The key role of Science Parks in Epistemic Networks

Strand A - Academic

Keywords: stakeholders, open innovation, triple helix model, business relationships, networking

Abstract

The main aim of this paper is to investigate the key role of Science Park in supporting the management of business relationships among heterogeneous organizations that belong to Epistemic Network. The paper investigates the collaborative approach focusing on Outsourced Innovation and Co-Managed Innovation. Going more in depth the paper analyses the perspective of relational proximity in order to develop Innovation. The empirical evidences are related to innovative projects supported by two Italian Science Parks.

1. Introduction

Several studies emphasized how the relationships between research and business have often been materialized in urban space characterized by the conditions for the innovation development.

Notwithstanding the transformation of a business idea into a new business requires skills, competences, capabilities and an entrepreneurial vision that could overcome geographic boundaries.

The innovation has been identified in the process of knowledge transformation into economic value (Dosi, 1988) and it is considered as a result of continuous and non linear interaction among different actors (Lundval, 1994) that requires the combination of heterogeneous resources (Freeman, 1991). In order to enhance the resources sharing, firms adopt a systemic approach founded on relationships that are considered key assets (Fiocca & Snehota, 1986) and that outline the innovation network (Tijssen, 1998).

This context emphasizes the importance of cooperation among different kinds of stakeholders, such as public authorities, users, regulators, industry, consumers and poles of excellence (Lundvall & Nielsen 2005).

The transfer of knowledge is tied to a proximity that mainly concerns the interaction between actors. In a traditional perspective proximity is related to local context. The spatial concentration of firms tends favoring the transmission of ideas, information and knowledge, activating knowledge and technology spill over. These ones are encouraged by geographical concentration of industry and regional specialization, and stimulate the growth of local firms (Glaeser et al., 1992). In this perspective technological and knowledge spill over tend to be realized within local networks of firms (Breschi and Lissoni, 2001).

The focus only on geographic proximity could generate the risk of lock in and thus the closeness of the network.

Overcoming this criticism, the interactions are based on similarity related to the way in which actors perceive, interpret and understand, assess the context in which they operate. Among these dimensions, technological proximity (Greunz, 2003) and cognitive proximity (Wuyts, Colombo, Dutta & Nooteboom, 2005), together with relational proximity, play a key role in defining firm's boundaries and facilitating the development of spatial relationships. In such relationships, actors interact to provide different resources and combine them to develop innovation.

As outlined by Triple Helix Model (Etzkowitz & Leydesdorff, 2000), in specific local contexts, the firms, universities and public institutions work together to encourage economic growth and "generative relationships"; the loosely coupled reciprocal relationships and joint undertakings persist over time. These relationships support the mutual learning (Helmsing, 2001).

With particular reference to the business network, considered as interconnections of interorganizational relationships that are developed to share and combine resources, the boundaries of the resources and activities can be mobilized and developed by the organizations involved in the interaction (Håkansson & Snehota, 1995; Håkansson & Snehota, 2006). The links (boundaries) between the organizations of the network are considered as factors that generate the growth and development of the firm and not as restrictive constraints for the development of the same (Gibbert & Valikangas, 2004).

In particular the main aim of this work is to investigate the key role of Science Park in innovation network. After a literature review the paper presents two case studies related to Italian Science Parks that support the development of innovative projects.

2. The development of the Co-Managed Innovation through the Relational Proximity

The co-operation has become an important way to share knowledge resources in order to generate new ideas and bring them to the market (Chesbrough, 2003).

The creation of knowledge by a firm depends not only on what the firm realizes, but also by what firms do to each other (Antonelli, 2000). In this point of view, the geographical concentration of industry, and therefore the regional specialization, encourages the spill over of knowledge between businesses, stimulating the growth of local industry (Glaeser et al., 1992) and the development of Regional capabilities (Maskell and Malmberg 1997).

Moreover through the processes of "interactive learning", firms outline a geographical space in which knowledge is embedded not only in the individual skills, routines and procedures of the organizations, but also in the relationships that connect the different firms each other and with the institutional reference (Maskell and Malmberg 1997).

Notwithstanding, the relationships between organizations are taken not only in the closed geographical proximity, but over in co-located small groups of local communities (Cowan, David and Foray, 2000). The areas of innovation are formed by complementary elements from the geographical, economic, social point of view. These communities of practices optimize the connections between knowledge's entrepreneurs.

The relationships in a local area are particularly narrow in specific epistemic communities or communities of practice that involve a number of actors, local and non-local, linked among them by sharing the same profession or business relationships (Amin and Cohendet, 2004; Cowan et al., 2000). The communities of practice, and epistemic communities (Newman, 2002) are responsible for the knowledge transfer and knowledge diffusion.

The collaborative approach well influences the process of knowledge transfer. In a traditional perspective, in the hierarchical linear model, the knowledge is generated by a university and used by a firm. Traditionally the linear model of technology transfer is considered a

progression of activities that range from the idea generation and its technological development to patent protection and market. In this process, the university and firms work independently without coordinating their efforts (Rosenberg, 1982).

