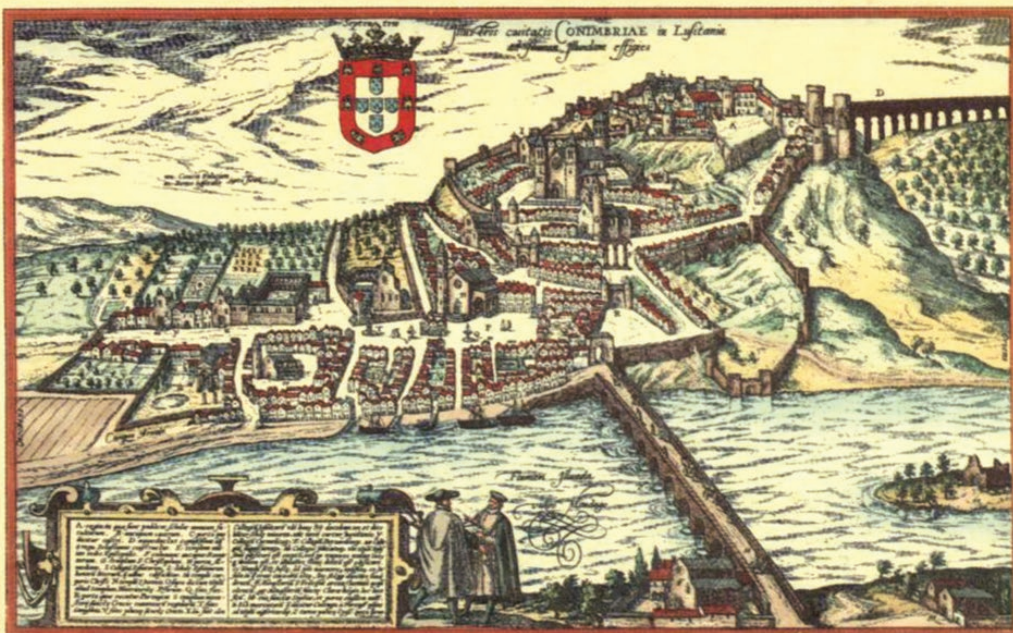


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ELECTRONIC INDUSTRY, REGIONAL INEQUALITY AND INNOVATION POLICY IN PORTUGAL

Mário Vale*

RESUMO

Neste artigo propomo-nos analisar a relação entre as indústrias de alta tecnologia e as actividades de Investigação e Desenvolvimento (I&D) e seus efeitos nos processos de desenvolvimento regional. Numa primeira parte, expõe-se a formação da indústria electrónica no contexto da divisão internacional do trabalho e também a distribuição geográfica desta indústria em Portugal. Seguidamente é feita uma análise crítica do papel da inovação e das políticas de I&D. A competição entre as regiões e as cidades depende da capacidade de criação e de inovação. Nos espaços periféricos este desafio pode ser entendido segundo dois modos: criar as condições indispensáveis para tornar inovador e/ou importar a tecnologia necessária para aumentar a capacidade competitiva dos tecidos produtivos. Na última secção apresentamos os parques de ciência e tecnologia de Lisboa e Porto e examinamos o papel destas infraestruturas no processo de mudança tecnológica.

Palavras-chave: Indústria electrónica. Inovação. Políticas de I&D. Desenvolvimento regional.

RÉSUMÉ

Dans ce article nous allons analyser le rapport entre les industries de haute technologie et les activités de Recherche et Développement (R&D) et ses effets dans les processus de développement régional. Dans une première partie, nous allons exposer la formation de l'industrie électronique dans le contexte de la division internationale du travail et aussi la distribution géographique de cette industrie au Portugal. Après, nous allons discuter dans un sens critique le rôle de l'innovation et des politiques de R&D. La compétition entre les régions et les villes dépend de la capacité de création et d'innovation. Dans les espaces périphériques ce défi peut être entendu selon deux façons: créer les conditions indispensables pour devenir innovateur et/ou importer la technologie nécessaire pour l'amélioration de la capacité compétitive des tissus productifs. Dans la dernière section nous allons présenter les parcs de science et technologie de Lisbonne et Porto et nous allons examiner le rôle de ces infrastructures dans le processus de changement technologique.

