

# Governing the Innovation

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## Abstract

*This article sums up the results of research oriented to analyze dynamics and outputs related to the development of two different technological parks in the North-East of Italy: the Area Science Park of Trieste and the Vega of Venezia. The research has tried to find an answer to the following question: what is the regulation model more efficient to implement good innovation policies? The article argues that, to achieve an efficient innovation governance, it is needed a strong regulation by the innovation broker – the central hub of the innovation network, able to support interactions among innovation-makers and innovation-takers. To test this hypothesis, the empirical research has used both qualitative and quantitative methodologies. In the Area Science Park, good innovation performance appears strictly connected to strong regulation of the technological transfer process. In the Vega, differently, low innovation performances are combined with weak innovation regulation. The paper concludes that institutional settings at the local level can be powered by a model of governance innovation able to combine autonomous interactions among main actors involved in technological innovation with a strong regulation of the process by the innovation broker.*

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## Introduction

This article summarises the results of a study aimed at analysing the structuring process and the development of two technology parks and their related effects, in terms of innovation, on companies and organisations established there. The hypothesis that the study attempted to confirm is that, to support policies for technological innovation, the policy-making process must be effectively regulated by an *innovation broker*, a person who takes on the role of a *cohesive-agent* (Hirschman 1977) to constantly stimulate interaction between producers – *innovation makers* and users – *innovation takers* of technological innovations and, at the same time, improving efficient utilisation of tangible, intangible and relational resources available on site. The innovation broker, therefore, should promote the establishment of relationships between previously non-cooperative parties, strengthen currently active relationships between *innovation makers* and *takers*, and, more generally, exert ‘more forceful pressure than that which one supposes motivates the rational economic agent of traditional economic theory’ (Hirschman 1977 in: Pugliese 2006: 35). To confirm this hypothesis, two technology parks (the Area Science Park – ASP – of Trieste and the Venice Gateway – Vega – of Venice) were chosen as the objects of the study, both developed by means of specific public policies supporting technological innovation. In the technological innovation sector, public agents, pertaining to different levels of government, interact with a large number of parties actively involved in innovative processes (universities, research centres, private companies), following an approach of *governance*<sup>1</sup>. According to the hypothesis to be tested, weak governance action in the field of innovation is insufficient to achieve optimum results in such policies, but it must be supported by effective regulation of a cohesive agent who stimulates interaction and facilitates relationship dynamics in innovative processes, thus reducing transaction costs and the cognitive distance between the parties involved. The presence of a mediator ought to help limit the influence of the condition of the *prisoner’s dilemma*, which limits the potential for cooperation in innovative processes through the incumbent risk of mutual defection among innovation makers and innovation takers.

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<sup>1</sup> ‘The term governance will be used with reference to a way of regulating processes that is distinct from the hierarchical model of control characterised by a higher level of cooperation and interaction between the State and non-state entities within mixed public/private decision networks’ (Mayntz 1999: 1).

The experiences analysed come from regional frameworks (Veneto and Friuli) that are characterised by a high level of industrial activity, the nucleus of which is composed of industrial districts, a particular way of organising production based on horizontal integration and decentralised regulation of production activities. Given the particular history of production in the two regions studied, the study attempted to understand whether technological innovation policies could make effective use of the tradition of self-regulation of the industrial districts or whether, as hypothesised, this represents only a favourable, but not a sufficient, condition for innovation policies to be implemented. In fact, innovation no longer arises from the decisions of an individual *Schumpeterian* entrepreneur-innovator (Schumpeter 1912), but constitutes a *complex social construct* (Trigilia 2007): an organised process that is the result of interaction between the government, enterprises and universities (the three key players in the new innovation models), as summarised by the *triple helix* model (Etzkowitz and Leydesdorff 1997 and 2000).

The empirical research was based on the reconstruction of key stages of the process of structuring the technology parks analysed, of relevant regional legislation, and of the concrete effects on the region. The reconstruction of the contexts was based on various data (Istat, Bank of Italy, Confindustria, *etc.*) by means of which the study proceeded to the SWOT analysis. The analysis of the statistical data accompanied the reconstruction of the European, national, and regional regulatory framework supporting innovative processes. Finally, were collated 56 interviews with individuals actively involved in innovative processes: researchers, owners of spin-off companies, technology park managers, public operators *etc.* The qualitative dimension of the research enabled it to explore the perceptions of people involved in the innovation processes in the regions studied. By means of these perceptions, information was collected on the dynamics that characterised the policy building process, the key stages of which were reconstructed on the basis of official documents and relevant legislation. The possible distance between expectations and concrete results achieved was also assessed on the basis of indications provided by those interviewed. These indications enabled the effects that innovation policies have had up until now to be defined in greater detail, in the local settings under analysis, in terms of structural growth and institutional evolution. In particular, the research has enabled to analyse:

- the generative mechanisms that stimulated the development of the technology parks, as well as the prevailing organisational models among local businesses and the responses to challenges posed by global competition;
- the forms of regulation that emerged regarding the governance of innovation and interactions between the parties involved in these processes.

The focus of activities in the parks studied is the promotion of technology transfer; that is, a process by means of which information, technical and scientific knowledge, products, or usage rights relating to innovative products or processes, are transferred from a supplying-organisation to a receiving-customer (Bozeman 2000). Interaction, between the supplying organisation (university, public or private research centres) and the customer company can be developed directly or via the intervention of an intermediary, who plays the role of technology broker.

