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TECHNOLOGY PARKS & ECONOMIC GROWTH AT A REGIONAL LEVEL

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Since 1995 until 1997 he was director of the Basque Country Government Industrial Counsellor Cabinet.

He has dedicated all his young life to Technology and has taken part in several meetings all around the world in pursuit of the last discoveries in the Science and Technology Area.

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1. INTRODUCTION

We need to go back all the way to the year 1951 no less to observe the beginnings of what could be regarded as the first Technology Park in the world, set up in the campus of Stanford University. Many other experiences followed in the sixties and seventies both in the States and the U.K.

Nevertheless, if we did need to be convinced of their validity, we need look no further than the ever greater number of initiatives springing up all over the world. Different models for different socio-economic realities, fulfilling their function as spaces for innovation, technology transfer and regional development without the need to fit the original theories of the 'perfect model'.

At the present time, there are more than 400 Technology Parks (or similar definitions) in existence throughout the world. There are also numerous projects under development,

whose general viability is linked to the prior existence of a particular industrial and business background and whose success will depend in large part on the wider development or innovation strategy propelled by local authorities.

2. THE TECHNOLOGY PARKS OF THE BASQUE COUNTRY

2.1. Background

Economic activity in the Basque Country in the nineteen eighties was based on a powerful industrial sector, heavily weighted towards traditional activities (iron and steel, shipbuilding, capital goods etc.), a notable lack of leading-edge technology and a consequent steady loss of competitiveness. This situation revealed the need for the great streamlining efforts which were subsequently carried out over the following years.

It was with this aim that the Basque

institutions started up a series of anti-cyclical measures to support the restructuring of industrial SMEs. These reactive measures were complemented by proactive strategies in the fields of technology and innovation, thereby creating the necessary conditions for a diversification of industrial activity and the development of R&D in the Basque Country.

A future scenario of radical change was envisaged, with fast development in all fields, globalisation and interaction between sectors, and with technology and innovation taking shape as key aspects in improving competitiveness.

These strategic reflections yielded strong basic support to facilitate the entry of new technologies into SMEs, drive on the creation of R&D units in companies and sectors, promote the work of Technology Centres, and set up the ideal new spaces for the implementation of advanced technology companies.

The initiative behind the creation of the Technology Parks in the Basque Country arose out of this context, counting on the essential factor when setting up this type of experience which had been so successfully demonstrated in other countries: the prior existence of an industrial / business framework and entrepreneurial culture.

The principle was taken on board that a Technology Park can only contribute to intensifying trends towards technology or diversification if policies to stimulate industrial development are already in place.

Technology Parks are not an end in themselves, but another potentially very effective instrument within and at the service of industrial and technological policies.

In this way the evolution of events during the decade of the nineties reveals the configuration of successive Plans of Industrial Policy which were widely negotiated, debated and approved by the Basque Parliament, together with the corresponding technology Plans, starting with the Plan of Industrial Technology,

which later became the Science and Technology Plan and the subsequent design of the new Science, Technology and Innovation Plan at the present time.

It is this global, interlocking design of industrial and technological policy which has marked out the objectives and strategies for diverse agents and instruments, endowing them all with the meaning and joint vision of the country as a whole.

The starting up of a Technology Park required a strategic location, close to communications infrastructure and to the university, with a quality environmental setting suited to the demands of the technologically advanced companies which would set up their operations there.

The first Technology Park in Spain was founded in 1985: the Technology Park of Bilbao, based in the small town of Zamudio.

The challenge was to create an environment with suitable infrastructure for the implementation of technologically advanced companies, Technology Centres, in-company and sectorial R&D departments together with services related to the various industrial activities. A setting that would facilitate inter-company co-operation, promote technology transfer and dissemination and instil a culture of innovation.

The undeniably positive general effects on Basque industry which has followed the attracting of technologically advanced projects towards the Bilbao Park has led to the establishment of two further similar initiatives. The Technology Parks of Alava (founded 1995) and San Sebastián (founded 1997) are thus now well under way.

The three Technology Parks are based on the same philosophy and set similar objectives, backed by the Industrial Policy guidelines behind the co-ordination of the three Parks as a strategic axis.

2.2. Brief view of situation

The three Parks are endowed with a total surface area of over 430 hectares and land for building in company set-ups of almost 146 hectares. The Parks are additionally equipped

with more than 73,000 square metres in buildings owned by themselves, destined for the location of companies.

