

UNIVERSITY AND BUSINESS:
THE CONTRIBUTION OF THE SCIENCE PARK
OF THE *UNIVERSIDAD DE ALICANTE*
TO THE CAUSE OF REGIONAL DEVELOPMENT

GABINO PONCE, ANTONIO RAMOS, ANDRÉS PEDREÑO
Universidad de Alicante

THE *UNIVERSIDAD DE ALICANTE* AND ITS INVOLVEMENT WITH ITS IMMEDIATE ENVIRONMENT

There are numerous socio-economic functions for defining and modelling the growth —to say nothing of the origins— of cities. Industry, trade and tourism are all forms of economic activity that are capable of determining —and sometimes even giving order to— the main factors governing the growth of many of today’s urban nuclei. They influence the way in which building plots are distributed and juxtaposed, and —normally through the mechanisms that control the market for land— help to establish a clear set of hierarchies and sub-ordinate and complementary relationships.

It is less common for “knowledge¹” to establish the rules by which territory is organised. That said, there is in fact a tradition for this dating back at least as far as medieval times. Then, knowledge and understanding resided in monastic cloisters, and that largely remained so until the dawning of the Renaissance. The architectural elements that characterised the monastery: its cloisters and patio and its different dependencies —including classrooms and professorships— represented the first attempt to organise “knowledge space²”. These elements have since been symbolically passed on to us.

With the humanism of the Renaissance and throughout the Baroque period, the conceptualisation of different types of knowledge —each with its own specific evolution— fostered the development of a whole array of different styles of presentation, each of which was defined in such a way as to accommodate each and every one of the new, individualised forms of knowledge. Little by little, buildings were endowed with the precise elements required for the full development of each particular science. They were furnished with the likes of laboratories, libraries, archives and rooms for conducting experiments. At the same time, they began to be organised over larger territorial spaces.

1. The word used in the original version is “*Saber*”, which literally means “knowledge” or “understanding”.

2. The term used in the original version is “*espacio del Saber*”. This would literally translate as the “area or space for knowledge and/or learning”.

Nevertheless, it was with the arrival of the Industrial Revolution, and its associated economic and social progress, that “knowledge” definitively fragmented into a multitude of new sciences, each requiring its own specialised spaces. Faculties, academies, scientific societies, schools and university colleges acquired separate existences and each required its own specific, differentiated space in order to realise its full scientific potential.

At that time, a question arose that remains highly relevant even today. The problem concerned whether to integrate or segregate these spaces, both with respect to each other, and with respect to the towns and cities in which they first appeared. At the heart of the matter —and indeed of these first reflections on the best model for defining the university— lay a quest for the purest and least tainted form of reason. The driving force was a desire to procure a series of utopian conditions that would foster peaceful reading, reflection, interaction and investigation; factors that together constituted the platform upon which the 19th century’s scientific project was constructed. In accordance with this postulate, complexes of conceptually and formally organised buildings were designed following a series of nationally applicable, centralised and uniform criteria.

While the oldest universities continued to develop among the tightly packed streets of their cities of origin, new universities were designed according to these new utopian premises. The “city of knowledge”³ was conceived as an island far removed from the distortions of city life and the environmental changes created by industrial dynamism.

Some of the keys to this circumstance may be found in the splendid isolation of the medieval period’s “ecclesiastical knowledge”,⁴ which sought and created an atmosphere of peace and tranquillity, deemed favourable for reflection and the quest for knowledge. Even so —to a great extent— the establishment of universities torn away from their urban settings was a practice that was rooted in the urban utopias that developed during the 19th Century and one which largely arose in response to the decline in the quality of life associated with industrialised cities.

These solutions included the proposals for “harmonious cities” forwarded by Pugin, Ruskin, and Morris, and the “socialist utopias” of Cabet, Owen, Fourier and Godwin. These ideas perhaps came to their climax in Howard’s proposal for the “garden city”. Howard structured the different functions to be found in the city in a differentiated way, and proposed connecting them by means of an excellent radial, concentric, communications network. This network was to be made all the more attractive by the insertion of a series of successive green belts, dedicated to either public or private land uses. According to the scale in question, these green belts were

3. “*La Ciudad del Saber*” —literally, the “City of Knowledge” or “City of Learning”.

4. “*El Saber eclesiástico*” —literally, “Ecclesiastical Knowledge”.

to have the added virtue of being able to separate different land uses and thereby create the most appropriate conditions for the optimum development of each of the established functions.

