mediante procesos de incorporación selectivos adecuados, en cada caso, al desarrollo de la capacidad científica y tecnológica española.
- f) Las repercusiones humanas, sociales y económicas que pudieran resultar de la investigación científica o de su aplicación tecnológica.

*Artículo cuarto.*

El Plan Nacional fomentará la investigación básica en los distintos campos del conocimiento a través de una financiación regular de la misma que haga posible el mantenimiento y la promoción de equipos de investigación de calidad, tanto en las Universidades como en los demás centros públicos de investigación.

A tal fin se incorporará la función investigadora en la expresión del gasto público.

*Artículo quinto.*

1. El Plan Nacional contendrá previsiones para el fomento de la investigación científica y del desarrollo tecnológico en las Empresas; así como para la promoción de las Entidades que éstas constituyan a tal fin.

2. El Plan Nacional promoverá, en todo caso:

- a) La necesaria comunicación entre los centros públicos y privados de investigación y las Empresas.
- b) La inclusión en los proyectos y programas de investigación de previsiones relativas a la utilización de los resultados de la misma.

c) Actuaciones concertadas de las Universidades y los centros públicos de investigación con las Empresas.

3. A partir de la entrada en vigor de esta Ley, los Presupuestos Generales del Estado contendrán medidas de carácter financiero y fiscal que apoyen y favorezcan las actividades de investigación científica y desarrollo tecnológico en las empresas y entidades ya referidas en el número 1 de este artículo.

*Artículo sexto.*

1. El Plan Nacional comprenderá las actividades a desarrollar por los Organismos de investigación de titularidad estatal, en materia de investigación científica y desarrollo tecnológico, y las análogas de aquellos otros Organismos y Entidades, públicas y privadas, que así se acuerden. En él se incluirán las previsiones presupuestarias plurianuales de los mencionados Organismos de investigación para actividades de investigación científica y desarrollo tecnológico.

La Comisión Interministerial de Ciencia y Tecnología, en coordinación con los órganos de planificación económica de la Administración del Estado elaborará el Plan Nacional, lo someterá al informe de los órganos asesores previstos en la presente Ley y lo elevará al Gobierno para su aprobación y posterior remisión a las Cortes Generales.

El Plan Nacional será revisable anualmente y, en todo caso, con esa misma periodicidad, será objeto de ampliación en nuevas anualidades y de informe respecto de su desarrollo mediante Memoria elevada por el Gobierno a las Cortes Generales.

2. El Plan Nacional, en función de los recursos y de las necesidades en materia de dichas actividades previsibles durante el período de su vigencia, definirá los objetivos que deba alcanzar el sector público y los que, mediante acuerdo, deban cumplirse por el sector privado.

A estos efectos, el Plan Nacional comprenderá, al menos, los siguientes capítulos:

a) Programas Nacionales de Investigación Científica y Desarrollo Tecnológico, que serán elaborados por la Comisión Interministerial de Ciencia y Tecnología y podrán integrar, en su caso, las correspondientes iniciativas sectoriales, cualquiera que sea el Organismo o Entidad pública o privada que las proponga. Esta Comisión determinará, asimismo, a quien corresponde la gestión y ejecución de los mismos y su duración.

b) Programas Sectoriales en materia de Investigación Científica y Desarrollo Tecnológico propios de los distintos Departamentos ministeriales y de otros organismos públicos de titularidad estatal que serán elaborados, gestionados, financiados parcial o totalmente y, en su caso, ejecutados por éstos, y propuestos a la Comisión Interministerial de Ciencia y Tecnología por los propios Departamentos a los que estuvieran adscritos los Organismos correspondientes. La Comisión Interministerial procederá a la integración de estos Programas Sectoriales en el Plan Nacional, previa coordinación y armonización de los mismos entre sí y con los Programas Nacionales a que alude el apartado anterior.

c) Programas de las Comunidades Autónomas que en razón de su interés puedan ser incluidos en el Plan Nacional y acordada su financiación, en todo o en parte, con fondos estatales. Estos programas serán presentados para su inclusión en el Plan Nacional a la Comisión Interministerial de Ciencia y Tecnología por el Gobierno de la correspondiente Comunidad Autónoma, y los criterios para su financiación, gestión y ejecución serán establecidos por acuerdo entre ambos.

d) Programas Nacionales de Formación de Personal Investigador, que serán elaborados por la Comisión Interministerial de Ciencia y Tecnología, atendiendo a las necesidades generales de la Investigación Científica y el Desarrollo Tecnológico, así como de las derivadas de los Programas establecidos en los apartados anteriores y ejecutados fundamentalmente por las Universidades.

3. El Plan Nacional incluirá una valoración precisa de los gastos de personal, operaciones corrientes y de capital necesarios para la elaboración, evaluación, gestión, ejecución y seguimiento de los Programas establecidos en el número anterior.