Differently, in the collaborative approach the knowledge is generated and transmitted by interaction between firms, universities and public institutions/government as depicted in the Triple Helix Model (Etzkowitz & Leydesdorff, 2000). These interrelationships, within specific local contexts, encourage economic growth and local innovation. The potential for knowledge-based development in "spatial area" reinforces the role of universities as a factor of socio-economic development within a spiral mode on trilateral interaction among academia, industry and government. The university can play an enhanced role in innovation in knowledge based societies (Etzkowitz, Leydesdorff, 2000). The shared objective of the actors that cooperate among them is to realize an innovative environment consisting of university spin off firms, tri-lateral initiatives for knowledge based economic development, and strategic alliances among firms, government laboratories, and academic research groups.

The cooperation and the interaction between several stakeholders, around the commitment to produce something new or different (Estrin, 2009), outline the main feature of the Open Innovation (Bourne, 2009; Lichtenthaler, 2011). Scholars are paying more and more attention in the involvement of various organizations, outlining open business model for the new innovation landscape (Chesbrough, 2003). Organization should consider the interests of those who have stakes in its activity, as well as firm pursues its interests through managing relationships with stakeholders (Hall and Vredenburg, 2003; Freeman, 1984).

The activities related to technological transformation linked together by sequential dependencies outlining the scientific value chain (Porter, 1985). The primary activities of value chain include the processes that lie from generation opportunity to the commercialization of products/services. The support activities provide resources and

procedures necessary to support the primary activities. These activities are related to the Offices for the Technology Transfer (TTO), Incubators and Science Parks (Compagno and Pittino, 2004). The TTO supports the process as the interface between universities and external environment. In this context the Incubators are considered as organizations that support new business development. According to Hackett and Dilts (2004), a business incubation center is defined as "a shared office space facility that seeks to provide its incubatees (the 'tenants') with a strategic, value-adding intervention system of monitoring and business assistance…". In addition to this, Science Parks facilitate the creation and growth of innovation-based firms through incubation and spin-off processes and provide other value-added services (IASP, 2002).

In particular the interactive perspective of technology transfer outlines the value constellation that is made up of different actors that are linked by relationships. The organizations operate in a system of innovation in which the two main features are identified in interconnection of relationships in order to share resources, and the involvement of heterogeneous stakeholders. As consequence we can consider the outsourced innovation and the co management innovation in a network perspective.

The study of innovation in network perspective has been conducted in different disciplines. Among them, we can distinguish three main approaches to innovation networks, respectively a macro, meso and micro layer (Corsaro et al., 2012). The Macro layer starts from the assumption that the innovation network plays a key role in terms of the institutional and the economic system on the basis of social embeddedness and knowledge spillovers (Cooke, 2002). The Meso approach mainly deals with the interplay between network interactions and innovation processes as investigated by the Industrial Network Approach (Håkansson et al. 2009) and Inteorganizational relationships (Gulati et al., 2002). Differently, the Micro approach concentrates on the firm and its internal processes (Jarillo1990).

Overcoming the boundaries of closed organizations, the open businesses combine their knowledge through a process of joint learning (Håkansson & Johanson, 2001) and interactive learning (Lundvall, 1993). Through relationships firms develop knowledge on how to use some resources more effectively and efficiently than others and produce joint values together. Considering knowledge as a resource, the value of this is generated by the interaction that develops between organizations (Håkansson & Waluszewski, 2002, 2007).

Differently to the competitive arena, the rainforest metaphor adopted by the Industrial network approach emphasizes the key role of inter-organizational relationships, founded on collaboration, with different actors in order to share resources (Håkansson et al., 2009). Innovation is an entity within a multidimensional and interdependent business landscape defined in terms of relatedness, motion, and variety (Håkansson and Olsen, 2011).

Through the interaction a transforming process occurs between business actors; "the interaction affects what each company contributes to and receives from the other and also affects the companies themselves and their activities and resources" (Håkansson et al, 2009: 31).

In the joint learning process the actors are linked through relativness. The driver of continuous learning is identified in the interaction through actors that activates and maintains a complex set of relationships between activities, resources and actors. Particularly significant is to recognize that the interaction is closely related to space (Håkansson et al., 2009).

What happens between two firms may bring them closer to some other interaction processes and more distant from other, changing position in the business landscape. Based on the network position and relationships developed, each organization identifies a different network horizon (Holmen and Pedersen, 2003). It is possible to make an analogy between position and place that appears as a combination of a set of resources. A business network can

be considered a space connecting different actors that occupy a certain place (i.e., position). Every position in a network is based on certain resources, but the network is also defined by the position of the counterparts and their resources.

Based on this perspective, a regional network can be considered a meso network that interacts with other micro, meso, and macro networks, characterized by relational proximity, in order to explore and exploit innovation; actors localized in the regional network develop relationships with actors localized in different geographical areas through the process of co-evolution (Baraldi et al, 2006).