The “peripheral campus” model —generically known as the “American campus” model— with its buildings integrated within a context of urbanistic quality, and dominated by landscaped gardens, is a direct product of this line of thinking. In fact, according to Jean F. Block, the term “campus” is an Americanism that dates back to the 18th Century. The first example of a truly purpose-built campus —planned as such from start to finish— dates from the end of the 19th Century and was presented in a competition organised by the University of Berkeley. The winning entry was a project for a “city of knowledge”⁵ which was to act as a self-sufficient cell, and to be safe from the ups-and-downs of political and socio-economic influences. It was organised along the lines of a small city, and this idea was reinforced by the presence of residential areas for students and professors. It was also to have functional spaces to provide for its internal needs, and these included restaurants, shops, offices —offering both public and private services— and other facilities such as post offices, banks and churches. To a certain extent, this project followed the “rural” tradition of the English College. Later, however, the diffusion of the urbanistic principles of the “Modern Movement” played a decisive role in separating the “city of knowledge” from the congested —and at times degraded— urban context, with the introduction of the zoning policies that form the basis of modern day planning. Even so, a functional deficit continues to gradually kill our urban centres —and not just their oldest and most historic quarters. In this segregated model, the integration of individual buildings and blocks that provide services for each other can only be achieved through an appropriate management of their milieu. This can be done by clearly defining the functional spaces, perspectives and common environments that finally produce the sensation of a finished and fully integrated whole.

However, in contrast to the utopian ideals —which use the purest of reason and understanding to define these spaces— their closed configuration has also been used as a design strategy for controlling space. This has facilitated the repression of revolts or any other similar challenges to authority at times and in societies characterised by a relative or absolute lack of democracy.

A quantitative and qualitative evolution in university space has made it possible to overcome the apparent contradiction between the existence of these “cities of knowledge” (the *Universidades Autónomas*⁶ were initially established as islands) and the need for their integration within the larger socio-economic context of the city, or

5. “*La Ciudad del Saber*” – literally, the “City of Knowledge” or “City of Learning”.

6. “*Universidades Autónomas*” – These relatively new universities were set up outside Spain’s largest cities particularly during the 1960’s and 1970’s.

cities, in which they originated and that have subsequently sustained them. It is not now a question of making proposals for de-urbanisation, for these complexes are no longer seen as isolated ruralising units, but rather as part of a complex system for regional planning. This is maintained by a city system that is linked together by a series of economic and social ties, and structured by excellent road, telephone and electronic communications. This is also the case of the *Universidad de Alicante*.

On one hand, the centrifugal tendencies that afflict our cities have emptied them of both their functional and residential content, and this has had an impact not only upon their historic centres, but also upon large areas of their 19th Century *ensanches*.⁷ The centre-periphery dialectic has thus been progressively replaced by a relationship based upon outlying functional spaces. This has been all the more noticeable in cases where the university function has extended beyond the limits of a single city and spread across a complex city system —often coming to form the central axis around which wider economic and social subsystems pivot.

On the other hand, the demand for an active symbiosis between the university and the neighbouring social fabric —which originally constituted the driving force behind the mechanisms responsible for the university's diffusion— must now be orientated towards transferring the results of research and academic culture beyond the confines of the university campus. R&D and R&TD strategies should be used to bring together the scientific and business communities and to encourage them to work together on common projects.

Policies aimed at creating new areas of innovation such as technopoli and science and technology parks are all moves in this direction. They are designed to promote productive relationships between scientific research and business units and to put the results of such partnerships directly to work in order to improve and diversify industrial, organisational and decision-making products and to thereby benefit both the economic fabric and its social and environmental repercussions.

WHAT THE UNIVERSITY HAS TO OFFER AND THE POTENTIAL FOR ECONOMIC DEVELOPMENT

The *Universidad de Alicante*, which has been in existence for twenty years now, offers excellent potential for socio-economic development in what ranks as Spain's fourth province in terms of GDP. The university runs about fifty courses that lead on to university degree qualifications and is formed by over seventy different departments, units and research groups. Studies offered include Social, Legal and Ex-

7. These are typically residential areas formed by wide avenues and offering relatively large open spaces. Although originating on urban peripheries they are now found near the centre of large cities.

perimental Sciences, Technology, Humanities, Education and Health Sciences. There are five university research institutes (carrying out research in such fields as Water, the Natural Environment, Geographical Analysis, and the International Economy). The university currently has more than 30,000 students and a good reputation for research activity.

In terms of its total number of employees and its annual budget, the *Universidad de Alicante* is effectively the largest single entity in the province of Alicante. As far as its involvement in the regional economic system is concerned, it also constitutes an obligatory point of reference for many local businesses, and is involved with them through a series of agreements relating to technical assistance, technology transfers, and student work experience schemes with both postgraduate and in-service work experience and training schemes. The university is also a necessary reference point for international relations. It has participated in many (and a wide range of) highly innovative projects involving agreements, centres, mobility, exchanges and co-operation in conjunction with entities from different parts of the world.

The *Universidad de Alicante's* involvement in the economic development of its surrounding territory and with the community of which it forms part is amply exemplified by the following bodies and initiatives: *Área de Experimentación Industrial, Servicios a la Investigación (Planta Cero de Analítica, Plantas Piloto de Experimentación), laboratories, Centro de Proceso de Datos, Sistemas de Información y Documentación Avanzados, Centro de Documentación Europea, Centro de Creación de Empresas, Area de Prácticas en Empresas del Gabinete de Iniciativas de Empleo (GIPE), Oficina de Transferencia de Resultados de Investigación (OTRI), Centro de Enlace Europeo del Mediterráneo (CENEMES), Vicerrectorado de Nuevas Tecnologías, and also in a series of other specialised services, such as those offered by the Taller de Imagen and the Sociedad de Relaciones Internacionales.*

This commitment to innovation and technology has been complemented by a notable concern for local heritage and culture. The university possesses an excellent museum, which gives pride of place to the results of both its own and other institutions' research into the development of new technologies in such fields as information and communication. It also plays host to the Archaeological Park of La Alcudía, where research work is carried out and its archaeological heritage is exhibited.