As you can see from the following tables, levels of occupation are very high.

	Bilbao	Álava	San Sebastián	Total
Land for Companies (sq.m.)	724.000	607.000	126.000	1.457.000
Index of Occupation (%)	75%	37%	42%	56%
Premises for Companies (sq.m.)	45.500	10.700	17.000	73.200
Index of Occupation (%)	100%	98%	71%	93%

The growth of activity has been spectacular, especially over the last three years. At the

present time there are 185 companies installed, with a total direct employment of 7,700 jobs.

	Bilbao	Álava	San Sebastián	Total
No. Companies	97	54	34	185
Direct Employment	4.300	1.950	1.466	7.716
Turnover 2000 (Mill. €)	841	301	117	1.259

The high added value of the companies located in the Parks is expressed in the average annual turnover per employee, which averages around 164,000 € in the three Parks and reaches almost 196,000 € in the case of the Bilbao Technology Park per person and year.

In terms of employment, it must be pointed out that nearly 50% are graduates, and over 30% devoted exclusively to R&D, thus clearly revealing the highly qualified employment generated by the Park environment. Another noteworthy aspect is the fact that nearly 50% of workers are less than 30 years of age.

2.3. Type of Companies

Companies located in the Technology Parks, as in practically all such Parks the world over, have to comply with a set of requirements about different aspects of their activity.

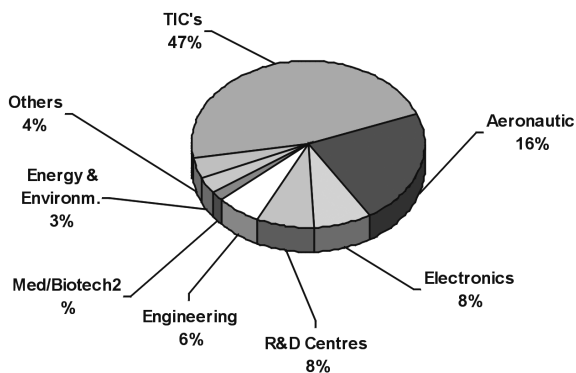
There are selective controls on company activities, levels of R&D and on architectural and urban planning standards.

They must be shown to be environment-friendly, as any type of uncontrolled waste dumping, pollution or contamination is strictly prohibited. This is a necessary requirement to maintain the quality of this type of setting. It presents no difficulty if we bear in mind that we are not concerned with manufacturing or production companies, but with companies based on R & D, information and communications technologies, of clean technology for assembling sophisticated high technology products, quality assurance, advanced engineering services, research centres, laboratories etc.

We can clearly see the efforts at diversification which have been made if we observe the spread of activities by sector,

demonstrating the technological capacity developed within the Basque Parks. Of these activities, the high and growing significance of I.T. and Communications Technologies should be stressed, representing 47% of total direct employment generated in the Parks.

Main Sectors of Activity (in % of direct employment)



We can confidently assert that the successful running and in many cases market leadership of companies working in areas that were practically non-existent or very under-developed only a few years ago has been a key contribution to the sectorial diversification of industry in the Basque Country. This is illustrated in the powerful growth of telecoms companies, of the aeronautics sector, software development, and above all in the last three years, of companies related to the phenomenon of Internet and the dawn of new projects in the areas of medicine and biotechnology.

3. THE TECHNOLOGY PARKS AND ECONOMIC GROWTH

The differential value afforded by the Technology Parks as opposed to other types of business structures can be synthesised in their power to promote inter-action between various economic agents and stimulate the generation of scientific knowledge, transform it into technology and apply it in

entrepreneurial fields.

As we have seen, the Technology Parks are thus converted into a fundamental instrument for industrial policy, as wealth generators within their sphere of influence driving on regional competitiveness by enhancing:

- the implementation of technologically-advanced companies and R&D Centres.
- the generation and development of new technologically-based companies.
- technology and knowledge transfer and dissemination.
- inter-company co-operation and inter-relation between agents of the Science-Technology-Company system.
- the creation of intelligent infrastructure.
- professional capacity, especially in the field of research and development.
- a culture of quality and excellence.
- the image of the country abroad.

The fact that they are instruments of development and competitiveness within their area of influence means that the Technology Parks, like all economic agents, must search for methods and indicators which allow them to evaluate and quantify the degree to which they are generating value in their local area.