## 1. Innovation, Cooperation and Regulation

Various studies have highlighted the positive influence exerted by regional concentrations of high technology activities on knowledge propagation (especially non-codified knowledge) by means of interactions established spontaneously or formally among individuals and organizations (Lester and Piore 2004), and the significance of informal interpersonal relationships in processes that generate new knowledge (Cowan and Jonard 2003). The geographical proximity of the high-tech businesses strengthens also the production of *local collective competition goods* (Crouch *et al.* 2001). These competition goods are able to support the agglomeration dynamics and competitiveness of companies operating in the local context, structuring a heritage of embedded competitive advantages capable of significantly improving the performance of companies and the area's economic profitability. In addition to that, intangible elements such as institutions, path-dependencies, social capital and propensity to cooperate, also constitute conditions that make the region a potential resource, or a possible obstacle, to the spread of innovative processes. The interactive and relational nature taken on by innovative processes takes tangible form in the increasingly frequent recourse to external sources of knowledge by companies, and in the parallel reduction in the importance of *intramural* research. Among the various causes of this trend, the intensification of the speed of innovation and the contemporaneous reduction in the life cycle of products play a crucial role. Partnerships with external organisations (whether they are companies, or universities etc.) are also made necessary by the growing need to integrate technology and specialist knowledge related to many technological fields in order to generate new knowledge.

There are small enterprises in particular that do not have the economic resources needed to carry out systematic screening of technological innovations and handle the costs related to deals with external parties. Potential losses caused by the knowledge externalities associated with cooperative interactions are such as to discourage, in many cases, opening external collaboration channels without adequate contractual coverage. In fact, horizontal cooperation between companies in the innovation sector entails high transaction costs connected with the influence of a high risk of defection. The condition of the prisoner's dilemma that results from this frequently discourages enterprises from taking the opportunities for collaboration that do arise.

The complexity taken on by the process of innovation and the interconnected problems has stimulated the development of organisations responsible for providing technology transfer services. These structures are defined by the European Union as: '*Technology Transfer Institutions*, such as industrial liaison offices, technology transfer offices, contract research organizations and other innovation support providers such as technology park and incubators, play an increasingly important role in the creation and reinforcement of the relationships between industry and public research organizations' (EU 2004: 7). The promotion of relationships between the research and industry, as well as the breaking down of barriers that limit interaction between these worlds, constitute the focus of action for technology parks. Various studies have reached the conclusion that innovative processes based cooperation between a variety of parties achieved optimum results when there is an academic institution or science park at the centre of the network – facilities that have sufficient autonomy and resources to act as impartial and reliable intermediaries (Breschi and Malerba 2005).

A key function fulfilled by the intermediary body between the various parties involved in innovative processes essentially consists in reducing the cognitive distance that often exists between universities, research centres and companies. The *cognitive distance* is not just linked to the different knowledge managed by parties involved in the process of innovation, but also in the modalities of perceiving and evaluating external inputs (Noteboom *et al.* 2007). In the absence of shared meanings, the cognitive distance tends to increase, inhibiting interaction between the parties involved and making dialogue between them difficult. The cognitive distance between SMEs and universities, for example, constitutes a powerful disincentive to cooperation between these organisations. Recent studies, however, have demonstrated that the geographical proximity between universities and SMEs helps to overcome cognitive barriers, entailing a sufficiently broad level of shared meaning to support the establishment of constructive dialogue between these organisations (Adams

2005). Once a certain level of cognitive discrepancy has been exceeded, the process of technology transfer is destined to fail, even if there is trust and complementary knowledge between the actors involved (Li *et al.* 2008). Complementary knowledge, in turn, is a further factor that can increase the effects of innovative processes. In order for these effects to be maximised, the process must involve parties with sufficiently diversified knowledge (know-how that is too similar does not allow for innovative hybrids) and at the same time, the cognitive distance between the parties must be low. Similar areas of knowledge reduce cognitive distance, but entail a redundancy of information circulating in the network and, as a result, determinate fewer benefits associated with interactions, with lower effects in terms of innovation. The role of the innovation broker is therefore to lessen the cognitive distance between the parties involved in the process, and also to structure relationships between parties with suitably complementary knowledge, thus increasing the benefits.

The relational aspect of innovative processes is closely related to the geographical and regional dimension in which the relationships are established. While for a large and vertically integrated company the region where it is established constituted an extra-economic variable, and an unimportant element in evaluating location advantages, differently, for high-technology SMEs the resources (both material and immaterial) incorporated in a region constitute a crucial competitive level and a relevant dimension to incentivize localization (Trigilia 2007). New innovation driving centres are often medium-sized cities, functionally at the cutting-edge but not congested. These are cities that represent standards of quality of life much higher than areas favoured for establishing Fordist industrial complexes. It is precisely in these urban environments that new typologies of policies are continuously tested, aimed at maintaining high standards of living to continuously make the area attractive for establishing activities with a higher added value (Florida 2004).

## 2. Vega

The local area, as a mere *container* of production activities, in the new economy knowledge-based becomes a strategic resource itself for companies established there. Politics and policies, in their various forms, can help to significantly increase the quality and attractiveness of the *region-resource*. At the same time, important changes have also had an impact on the local political sphere, making the cities active actors

in structuring innovative forms of political participation. They become laboratories to experiment new public policies based on the active involvements of local actors and on greater attention to the specific details of the urban environment in which they are developed (Sebastiani 2007).