Within its setting, the *Universidad de Alicante* aims to progressively establish a Science Park **which, through a series of investments, it plans to gradually provide** with all the infrastructure and equipment required for its educational and investigation projects. It is hoped to attract funding for this project from the *V Programa Marco Europeo*⁸ and, once under way, to progressively incorporate business funding and other financing generated by its own resources.

8. An EU programme.

THE COMMITMENT TO REGIONAL DEVELOPMENT

In the course of the last decade, Alicante's economy has lost both its spectacular capacity for growth and its position as a regional leader in terms of increases in GDP. From 1985 onwards, the year that marked the end of the Fordist period of intensive employment of labour, Alicante's industrial sector bore the brunt of an economic restructuring crisis. Various socio-economic indicators have shown a relative tendency for decline, with existing services being inadequate to absorb the loss of employment in industry and political measures also proving insufficient to reactivate this important sector of Alicante's economy. While in 1985, Alicante was responsible for 3.3% of Spain's GDP, by 1995, this share had fallen to 3%. In 1985, Alicante's per capita income was equal to the national average, but by 1995, it was equivalent to only 89%. In 1985, the net disposable family income for Alicante was 103% of that of Spain, yet just ten years later it had fallen below 97%.

In more concrete figures: while in 1985, 1401 industrial businesses were created in the province of Alicante offering 7957 new jobs, in 1999, only 392 new industries began trading and 3818 jobs were created. The different evolutionary processes of territories are a direct expression of their intrinsic levels of dynamism and their capacity to adapt to the needs of a rapidly changing world. Even so, this process of adaptation must be built upon a solid foundation of sector-specific policies that are clearly supported by regional and/or local authorities. If not, there is a distinct risk that the fleet of small and medium-sized businesses will soon be sunk by the stormy seas of world trade.

Historical inequalities in regional development have been responsible for enormous differences in the endowment of infrastructure (transport, energy, telecommunications and natural environment) and human capital. The latter, which was once assessed in terms of quantity, is now evaluated in terms of technical knowledge and labour training —factors which have now become fundamental aspects of effective, competitive production. Differences in per capita income are closely related to deficiencies in existing infrastructure and the low level of skills possessed by the workforce. Labour training and skills have a decisive influence upon regional economic structures and their competitiveness and capacity to adapt to change, and are also closely connected with performance in such fields as research and technological development (R+TD). With this in mind, efforts have been made to close the enormous gap which currently separates Spain from the average for the European Union: in the early 1990s, the percentage of employment in R+TD in Spain was calculated at around 30% of that of the most developed members of the European Union.

The fundamental problem resides in businesses' lack of awareness of the need for R+TD. Companies are obsessed with trying to repeat models that proved successful in the 1960's and 1970's, which were based upon the exploitation of a single resource —the abundance and cheap labour—, and otherwise leave much to luck.

Businesses are not aware of the importance of R+TD and are generally incapable of adopting a line of managerial behaviour based on the uninterrupted introduction of new products and productive processes.

There has been a noticeable lack of resolved impulse from public administrations insofar as taking action to palliate this deficit and to break the pronounced dependence on traditional markets in such characteristic local industries as footwear, textiles, toys and furniture. Even so —with very few exceptions— Alicante's industries have opted to destine part of their production to the black economy in order to remain competitive in the short run. However, increased competition from other producing countries on existing world markets is increasingly limiting the benefits of this resource.

In view of this situation —and along with other measures intended to support local industry— there has emerged a clear need for a science park capable of promoting relations between industry and the university. This park should promote applied research, targeting specific branches of production within Alicante's economic sector, and seek to encourage technology transfers. Support for these research facilities and for the transfer of their results is an inexcusably political measure aimed at increasing the competitiveness of Alicante's economic system. This is particularly needed given the family nature and generally small company structure of Alicante's businesses, practically all of which could be included in the category of small and medium sized companies,⁹ and which have few available resources to assume the challenges of innovation by themselves.

It has been demonstrated that only public sector investment in new technologies is insufficient to effectively promote their incorporation within the productive processes. It is not sufficient to simply connect up a whole industrial estate with telecommunications cables, or to provide a city with an integrated computer network (there are plenty of examples in the province). Thus, investments in transport, energy and telecommunications —which are essential for overcoming the difficulties facing Alicante's productive sectors— must be accompanied by major measures and incentives to encourage businesses to adopt R+TD strategies.

In the medium to long term, Alicante's economic system looks to base itself on the development of qualified employment and the consolidation of competitive managerial projects that incorporate new technologies. This must be achieved within a framework of progressive productive diversification, as it is impractical to continue relying on the exploitation of cheap labour. These are all objectives of the Medpark project. While it was cheap labour that attracted foreign investment to Alicante in the 1960's and 1970's, the main factors that international capital looks for today when taking decisions concerning industrial location are the availability of infrastructure and human resources.