The search for measurement indicators faces two main problems in this case:

- Firstly, the fact that a large part of the actions carried out by the Technology Parks in pursuit of the objectives mentioned above are intangible by nature and thus difficult to measure in consistent economic terms.
- Secondly, many of the effects produced by these activities are felt in the medium to long term.

This means that only a part of the impact which the Technology Parks have in their local

area may be consistently quantified through standard economic models and indicators. Despite this limitation, it is still worth developing a model which allows us to evaluate the contribution of at least the most tangible activities carried out in the Parks, and, more importantly, to follow their evolution over time.

These factors must be considered together with the long period of time since the first Technology Park was created in the Basque Country, meaning in turn that part of the longer term effects are already taking shape.

The Network of Technology Parks of the Basque Country have therefore developed a Measuring Model to allow for a periodic evaluation of the Economic Impact being generated in their sphere of influence.

4. MODEL OF ECONOMIC IMPACT OF THE NETWORK OF TECHNOLOGY PARKS OF THE BASQUE COUNTRY

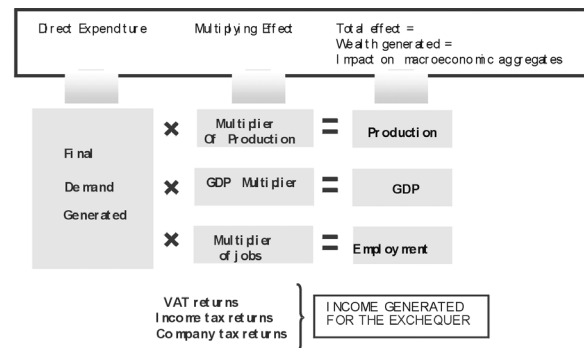
The objective of a Model of Economic Impact is to determine the wealth generated in an area by the development of a particular economic activity during a set period of time.

In this particular case, the wealth generated in the Basque Country by activities associated with the Technology Parks has been evaluated for both 1999 and 2000.

This wealth is measured, basically, through three macroeconomic aggregates: Production, GDP (gross domestic product), and Employment.

While the first two indicators are measured in terms of their actual contribution to wealth generation within the period, in the case of Employment reference is made not to number of posts created, but to a contribution to maintaining these posts.

Economic Impact is measured based on an analysis of the final demand carried out by the activity under study. This demand is quantified on the basis of Direct Expenditure incurred by the agents on the last link of the chain of economic transactions (clients or final users).



The input-output tables of the economy allow this expenditure to be expressed through the development of specific multipliers for each sector and economic aggregate, in terms of Production, GDP and Employment. This Total Effect on the macroeconomic aggregates is produced by the combined effect of three different types of effect:

- A Direct Effect, which expresses the Direct Expenditure incurred by the final users of an activity in terms of Production, GDP and Employment (e.g. expenditure made by a client in a company).
- An Indirect Effect, which expresses the knock-on impact of this Direct Expenditure of successive transactions between sectors on Production, GDP and Employment. (i.e. the company receiving income from the client will in turn spend on other suppliers which in turn will also spend on others etc.)
- An Induction Effect, which expresses the longer-term impact had by this expenditure on Production, GDP and Employment through the increase in disposable income in the domestic economy. (e.g. wealth generated by company activities raises domestic economy income and capital returns, leading to higher consumption and demand thus generating further side effects on the economy).

Wealth generated in the economy as a side effect of the development of industrial activity is thus superior to the direct demand for such an activity through these knock-on effects.

When we came to define a Model of Economic Impact which would allow us to quantify wealth generated in the Basque Country by the associated activities of the Technology Parks, the first problem faced was exactly how to define their field of action: Are associated activities of the Technology Parks only those developed by its tenant companies? Are they limited to those carried out within the physical confines of the Park? Or those developed by all organisations located therein?

It would seem logical to consider all three Levels outlined, given that each one comes close to the various possible definitions which could be made of a 'Technology Park'.

To this end, the Model of Impact will consider the three Levels separately:

- Level I of the Model considers activities carried out by tenant companies in the Technology Parks.
- Level II considers activities generated within the physical confines of the Technology Parks.
- Level III considers activities carried out by organisations located within the Network of Parks, whether inside or outside of the Parks themselves.

In this way we can obtain both a detailed and overall view. To achieve the latter, we need to add the Direct Expenditure quantified in Level I as coming from final users not located in the Network of Parks to the Direct Expenditure quantified in Level III (given that organisations within the Network and Level II generators will both already appear in Level III).