The maturation of ASP and Vega experiences can be attributed to this new dynamic framework of local policies, whose generative mechanisms are ascribable to public policies aimed at increasing the quality and competitiveness of urban systems. In particular, Vega was created from the intersection of various public policies locally implemented, some of which are aimed at reclaiming disused industrial areas, while other are aimed at intensifying innovative processes. The technology and science park that has sprung up in the disused area of Porto Marghera constitutes the embryonic stage of a wider project of post-industrial redevelopment of Venice and the surrounding area.

Vega (an acronym of *VENice Gateway for Science and Technology*), like numerous other Italian science and technology parks, was created through urban regeneration policies aimed at reconverting disused industrial structures. The current centre of Vega, in fact, stands on the original heart of the industrial establishment of Porto Marghera. As the initial drive behind intense industrialisation wore down, the problem of reconverting the area arose; more than 2,000 hectares needed to be given a new urban profile. The project became a reality in 1993, when Vega Scarl was formed, a consortium to run the park assisted by the City of Venice, the provincial authorities, and the region authorities (via Veneto Innovazione), the University Cà Foscari, IAUV University, and the Eni group. The impetus behind the Park was a specific urban and industrial regeneration policy co-financed with 30 million Euros of European Structural Funds. The Veneto Region is classed as an Objective 2 area by the European Union, and as such receives structural funds for industrial conversion. The redevelopment of ten hectares on which Vega 1 currently stands has enabled 200 companies to be established there, with the workforce of 2,500 employees. Via the Regional Operational Programme, the same European funds have co-financed the conversion of further 25 hectares through the construction of Vegas 2, 3 and 4.

Among the other activities located in Vega, the nanotechnology research laboratory takes on particular strategic importance. Created with co-financing from the European Structural Funds, it is simultaneously one of the few research centres located in the Park and the most important section of Veneto Nanotech, a technology meta-district with sites in various locations that operates on a regional scale. After a total investment of more than 140 million euros, the 70,000 sq metres of Vega houses fifteen research laboratories (as well as the above-mentioned nanotechnology

centre; there is also the glass experimental station, and several chemical analysis and biotechnology research laboratories), headquarters of institutions and professional associations, alongside almost two hundred companies operating in extremely varied sectors: from services for businesses to services for individuals, consultation offices (lawyers, public accountants), and design studios (architects, engineers, etc), offices for communication and marketing, training, and restoration of cultural goods. There are also photography studios and English schools. Around twenty companies established there operate in the ICT sector, mainly focussing on software design, while another ten or so companies operate in the green economy sector. Only a tiny fraction of the companies established there are active in the biotechnology and nanotechnology field, less than five units per sector.

Given the heterogeneous profile of the companies and organisations established there, Vega has taken on the characteristics of an advanced management centre over time, rather than strictly those of a science park. The strategy adopted by the body that runs the Park has for a long time been aimed solely at increasing the number of companies (operating mainly in the service sector) and organisations established there. Little attention, however, has been paid to the location of research centres and services supporting interactions between universities and businesses. The companies established there benefit from material infrastructures and cutting-edge technology platforms, as well as a range of ancillary services (maintenance, surveillance, cleaning) provided by the Park administration. The buildings have fibre optic cables and offer rooms from 50 sq metres for use as offices or laboratories. The Park also provides rooms equipped for organising conventions and conferences. There are no particular barriers to locate in Vega; the main obstacle to enter is essentially economic, since localisation is particularly expensive.

In its almost twenty years of experience, Vega has developed a profile that has perhaps distanced it from its original mission as a technology Park, making it an indistinct location for businesses, organisations and offices for all kinds of professions. Intervention on the innovation front, however, has been of a residual nature compared to what has become the main activity of the facility: establishing companies and organisations that apply. However there have been changes in strategy on this front, following changes in the Vega managing structure at the beginning of 2010.

Vega, therefore, presents a profile with a notable variety of specialisms. The research activities conducted in the Park are focussed around three main fields: nanotechnology, biotechnology and green technologies. In reality, stable interactions or systematic technology transfer processes conducted according to structured and



well organised methods have not developed in synergy with these three core areas. The action taken by Vega's managing structure in this area has been very fleeting, favouring increasing the number of companies established in the Park rather than expanding the intangible services supporting technology transfer. The exchanges that have emerged between the organizations established there, which are few and sporadic, did not arise from any systematic unifying action taken by the Park's guiding structure.

The strategies implemented by the new management are aimed at improving innovative processes, both by promoting interventions in high-tech sectors considered strategic for the competitiveness of local companies, and by developing relational resources and external knowledge factors associated with interaction between the businesses and organisations established in the Park. As far as the first set of interventions is concerned, the two sectors on which the attention of the new managers of Vega has been focused are ICT and nanotechnologies. In ICT, the interventions are focused on innovations connected with IT networks and online marketing structures. As far the nanotechnology sector is concerned, Vega's real strong point, the aim is to involve SMEs operating in the Veneto region in technology transfer processes. Currently, interconnections are in an embryonic stage, which is also due to a lack of interest from local companies.

In terms of improving relational resources, in the 2011 various initiative were put into action aimed at increasing the opportunities for contact between the businesses and organisations established in the Park: meetings in which best practices are discussed and analysed, opening up co-working areas and setting up a blog run directly by the general manager of Vega. The common goal of all these activities is to increase the contamination associated with interactions. In the story-telling sessions, the success stories of people, products or companies are told with the aim of promoting the circulation of ideas and information. The same aim is behind another initiative, which is the setting up of a blog within the Park, to which everyone has access and where they can meet in a horizontal logic. The opening of co-working spaces also pursues a similar goal. Vega provides around 10 workstations, equipped with internet access, with the option of using them daily, weekly or monthly at a decreasing fixed daily cost. The aim is to help professionals to work together in a non-isolated way, and through contact and interaction, to promote the development of creative solutions or collaborative projects.