Mots-clés: Industrie électronique. Innovation. Politique de R&D. Développement régional.

ABSTRACT

In this paper we try to discuss the association between the high-technology industries and the Research and Development (R&D) activities and their role in the process of regional development. First we pay attention to the formation of the electronic industry in the context of the International Division of Labour (IDL) and we analyse the geographical distribution of this industry in Portugal. After we try to discuss in a critical way the role of innovation and the related policies. The competition between regions and cities depends heavily in the capacity to create and to innovate. In the peripheral spaces this challenge has been seen in two ways: to create the indispensable conditions to innovate and/or to import the necessary technology in order to improve the competitive level of the productive

* Centro de Estudos Geográficos. Faculdade de Letras. Universidade de Lisboa.

fabrics. In the final part of the paper we look at the science and technology parks of Lisbon and Oporto and we examine the role of these infrastructures in the technology change process.

Key-words: Electronic industry. Innovation. R&D policy. Regional development.

INTRODUCTION

This paper seeks to analyse the territorial distribution of electronic industry in Portugal and to discuss the impact of R&D policies. Electronic industry is one of the most important activities in many developed countries and it has an important financial support from the national governments. What we intend to study is the spatial distribution of this economic activity and what are the impacts of the R&D financial support, largely dependent on EC funds.

The association between the electronic industry and the R&D activities it isn't developed necessarily in the regional economies. In fact R&D activities can be developed in connection with any other types of industry. In this paper we find interesting to analyse both because in first place the technology change capability tend to be considered as a result of the economic success of the most innovative and most advanced manufacturing branches — where electronic industry usually plays a major role — and in second place we find useful to study the formation of new innovative spaces where electronic industry is also present. In the first part we deal basically with the global competition issue. The second point is about the electronic industry and the territorial unbalances in Portugal and in the last section we pay more attention to the role of policies in order to create stimulating innovative environments although they are not only dedicated to the electronic industry.

1. IDL AND THE ELECTRONIC INDUSTRY IN PORTUGAL

The formation of electronic industry in Portugal is explained basically by the internationalization of the economy in the sixties. The peripheral position of Portugal in the International Division of Labour (IDL) is the principal feature to be considered, although national regulatory policies were important to the formation of this industry (VALE, 1990).

The electronic sector was one of the first who went global. The technological change in the production process that occurred in the end of the sixties permitted the physical division of the process in different tasks which required distinct labour force qualifications (SCOTT and HENDERSON, 1987, MORGAN and SAYER, 1988 and DICKEN, 1992). In this context assembly lines were dislocated to the peripheral countries of Asia, Europe and America, where labour

costs were lower and there wasn't any problem with the availability of labour force.

In Portugal the first relevant investment in the electronic industry took place in the telecommunications segment in the fifties. This segment was dependent first on English capital (Plessey) and after on Americans investments (Standard Electric). The logic of these initiatives were not dependent on labour force requirements yet, because it was in formation an important national market (Portugal and former overseas colonies) which attracted large foreigner companies.

After EFTA agreement, Portugal became an attractive location to enterprises that produced to the European market and wanted to keep down the labour costs. These advantages were dramatically reinforced when Portugal became member of EEC in the eighties. Recently, the most important investments were due to European and American companies on consumer electronics, electronics components and also telecommunications.

2. ELECTRONIC INDUSTRY AND TERRITORIAL UNBALANCES

2.1. The formation of the industry

The internationalization of the economy and the regulation policies of national authorities has been crucial to the formation of electronic industry in Portugal.

As we pointed out the formation of this industry was initial dependent on the telecommunications segment, which represented an emerging market. The national operator, central government (favourable legal framework) and foreign capital were combined in the Fordist golden age to produce the foundations of a new industry. Only some decades after, and in a period of internationalization of the economy, Portugal became an interesting location to other firms on other segments in the electronic sector. In particular, the consumer electronics and electronic components segments were very dynamic. The most important investments were made by Grundig (Braga), Siemens (Évora), Vitrohm (Lisbon MA), Magnetic Peripherals (Lisbon MA), Philips (Ovar), Roederstein (Famalicão) and Texas Instruments (Oporto MA).