4. El Plan Nacional se financiará con fondos procedentes de los Presupuestos Generales del Estado y de otras Administraciones Públicas, así como con aportaciones de Entidades públicas y privadas, y con fondos procedentes de tarifas fijadas por el Gobierno.

*Artículo séptimo.*

1. La Comisión Interministerial de Ciencia y Tecnología, órgano de planificación, coordinación y seguimiento del Plan Nacional, estará formada por los representantes de los Departamentos ministeriales que nombre el Gobierno, que asimismo designará el Ministro que haya de presidirla.

2. Asimismo, el Gobierno nombrará, de entre los miembros de la Comisión Interministerial, una Comisión Permanente, cuyas funciones serán establecidas por aquella, y que dispondrá de la estructura orgánica, personal y medios necesarios que estarán adscritos al Ministerio del que sea titular el Presidente de la Comisión Interministerial. Para colaborar en la elaboración, evaluación y seguimiento del Plan Nacional, así como para gestionar aquellos Programas Nacionales que la Comisión Interministerial le encomiende, esta Comisión Permanente, previa autorización del organismo correspondiente, podrá adscribir temporalmente a tiempo completo o parcial y con reserva del puesto de trabajo, personal científico, expertos en desarrollo tecnológico y otros especialistas relacionados con los objetivos del Plan, que presten servicios en Departamentos ministeriales, Comunidades Autónomas, Universidades, organismos públicos de investigación y Entidades o Empresas de carácter público. La adscripción a tiempo parcial del personal mencionado anteriormente será compatible con el desempeño, igualmente en régimen de prestación a tiempo parcial, del puesto de trabajo que vinieran ocupando.

Asimismo, esta Comisión Permanente podrá contratar, por tiempo no superior a la duración del Programa, a cualquier otro tipo de personal no adscrito al sector público, conforme a lo establecido en el artículo 15, 1, párrafo a), del Estatuto de los Trabajadores. La Comisión podrá solicitar el asesoramiento de los órganos de planificación, coordinación y seguimiento de investigación de las Administraciones Públicas.

3. A la Comisión Interministerial de Ciencia y Tecnología corresponden, además de la elaboración del Plan Nacional, las siguientes funciones: -

- a) Proponer la asignación de los fondos públicos y de aquellos privados acordados, destinados a los diferentes programas que integren el Plan Nacional, y atribuir, cuando proceda, la gestión y ejecución de los mismos, así como determinar su duración.
- b) Coordinar las actividades de investigación que los distintos Departamentos ministeriales y organismos de titularidad estatal realicen en cumplimiento del Plan Nacional, así como conocer las actuaciones de apoyo y asistencia técnica de aquéllos que tengan relación con las mencionadas actividades.
- c) Coordinar e integrar en el Plan Nacional los proyectos de investigación científica y desarrollo tecnológico, financiados con fondos procedentes de tarifas fijadas por el Gobierno.
- d) Evaluar el cumplimiento del Plan Nacional y de los programas presupuestarios correspondientes al mismo, sin perjuicio de las competencias propias de los demás órganos de la Administración.
- e) Coordinar con el Plan Nacional las transferencias tecnológicas que se deriven del programa de adquisiciones del Ministerio de Defensa y de cualquier otro Departamento ministerial.
- f) Presentar al Gobierno para su elevación a las Cortes Generales una Memoria anual relativa al cumplimiento del Plan Nacional, que comprenda, en su caso, las propuestas de rectificación que estime necesario introducir en los mismos.
- g) Orientar la política de formación de investigadores en todos sus niveles, proponer medidas para el fomento del empleo de los mismos y facilitar su movilidad en los ámbitos investigador y productivo.
- h) Recabar, coordinar y suministrar la información científica y tecnológica necesaria para el cumplimiento del Plan Nacional.
- i) Elevar al Gobierno las propuestas que estime necesarias para asegurar el desarrollo y cumplimiento del Plan Nacional.

#### Artículo octavo.

1. A la Comisión Interministerial de Ciencia y Tecnología le corresponderá definir las exigencias del Plan Nacional en materia de relaciones internacionales y establecer provisiones para su ejecución, todo ello en colaboración con los órganos competentes de la acción exterior del Estado.

2. Corresponde, asimismo, a la Comisión Interministerial de Ciencia y Tecnología la coordinación y el seguimiento de los programas internacionales de investigación científica y desarrollo tecnológico, con participación española, para lo que asumirá las siguientes funciones:

- a) Distribuir los créditos presupuestarios derivados del correspondiente programa internacional, así como atribuir la gestión y ejecución, en todo o en parte, de dichos programas.
- b) Incorporar al Plan Nacional proyectos de investigación recogidos en programas internacionales.
- c) Asegurar los adecuados retornos científicos, tecnológicos e industriales en colaboración con el Centro para el Desarrollo Tecnológico e Industrial.
- d) Proponer al Gobierno o designar, en su caso, a quien haya de representar a España en los Organismos Internacionales responsables de los correspondientes programas.