Nor is it limited to the geographical, cultural, industrial or intellectual boundaries (Håkansson et al., 2009: 260). On the basis of "rainforest" metaphor elaborated by the IMP Group, there are "thousands of different species adapted to a life side by side" (Håkansson et al. 2009). This context is characterized by the shared vision (Håkansson, 1995) that is considered as the basis for relational proximity (Cantù, 2010).

The boundaries of the network, and then the relational space, change based on the development of relationships determined by the process of identifying an actor in the network (Håkansson & Snehota, 2003; Holmen & Pedersen, 2003; Håkansson & Snehota, 1989; Huemer, Becerra & Lun, 2004:63). A strong identification with the network influences the focal company in a positive sense of belonging and allows firms to outline the goals that can converge in the network.

The same organizational culture helps businesses to support a shared vision within the organizations as it creates a commitment to the organization and its aims (Håkansson, 1995).

The firm considered to be part of a network whose boundaries are influenced by the space-relations from a relational proximity is thus founded on the shared vision, convergence of objectives and strategies (Cantù, 2010).

3. Research Method

The main aim of this paper is to investigate the key role of by Science Parks in Epistemic network. Going more in depth, the work analyses the role adopted by Science Parks in supporting the development of inter-organizational relationships among heterogeneous actors involved in the innovation process and that outline the Epistemic Networks.

The research is based on a qualitative approach and it investigates the development of innovative projects managed by 2 Italian Science Parks (Area Science Park and Kilometro Rosso).

These case studies are part of a research project whose objective is to investigate the development of spatial relationships in Innovation Network, focusing on networking generated and supported by STPs. In total, 80 in-depth semi-structured interviews (face-to-face, e-mail, videoconference, and phone interviews) were conducted, with 20 being referred to the general business context of the project being analysed and 60 referring to case studies.

The research is structured in four stages. The first stage was the pre-understanding phase, which consisted of collecting the primary and secondary data in order to select Science Parks on their peculiarities in technology transfer and innovativeness. In order to develop a general picture, results of interviews with Science Parks experts were combined with secondary data. Stage 2 involved semi-structured interviews with key referents of selected Science Parks. During stage 3, the innovative projects realised by Science Parks and by firms hosted or located in the area were chosen. Finally, stage 4 involved semi-structured interviews with key referents of firms involved in the selected projects.

The main objective of the analysis is to construct the context and boundaries of the phenomenon as theory interacts with empirical observation (Dubois and Araujo, 2004). The research development is based on a systematic combination of the continuous interaction between theory and the empirical world (Dubois and Gadde, 2002; Piekkari et al., 2010).

The case studies approach enabled to study contemporary phenomena in a real-life setting characterized by blurred boundaries between context and phenomenon (Eisenhardt, 1989; Yin, 2003).

The inter-organizational relationships have been analyzed focusing attention on the role of firms, universities and governments.

In particular the research is founded on the ARA model, focused on Actors, Resources and Activities, and the 4R model in which the resources are divided in product, production facilities, organizational competences and relationships. Any relationship is part of a broader context of interdependent relationships that define the network. The network, in IMP approach (Håkansson, 1982), is based on nodes (organizations and business units) linked together by interconnected relationships, through witch actors can share resources and develop activities. Referred to the "4-Resources" model, resources can be considered as a part of different interaction processes, referred to organizational units engaged in cooperation activities; business relationships used in networking activities; products as parts of buying-selling activities; facilities that are involved in producing-using activities (Håkansson, Waluszewski, 2002, Baraldi, 2002). Resources are adapted to each other; the features of one resource become embedded into other resources (Håkansson, Waluszewski, 2002:18).

4. Science Parks: the Italian context

In Italy the first STP was established in the 1990s using funding from the Ministry of University and Scientific Research and the Structural Funds of the European Community. The Association of Science and Technology Parks, which represents Italian Parks, includes more than 30 members working together in a network of 700 high-tech firms: 200 incubated, 15 incubators, and 150 private/public research centres. In addition, 2500 firms with 10000 employees have benefited from STPs.

4.1 **KILOMETRO ROSSO**

Kilometro Rosso, located at Stezzano, near Bergamo, was founded at the beginning of the 2000s and is based on strong ties among science, industrial research, technological development, and innovation.

Located in the centre of the Lombardy Region, Kilometro Rosso focuses on growing the knowledge district linked to innovation and high technologies. As such, the Park supports the development of firms and the aggregation of research centres.

Unlike the main European Parks, Kilometro Rosso is characterized by a private management firm; meanwhile, the real estate operation is supported by a different firm.

Kilometro Rosso provides an environment that promotes cross-fertilization and the contamination of various cultures thanks to the mutual proximity of hi-tech companies, research centres, and laboratories.

The tenants, participating firms, research centres, and laboratories will ultimately include 50-70 tenants with 3.000 employees.

In June 2004, the first settlement was related to the Brembo research centres (specializing in the planning and production of automotive brake systems). In the same year, the laboratories of a joint venture related to Daimler-Chrysler (ceramic composite material production) were opened. Among the tenants there are Orobix and Umania.