Recently, it is possible to witness the growth of electronic automobile components, which will be in a short period one of the most important segments of the industry. Ford Electrónica (Lisbon MA), Delco-Remy (Lisbon MA), Reicab (Guarda), Cablesa (Lisbon MA and

Castelo Branco), Indelma (Lisbon MA), United Technologies Automotive (Oporto MA) and Yazaki Saltano (Oporto MA) are the principal enterprises operating in Portugal.

The Portuguese enterprises in the electronic industry are predominantly SME. Although, firms like Centrel — telecommunications segment — have an important share of the market, based on strategic alliances with other national and foreigner companies.

2.2. Electronic industry structure

The Portuguese electric and electronic industry represents only 1.1% of Portuguese GDP but it has a share of 10.2% in total exports (ANIMEE, 1994). This industry represents only 3% of total manufacturing employment whereas is responsible for 5.9% of the national manufacturing product and for 11% of the manufacturing exports.

In the 1986-90 period the employment grew about 10% but not in all the branches (Table I). In fact, there was a massive jobloss in telecommunications (almost 40%). The technology change in this segment has contributed to the reduction of employment and to a concentration trend in the industry. The Portuguese traditional products were no longer competitive in the international markets (mainly Portuguese former colonies) conducting to a recession.

computer equipment. In the telecommunications branch the identified trend in the end of the eighties still is perceivable in the beginning of the nineties. The less important branch — the automation, control and measure equipment — has registered a slowdown in terms of employment. Anyway in the overall period the employment growth in this branch was quite clear above the average in the electronic industry.

If we considered the evolution of the employment in the electric and electronic industry we found that the electric industry has been more dynamic (18.4% change in the period 1986-92 against -6.4% in the electronic industry in the same period). The wiring harnesses manufacturing branch in the electric industry is the major responsible for the presented results. In fact this segment grew around 41% in what concerns employment, representing in the present 30% of the electric and electronic industry employment. Again, the automobile industry and the associated components industry increasing role in the national economy explain the dynamic in that electric manufacturing branch.

2.3. Electronic industry and regional inequality

The general trends in the organization of Portuguese economic space show us some dichotomies: coastal area/interior and urban/rural are in rough terms the identifiable

Table I - Employment in the electric and electronic industry in Portugal, 1986-92

Manufacturing Branches	1986	1990	1992	% change 1986-90	% change 1986-92
Automation, Control and Measure Equipment	818	1 719	1 296	100.1	58.4
Telecommunications	6 126	3 887	2 648	-36.5	-56.8
Electronic Components	4 661	6 452	5 508	38.4	18.2
Consumer Electronics	3 572	4 709	4 748	31.8	32.9
ELECTRONIC INDUSTRY	15 177	16 767	14 200	10.5	-6.4
ELECTRIC AND ELECTRONIC INDUSTRY	29 500	34 135	34 937	15.7	18.4

Source : ANIMEE

In that period the employment growth in the electronic components and in the consumer electronics manufacturing branches was a result of the foreigner direct investment as a need to reduce labour costs in a context of global competition. In the 1990-92 period all the branches with the exception of the consumer electronics registered a reduction in the employment levels. The performance of the consumer electronic branch reflects the general trends of the European market and the expansion of this segment is associated with recent foreign direct investments in the automobile audio equipment. It is necessary to refer that the automobile industry has witnessed a fast growth and it is a promising industrial “cluster”. The slowdown in the electronic components is a result of the decrease of the traditional markets, like the TV sets and VCRs and also the

territory unbalances (FERRÃO, 1988; GASPAR and JENSEN-BUTLER, 1992). The electric and electronic industry is rather concentrated in the two major urban areas of the costal area — the Metropolitan Areas (MAs) of Lisbon and Oporto (Fig. 1 and Table II). It is also visible the concentration in Évora (South) and in Braga/Famalicão (North).