#### Artículo noveno.

1. A los efectos de promover la participación de la comunidad científica y de los agentes económicos y sociales en la elaboración, seguimiento y evaluación del Plan Nacional a los que se refiere la presente Ley, se constituye un Consejo Asesor para la Ciencia y la Tecnología cuya composición se establecerá reglamentariamente y que será presidido por el Ministro que designe el Gobierno.

2. Al Consejo Asesor para la Ciencia y la Tecnología le corresponden las siguientes funciones:

- a) Proponer objetivos para su incorporación al Plan Nacional.
- b) Asesorar a la Comisión Interministerial de Ciencia y Tecnología en la elaboración del Plan Nacional.
- c) Informar, previamente a su remisión al Gobierno, el Plan Nacional elaborado por la Comisión Interministerial de Ciencia y Tecnología, así como sobre el grado de su cumplimiento, especialmente en lo que se refiere a su repercusión social y económica.
- d) Elevar a la Comisión Interministerial de Ciencia y Tecnología propuestas de modificación del Plan Nacional a las que se hace referencia en la letra f) del apartado tercero del artículo séptimo.
- e) Emitir cuantos informes y dictámenes le sean solicitados por la Comisión Interministerial de Ciencia y Tecnología o por los Organismos responsables de la política científica en las Comunidades Autónomas.

#### Artículo décimo.

1. A los efectos de promover la implantación de nuevas tecnologías y sin perjuicio de las competencias que legalmente le correspondan, el Centro para el Desarrollo Tecnológico e Industrial ejercerá, en relación con el Plan Nacional, las siguientes funciones:

- a) Evaluar el contenido tecnológico y económico-financiero de los proyectos en los que intervengan Empresas.
  - b) Contratar con las Universidades, Organismos públicos de investigación y Empresas la promoción de la explotación comercial de las tecnologías desarrolladas por ellas.
  - c) Colaborar con la Comisión Interministerial de Ciencia y Tecnología en la obtención de los adecuados retornos científicos, tecnológicos e industriales de los Programas Internacionales con participación española y gestionar los que, de acuerdo con lo establecido en el artículo 8, aquella le encomiende.
2. El Centro para el Desarrollo Tecnológico e Industrial gestionará sus recursos de acuerdo con las orientaciones y criterios que se determinen en el Plan Nacional.

#### Artículo undécimo.

1. En la ejecución del Plan Nacional podrán participar Organismos públicos dependientes de la Administración del Estado y de las Comunidades Autónomas, Universidades y Empresas e Instituciones de carácter público o privado que realicen actividades de investigación y desarrollo tecnológico. Los programas incluidos en el Plan Nacional podrán ser ejecutados, asimismo, en colaboración con instituciones extranjeras o de carácter internacional.

2. Los Organismos, Empresas e Instituciones a las que se refiere el apartado anterior podrán contratar personal científico y técnico para la ejecución de las actividades de investigación y desarrollo tecnológico correspondientes al Plan Nacional, por un periodo máximo idéntico al del programa con cargo al cual se satisfagan los salarios y cargas sociales correspondientes, conforme a lo establecido en el artículo 15, 1, a), del Estatuto de los Trabajadores.

#### Artículo duodécimo.

1. Con el fin de promover la coordinación general de la investigación científica y técnica, se crea el Consejo General de la Ciencia y la Tecnología que, presidido por el Presidente de la Comisión Interministerial de Ciencia y Tecnología, estará integrado por un representante de cada Comunidad Autónoma y por los miembros que designe el Gobierno, a propuesta del Presidente del Consejo, de entre los de la Comisión Interministerial, en número no superior al de aquéllos. En todo caso, la representación de la Administración del Estado tendrá atribuido un número de votos igual al de la representación de las Comunidades Autónomas.

2. El Consejo General de la Ciencia y la Tecnología podrá funcionar en Pleno y en Comisión Permanente, de acuerdo con el Reglamento elaborado por el propio Consejo y aprobado por mayoría absoluta de sus miembros.