Orobix is an R&D company, founded in 2009, aims at providing customized solutions for quantitative image analysis and biomedical data management through the use of innovative technology. UMANIA was created by a team of experts in Ergonomics and Design with the main aim of giving importance to human beings, studying, observing, and understanding them. The goal set by UMANIA in each project is the creation of innovation “from” and “for” people. It does it by studying some aspects of man, from cognitive to physical, from postural to behavioural ones, to create design projects.

Kilometro Rosso cooperates with local firms in order to promote economic development. For example, K Idea—a Bergamo Science event—is a cultural and creative operation dedicated to the promotion of ideas and inventions. This initiative has been identified as innovation in a showcase. In addition, to promote the growing of the local economy, in 2006 Kilometro Rosso—together with Bergamo Industrial Association and Servitec (the management company of POINT SciencePark)—founded Intellimech, a consortium specializing in mechatronics. Firms are related to the consortium and belong to different geographic areas, such as ABB, Bergamo Industrial Association, and Tenaris Dalmine. Intellimech supports interdisciplinary research in mechatronics that involves advanced electronic planning, informatics and ICT, mechanics planning, and planning for industry applications. The main aim of Intellimech is to benefit from the opportunities related to automation, robotics, and mechatronics while managing R&D projects. The project was developed in the laboratory localized at Kilometro Rosso, together with scientific and technological competences. Several actors, such as Turin Polytechnic, have been involved in developing this project, providing different competences.

The main cooperative agreements of Kilometro Rosso also involved international actors such as Kista Science City (Stockholm) and MIT (Boston).

4.2 AREA SCIENCE PARK

AREA is the first multi-sectoral Science Park in Italy and one of the largest in Europe. Based on two campuses in Padriciano and Basovizza (Trieste), AREA manages the activity of starting up and developing centres, companies, and institutes engaged in research, technology transfer, training, and professional service.

AREA was founded in Trieste at the end of the 1970s with a primary aim to create a structure to support joint development between science and firms. The main strength of the Park is the

shift from science to technology: In the past 30 years, the Park has shifted from producing science to producing technological knowledge aimed at enhancing the quality of life.

The management company the Consortium plays a key role in the Park's development process. The Consortium was founded to support the growth of techno-industrial partnerships. The Park's main areas are related to energy and environment, life sciences, IT and ICT, physics and materials, nanotechnology, and innovative services.

To foster the development of the territory, especially at the regional level, AREA firms, research centres, and universities work closely together to define the ideal conditions under which to increase the level of technical and scientific knowledge, developing basic and applied research as well as honing new technologies, products, and processes.

AREA also supports the development of collaboration among tenants. To date, 88 tenants (67 firms and 21 research centres) have operated in the two AREA campuses. The personnel is over 2500 units. Laboratories, research centres, and spinoffs cooperate with firms involved in biotechnological, telecommunications, innovative materials, and nanotechnologies.

To promote such cooperation among tenants, the Park founded the 3T/3L award, taking into consideration the repercussions of the 3Ts—namely, territory (the Friuli Region), Trieste (the communities), and the individual citizen. The 3Ts are key "levers" for the success of a new product due to their contributions during the initial phases or by acting as test-subjects prior to the product's market launch. Meanwhile, the 3Ls are related to innovation that can be "early bird" (certified but not industrialized), "existing" (industrialized but looking for new markets), and "in the market" (can increase their markets).

Moreover taking into consideration the tenants' area, Innovation Factory is the "first mile incubator" of AREA. The Incubator supports firms interested in creating their own business plan, and cooperates with them to transform an innovative idea into a competitive business.

The collaboration between potential star ups and Innovation Factory is founded on 3 phases:

- Evaluation of the business idea. The proposer submits to the Innovation Factory scientific and technical committee a description of the business idea and the activities plan
- Pre-incubation. Once the proposal is accepted and an agreement is signed, Innovation Factory helps future entrepreneurs by providing the services and resources needed for the creation of a new business.
- Firm setup. The conditions for economic sustainability allow the creation of the new firm.

Between 2009 and 2012 the business idea selection was made. Innovation Factory started with 208 business ideas and 5 have already become businesses.

AREA further supports collaboration to increase local competitiveness, as evident in the Domotics FVG. Domotics, considered as key industry for the Friuli Region, is related to the application of technology and automation solutions to private homes to improve the quality of life, reduce energy consumption, increase security levels, and manage house appliances. The Domotics project aims to create a cooperative network for research and development in the field of prototyping and automation solutions for the home in order to meet practicality, effectiveness, and efficiency goals. The main partners involved in the Domotics FVG project are Friuli Innovazione Science Park, Agemont (Agency for Mountain Economic Development), and Pordenone Technology Centre as well as collaboration with the Rino Snaidero Scientific Foundation and the firm Rino Snaidero.

Each actor provides specific competences, such as coordination (AREA), technology transfer (Friuli Innovation), and the promotion of economic initiatives and the valorisation of human resources and mountain materials (Agemont). AREA operates in order to promote collaboration between enterprises and scientific and technological research networks at the local level.