9. Referred to in Spanish literature as PYMEs (Pequeñas y medianas empresas).

QUALIFIED LABOUR AND IN-SERVICE TRAINING

Over the last few decades, the labour market in the province of Alicante has suffered a series of major problems and limitations. With an overall unemployment rate (20.2%) that towards the end of 1997 was very similar to the national average—and 1.9% above the regional average—Alicante's labour market suffers a number of important deficiencies:

- a) There is a very worrying segmentation of employment. On one hand, there are the tertiary sectors, with qualified labour and greater labour stability; on the other, there is a precariousness syndrome with seasonal employment, which is typified by poorly qualified labour and the black economy.
- b) There are major entry barriers that make it difficult for young people to join the labour market.
- c) There are evident inadequacies in the creation of new employment, even at times of rapid economic growth. This is the consequence of various factors: a relatively low level of activity; the black economy; manpower surpluses in labour intensive sectors; and generally insufficient levels of tertiarisation and structural diversification.

The encouragement of competitive innovation, applied research, technology transfers and in-service training constitute the only ways to bring about the long term structural transformation of an economic base that is excessively dependent upon sectors with weak demand and mature technologies. The Science Park could be an initiative that is capable of harnessing the synergies deriving from both the present and future development of Alicante's university environment.

TECHNOLOGICAL TRANSFER AND THE CAPACITY FOR INNOVATION

Innovation and technological change will be fundamental requirements in the battle to increase labour productivity. Alicante's economy needs to become more receptive to the international competitive capacity of the businesses and regions of Europe and the rest of the world as technology evolves and permits the emergence of new forms of production and favours the extension and diversification of productive activities. The modern concept of technology covers many areas in which Alicante's businesses exhibit clear deficits: specialised teams, methods, procedures, organization, routines, and "know how". Although scientific knowledge is structured independently from its possible applications, the tremendous dynamism of this knowledge—it is estimated that relevant scientific knowledge doubles in quantity every five years—confers real possibilities for spectacular technological progress in both the present and, far more clearly, the immediate future.

The globalisation of the economy makes it necessary for Alicante's economy to adapt to increasingly rapid rhythms of change and transformations in technology,

which occur over increasingly shorter periods. In the course of these development processes, discoveries arise and new solutions are found for the problems posed in particular areas of production (these include: footwear, toys, textiles, food and the hotel and catering industry) and technology and techniques are transferred from some industries to others. In the fields of both process and product innovation, there is still potentially a long way to go. In the case of some businesses, the innovations in question may be radical, involving the introduction of previously unknown processes and/or products. In the majority of cases, Alicante's industries have been able to easily absorb "incremental innovations"; the changes that improve already known products and processes.

Science Parks create favourable environments for the development of both knowledge and information. In both areas, those of Alicante's businesses that are open to innovation have been forced to make a special effort to learn. It should not be forgotten that technology transfers from some businesses, or industries, to others constitutes a difficult and expensive operation for the receivers; on top of the price that must be paid in order to obtain this technology, there are frequently problems related with learning and coming to master it.

Any delay in adopting innovations that have a major impact upon the productivity and competitiveness of Alicante's businesses may give rise to a series of important costs. With this in mind, a Science Park can, and indeed should, embrace all of the possible fields in which technological change is seen:

- a) Technologies dominated by suppliers. – These are sectors in which Alicante's economy remains well represented (including textiles and footwear) and whose innovative capacity is mainly determined by their capacity to adopt the new process technologies associated with capital assets and intermediate goods. These technologies are generated in businesses whose main activity lies outside these sectors. The technological change involved is based on incremental improvements and is aimed at reducing costs. Reducing dependence and individual technological improvements have a great impact upon other businesses that depend upon third parties.
- b) Technologies of specialized suppliers. – Here the technology that is generated through specialised machinery or instruments requires design and engineering developments and is orientated towards such objectives as providing new products, understanding processes, and creating new materials.
- c) Intensive technologies in economies of scale. – These are technologies in which technological change is simultaneously channelled towards both product and process innovation, producing economies of scale and cutting costs. Such technologies can be obtained from internal R+D, design and engineering activities.
- d) Technologies based on science. – In the recent past, few industries based their development upon advances in basic science. Businesses, which tended to be large,

took advantage of official funding in order to make major investments in R+D resources and in engineering activities in their search for new products and ways of improving existing production processes. The likes of the chemical, pharmaceutical, electronics and electrical machinery industries have opened the way for many others (capital assets, intermediate *inputs* and manufacturing industries in general).

Although no country in the world is capable of generating all of the technologies required by a productive system, the importation of technology makes it possible to resolve material deficits. Even so, in many cases, this importation also requires additional adaptations or even potential improvements that are more readily assimilated in specialized environments, such as those generated by a Science Park.

In such a situation, it becomes progressively easier to create a group of relations for feedback derived from the process of generation and diffusion of innovations. This is particularly true of the learning and accumulation of the experience that businesses gradually acquire and of technological wealth in general, in contrast to the increasing complexity of the most innovative forms of technological development. No sector escapes from the determinism of technological development: sooner or later, its influence reaches even the most atypical of services and industries, as illustrated in the cases of leisure and tourism.