3. Serán funciones del Consejo General de la Ciencia y la Tecnología:

- a) Informar previamente el Plan Nacional, especialmente en lo que se refiere al mejor uso de la totalidad de los recursos y medios de investigación disponibles.
- b) Proponer la inclusión de objetivos en el Plan Nacional.

c) Proponer, en función de su interés, programas y proyectos de investigación de las Comunidades Autónomas, tras su correspondiente presentación por los Gobiernos de las mismas.

d) Promover el intercambio de información entre la Administración del Estado y la de las Comunidades Autónomas acerca de sus respectivos programas de investigación, con el fin de facilitar la coordinación general de la investigación científica y técnica.

e) Promover acciones conjuntas entre Comunidades Autónomas, o entre éstas y la Administración del Estado, para el desarrollo y ejecución de programas de investigación.

f) Emitir los informes y dictámenes, referidos a la coordinación de las investigaciones desarrolladas por las Administraciones Públicas, que le sean solicitados por la Comisión Interministerial de Ciencia y Tecnología o por los Organismos responsables de la Política Científica en las Comunidades Autónomas, o por el Consejo Asesor para la Ciencia y la Tecnología.

g) Constituir un fondo de documentación sobre los diferentes planes y programas de investigación promovidos por los poderes públicos.

## CAPITULO II

### De los Organismos públicos de Investigación

#### Artículo decimotercero.

El Consejo Superior de Investigaciones Científicas, la Junta de Energía Nuclear, que pasa a denominarse Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas, el Instituto Geológico y Minero de España, el Instituto Nacional de técnica Aeroespacial y el Instituto Español de Oceanografía, se regirán por la presente Ley, por su legislación específica en cuanto no se oponga a ésta y por la legislación vigente en régimen jurídico de las Entidades estatales autónomas que les sea de aplicación.

#### Artículo decimocuarto.

Son funciones de los Organismos a los que se refiere el artículo anterior:

a) Gestionar y ejecutar los Programas Nacionales y Sectoriales que les sean asignados en el Plan Nacional y, en su caso, los derivados de convenios firmados con Comunidades Autónomas al amparo de lo establecido en el artículo 15, así como desarrollar los programas de formación de investigadores que en dicho Plan les sean encomendados.

b) Contribuir a la definición de los objetivos del Plan Nacional y colaborar en las tareas de evaluación y seguimiento de los mismos.

c) Asesorar en materia de investigación científica e innovación tecnológica a los Organismos dependientes de la Administración del Estado o de las Comunidades Autónomas que lo soliciten.

d) Cualquier otra que les sea encomendada por la Administración competente.

#### Artículo decimoquinto.

1. Los Organismos autónomos a que se refiere el artículo 13 podrán establecer convenios de cooperación con las Comunidades Autónomas para la ejecución o colaboración en programas y proyectos de investigación científica y desarrollo tecnológico, formación de especialistas, creación de centros o unidades de investigación y, asimismo, para la dirección, gestión y financiación de centros o unidades de investigación ya existentes. De los referidos convenios se dará cuenta al Consejo General para la Ciencia y la Tecnología.

2. Los mencionados Organismos podrán, asimismo, participar en proyectos internacionales, estableciendo los oportunos acuerdos y convenios, previo conocimiento de la Comisión Interministerial de Ciencia y Tecnología. Reglamentariamente, se desarrollará el régimen financiero para el cumplimiento de las obligaciones que se asuman en los mencionados convenios y acuerdos.

#### Artículo decimosexto.

Los Organismos a los que se refiere el artículo 13 contarán al menos, como órganos de gobierno, con un Presidente, que será nombrado por el Gobierno, a propuesta del Ministerio al que esté adscrito el Organismo, y un Consejo Rector, presidido por aquél. La composición del Consejo Rector se establecerá reglamentariamente en función de las características específicas de cada Organismo.

#### Artículo decimoséptimo.

Los Organismos a que se refiere el artículo 13, dentro de sus disponibilidades presupuestarias y en las condiciones que se fijen

en el reglamento de organización, funcionamiento y personal de cada uno de ellos, podrán contratar en régimen laboral:

a) Personal científico y técnico para la ejecución de proyectos determinados sin que, en ningún caso, estos contratos puedan tener una duración superior a la del proyecto de que se trate, conforme a lo dispuesto en el artículo 15, 1, a), del Estatuto de los Trabajadores.

b) Personal para su formación científica y técnica, en la modalidad de trabajo en prácticas regulada en el número 1 del artículo 11 del Estatuto de los Trabajadores, sin que sea de aplicación el límite de los cuatro años a que se refiere el citado precepto, y con una duración máxima, incluidas, en su caso, las prórrogas, de cinco años.

#### Artículo decimoctavo.

1. A los efectos de su gestión económico-financiera los Organismos a que se refiere el artículo 13 de la presente Ley se entenderán incluidos en el apartado b) del párrafo primero del artículo 4 de la Ley 11/1977, General Presupuestaria, de 4 de enero.

2. Los titulares de los Departamentos ministeriales a los que estén adscritos cada uno de los Organismos autónomos a que se refiere el artículo 13 de esta Ley, podrán autorizar, respecto de los mismos, y previo informe de la Intervención Delegada, generaciones de crédito en los estados de gastos de sus presupuestos cuando se financien con los ingresos derivados de los contratos celebrados por los citados Organismos con Entidades públicas y privadas o con personas físicas, para la realización de trabajos de carácter científico o de asesoramiento técnico, para la cesión de derechos de la propiedad industrial o intelectual o para el desarrollo de cursos de especialización, así como con los recursos aportados por el sector público dentro del Plan Nacional a los que se refiere la presente Ley.