Meanwhile, AREA networking involves firms and centres that operate in an international context, including cooperation with the Massachusetts Institute of Technology (MIT) of Boston and the SRIC-BI in the European region. AREA has also partnered with IRENE (the European Innovation Relay Centre) and cooperates in the Enterprise Europe Network as well as with the Friend Europe Consortium.

5. Discussion

The research results are mainly ascribable to the ability of Science Parks to support the transformation of knowledge in business ideas, facilitating the sharing and combining of heterogeneous knowledge among different organizations (focusing on firms, universities and governments). As depicted by the case studies, the innovation is generated by the interaction among the actors that are characterized by different core activity and different knowledge.

We can thus consider the first proposition:

P1. Science Parks, as knowledge's intermediaries, allow the development of inter-organizational relationships among several organizations characterized by different core competences that outline the Epistemic Networks.

The research depicts how the STPs can support the key relationships between firms and universities in technology transfer. AREA is responsible for the Coordination of Research Institutions, the networking initiative of national and international research centers, universities and scientific and technological Parks in the Friuli Region. From this perspective, the start up supported by Innovation Factory can develop relationships with these universities and share knowledge.

Moreover, the start-ups located at Kilometro Rosso cooperate with the local University (Bergamo University) that develops research at the Park. STPs as relationship facilitators also support the direct transfer of academic research results to industry through interaction.

Moreover AREA and Kilometro Rosso cooperate with the Region in order to improve the development of firms located in the local space. Kilometro Rosso aims to increase ability to innovate products, processes, services. Kilometro Rosso is the first private Italian Science and Technology Park that creates strong ties between science, industrial research, technological development and innovation.

The second proposition can be synthesized in:

P2. STP can support co-opetition.

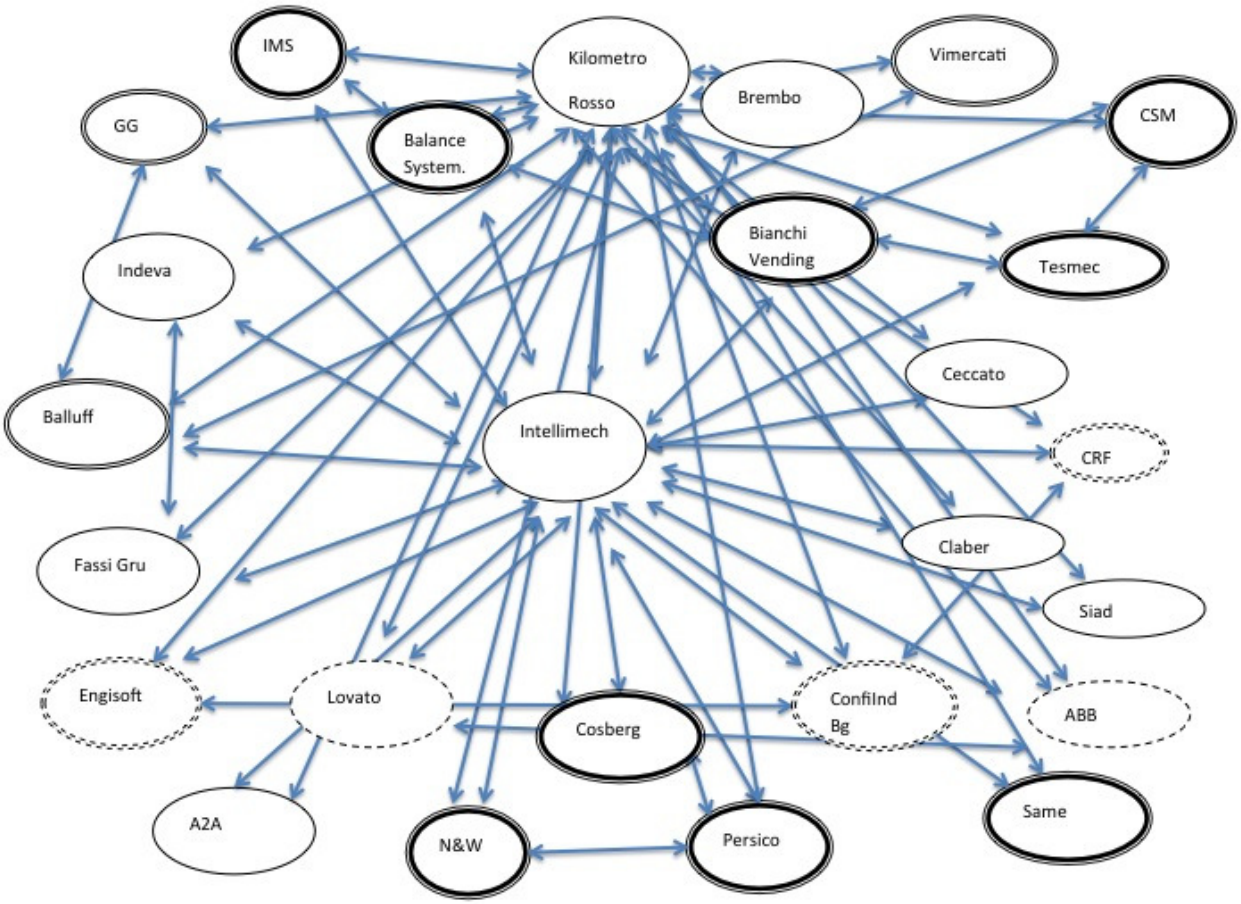
STP activities are developed through the support of other STPs from a co-opetition perspective. The Domotics Project realised by AREA involves Friuli Innovazione Science Park. Intellimech is promoted by Confindustria Bergamo, Servitec and Kilometro Rosso STP.