In spite of the importance of Oporto and Lisbon MAs, there are significant differences between these areas. In first place, the size of the industry is quite different. Secondly, the dynamic of Oporto MA is more tangible, only compared with Setúbal Peninsula (South of the Lisbon MA). Finally, the structure of the industry in Lisbon MA is distinct from the Oporto MA where in the first region the telecommunications segment is more important and the employment qualifications level is higher (VALE, 1990).

Table II - Regional distribution of employment, production and exports in the electric and electronic industry in Portugal, 1992

Districts	Employment (%)	Production (%)	Exports (%)
Oporto, Braga and Aveiro	49	51	60
Lisbon and Setúbal	41	43	30
Other Districts	10	6	10
TOTAL	100	100	100

Source : ANIMEE

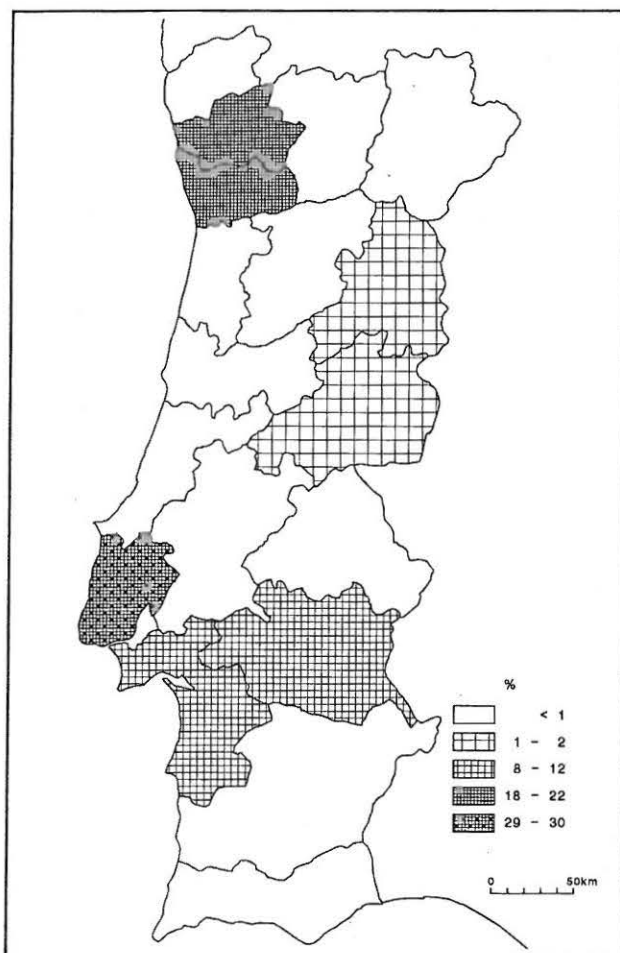


Fig. 1 - Regional distribution of employment in the electric and electronic industry, 1992

In the Interior area the electronic industry is less important and there is a dominance of SME or in other situations the presence of large foreigner companies in search of low cost labour. The last case can be illustrated by Siemens in Évora or Grundig and Roederstein in the periphery of Oporto MA.

According to Table 2, it is possible to foresee different features of the electric and electronic industry in Portugal. In the Lisbon region this industry is less driven by the external markets and on the contrary the Oporto region and the other areas of Portugal mainland depend more on those markets. It is also possible to notice that the production when compared with the employment figures has not the same weight in the less developed regions of Portugal (Other districts), by the fact of the low technology level of the products (mostly associated with labour intensive practices performed by women) of the enterprises located in these areas.

3. R&D POLICY AND TERRITORY: NEW PRODUCTION SPACES

The innovation policies can be defined as the measures developed by the State as a meaning to stimulate the technological innovation process (products and production processes) and to guarantee their diffusion in the productive fabric. The internationalization of the economies by the end of the 60's were a major challenge to the enterprises. The end of the protected markets has been present in the mind of the entrepreneurs and regional/national authorities and as a consequence the need to improve was regarded as a key issue in the manufacturing activity. The crisis of the 70's was another motive to accelerate the restructuring process in the industry and again technology change was seen fundamental to achieve that objective.

In the 70's more attention was paid to the role of innovation. According to BENKO (1990), the basic reasons were:

- to accelerate the industrial restructuring process;
- to adapt and to keep the manufacturing activity competitive at the international level;
- to reduce unemployment;
- to create an economic, social and cultural environment favourable to the technological change (which is a very ambitious aim).