Although developing these initiatives does not enable many present critical issues to be overcome, it does constitute the first sign of the changes that the new management intends to bring to the Park. Even if these interventions prove to be

effective in the medium to long term, they would not, however, resolve the problem of the lack of a structured technology transfer system. Spontaneous interactions, alone, do not enable effective channels of interaction between innovation-makers and innovation-takers and don't fix many critical issues that arise in conjunction with the technology transfer process. In Vega there are nor facilities oriented to support the developing spin-offs, nor specifically responsible for interfacing between research centres and end users. In managing these processes, a lot of issues are left for self-organisation and improvisation. The lack of constant support for innovative processes from an innovation broker in the region, as the Veneto, with a consolidate tradition of solid capacity to self-regulate processes (embedded in the industrial districts experience), allows assessing whether interactions that promote innovation can arise and structure themselves automatically, or if, on the contrary, they require structured and continuous support.

The limits deriving from the business model adopted by Vega, focussed on managing buildings in the Park, were also widely emphasised by those interviewed: 'Vega has fulfilled the function of spatially concentrating the companies established there. It has grown a great deal as a physical reality. It has offered spaces, housing companies operating in very different sectors' (Interview 40, project manager, Veneto Innovazione).

The potentially available relational capital, which is consistent and highly qualified, without a doubt constitutes a strong point, that in its current state, remains a somewhat latent and underdeveloped resource. According to what reported by operators located in Vega in the interviews, a few exchanges that emerged between the organisations operating in Vega were exclusively promoted by the autonomous initiative of companies located there, rather than following any *ad hoc* input promoted by the managing body of the Park.

'This is an aspect that is lacking compared to other institutions like the ASP, where there is continuous support for the development of the companies established there. In Vega, attention has until recently been focussed on increasing the quantity of the companies established there to »keep the machine running«. It was a fairly recent initiative that changed the face of this area. Now there is work to do in increasing exchanges between the companies established there' (Interview no. 40, project manager, Veneto Innovazione).

The propensity to cooperate, which is low among companies in the Veneto region, is even more limited in high added value sectors, where there are other incentives to restrict the opening up of channels of interaction with other companies to limit the

potential external knowledge factors. However, this tendency restricts innovation and raises the costs of transaction connected with establishing partnerships.

‘The businesses established there do not interact and collaborate among themselves. Technology transfer, in fact, is not just between universities and businesses, but it operates also between businesses themselves in an horizontal logic’ (Interview 35, Vega’s General Manager).

When horizontal collaboration does not arise from the voluntary urge to integrate, it can be the consequence of an activity organised by a *cohesive agent*, a person who stimulates and supervises interactions between the parties involved in the innovation process, creating new connections and strengthening existing ones between the main parties involved in innovation. This role of relational intermediary should be assumed by the organisation responsible for managing the Park. The act of facilitating relationships between companies and organisation in the park would constitute a first step, by the managing structure, towards taking on a more active role in technology transfer processes on a micro-local level. The prevailing opinion among those interviewed is that, on the technology transfer front, only somewhat limited successes have been achieved by Vega.

‘In its current state, rather than dealing with technology transfer, Vega is a real estate business that rents, or sells office space. Its activities developing new businesses are limited’ (Interview 44, local authority councillor for productive activities, Province of Venice).

The causes of the considerable debacle of the Vega (due to the wide disjunction between current performance and aims for which the initiative was conceived) are first and foremost due to the approach that led to the creation of the Park itself, a choice that emerged from the attitude, widespread at the time, that saw technology parks as the universal solution to the problem of deindustrialisation. Like other Italian technology parks, which arose to replace disused industrial complexes, Vega was also

‘created with a »spatial« setup: it basically serves to regenerate spaces, with an »Enlightenment approach« according to which science and technology serve to convert industry. This however, led to certain limitations in its first stage of life that we are now trying to overcome. We want to become a park of advanced services. If new businesses arrive because of these activities and they set up here, this is a positive externality, but not the main aim as it was in the past’ (Interview 35, Vega’s General Manager).

Essentially, Vega has not yet taken on the role of ‘innovation broker’. Given the lack of a stimulus combined with spontaneous horizontal interactions between those

who produce and those who benefit from innovation; innovation has not established itself as a systematic process in the technology Park in question. First and foremost, Vega and the urban environment lack a real critical mass of research institutions. Even though there are excellent institutions, like the nanotechnology laboratory, these work in isolation, separately, not integrated in a systematic scheme. The lack of a critical mass, therefore, does not refer to the lack of scientifically important institutions, but rather to the lack of integration between these institutions, due to considerable fragmentation in the governance of the regional model of innovation, which was discussed above. In the Veneto region, there are many institutions responsible for technology transfer which overlap and are often in competition with each other. This condition makes the use of resources (material, immaterial and relational) extremely fragmented and not very synergistic. This problem was widely cited by interviewees:

‘the fragmentary nature of competencies creates confusion, useless competition, duplication and wastes resources. The system is thus inefficient. That’s not teamwork. Everyone is competing, but in the end, probably no one will manage to stand out. We need more coordination and collaboration, respect for the roles of the others’ (Interview 49, expert of technological innovation, Veneto Industrial Union).