The strategy is to pursue both the goal of integrating the technologies available in a competitive key and expand the Domotics technology to the wider industrial context. Similarly, several competitors belonging to mechatronics cooperate in Intellimech that is a consortium of high-tech firms dedicated to interdisciplinary research in mechatronics. Mechatronics includes different industries: electronics, IT, ICT and mechanics. As a consequence, firms belonging to Intellimech operate in different fields that are:

- Instrumental mechanics: Balance Systems, Bianchi, CMS, Cosberg, IMS Deltamatic, N&W, Persico Engineering, Same DeutzFahr, Tesmec
- Mechanical and Electrical Appliances: Brembo, Ceccato, Claber, Fassi, Indeva, SIAD
- Precision instruments - automation and meaurement: Balluff, G&G, Vimercati
- Metallurgy: Tenaris Dalmine
- Multi utilities: a2a
- Instrumental electronics: ABB, Lovato
- Industrial Service: FIAT Research Centre, Confindustria Bergamo, EnginSoft

The development of interconnected relationships outline the Intellimech's network (figure 1).

Figure 1 – The Intellimech's network



Intellimech develops two types of projects, the general projects and the research on order projects, where these last ones generally come after the first. Moreover the projects involve a qualified international network of academic and industrial researchers and organizations. The cooperation among competitors supports the development of pre-competitive platform and then each actor customizes specific solutions.

The third proposition concerns:

P3. The high performances of Science Parks are generated by their innovative business model founded on the innovative services.

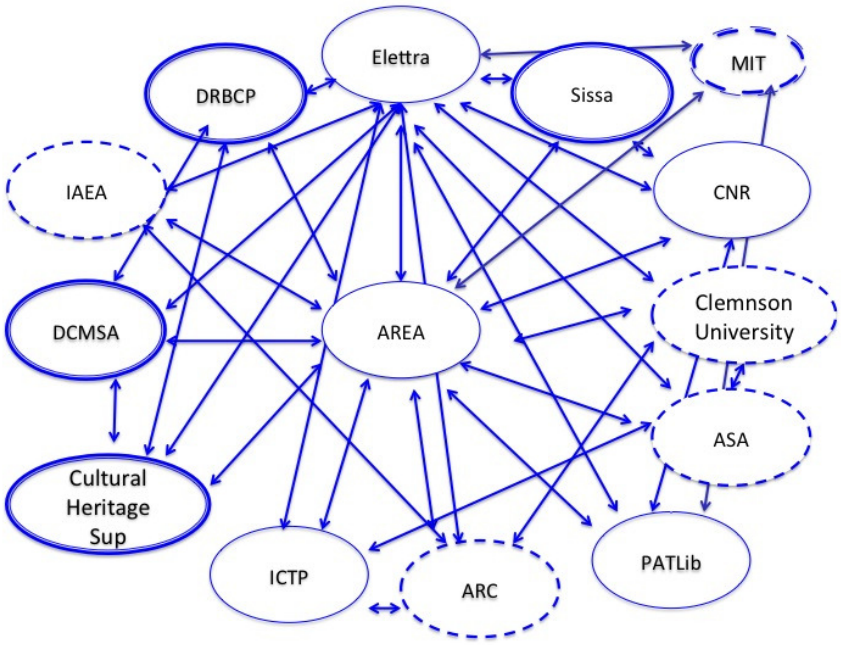
The attention of STPs stresses not only traditional services, such as tangible assets and real estate operations that are provided from a traditional perspective, but also innovative

services that support networking. Kilometro Rosso promotes partnerships, interaction, and synergies between companies located within the Park as well as those outside the Park.

AREA is considered a national benchmark for technology transfer and a place where top training, research and enterprise can meet and become a key resource for the growth of the economy. In the same perspective, the Innovation Factory works to validate the idea of a business Incubator from the perspective of first mile. It assesses whether ideas can be turned into competitive businesses, so recently a business accelerator was introduced.

Going more in depth in the process of resource sharing, we can consider the Microscopy Line Project generated by Elettra and supported by AREA in testing a specific technique dedicated to anti-falsification system for cultural heritage management (figure 2)

Figure 2 – The Project Network



AREA decided to involve in the project national and international organizations that provide specific resources.