The growth of high-technology industries become more relevant when we pay attention to the significant role of the defence spending in the economic geography and

the regional development process (MARKUSEN and BLOCH, 1985). In fact, in the first years of formation of the Silicon Valley and route 128 as well as in the consolidation of the M4 Corridor the defense-military complexes had encouraged the emergence of these new industrial spaces.

3.1. R&D and innovation spaces

The role of innovation is considered vital to the economic development process. In the industrialised countries the R&D policy is central to the lead on of economic activities in a global economic arena because only innovation can guarantee the necessary changes in the industry and this way keep an high competitive level.

The theoretical assumptions of the linear model of technology change are an important input to the current R&D policies. According to the model, the basic and applied research are crucial to the product and process development which in turn will be used in the production itself and finally will reach the diffusion and marketing stage. In consonance with this linear and mechanical relation the growth of investments in R&D activities is followed by an increase in technological innovation (MALECKI, 1991). The competitive level of the economy is directly dependent on the investments on R&D activities mainly supported by the State.

The concentration of innovation activities in one place surely enable the technological transfer in a short period. Thus the innovation spaces are a paradigmatic territorial form of the end of the eighties. The paradigm still is Silicon Valley and in Europe spaces like M4 Corridor or Sophia-Antipolis are references in the geography of innovation. However the linear model of technological change is shortcoming by the fact that innovation is not unidirectional, by the contrary often innovation arrives as a result of the resolution of problems with the product itself — market-driven innovation (MALECKI, 1991 and MASSEY *et al.*, 1992). At the same time the non existing integration between the technological change and the society in this model is criticised (DOST *et al.*, 1988 and FREEMAN, 1991).

The advantages of geographical concentration of the R&D activities can be explained by the effects of the agglomeration economies because they usually favour cost reduction in the inputs, information and in a boarder sense in the transactions (VALE, 1990). BENKO (1993) also refers the importance of the local labour market. In what concerns the labour market the location of high skilled labour force is a key point to the formation of these new complexes. In the urban areas generally the availability in human resources highly skilled is higher which reinforce the trend to the geographical concentration of innovative enterprises. The formation years has been characterised by intensive mobility of the high skilled labour force what can become a problem to the established firms and again the agglomeration is the solution to find the necessary staff with lower costs. The urban areas also provide a reasonable

cultural supply and a stimulating social environment to attract R&D researchers.

The benefits of geographical concentration were well analysed by Alfred Marshall who developed the “industrial district” concept. The Italian authors in their studies on “Third Italy” also provide a relevant input to the understanding of the advantages of agglomeration economies. In the field of geographical knowledge probably the more accurate studies were developed by SCOTT (1988) concerning Los Angeles.

Starting from the view point of the advantages of geographical concentration the GREMI researchers (Group de Recherche Européen sur les Milieux Innovateurs), firstly through the works of AYDALOT and KEEBLE (1988), developed a very consolidated theoretical approach in what concerns innovation. In that perspective the local “milieux” has an important generating role in the innovative behaviours of the local actors. CAMAGNI (1991) says that this dynamic role is twofold: to increase the collective learning processes and to develop the processes to reduce elements of dynamic uncertainty.

The geographical concentration of activities is not however the only way to become an innovative enterprise. In fact, even the more consolidated “milieux” have to develop relations with other spaces, sometimes at an international level. So to say it is necessary to establish innovation networks and cooperation agreements as a way to avoid the effects of entropy very typical in closed systems. QUÉVIT (1991) argues that the local/international relation is crucial to understand the competitive strategies of enterprises in what concerns innovation.

3.2. Brief evolution of R&D resources in Portugal

In the European Community (EC), Portugal is a State member with one of the lowest level of expenditure on R&D activities (only 0.6% of GDP meanwhile in countries like Germany, France, UK and Holland the value is more than 2% of GDP).

During the eighties the investment in R&D activities grew from 0.1% to 0.6% of GDP in Portugal. The public investment has almost 75% of total expenditures - PTE 52 billions, where the Universities and the Government are the principal agents.