While on the one hand, there is the need to focus resources on centres of excellence to reduce waste and redundancies, on the other hand, centres of expenditure continue to expand:

‘we, as a Province, are creating an incubator for businesses, but not by means of Vega. One might create a kind of Vega 2 at Padua, or even get rid of it. We don’t clearly understand what the future of Vega will be’ (Interview 44, local authority councillor for productive activities, Province of Venice).

Innovation policies implemented on a regional level, however, suffer from the lack of a clear and coherent vision regarding the goals to be pursued as a priority and the interventions to be supported. One interviewee observes:

‘there is essentially a lot of informality, an element that is at the base of the economic model in Veneto: a model that is too informal and unstructured. This has repercussions for the ways in which innovation is governed in practical terms. Such issues have never really been confronted. Traditionally, innovation happened without having a structure or formalisation behind, what makes it more efficient’ (Interview 29, technology transfer expert, Veneto Innovazione).

To this lack of coordination in organising and structuring a suitable technology transfer model (within Vega and on a wider regional level) is added the widespread problems among end users. The morphological characteristics of businesses in Veneto (subcapitalised and undersized) accompany a low level of openness to external relations. The lack of interaction inhibits the development of hybrids and processes that spread knowledge.

‘Enterprises in Veneto are very closed to the outside relationships, they don’t exchange information or knowledge. There is no culture of innovation at the base’ (Interview 55, manager of IT services company).

In order to overcome these attitudes, an external continuous stimulus could change framework and the consolidated attitudes, pushing local operators to perceive high advantages linked to cooperation in the innovation processes. The levelling out of short term strategic planning also makes entrepreneurs in Veneto

‘overly worried about »what is«, about the realities of the current market, to worry about »what will be«. From my point of view it seems that innovation is not a daily activity in businesses in Veneto. Big businesses develop their R&D activities with European or national funds, they don’t need local mediation. SMEs, on the other hand, have a less driven propensity to innovation. Especially in this time of crisis they are absorbed by other problems’ (Interview 49, expert of technological innovation, Veneto Industrial Union).

Essentially, companies continue to focus on static competitiveness, on reducing costs, to increase company performance, rather than on dynamic competitiveness based on introducing innovative products and processes. Therefore the endemic characteristics of the local production system have contributed to limiting interactions between the Park and the region of establishment, restricting technological externalities to very limited areas. While the exogenous effects were negligible or non-existent, even localization benefits for businesses established there were low. The production of local competition goods still does not constitute the main focus of the activities of Vega. One interviewee states:

‘there is a slight lack of governance of the Park, that’s the criticism that many have of the institutional structure of Vega. At least in this initial stage, more importance was attached to the financial and institutional aspects of the Park to cover the costs of setting up and managing it’ (Interview 33, Unioncamere Veneto operator).

The analysis carried out on Vega seems therefore to confirm that the lack of effective regulation of innovative processes makes innovation policies ineffective. Complex strategies aimed at stimulating optimum use of material and immaterial

locally available resources are needed. Possibilities for development depend not only on increasing the stock of resources and production factors locally available, but above all, on the ability to combine them in an optimum way to *use hidden, scattered, or under-used resources and capabilities* (Hirschman 1968). As one interviewee notes:

‘the remarkable resources we have in Veneto do not automatically guarantee good growth prospects. We have to build this transition ourselves’ (Interview 53, Regional manager).

The effects of Vega, therefore, seem ambivalent: from the perspective of urban regeneration policies without a doubt, it should be considered a successful intervention; from the perspective of innovation policies, the effects seem more ambiguous. On this front, the picture appears considerably different to Trieste, in the context of the other technology park assessed, the Area Science Park.

### 3. The Area Science Park

The public policies that supported the development of the science park were aimed at promoting the conversion of the economy of Trieste, which was in crisis. The ASP was formally established with the Law of 08/08/1977 no. 546, and created using post-earthquake funds allocated by the State and the Regional authorities. To support the growth of the physical structure of the Park, the area of Padricciano (four hectares) was bought, and, at the end of the 80s, the Basovizza site (50 hectares) was also bought with the construction of the synchrotron. In the first stage of life of the ASP, the fundamental infrastructure, offices and laboratories were built (with state and regional funds), in order to give the park a physical structure. The start-up phase turned out to be complicated, however. Given the lack of infrastructure in the area, not many companies were interested in having laboratories and research centres there. To make the ASP more attractive, it was therefore decided to favour the establishment of public scientific research centres as a priority, which have over time become part of international circuits. All this played a functional role in creating, preliminary, a facility for research able to attract private companies. In parallel to its structural growth, the Consortium took on new functions and expanded its workforce, which is currently composed of 140 employees (in the mid-90s there were 50). The ASP has developed as a multidisciplinary park specialising in several areas.

A critical mass in this sense began to be aggregate in the second half of the 90s. The sectors where the companies established are active concern five main fields:

- biotechnology, applied to the medical, and agro and food sectors;
- physics, applied to research into nanotechnology and new materials;
- IT, electronics, and telecommunications;
- energy and the environment.