The main actors involved concern organizations related to cultural heritage asset management (DRCP, DCMSA), higher education (Sissa), organization for innovation (ICT),

internal office for patenting (PATlib). In addition to this we can find interorganizational organizations such South Dakota University. Each actor provides specific resources in order to develop the project. AREA provides laboratories (product), the system of analysis (production facilities), the coordination competences (organizational resources) and develops relationships with each actor. Elettra provides the Synchotron (product), the applied research (organizational resources) while SISSA operates through report (product), the teaching system (production facilities) and the training competences (organizational resources). The Cultural heritage superintendent provides documents (product), routines (production facilities) and applied research competences (organizational resources)

The cases analysed also show how the projects and services provided by STP involve several organizations in different places and are characterized by different resources. The fourth proposition becomes:

P4. The innovation is generated by the interconnected relationships between actors that belong to different network position. These organizations are characterized by shared vision

The emblematic start-ups of Innovation Factory are characterized by paying major attention to Health care and human aspects, both related to the main values of STPs and Incubators. Taking into consideration the start-ups related to Innovation Factory, G&LIFE operates in nutrigenetics, SBS focuses on wellness, while BILIMETRIX addresses health areas. This area is relevant for the Incubator and for its start-ups as well as for the STPs.

The start-ups located at Kilometro Rosso pay major attention to open innovation and the cross-fertilization principle that characterizes the Science Park. In a similar perspective the Mario Negri Institute has a long tradition in education and cultural promotion for young scientists in the field of biomedicine and human health. Moreover the goal UMANIA sets in each project is the creation of innovation "from" and "for" people. In addition to this, Brembo

has built its success on its highly innovative approach: its dedication to innovation, which takes the form of a constant commitment to research and development, is geared towards ensuring that the company retains its competitive advantage.

Kilometro Rosso has developed strong relationships with tenants, with members of Innovation Factory belonging to the local area, and with international actors such as MIT and Kista Science City to allow start- ups and innovative firms located in Lombardy Region to benefit from that cooperation.

From a similar perspective, AREA provides a network of knowledge and skills through its extensive experience in transferring technology to companies; exclusive services for business intelligence; patent information, and documentation. Microscopy Project well depicts the interrelationship between actors that belong to different local area (tenants, regional actors, international actors). Moreover Innovation Factory networking involves universities, enterprises, public institutions, venture capitalists, and business angels. Particular attention is also paid to cooperation with associations and international organizations (MIT, Stanford, and the International Association of Science Parks).

Thanks to the agreement between AREA and the MIT, a strong relationship connects start - ups with MIT. Through this agreement, AREA aims at providing to start-ups with a range of skills and excellence to foster a competitive jumpstart and allow them to have privileged access to MIT knowledge. The objectives are to promote the creation of research spin-off more effectively and facilitate the development of innovative products, processes, and the management of regional firms. There is a specific interest in the Region to identify leading-edge technologies and expertise available within MIT through the experts at the Industrial Liaison Program. The Innovation Factory has followed the MIT model based on the mentorship role.

The cooperation between the actors becomes stronger through the increasing of relational proximity.

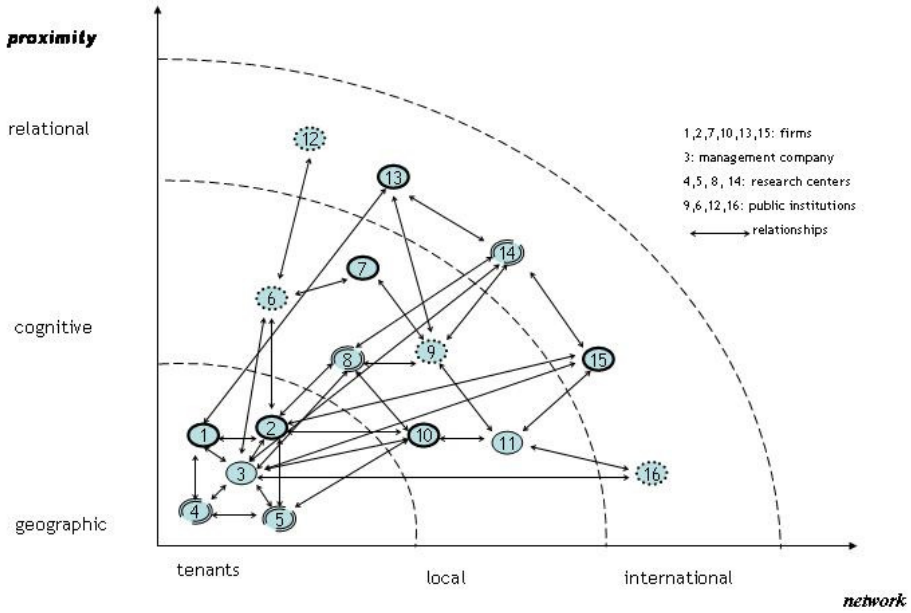
As depicted in the figure 1 we can see the relationships between firms (knots 1,2,7,10,15), research centres (knots 4,5,8,14), institutions (knots 9,6,12,16). The management company (knot 3) can so develops relationships with firms (1, 2), research centres (8), institution (6) belonging to local area; as well as firms (15), research centres (14), institutions (16) belonging to international area.