No obstante lo señalado en el párrafo anterior, cuando la generación de crédito se pretenda que afecte a la dotación del complemento de productividad a que se refiere el apartado c), del número 3, del artículo 23 de la Ley 30/1984, de 2 de agosto, se requerirá informe favorable del Ministerio de Economía y Hacienda.

#### Artículo decimonoveno.

1. El Gobierno podrá autorizar a los Organismos a que se refiere el artículo 13 de la presente Ley la creación o participación en el capital de sociedades mercantiles, cuyo objetivo sea la realización de actividades de investigación científica o desarrollo tecnológico o la prestación de servicios técnicos relacionados con los fines de las mismas.

El personal funcionario de dichos Organismos que pase a prestar servicio en las citadas Entidades quedará en la situación administrativa de excedencia voluntaria prevista en el artículo 29, 3, a), de la Ley 30/1984, de 2 de agosto.

2. Los contratos de prestación de servicios de investigación que realicen los Organismos a que se ha hecho referencia en el número anterior, quedan exceptuados en el ámbito de aplicación de la Ley de Contratos del Estado y se regirán por las normas de Derecho Civil y Mercantil que les sean de aplicación.

3. Los contratos que realicen tales Organismos relativos a obras de tecnología especialmente avanzada o cuya ejecución sea particularmente compleja se adjudicarán, en todo caso, por el procedimiento de concurso.

4. Los Organismos a que se refiere el artículo 13 de la presente Ley podrán adquirir, por el sistema de adjudicación directa, previa autorización de su Consejo Rector, los bienes de equipo necesarios para el desarrollo de las tareas de investigación.

## DISPOSICIONES ADICIONALES

Primera.—A los efectos de lo previsto en el artículo 6, 1, y sin perjuicio de lo que disponga el Reglamento de las Cortes Generales, se constituirá una Comisión Mixta del Congreso y el Senado para conocer del Plan Nacional de Investigación Científica y Desarrollo Tecnológico, y de la memoria anual sobre su desarrollo.

Segunda.—1. El Gobierno, en un plazo no superior a seis meses a partir de la entrada en vigor de la presente Ley, procederá a la definición de la estructura orgánica de la Comisión Permanente a que se refiere el artículo 7, 2, de ésta, ordenará la extinción de la Comisión Asesora de Investigación Científica y Técnica y traspasará sus medios materiales y personales a dicha Comisión Permanente.

2. Desde la entrada en vigor del Plan Nacional, el Fondo Nacional para el Desarrollo de la Investigación Científica y Técnica se destinará a la financiación de los programas nacionales a que se refiere la letra a), del artículo 6, 2, de la presente Ley, así como de los programas sectoriales que, conforme a lo previsto en la letra b) del mismo, correspondan al Ministerio de Educación y Ciencia.



Tercera.-El Gobierno, a iniciativa, respectivamente, de los Ministerios de Educación y Ciencia, Industria y Energía, Defensa y Agricultura, Pesca y Alimentación, y a propuesta del de la Presidencia, aprobará el reglamento de organización, funcionamiento y personal del Consejo Superior de Investigaciones Científicas, del Centro de Investigaciones Energéticas, Medioambientales y Tecnológicas, del Instituto Geológico y Minero de España, del Instituto Nacional de Técnica Aeroespacial y del Instituto Español de Oceanografía.

Cuarta.-El Gobierno, a iniciativa de los Ministerios de Industria y Energía, Educación y Ciencia, Defensa y Agricultura, Pesca y Alimentación, y a propuesta del de la Presidencia, en el plazo de seis meses a partir de la entrada en vigor de la presente Ley, dictará las normas necesarias para facilitar e incentivar la movilidad del personal investigador al servicio de los Organismos públicos de investigación dependientes de la Administración del Estado. Asimismo, y de acuerdo con las Comunidades Autónomas y las Corporaciones Locales, en su caso, se establecerán medidas para facilitar e incentivar la movilidad de este personal entre las respectivas Administraciones públicas.

Quinta.-Se faculta al Ministerio de Educación y Ciencia para regular la participación y representación de los científicos españoles agrupados en Sociedades Científicas en el Consejo Internacional de Uniones Científicas y en sus Uniones, así como en aquellas otras Uniones o Comisiones Científicas internacionales que, por su carácter, exigieran tal regulación.