At the moment, in the ASP are located about 87 organisations, and nearly 70 of which are laboratories of private companies, while the rest is made up of public scientific research laboratories. Overall, the Park has a the workforce of 2,500 employees within the various structures located there. According to data from the social and the intellectual capital report published in 2008, 54 per cent of the occupants of the Park are researchers (22 per cent technical, 24 per cent administrative), 49 per cent have obtained at least a degree, and an additional 24 per cent of the workforce holds a research doctorate. 16 per cent of Park employees come from abroad. More than 2,800 companies have been involved in technology transfer processes. Over the course of the ASP thirty years of activity, the research centres and companies established there have registered more than a hundred of patents.

The ASP began to structure its role as an innovation broker in the mid 90s, when it was decided to set up a facility exclusively for the purpose of improving academic research, and at the same time, transferring the results of this research to the market. By means of a process of institutionalisation of the technology transfer system, which lasted several years, the current situation has been reached, in which the activities carried out by the ASP on the innovation front are essentially focused on four key areas: the *Sister Programme*, *Innovation network*, *Innovation factory* and *Innovation campus*. The programme to improve research, *Sister Programme*, which has been active since 2000, is aimed at supporting the university and scientific research bodies in the activity of knowledge sourcing, for the purpose of identifying the most promising research projects, and the most interesting results. This aim is achieved by monitoring these researches continuously and assessing their possible economic value, both via transfer of know-how and via possible creation of spin-offs. Essentially, the programme acts through a team of experts, who assess the quality of the research in progress, evaluating its patentability and innovativeness, as well as the potential practical effects, providing output that can go in three directions:

- the research programme can be deemed mature enough to be transferred to the market, already in line with the needs of businesses;
- it can be assessed as interesting and potentially transferable, but requires adjustments to make it more suitable to the needs of end users;

- or the know-how is deemed transferable but not yet ready to enter the market.

The outcome of this process of research scouting can therefore potentially determine the structure of partnerships supporting R&D activities with industry operators, or promote the creation of new businesses. The programme does not issue pre-feasibility assessments, but only provides potential support for accessing the ASP's initial stage incubator, the *Innovation factory*. The programme does not acquire any royalties for the Park regarding the research it helps to finance, the sole ownership remains with the organisation proposing the research. These, therefore, are the aims of the Sister Programme, which acts on the supply side of research.

The other, mirror programme to Sister is *Innovation network*. Launched in 2003, the aim of the initiative is to facilitate technology transfer in the region. The system is based on small centres of competence made up of experts grouped by technological and industrial area of specialisation. There are centres of competence for metallic materials, plastics, navigation etc. working in the ASP. The centres of competence perform a role of scouting the technological needs among companies and identifying the latent need for R&D. The Sister programme and Innovation Network are therefore mirror programmes, they feed into each other; both are provided with a permanent team and financed directly by the region of Friuli, in the framework of innovation policies supported by the region.

The third key area at the basis of the model supporting innovation developed by the ASP is again connected to the Sister Programme and its possible outputs relating to the creation of new businesses. To support this process, the Innovation Factory was developed, a pre-incubator of spin-offs that has been in operation since 2006. There are also other incubators active in the region (one in Trieste and one in Udine) that are part of the old Sviluppo Italia (Development Italy) network. There are, however, important differences among these initiatives: while these incubators operate in a traditional way, Innovation Factory is an initial stage incubator that allows research ideas to be transformed into business plan; it thus intervenes in the stage before the real incubation of the business. In practical terms, Innovation Factory helps companies to develop a business plan and conduct all the activities preliminary and preparatory to incubation. It is only in the subsequent stage that traditional incubators intervene. Innovation Factory is run by an in-house company, an operational arm of the ASP dedicated to developing spin-offs.

The final structure created by the ASP is Innovation campus, a permanent training laboratory established in 2006 in cooperation with the Milan Polytechnic, thanks to programmes funded by the Regional authorities and the European Union.



The ASP did however enter the training sector before the activation of Innovation campus. Its entry into this sector dates back to the nineties, when it introduced a training course, the only one of its kind in Italy, intended for future innovation managers. This arose from the recognition that technology transfer and research improvement processes are not automatic or spontaneous, but require specific courses and a dedicated method to be effectively implemented. This is where the innovation manager (or technology broker) comes in, whose training is not supported by any university course.

The comments of people interviewed regarding the various spheres involved in the technology transfer process on a local level depicted an image of general satisfaction with the ASP's work and the effects that this structure has had on the region. The trend of expansion has intensified over the years in parallel to the perfecting of methods of technology transfer and research improvement implemented by the ASP. According to the interviews with members of the managing body of the Park, even in the terminology used, the representation of technology transfer appears as a professionalized and institutionalised process implemented following standard methods that leave little room for improvisation:

‘managing the process of technology transfer is a programmed, structured task that requires experts. This is why we created a specific training course for technology brokers’ (Interview 1, Strategic Planning Director, ASP).

The added value of the ASP consists in the integrated system of methods for amplifying the spillover effects linked to innovation. This activity

‘was developed via the pooling and progressive accumulation of competencies, until these systems took on the concrete form of real models’ (Interview 8, General Manager Area Science Park).

Local anchorage on the one hand and global connections on the other constitute the two fronts on which the ASP operates, creating stable exchanges between the two dimensions:

‘we often contact and receive international delegations, introducing potential foreign customers to the companies established here’ (Interview 8, General Manager Area Science Park).

The ASP acts as a filter for information and relationships towards the outside environment, choosing know-how and partners to interface with in the complex global technology scene. This strategy, aimed at establishing connections between the global and local level, is combined with an action intended to strengthen relationships between the businesses operating in the ASP.