The regional distribution of general expenditures in R&D is rather concentrated in the two major urban areas — Lisbon and Oporto MAs. In the Table III it is possible to notice that Lisbon and Tagus Valley absorb 63.5% of total expenditures in R&D in Portugal. If we consider the Government investments the share of this region rise to more than 90% what should be interpreted as a massive concentration of the public science and technology system in the capital region. The North and Centre regions are in intermediate positions. In the case of North it is expected an important share of R&D efforts because the second large urban concentration — Oporto MA. In this region the investments made by the enterprises in R&D activities are

Table 3 - Breakdown of expenditures by sector and by region, 1990

Regions	Sector (%)			
	Government	Higher Education	Enterprises	Total
North	2.9	22.8	26.0	18.5
Centre	2.7	18.0	19.3	14.5
Lisbon and Tagus Valley	90.7	55.0	52.8	63.5
Alentejo	1.0	1.8	1.8	1.6
Algarve	0.1	0.8	0.0	0.4
Azores	2.1	1.2	0.0	1.1
Madeira	0.6	0.5	0.1	0.4
TOTAL (PTE 106)	13 240.2	25 206.4	13 585.6	52 032.2

Source : SEFOR/JNICT

higher than the Centre region as a result of the more dynamic productive fabric of the North region. In the Centre region the relatively high values are a consequence of the presence of an important university pole such as Coimbra. In the other regions the R&D expenditures are very scarce.

In what concerns human resources (Equivalent Time Integral) the general pattern is very much the same as the expenditures regional breakdown (Table IV) because most part of R&D expenditures are affected to human resources (VALE, 1994). The Lisbon region reinforce slightly its position, basically as a result of the location of more technological advanced enterprises that need a larger proportion of R&D human resources. It is interesting to notice that although the North region concentrates a very relevant share of the manufacturing activity it has only 28% of the R&D human resources and 26% of the R&D expenditures. These results illustrate the predominance of traditional manufacturing branches — textile — in North region. The higher education sector remains the more spread whilst the Government sector is by far the more concentrated one.

3.3. Innovation spaces: science and technology parks

The innovation policies are associated often to the urban spaces and sometimes the innovation is a key point in the design of urban economic policies. Creativity and innovation are perceived as a fundamental aspect to the competition between cities and urban success. The promotion of scientific research and technological innovation usually includes the financial support to R&D activities, the development of business innovation centres and the promotion of science and technology parks (JENSEN-BUTLER, 1993). However, according with the same author, these measures bring some risks in a market context: high risks; long pay-back periods; substantial indivisible investments.

The peripheral spaces without a strong foundation to generate innovation can overcome this problem through the technology import or the institutional arrangements in order to absorb imported knowledge. However, these strategies of technological change have lower growth rates than endogenous generated technological change (CASTRO and JENSEN-BUTLER, 1991).

Table IV - Breakdown of human resources by sector and by region, 1990

Regions	Sector (%)			
	Government	Higher Education	Enterprises	Total
North	3.7	26.0	28.0	18.5
Centre	3.9	18.3	10.9	12.0
Lisbon and Tagus Valley	87.7	50.6	59.0	65.0
Alentejo	1.6	2.6	1.7	2.1
Algarve	0.2	0.7	0.0	0.4
Azores	2.2	1.6	0.0	1.6
Madeira	0.7	0.2	0.4	0.4
TOTAL (ETI)	4 229.9	5 816.1	1 996.6	12 042.6

Source : SEFOR/JNICT

In the absence of spontaneous formation of innovation spaces the R&D policies try to build these spaces. The European Community policy in this sector encourages the formation of technopols or science and technology parks. In Portugal it is also possible to witness the effects of these policies.

The implementation of R&D infrastructures has been a priority of recent regional policy. The community support has contributed strongly to reach the goals defined by the government. In Figure 2 are the principal R&D infrastructures of the country. The geography of R&D, as it was expected, reveals a massive concentration on the coastal area and in particular in Lisbon and Oporto MA.