In summary, the dynamism of the results of modern day research on the world scale propitiates a very notable potential for technology transfer in a very diverse range of productive environments and this constitutes the basis of modern economic growth. The complexity and extent of basic and applied knowledge becomes an important limiting factor for its direct use and exploitation by businesses and sectors. In many cases, technology transfer requires specialisation; in others, it calls for adaptations or studies that demonstrate the viability of potentially exploitable methods and solutions.

THE MODERNIZATION OF TRADITIONAL INDUSTRIES

Over the last few decades, Alicante's traditional industries have based their competitiveness on low wages and access to mature technologies. The fact that these were intensive sectors in terms of labour employment presented them with serious comparative disadvantages during the 1970's and during the early 1980's. Technological modernization and product differentiation have still only been partially introduced in certain sectors and businesses. The ceramics and marble industries of Castellón have been some of the most receptive in terms of the introduction of innovations, whereas in other industries, such as footwear, textiles and furniture, there is still room for major modernization. The modernization of a section of the productive sectors has become a pending objective. These changes should not only put emphasis on specific reforms of processes and products, but also on the adoption of a philosophy which is much more receptive to innovation in general.

The traditional sectors can benefit from the major lines of innovation that are generated around the most innovative sectors or from the technologies and design solutions that are specifically developed for these businesses. In this respect, the *Universidad de Alicante's* Science Park constitutes an excellent way for progressively steering these sectors along the path to innovation and competitiveness.

DIVERSIFICATION AND TERTIARISATION

The high unemployment rate that affects all of our economies, and particularly that of Alicante province, has conferred maximum priority on the objectives of productive diversification and tertiarisation. In 1998, the unemployment rate in the province's industrial sector was 12.8%, while that of the *Comunidad Valenciana* as a whole was calculated at 9.6% and the global rate for the Spanish state was 8.7%. Whereas more than 1,500 new industrial businesses were created each year in the second half of the 1980's, the average number of new industries created each year between 1995 and 1999 was only 440.¹⁰ Without being able to speak in terms of "crises of managerial vocation", there is certainly a need to encourage "entrepreneurial aptitudes" in businesses and sectors linked with the sources of future demand, new technologies and schemes for taking advantage of our immediate environment.

Alicante's economy maintains a high degree of diversification on a single structural plane: with sectors that make intensive use of labour, mature technologies and weak demand. However, comparatively speaking, it has yet to reach a sufficient degree of tertiarisation, especially in specialized services for businesses that help to increase their competitiveness. There is a similar lack of relevant participation in sectors with a strong demand for high technology. Alicante province should not renounce the possibility of progressively increasing the presence of services and non-traditional sectors, and similarly, it should not renounce the chance to introduce sectors with a future. Failing to do this would be equivalent to what in the recent past would have been the result of becoming relegated to the status of an agricultural area without industry or to an industrial area without services.

EXTERNAL COMPETITIVENESS

External competitiveness is, par excellence, the best indicator of the health of both businesses and productive sectors. Accessibility to all types of information through new technologies and the suppression of barriers to free trade throughout the world —with an irreversible tendency towards globalisation— have created a

10. Data supplied by the Conselleria d'Indústria, Comerç i Turisme, Inversió registrada, for various years.

single reference framework. Within this framework, Alicante's businesses must aim to produce as efficiently as those located throughout the rest of the world. They need to assimilate a capacity for innovation that is sufficiently efficient to meet the demands of this global market. Human capital has become a key piece and vehicle for the introduction of innovations and therefore also for maintaining the competitiveness of the economic fabric. Universities offer a very relevant potential in contexts in which the insufficiencies of individual research —by small-scale businesses and traditional sectors— are telling. The conception of the *Universidad de Alicante's* Science Park makes it possible to add a very important human capital potential to the benefits of technological development and innovation and, in so doing, to raise the competitiveness of our businesses with the help of products whose external commerce provides the best indicator of its future potential.

REGIONAL COMPETITIVENESS

Territorial spaces are becoming increasingly competitive. All regions offer greater incentives in the form of such parameters as infrastructure, modern facilities, specialized services, the rational regulating of legal frameworks, incentives, spaces with environmental quality, and attractive residential areas.

Within the ambit of the European Union there is also a gravitational displacement towards the centre, as a consequence of its opening to the east. Spain, and especially its southern regions, needs to therefore substantially increase its "regional competitiveness" if it wants its industries and services to be able to resist competition from abroad. From this perspective, it seems that the creation of spaces that encourage innovation and technology transfer represent a necessary option and a way to defend our productive system.

THE OBJECTIVES OF THE PARQUE CIENTÍFICO DEL MEDITERRÁNEO: MEDPARK

The *Universidad de Alicante's* Science Park, which was initially devised as a project to serve the neighbouring community, has developed into an initiative to take advantage of the educational and research potential of the departments and services of the *Universidad de Alicante*.

It was initially conceived as a space for environmental excellence, in which the aim was to promote an environment capable of encouraging creativity, entrepreneurial attitudes, and the philosophy of innovation. Other major objectives included the conservation of the natural environment, rationalization of basic resources (such as water and energy), support for the welfare state (including health, education, and leisure) and the development of culture and integration of training.