Sexta.-A la entrada en vigor de la presente Ley, quedará extinguida la Comisión Nacional de Investigación del Espacio. Las funciones de dicha Comisión serán asumidas por la Comisión Interministerial de Ciencia y Tecnología, de acuerdo con lo previsto en el artículo 8 de la presente Ley, correspondiendo al Centro para el Desarrollo Tecnológico e Industrial la colaboración con ésta en la obtención de los adecuados retornos científicos, tecnológicos e industriales de los Programas de la Agencia Europea del Espacio con participación española, así como la gestión de aquéllos que, de acuerdo con lo establecido en el mencionado artículo 8 de la presente Ley, le encomiende la Comisión Interministerial de Ciencia y Tecnología.

El Gobierno, en el plazo de tres meses, decidirá el destino de los medios materiales y personales de la extinguida Comisión Nacional de Investigación del Espacio.

Séptima.-1. El actual «Plan Nacional de Investigación Agraria» se incorporará al Plan Nacional como Programa Sectorial, cuya gestión corresponderá al Ministerio de Agricultura, Pesca y Alimentación.

2. El Instituto Nacional de Investigaciones Agrarias, Organismo autónomo adscrito al Ministerio de Agricultura, Pesca y Alimentación, pasará a regirse por lo establecido en la presente Ley para los Organismos autónomos que se recogen en el anterior artículo 13. Por el Gobierno, se procederá a aprobar su régimen de organización, funcionamiento y personal.

Octava.-La presente Ley se aplicará, sin perjuicio de la competencia de la Ley Orgánica 6/1980, de 1 de julio, por la que se regulan los criterios básicos de la Defensa Nacional y la Organización Militar atribuye al Ministro de Defensa, de fomento y coordinación de la investigación científica y técnica en materias que afecten a la Defensa Nacional. En ejercicio de dichas competencias, el Ministro de Defensa podrá adaptar al Plan Nacional y, en su caso, integrar en él proyectos de investigación científica y desarrollo tecnológico en materias que afecten a la Defensa Nacional, para su financiación, en todo o en parte, con cargo a dicho Plan, así como financiar proyectos integrados en los mismos.

Novena.-1. Por el Gobierno se dictarán las disposiciones oportunas para adaptar la estructura y organización del Centro para el Desarrollo Tecnológico e Industrial a las funciones que se le encomiendan en el artículo 10 de la presente Ley.

2. Los créditos presupuestarios adscritos a los programas y proyectos a los que hace referencia el artículo 10. 1. c), y cuya gestión y ejecución asuma el Centro para el Desarrollo Tecnológico e Industrial, se transferirán al Ministerio de Industria y Energía.

Décima.-Las Universidades y otros centros públicos de investigación podrán contratar personal para la ejecución de proyectos determinados en los términos previstos en la letra A del artículo 17 de esta Ley y dentro de sus disponibilidades presupuestarias.

Undécima.-1. Quedan modificados los artículos 1.º, 4.º y 8.º del Real Decreto-ley 7/1982, de 30 de abril, que quedarán redactados en la forma siguiente:

«Artículo 1.º Con la denominación de Instituto de Astrofísica de Canarias se crea un Consorcio Público de Gestión, cuya finalidad es la investigación astrofísica.

El Instituto de Astrofísica de Canarias estará integrado por la Administración del Estado, la Comunidad Autónoma de Canarias, la Universidad de La Laguna y el Consejo Superior de Investigaciones Científicas.»

«Art. 4.º El Consejo Rector estará integrado por el Ministro de Educación y Ciencia, que actuará como Presidente; un Vocal en representación de la Administración del Estado, que será nombrado a propuesta del Ministerio de la Presidencia, y tres Vocales más en representación de cada una de las restantes Administraciones públicas y Organismos que se relacionan en el artículo 1.º

Formará parte del Consejo Rector, asimismo, el Director del Instituto, que será miembro nato.»

«Art. 8.º Los medios personales al servicio del Instituto para el cumplimiento de sus fines, todos ellos bajo la dependencia funcional del Director de aquél, podrán comprender:

a) Personal propio del Consorcio, de carácter laboral, para funciones que no sean de investigación.

b) Personal propio de las Administraciones consorciadas y personal docente universitario. Dicho personal, cuando sea funcionario, quedará adscrito al Instituto de Astrofísica de Canarias en la situación administrativa que corresponda en cada caso.

c) Personal al servicio de otras entidades públicas o privadas, con las cuales el Instituto celebre contratos administrativos o civiles, o convenios de cooperación.»

2. Se declaran a extinguir las Escalas de Astrofísicos y Astrofísicos adjuntos creados, por Real Decreto 2678/1982, de 15 de octubre. El Gobierno, a propuesta del Consejo Rector, establecerá los criterios, requisitos y condiciones para que los funcionarios de las referidas Escalas puedan integrarse en los Cuerpos o Escalas equivalentes de las Administraciones consorciadas.