‘We also create vitality within the various clusters present by means of cluster managers, who have the task of constantly stimulating interactions between the companies established here’ (Interview 3, employee of the Innovation Network project, ASP).

These companies show a greater propensity to cooperate than found on average among Friulian companies. Greater openness to relationships is stimulated by the perception of the benefits associated with widespread cooperation between the companies established here.

‘It’s normally difficult to force small and medium Friulian companies to collaborate. Here we can experience first-hand the advantages of cooperation and of economies of agglomeration, of being close to other companies with research centres here’ (Interview 20, entrepreneur).

The greatest benefit deriving from location in the park’s physical structure, and most frequently identified by interviewees, is the use of relational, technical and scientific knowledge resources that are difficult to access externally. The activities of the ASP are therefore focused on producing local collective competition goods, on managing know-how and a complex system of relationships. For the ASP, the intermediary function in innovative processes is more important than mere administration of the physical infrastructure of the Park: this is the fundamental difference to Vega. This feature of the ASP is summarised well in the following excerpt of an interview, which highlights the essentially relational nature of the processes managed by the Area:

‘The added value embedded in the Park lies in creating a series of relationships, synergies, between public and private research, finance and market, creating a system of stable relationships within the Park. I would define the ASP as exactly that: a system of relationships in which the businesses and organisations that operate in the Park can develop, grow, work better. Here we have the opportunity to develop and share know-how, resources, instruments, market opportunities, alliances and technologies, to take part in joint research projects financed with the national and European public funds. We often talk about networking. There is a series of linking mechanisms that ensure that working within the Park is more effective than working in isolation, in other areas’ (Interview 1, Strategic Planning Director, ASP).

The ASP, essentially, manages the intangible aspects of the life of the park: know-how, information, and relationships that develops and circulates in the park, acting as a cohesive agent between the various members of the network. The ASP produces collective goods on a local level that increase the competitiveness of the businesses

established there and those involved in technology transfer processes. These goods contribute to mitigating the typical diseconomies of local companies, and above all, they contribute to interfacing between the world of research, local and global, and the local production system, mainly consisting of a dense network of small and medium enterprises, increasing their dynamic competitiveness.

The methodologies, developed by the ASP, incorporate constant stimulation and the mediation of innovative processes by experts who are members of the facility, whose role is to stimulate and guide the processes. The good performances produced by these methodologies (demonstrated by the critical mass of companies involved, by the patents obtained, etc.), seem to support the thesis at the basis of this study: the importance of the presence of an innovation broker who continuously supports interactions between innovation makers and innovation takers, regulating innovation processes and promoting the creating of good governance. By doing this, the ASP stimulates greater interaction than develops spontaneously in the local context. The most important function, in this sense, lies in the cognitive discrepancy that often accompanies interaction between the parties involved in innovation. Parties belonging to different spheres, who have different cognitive maps and whose ways of interacting need to be recombined and integrated, and also to reduce the relative transaction costs. The experience of Vega clearly demonstrates that dialogue and interaction between these structures is not a construct that emerges spontaneously.

## 4. Governing Innovation

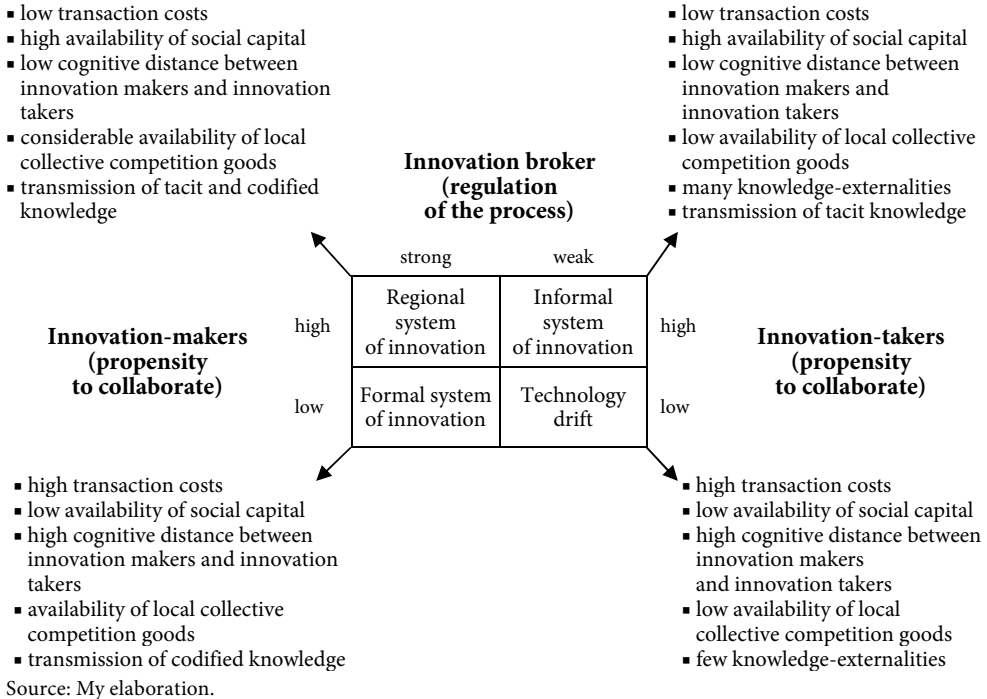
What emerges from the analysis of the two case studies seems to confirm the need to structure the innovation process as a highly organised policy in which spontaneous interactions between participants involved in the process are strictly regulated by the network's central hub: a cohesive agent who plays the role of intermediary between those involved in the innovation processes. The indications that emerged from the study also enable us to outline different models of innovation governance in relation to various way of interacting between *innovation-makers* (universities and research centres, those who operate on the supply side of innovation), and *innovation-takers*, (the businesses who benefit from innovation). The effectiveness of these interactions can be increased by the regulatory action of an *innovation broker* (it can be a public figure, a managing body of parks or technological districts, thus responsible

for constant mediation). The innovation broker, the key link in the innovation policy network, should support the structuring of stable connections between the various parties involved in various ways in innovative processes. Innovation brokers should, above all, contribute to developing models of innovation governance connected with the particular needs and characteristics of the local system, to support innovative processes in the form they take in the context of interaction.