Making this a reality in a physical space is part of a search for a tight symbiosis between the university and business communities. It has the clear objective of

clearing the way for fruitful communication and coexistence; and for promoting the desired encounter between the productive sectors and the scientific community. The proposed venue forms part of the future development of the *Universidad de Alicante* and of its educational and research projects.

The Science Park was chosen ahead of other options, such as a *Parque de Investigación* (Research Park) and a *Parque Tecnológico* (Technology Park), as it was deemed the most conceptually precise. According to General Directive XIII of the European Commission, a Science Park is the name given to the development of a project related with a space that:

- a) Is physically close to, or maintains operational ties with, one or more university institutions or centres for advanced research
- b) Is designed to promote training and the growth of knowledge-based business initiatives
- c) Facilitates the transfer of technology from research centres, and university centres in general, to businesses located in and near the park through active intervention.

According to the established guidelines, the main objectives of the park are: research, development and design, accompanied by the origination of new products and their development up to, and including, the marketing phase.

The proposed trademark —MEDPARK— has the advantage of offering all the attributes of a unique geographic environment: the Mediterranean. This “trademark”, which is readily recognizable throughout the world as a reference to the cradle of civilization and numerous cultures, evokes an attractive environment which is rich in natural history and heritage, and offers a plural and diverse environment that is full of contrasts. In short, it is able to bestow our Science Park with an image that is easily recognizable, global, memorable and prestigious.

The philosophy behind the Mediterranean Science Park and its specific mission can be synthesized in the following points:

- a) To create a space for excellence and innovation that promotes relations between the university and business communities, encourages applied research directed towards productive activity within the area of influence, and fosters technology transfers and the competitiveness of the economic system.
- b) To fulfil the medium term aim of creating skilled employment and helping to set up competitive business projects within a general framework of progressive productive diversification.
- c) To encourage the introduction of new technologies and their internationalisation and also to increase the capacity for innovation within a global context.
- d) To establish a standard for environmental excellence and a space for creativity, design and future projects, and to do this in accordance with the parameters for quality and innovation associated with a knowledge society.

- e) To promote traditional Mediterranean sectors (such as tourism, agriculture, and manufacturing industries) within a framework of efficient productivity in accordance with the new parameters of innovation and competitiveness, associated with new technological developments and products.
- f) To channel potential university development over the coming years within a framework offering maximum economic and social benefits.
- g) To improve employment possibilities and working conditions for young university graduates, and also create new businesses based on knowledge and research.
- h) To promote to the maximum the potential benefits of the two urban areas that play host to the university development: Alicante and San Vicente del Raspeig, as well as those of the local *comarca*¹¹ and province in general.
- i) To encourage the possible interest of foreign businesses, which may be attracted—in the medium to long term—by the advantageous location of the Science Park.
- j) To stimulate the development of a type of university that is open to the social needs of its surrounding area.

AN APPROPRIATE FRAMEWORK FOR A SCIENCE PARK

Many of the experiences undertaken in different parts of the world have been less successful than predicted due to the fact that they have adopted some of the characteristics of Parks, yet failed to distinguish and separate key elements from secondary ones. Two of the most commonly repeated errors have been:

- a) Considering the aesthetic characteristics of the park, its services and image separately from the factors that explain or create the environment for technological development, and believing that the former are sufficient to make the park a success. Some Spanish initiatives have placed a lot of emphasis on the design of Technology Parks, and have received official support to help attract businesses committed to research, but have failed to provide the necessary critical mass of researchers to assure an on-going capacity for research and technological development. As a result, these initiatives have been converted into what might be referred to as “enlightened” industrial estates. They present a good aesthetic image and businesses have been attracted by various incentives, but they offer very little real capacity for research and innovation.

Experiences in the United Kingdom have demonstrated that, in cases where there are insufficient businesses in both number and capacity to reach the required “critical mass”, the universities have been the only nuclei capable of maintaining

11. A local administrative unit below the level of the province.

a permanent environment for the development of competitive research. At the same time, working with businesses has acted as a driving force for the universities themselves, and has brought them progressively closer to the real demands and needs of the productive sectors.¹²

- b) Adopting a narrow view of a Science Park as a place exclusively reserved for what is regarded as high technology. Or, to put that in other words, looking to attract, and indeed counting on, businesses from certain emerging sectors, while forgetting about the need to modernise the leading sectors and businesses within a given geographical region. It is the existing sectors and businesses that constitute its authentic economic base and which have the capacity to generate employment. They also possess historical competitive advantages (with respect to salaries, qualified labour, raw materials, etc), though they often need to renew these through the aforementioned innovative capacity and technological development. In the absence of either a university or committed businesses and sectors within the region itself, official organisations have to make major financial outlays either to attract businesses from outside the geographic region, or to create research institutes whose relevance and entity never reach the critical mass afforded by a consolidated university. In such cases, growth accelerates artificially although most of the time there is either unredeemable stagnation or projects are finally reconverted into something resembling any other, more or less qualified, industrial space.