3. Por Real Decreto, a propuesta del Consejo Rector, se regulará la organización y funcionamiento del Instituto de Astrofísica de Canarias.

## DISPOSICIONES TRANSITORIAS

Primera.-A efectos de la elaboración del Plan Nacional, de su presentación a las Cortes Generales prevista en el artículo 6.º, 1, y de su puesta en marcha, la Comisión Interministerial a que se refiere el artículo 7.º de esta Ley será presidida por el Ministro de Educación y Ciencia y estará integrada por dos representantes del Ministerio de Educación y Ciencia, dos del Ministerio de Industria y Energía y uno de cada uno de los siguientes Ministerios: Defensa, Economía y Hacienda, Agricultura, Pesca y Alimentación, Obras Públicas y Urbanismo, Transportes, Turismo y Comunicaciones, Cultura y Sanidad y Consumo. La Comisión Permanente de la misma será presidida por el Secretario de Estado de Universidades e Investigación y estará constituida por los Directores generales de Política Científica y de Innovación Industrial y Tecnología y por el Director general de Planificación del Ministerio de Economía y Hacienda.

Segunda.-El Gobierno, en el plazo de tres meses a partir de la entrada en vigor de la presente Ley, establecerá la composición del Consejo Asesor para la Ciencia y la Tecnología, que, a los efectos previstos en la disposición transitoria anterior, estará presidido por el Ministro de Industria y Energía.

Tercera.-El Fondo de Investigaciones Sanitarias de la Seguridad Social se destinará a financiar programas sectoriales elaborados y gestionados por el Ministerio de Sanidad y Consumo, pudiendo, asimismo, contribuir a la financiación de programas nacionales o sectoriales de interés para la política sanitaria.

## DISPOSICION DEROGATORIA

Quedan derogadas cuantas disposiciones se opongan a lo dispuesto en la presente Ley.

## DISPOSICION FINAL

Se autoriza al Gobierno para dictar cuantas disposiciones sean necesarias para el desarrollo y aplicación de la presente Ley.

Por tanto, Mando a todos los españoles, particulares y autoridades, que guarden y hagan guardar esta Ley.

Palacio de la Zarzuela, Madrid, a 14 de abril de 1986.

JUAN CARLOS R.

El Presidente del Gobierno.  
FELIPE GONZALEZ MARQUEZ







European Communities — Commission

**EUR 10955 — Supporting infrastructure for innovation, technology transfer  
and enterprise creation in Spain and Portugal**

Luxembourg: Office for Official Publications of the European Communities

1987 — VIII, 118 pp. — 21.0 × 29.7 cm

Innovation series

EN-ES

ISBN 92-825-7228-5

Catalogue number: CD-NA-10955-2N-C

Price (excluding VAT) in Luxembourg:

ECU 9.40    BFR 400    IRL 7.30    UKL 6.90    USD 10.60

The study examines the organisms and measures, public or private, at the central and regional level which influence innovation, technology transfer and the creation of enterprises in both countries.

In Spain, the Ministries of Industry and Education are in the centre of the existing infrastructure. Moreover, a certain number of programmes exist on the regional level. Up to now, the private sector has contributed very little to the existing infrastructure.

In Portugal, the infrastructure is very young and not very well developed. Nevertheless, a few strong institutions exist which can form the basis of a rational infrastructure.

Finally, the study lists a certain number of recommendations.



**Venta y suscripciones · Salg og abonnement · Verkauf und Abonnement · Πωλήσεις και συνδρομές  
Sales and subscriptions · Vente et abonnements · Vendita e abbonamenti  
Verkoop en abonnementen · Venda e assinaturas**

**BELGIQUE / BELGIË**

**Moniteur belge / Belgisch Staatsblad**  
Rue de Louvain 40-42 / Leuvensestraat 40-42  
1000 Bruxelles / 1000 Brussel  
Tél. 512 00 26  
CCP / Postrekening 000-2005502-27

Sous-dépôts / Agentschappen:

**Librairie européenne /  
Europese Boekhandel**  
Rue de la Loi 244 / Wetstraat 244  
1040 Bruxelles / 1040 Brussel

**CREDOC**

Rue de la Montagne 34 / Bergstraat 34  
Bte 11 / Bus 11  
1000 Bruxelles / 1000 Brussel

**DANMARK**

**Schultz EF-publikationer**

Møntergade 19  
1116 København K  
Tlf: (01) 14 11 95  
Telecopier: (01) 32 75 11

**BR DEUTSCHLAND**

**Bundesanzeiger Verlag**

Breite Straße  
Postfach 10 80 06  
5000 Köln 1  
Tel. (02 21) 20 29-0  
Fernschreiber: ANZEIGER BONN 8 882 595  
Telecopierer: 20 29 278