In order to obtain a more precise analysis, a differentiated treatment according to the specific nature of organisations present in the Network has been made: companies by industry and service, Technology Centres, clusters and the like, the University, ancillary service companies and, logically, client companies.

Likewise, the Impact of General Activities has been calculated separately within the three Levels considered, together with the Impact produced by Activities related to the development of physical infrastructure (building construction and other complementary infrastructure) and of communications.

Despite the rigour of the Model not all effects produced by activities linked to the Technology Parks are capable of being quantified however, at least in consistent economic terms, and will thus fall outside its scope.

Particularly noteworthy activities with highly intangible effects carried out by tenant companies and not covered by the Model include:

- Support for the generation of new companies and Research Centres.
- Networking between agents of the Science-Technology-Company system.
- Diversification of the industrial fabric.
- Advanced and ongoing development of infrastructure generating added value for the rest of the region.
- Collaborations with the University.
- Promotion abroad of the Basque Country Autonomy and organisations located within the Network of Parks.
- Collaborations with other Technology Parks, national and international.
- Completion of R&D projects.
- Dissemination of Technology and Knowledge.
- Bringing of new technologies closer to society.
- Long-term, ongoing magnet effect generated on scientific and technical vocations in the Basque Country Autonomy.
- Examples of good practice.
- Encouragement of a culture of quality and technological innovation in the Basque Country Autonomy.

- Attraction of technology-based companies

In the same way, we must also bear in mind that the impossibility of quantifying part of the activities carried out by tenant companies in economic terms also affects a large part of the activities developed by the organisations located in the Network of Parks.

5. THE ECONOMIC IMPACT GENERATED BY THE NETWORK OF TECHNOLOGY PARKS OF THE BASQUE COUNTRY IN 2000

Applying the Model to general activities linked to the Basque Technology Parks during 2000, and taking into account the various effects which are incapable of economic quantifying, it can be observed that the Final Demand (measured in terms of Direct Expenditure) of such activities has risen to 1,214 million Euros.

This volume of demand rises to 2,431 million Euros in production and 1,255 million Euros to GDP in the Basque Country by virtue of knock-on inter-sector trade. It has likewise led to the conservation of 33,437 jobs.

In other words, 3.5% of GDP in the Basque Country has been generated by activities linked to the Technology Parks. At sector level, 3.9% of the Industrial GDP of the Basque Country has been generated by industrial activities linked to the Parks, rising to 4.2% in the case of the Services Sector.

In terms of employment, activities linked to the Technology Parks have contributed to conserving 4% of posts existing in the Basque Country during the year 2000.

All these reference points have also registered a very positive evolution compared to the preceding tax year. Final Demand has thus increased by 19% with respect to 1999, meaning that activities linked with the Technology Parks have raised their contribution to production and the GDP by 19% and 20% respectively. Likewise, such activities have

also contributed to conserving 20% more jobs than the previous year.

Aside from general activities, expenditure up to now by the Network of Technology Parks on the development of physical and communications infrastructure has contributed 688 million Euros to Production in the Basque Country, in 466 million Euros to the GDP and has helped to maintain 8,303 jobs.

In relative terms, this means that 14% of the GDP generated by the Construction sector in the Basque Country has derived from infrastructure development carried out for the Network of Technology Parks.

The positive evolution of activities carried out in Level II should also be stressed at a quantitative level, where organisations located in the Network of Parks are linked beyond a simple client-supplier relationship towards research collaborations (54% of organisations), commercial deals (34% of organisations) and alliances (19% of organisations).

6. IMPACT IN THE AREA OF TECHNOLOGY TRANSFER AND DISSEMINATION

Lastly, as far as activities involving technology transfer and dissemination, the following points should be stressed:

- Organisations located in the Network of Parks destined 27,000 million pesetas in R&D during the year 2000, which represents almost 13% of their trading figures, and 30% of overall spending on R&D in the whole of the Basque Country.

- * Organisations located in the Network of Parks are developing 389 R&D projects in Official Programmes of the European Union, Spain or the Basque Country itself.

- There are currently 48 collaboration projects running between the Parks-University or Technology Centres.

- More than 23 new entrepreneurial initiatives were dealt with.

- 1,990 events of various types connected with technology and innovation were organised (Technical Days, Seminars, Congresses etc.,) attended by nearly 60,000 people.

- Close on 100 national and international delegations visited the Network of Parks, whether from an institutional or business perspective.