It is important to underline the characteristics shared by the largest and most successful science parks, and that help to explain the development of these entities that give rise to competitive companies, foster the emergence of the sectors of the future, and also create new employment.¹³

- a) The decisively important contributions from universities and the generation of specialized knowledge.
- b) Interaction between the university and industry.
- c) Their rapid emergence.
- d) The importance of initial services.
- e) A good response from the public authorities, backed up in certain cases by substantial financial support for specific initiatives.
- f) The important role played by planning.
- g) Relative advantages with respect to location (labour market, services, accessibility).
- h) The progressive development of high quality, specialised infrastructures and services.

12. The UK Science Park Association (UKSPA).

13. Koster, K. F., Massachusetts Institute of Technology (MIT).

A serious consideration of these factors by a university institution is, in itself, a positive start. Even so, it is the results deriving from these lines of action that constitute the most important consideration.

DIFFERENT MODELS AND THEIR TERRITORIAL IMPLICATIONS

According to the IASP, there are three fundamental objectives that define a Science Park:

- 1) To establish strong functional connections with universities, research centres and higher educational institutions in general.
- 2) To encourage the creation and development of industries based upon knowledge, and also that of businesses specializing in tertiary sector activities and capable of generating high added value.
- 3) To promote the transfer of technology to the businesses that rent land on the Science Park.

A recent congress held in Stockholm (24-25 June, 1998), which was organised by the European IASP and dedicated to the theme of science parks, outlined the need to expand the role of universities in both technological and other types of specialised parks. To date, their role in such entities has been only secondary. Given the interest shown in some of the conclusions from the conference, it is perhaps interesting to briefly refer to them:

- a) One frequently committed error is that of affording universities a mere secondary role, whereas greater importance and attention are given to such considerations as image, marketing the prestige value of the location, and configuring the site's urbanistic aesthetics (including car parking space, offices, and restaurants).
- b) Some of the technological parks that have received major official backing have had their potential for innovation and technological transfer notably curtailed and relegated in the order of priorities with respect to some of the more modest science parks promoted by universities.
- c) The ideal synthesis can be found by reconciling the emphasis on image of some technological parks with the solid relationship with training, research and the transfer of technology that characterizes most science parks.
- d) In the "American model", the science parks most closely connected with universities, or with businesses with a high level of expenditure on R+D and their own resources dedicated such ends, are the ones that are most successful at promoting new businesses, encouraging innovation in general and achieving the large-scale creation of qualified employment.
- e) In the "European model" (with the exception of the United Kingdom), in many initiatives and projects for technological parks, it has been possible to note a certain physical and functional distance with respect to universities. As a result,

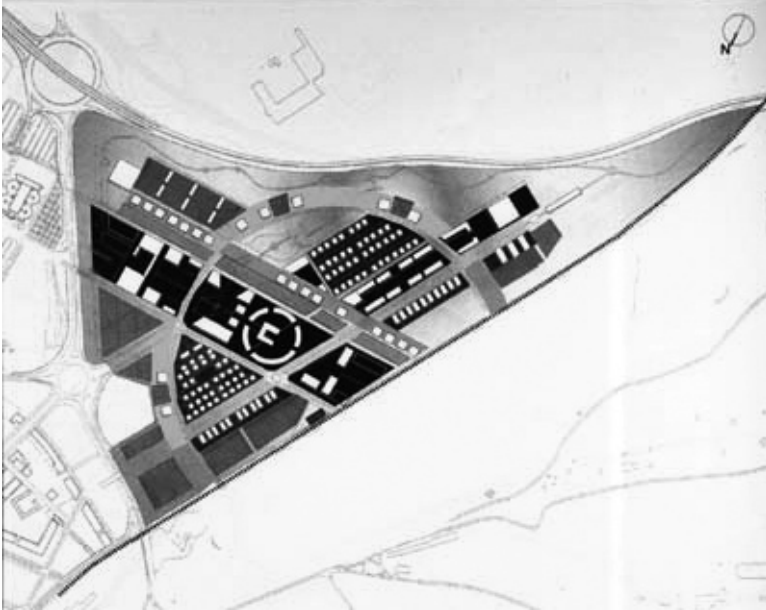


General map of *Universidad de Alicante's* Science Park, MEDPARK.

in the best of cases, they have tended to become modern industrial or business estates, with carefully guarded images, and have even boasted certain elements that would elevate them to the category of “enlightened estates”. Yet, in many cases, once their initial allocations of land have been exhausted, the main reason for their creation —encouraging innovation and technological transfer— is often forgotten.

- f) It is often difficult to understand why many of the typical businesses that look to technological and science parks do so. The fact is that almost a third (31%) of newly created European businesses seek to locate at a science park. Even so, only 8% of them do so as the result of any concrete projects or after developing relationships with universities. In other words, it is evident how image related motivations effectively hold sway over the real advantages that a science park can offer. This phenomenon is particularly apparent in the countries of southern Europe, where only 13% of businesses perceive the advantage of a relationship with a university, whereas among the countries of northern Europe, 40% of businesses see a potential relationship with the university as being something positive.
- g) Everything suggests that there is still a great amount of ignorance on the part of businesses with respect to what universities can offer them. On the other hand, relations between university and business are perhaps not always given adequate consideration and recognition in academic circles either. Although in saying this, it must be recognised that initiatives and projects developed by universities in

this area are usually very well accepted by both government and local authorities, who have great interest in converting their development policies into practical realities.