**GREECE**

**G.C. Eleftheroudakis SA**

International Bookstore  
4 Nikis Street  
105 63 Athens  
Tel. 322 22 55  
Telex 219410 ELEF

Sub-agent for Northern Greece:

**Molho's Bookstore**

The Business Bookshop  
10 Tsimiski Street  
Thessaloniki  
Tel. 275 271  
Telex 412885 LIMO

**ESPAÑA**

**Boletín Oficial del Estado**

Trafalgar 27  
28010 Madrid  
Tel. (91) 446 60 00

**Mundi-Prensa Libros, S.A.**

Castelló 37  
28001 Madrid  
Tel. (91) 431 33 99 (Libros)  
431 32 22 (Suscripciones)  
435 36 37 (Dirección)  
Télex 49370-MPLI-E

**FRANCE**

**Journal officiel**  
**Service des publications  
des Communautés européennes**  
26, rue Desaix  
75727 Paris Cedex 15  
Tél. (1) 45 78 61 39

**IRELAND**

**Government Publications Sales Office**

Sun Alliance House  
Molesworth Street  
Dublin 2  
Tel. 71 03 09

or by post

**Government Stationery Office  
Publications Section**

6th floor  
Bishop Street  
Dublin 8  
Tel. 78 16 66

**ITALIA**

**Licosa Spa**

Via Lamarmora, 45  
Casella postale 552  
50 121 Firenze  
Tel. 57 97 51  
Telex 570466 LICOSA I  
CCP 343 509

Subagenti:

**Libreria scientifica Lucio de Biasio - AEIOU**

Via Meravigli, 16  
20 123 Milano  
Tel. 80 76 79

**Libreria Tassi**

Via A. Farnese, 28  
00 192 Roma  
Tel. 31 05 90

**Libreria giuridica**

Via 12 Ottobre, 172/R  
16 121 Genova  
Tel. 59 56 93

**GRAND-DUCHÉ DE LUXEMBOURG  
et autres pays / and other countries**

**Office des publications officielles  
des Communautés européennes**

2, rue Mercier  
L-2985 Luxembourg  
Tél. 49 92 81  
Télex PUBOF LU 1324 b  
CCP 19190-81  
CC bancaire BIL 8-109/6003/200

Abonnements / Subscriptions

**Messageries Paul Kraus**

11, rue Christophe Plantin  
L-2339 Luxembourg  
Tél. 49 98 888  
Télex 2515  
CCP 49242-63

**NEDERLAND**

**Staatsdrukkerij- en uitgeverijbedrijf**

Christoffel Plantijnstraat  
Postbus 20014  
2500 EA 's-Gravenhage  
Tel. (070) 78 98 80 (bestellingen)

**PORTUGAL**

**Imprensa Nacional  
Casa da Moeda, E. P.**

Rua D. Francisco Manuel de Melo, 5  
1092 Lisboa Codex  
Tel. 69 34 14  
Telex 15328 INCM

**Distribuidora Livros Bertrand Lda.**

**Grupo Bertrand, SARL**  
Rua das Terras dos Vales, 4-A  
Apart. 37  
2700 Amadora CODEX  
Tel. 493 90 50 - 494 87 88  
Telex 15798 BERDIS

**UNITED KINGDOM**

**HM Stationery Office**

HMSO Publications Centre  
51 Nine Elms Lane  
London SW8 5DR  
Tel. (01) 211 56 56

Sub-agent:

**Alan Armstrong & Associates Ltd**

72 Park Road  
London NW1 4SH  
Tel. (01) 723 39 02  
Telex 297635 AAALTD G

**UNITED STATES OF AMERICA**

**European Community Information  
Service**

2100 M Street, NW  
Suite 707  
Washington, DC 20037  
Tel. (202) 862 9500

**CANADA**

**Renouf Publishing Co., Ltd**

61 Sparks Street  
Ottawa  
Ontario K1P 5R1  
Tel. Toll Free 1 (800) 267 4164  
Ottawa Region (613) 238 8985-6  
Telex 053-4936

**JAPAN**

**Kinokuniya Company Ltd**

17-7 Shinjuku 3-Chome  
Shiniuku-ku  
Tokyo 160-91  
Tel. (03) 354 0131

**Journal Department**

PO Box 55 Chitose  
Tokyo 156  
Tel. (03) 439 0124

## NOTICE TO THE READER

All scientific and technical reports published by the Commission of the European Communities are announced in the monthly periodical '**euro abstracts**'. For subscription (1 year: BFR 3 300) please write to the address below.

Price (excluding VAT) in Luxembourg  
ECU 9.40 BFR 400 IRL 7.30 UKL 6.90 USD 10.60



OFFICE FOR OFFICIAL PUBLICATIONS  
OF THE EUROPEAN COMMUNITIES

L - 2985 Luxembourg

ISBN 92-825-7228-5