The science and technology parks are an important infrastructure to the promotion of technological transfe-

rence and in consequence have a role to play in the process of technological change (GODINHO and CARAÇA, 1988). The more advanced countries of Europe have been promoting these infrastructures during the last decade. In Portugal only after integration in the EC the science and technology parks are a government concern. In this context the CIENCIA and PEDIP programs and STRIDE have the objective of creating two science and technology parks in Lisbon and Oporto MAs.

SALEMA (1991) points out two reasons for the implementation of these infrastructures in Lisbon and Oporto:

- development of synergies between the principal R&D infrastructures;
- attract national and international "high-tech" firms that can take advantages from the urban environment.

Science and Technology Park of Lisbon MA - Tagus Park

The Tagus Park is located at the confluence of three municipalities close to Lisbon, although most part of the area is at Oeiras. The park will occupy an area of 200 ha. The investors in the Tagus Park are entities of the National System of Science and Technology, local authorities, public enterprises and other firms. It is expected this infrastructure will reinforce the competitive advantages of the Lisbon region. The amount of investments overtake PTE 4 billion. The FEDER assistance will be around 25%, the government funding 5.5% and the remaining will be supported by the private sector.

The Tagus Park goals embrace the concentration of the science community and the private business sector, the creation of an innovative environment, the development of knowledge enterprises, the installation of high-tech foreign firms and the adequate education and job training in advanced technological activities.

In the first phase of the project the Central Nucleus and the Expansion Incubator will be finished by the end of 1996. The Central Nucleus includes a centre for business innovation, an innovation agency, a centre for science and technology information, a GIS centre, a telecommunications centre as well as leisure activities (hotel, restaurants, shopping area, health club, golf...). The expansion incubator has been designed to incubate SMEs in an advanced state of development. This unit will cover an area approximately with 5,800 m².

By the end of 2006, it is expected that 13,000 users will be involved in the Tagus Park, of which 6,000 in R&D activities.

Science and Technology Park of Oporto MA

The Oporto park has a tripartite structure, with poles in Minho, Maia and Feira (FIGUEIREDO *et al.*, 1992). The total area of the park is around 338 ha. The Maia pole will be more related with the university institutions whilst the Feira and Minho poles will develop a large entrepreneurial component. The total amounts involved represent PTE

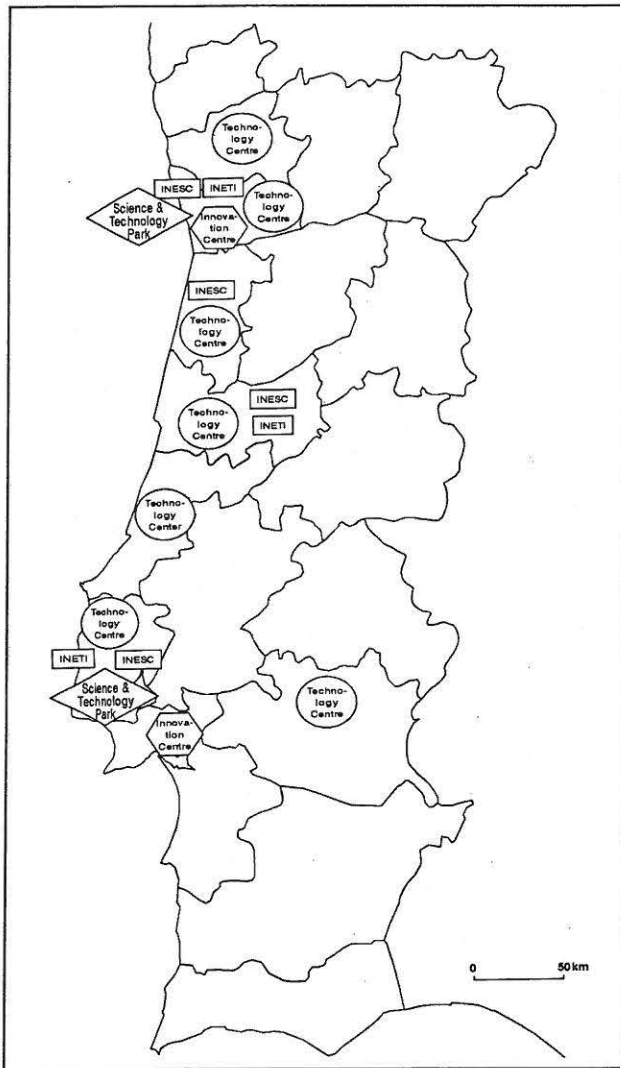


Fig. 2 - Principal R&D infrastructures (excluding Universities)

360 millions, of which 70% are FEDER funding and the remaining 30% are the national public participation.