Basic schema for the organization of MEDPARK scientific park.

- h) The incorporation of university graduates into the ranks of the business community has played a decisive role in progressively raising its awareness. Even so, such efforts are largely undermined if graduates subsequently lose important contacts with the sources of knowledge and development.
- i) On the subject of these graduates, it should be noted that many universities have introduced “business tailored training”, as a knowledge of business needs makes it possible for universities to design their curricula in such a way as to prepare their graduates to help meet them.
- j) It seems important to opt for a form of management based on the logic of non-profit making organisations (such as foundations and associations) and to thereby defend the interests and general objectives that converge in a science park.

Spain’s science parks, which have tended to be more like technological parks, include very few projects in which the Spanish university system actively participates. Most of their activities are of a purely commercial or business nature. Even, at the *Parque Tecnológico del Vallès* (Catalonia), which houses businesses that turnover 55,000 million pesetas a year and generate around 1,800 jobs, the projects carried out in collaboration with the university —although relevant— are few in number. Thus, the three essential conditions that together characterise the concept of a science

park —strong connections with university research centres, industrial growth based on knowledge, and technological transfer— are not being met. In some cases, such as the *Parque Tecnológico del Andalusia*, in Málaga, a more active university presence is being demanded. On the other hand, this situation explains why —despite the relatively successful performance of parks in Catalonia— the *Universitat de Barcelona* is planning the science park of Barcelona following the previously mentioned scheme that responds to needs for innovation and the dynamic transfer of technology from the productive fabric.

THE URBANISTIC DESIGN OF THE SCIENCE PARK AND ITS VOCATION AS A METROPOLITAN REFERENCE POINT

Today, interventions conducted on the urban periphery are justified by the fact that they subordinate their decentralized location to a strategy for improving the urban fringes. This decentralization makes it necessary to draw up planning policies in order to improve, integrate and reinforce the civic aspects of these suburban environments. They may even function as metropolitan or sub-regional reference elements, within which the possibilities offered to the university student abound, as do those available to the average citizen, who can visit, access and enjoy the infrastructures, facilities and services managed by the university. There is a fundamental need to understand related interventions within a set of more global guidelines that can define a desirable territorial model, though at the same time allowing sufficient flexibility to accommodate the full range of possible interventions within these circumstances. Some infrastructures, such as those developed by the *Universidad de Alicante*, are essential for the definition of the territorial model towards which the metropolitan area of Alicante should develop. Their implications go beyond the urban system and have a decisive influence upon the wider development of the territory, its functional potential, and ultimately, its quality of life.

This vocation calls for serious reflection on the urbanistic model employed. It is necessary to start with a clear idea and to add any necessary mechanisms in order to allow it to grow and develop in accordance with the defined parameters. The *Universidad de Alicante* and the MEDPARK both contribute to these ideas for integration. Furthermore, both territorial elements have emerged as projects within a plastic whole, with a carefully constructed park, flanked by gardens organised according to the ecological parameters dictated by the natural environment, and in which there are outstanding sculptural compositions. This all contributes to a “city of knowledge”, which is housed within the patrimonial wealth of its urban context, and which has an evidently favourable impact upon the qualification of the suburban environment that it occupies. The Science Park and *Villa Universitaria* projects also represent the definitive conurbation and a symbiosis with the business fabric of Alicante’s complex industrial system. From an urbanistic perspective, the whole

complex and all the other components of the urban system are destined to convert it into an emblematic landmark within Alicante's vast metropolitan environment and will thereby reinforce the functional centrality of the provincial capital.

It is a question of taking advantage of the growth potential of the various infrastructures and future facilities of the *Universidad de Alicante* (educational and research units), in order to strengthen the physical configuration of the MEDPARK. The design guidelines anticipate the final image of a development that, in many aspects, has been slow to emerge. However, they constitute material of enormous creative value and with an architectural design that has been subjected to the dictates of an attractive location. Furthermore, they have been globally conceived in order to offer solid and coherent functionality among their different component parts – research, training, businesses and services.

Execution of the project calls for very long term planning. When it actually becomes a reality will depend on many different factors including: economic and investment cycles, official support for transfers of technology and research, its acceptance by businesses, businesses' plans for technological development, businesses' need to be competitive, and businesses' awareness of the relationship between competitiveness and technological development.

Following all that has been said, it can be deduced that a science park serving an economic area like the province of Alicante is capable of saturating the projected surface area of one and a half million square meters, within a minimum eight or maximum thirty year period. If the first of these predictions proves correct, this will be a good indicator of the health of Alicante's productive fabric and the dynamism of the businesses that comprise it. If the second prediction is correct, it would clearly show that Alicante's economic system was lagging behind that of other territories. It would be even more serious, however, to lack any economic instrument of these characteristics; that would be tantamount to trying to ignore the factors that explain progress.