The combination of the characteristics of the regulation carried out by the innovation broker (weak or strong) and the heterogeneous propensity to cooperate among those who produce and those who benefit from innovation generate diverse outcomes in terms of the possible effects of innovation processes (fig. 1). To be specific, high propensity to exchange between innovation makers and innovation takers is associated with low transaction costs, high information spillovers, greater capacity to transfer tacit knowledge, whereas strong regulation by the innovation broker is often associated with the production of local collective competition goods. In situations characterised by low propensity to cooperate, constant stimulation and animation in the region on the part of the innovation broker can favour the development of interaction preparatory to initiating synergic relationships on the innovation front between innovation makers and innovation takers. Where strong regulation is combined with a dense network of relationships, a *regional innovation system* (fig. 1) is created: i.e., a highly innovative environment that allows the parties involved to constantly operate at the cutting edge of technological possibilities. The speed with which innovations are developed and incorporated into productive processes makes the companies in the region highly competitive. At the opposite extreme, however, is a hypothetical scenario of *technology drift* (fig. 1), with cognitive and operational discrepancy between the parties involved in the innovation processes. In intermediate situations, low regulation of the processes by the innovation broker can reduce the effects potentially associated with the stock of material and relational resources locally operating, structuring an *informal innovation system* (based on spontaneous cooperation between innovation producers and users). Alternatively, strong regulatory action carried out by the guiding structure on the governance of innovation can come up against a local environment that is not very open to interactions. In this case sporadic interactions between innovation makers and takers will essentially be based on transfer of codified knowledge. In fact, being closed to relationships precludes interactions based on informal flows, while high transaction costs discourage interactions, reducing the effects of knowledge spillover. When

codified knowledge is acquired via market processes, there is a strong incentive to limit potential information spillover.

**Figure 1. Regulation and cooperation in innovation processes**



In networks in which mainly tacit knowledge circulates and in which there is greater openness to cooperation, external effects will be greater; however, in the absence of a pervasive regulation of processes by an innovation broker, the innovation process will be too weakly structured to provide innovation output suitable to compete on a global level. This scenario, the *informal system of innovation* in figure 1, reflects the type of processes of tacit and incremental innovation widespread in the industrial districts of the North East. A weakly structured, poorly articulated model of innovation that is rarely able to overcome the restrictive local barriers and take part in global competition. Only where exchanges between the key players in innovation processes are combined with structured regulation of the innovation process by the innovation broker emerges a regional cluster globally competitive. The experience of the ASP is closer to this ideal type of the *regional system of innovation* (fig. 1), whereas the situation of Vega seems closer to the *technology drift*, a condition

in which innovation occurs randomly, unsupported by an effective system for coordinating innovation processes. Obviously, the models identified are situated in a continuum that includes a multiplicity of intermediate solutions characterised by varying levels of cooperation and regulation, with a variable mix within a very broad spectrum in which the four systems identified represent extreme solutions. The characteristics themselves of the local innovation system are not static, but dynamic and procedurally redefined by the variations that arise in the internal regulative/relational sphere, influenced also by the exogenous competitive pressures.

Regional context, as well as physical space, is a competitive resource in which economic, social, and cultural interactions stimulated by geographical proximity are interlinked. The strict complementary nature of relational and physical proximity in determining the effective outcome in terms of innovation requires adequate regulation of the interactions that develop on the geographical dimension. From this dimension, a third form of proximity is derived: organisational proximity, which reduces the cognitive distance and promotes the emergence of shared meanings that stimulate cooperation. When these three forms of proximity are combined on a local level, there are high probability that an innovation network, based on the strength of strong links, will emerge capable of lessening cognitive distance and promoting the structuring of stable interactions. At the same time, in order to avoid the risk of irrelevance and increase its own competitive capacity, the network based on a local level has to interface with global networks in which diversified information and know-how circulate, elements able to stimulate extensive processes of knowledge hybridisation. Obviously, global links are less dense than those the network develops at a local level, but this does not mean they are less profitable. The strength of weak global links enables players involved in networks to benefit from the effects linked to the interaction with other subjects with highly diversified competencies. The region thus becomes the terminal of extensive global networks that overlap and interact with smaller local networks. Therefore, an effective innovation policy, rather than distributing incentives to individual businesses, should look at the region as a whole, helping to structure stable links between the parties operating in it. Top down support of the innovation process is not a substitute for processes of innovation governance, nor can it produce relational goods that do not emerge spontaneously in the region. On both fronts, however, the role played by the central hub of the innovation policy network is indispensable for promoting effective and efficient use of locally available resources. Although high quality regulation can increase a region's qualities and its available resources, high quality regions do not always manage to exert a form of regulation capable of increasing the quality of their local environment.

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