The general goals of the Oporto park can be summarised in the following aspects: to strengthen the science and technology system and the productive fabric; to create the conditions to the growth of centres and enterprises associated with R&D, advanced training and industrial production; to incubate high-tech SMEs; to attract foreign direct investment in advanced economic activities.

The Minho Pole is going to be located in Ave valley and will present a configuration highly related with the productive specialization of the area (textile/clothes industries). The promoters are the Minho University, local authorities of the region and the Industrial Association of Minho. In this pole will be installed the TECMinho — Association University/Enterprise for Development.

In the Maia Pole the park profile will be oriented to the job training in high technologies with emphasis in biotechnologies, electronics and mechanical and computational systems. The institutions involved are the local universities, regional management institutions and firms. In this pole will be installed the Experimental Centre of Biologic Natural Resources, a Pilot Farm, the Institute of Environment Studies and the Institute of Continuous Training.

The Feira Pole will perform as a start-up structure to the consolidation of innovative SME. The University of Oporto and Aveiro, the Industrial Association of Oporto and the national telecommunications operator are the institutions involved in this pole. In this pole will be installed the Institute of Environment and Development.

It is expected that each pole will attract around 7,500 users.

4. CONCLUSION

The high technology industries are a major concern of the national and regional authorities because they can promote and create favourable innovative local/regional environments. Innovation is seen as a fundamental issue to improve the competitive levels of cities and regions.

The semi-peripheral spaces depend heavily in the technology imports which is one way to modernize the productive fabrics with low costs but with some limitations, also the impacts are not so positive as the impacts generated by self-technology change process. In Portugal, the modernization of the economic activity relies basically in the technology import. However this trend can be transposed by the development of more local/regional oriented R&D policies.

The conception of science and technology parks is in fact an answer to the need of an innovation generation more related with the local and regional economies. In Europe it is possible to find some examples of success in what concerns the creation of innovation and its diffusion. However it is also possible to find parks with low capacity levels of innovation diffusion. If it is almost unquestionable the need of these kind of infrastructures in Portugal it is

also a motive of concern the relatively low appeal of the private sector, namely the SME of the manufacturing activity. Until now the foresee impacts are weak regarding the investment amounts and if there were not EC funding these infrastructures would not be seen as fundamental as they are now. If these parks fail in achieving their objectives the technology import will continue to be the easiest and probably the only solution to the improvement of SME competitive capacity in the international markets. This last trend will have severe consequences to the national economy, being the final result the reinforcement of technology dependency.

The geography of innovation in Portugal reveals important regional inequalities which are associated to the traditional economic and social divisions in the country, namely the contrast coast/interior and urban/rural. The recent R&D policy is not contributing to the decrease of regional inequalities and we may say that in fact is reinforcing the differences among coast and interior, what is quite noticed either by the investments breakdown or by the allocation of human resources or even by the geographical distribution of electronic industry. The new science and technology parks will reinforce these territorial unbalances, although the possible locations to these innovation infrastructures were very limited by the fact that the necessary agglomeration economies were and still are difficult to find in other areas of the country.

The competition between regions is strongly shaped by the competition among the cities of the European urban system, what has been understood as a change from a *territoire-zone* to a *territoire-reseau* (LAPIETZ and BENKO, 1992). In this context it is reasonable to ask if the location of R&D infrastructures in Portugal is adequate. If we agree with the recent regional development theories we must say that concerns aren't converging in the assistance to the peripheral regions but specially to the modernization of economic basis of the most performing regions/cities (DUNFORD and PERRONS, 1993). In the light of these statements, Portugal R&D policy seems to be in concordance with the dominant trends in Europe what can result in a progressive peripheralization of a significant part of the Portuguese territory if the innovation diffusion process is going to be limited in space and time.

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