Thanks to these relationships, the tenant (2) can develop relationships mediated by the management company also with local institutions (6), local centre (8), local firms (10) and international one (15).

Geographic concentration can influence the network horizon, but it is not sufficient to create the network context made up by the more important relationships. The attention is so focused on cognitive proximity and relational proximity (Figure 3).

STPs support the development of relationships at different levels of space in a geographic perspective, including the area of tenants, the local area, and the international area. In addition, STPs support the development of relationships at different levels of proximity.

Figure 3 – Network and proximity

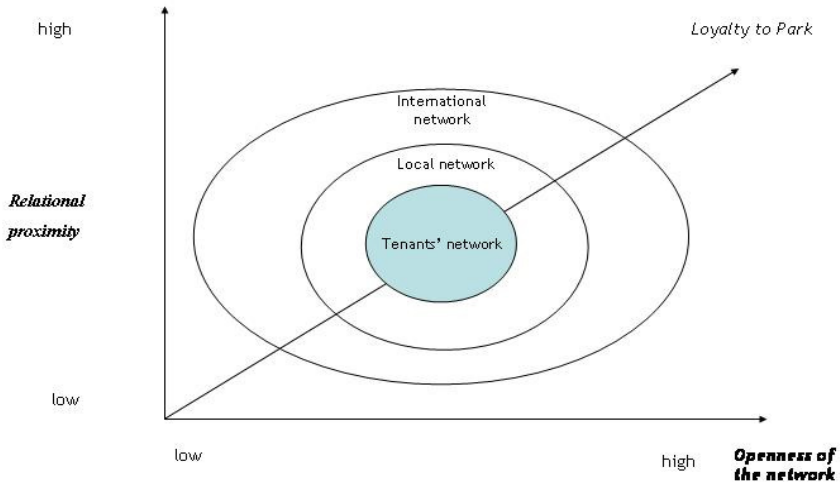


The fifth proposition is thus related to:

P5 The Science Park supports the shifting from geographic proximity to relational proximity.

As emphasized in the following figure (figure 4), increased relational proximity and the openness of STP networks support the outlining of a loyalty of firms and organisations to STP.

Figure 4 – Relational proximity and network openness



This consideration is related to the tenants' area, local area, and international area. Relational proximity is influenced by commitments. Lenney and Easton (2009) consider commitment concept as agreement made between actors. Fulfilling commitments involves the use of resources that are many and varied.

In addition, the development of interconnected relationships refers to collective learning versus collaborative learning. Collective learning is a way for an independent firm to gain access to the sticky as well as to the tacit knowledge of another firm. From a broad perspective, collaborative learning is related to collaborative entrepreneurship. As such, innovation is generated by the ability of the firm to co-operate in an internal (collective entrepreneurship) and external (collaborative entrepreneurship) perspective (Miles et al., 2006). Collaborative entrepreneurship is more focused on value generated by external knowledge. Thus, the interconnected relationships outline a relational embeddedness and a network embeddedness: the development of a firm depends on the development of its network (Echols and Tsai, 2005).

From this perspective, the management company supports the relational proximity based on a shared vision and long-term relationships. Tenants choose the STP in order to benefit from synergies related to the use of the same structure, but they also are interested in different geo-spatiality within the same space-relationship. STPs allow tenants to benefit from the shift from geo-spatiality to relational spatiality.

The interconnected relationships are supported by "a linguistics and semantics architecture of non-deterministic rules and procedures " (Pilotti, 1990: 123). The shared and specific language enables firms to develop the enhancement of complementarity. The language allows the reproducibility of a phenomenon in times and places other than those of the first event.

The enhancement of relationships founded on shared language characterizes the communities of practice and the epistemic communities. The community of practice is characterized by a

mutual commitment among the participants; the learning thus becomes a "social phenomenon". According to this approach the acquisition of practices is founded on social identity and the belonging to the community. The community of practice is characterized by common practices and a common approach to work.

The communities do not require physical proximity of their members as they are considered as open social systems whose boundaries are continually redefined with the entry and exit of new members. The community has the advantage of achieving a unified view of working, learning and innovation (Brown and Duguid, 2001).

Relationships are focused on specific issues to emerge in the epistemic communities that carry out their activities on the basis of a mutually recognized subset of knowledge, considered essential to the success of the collective activities of knowledge production (Cowen et al., 2000).

Epistemic communities can be considered as groups with common goals and practices, interested in relationships of knowledge exchange. The informal cooperation, based on trust and reciprocity, therefore, assess the potential relationship of the firm. Epistemic communities are linked in particular to the scientific knowledge that is characterized by three basic qualities: spreads easily, going beyond the concept of ownership; loses value over time, especially because of the imitative processes; has a use "non-rival "and so can be shared (Rullani, 2003).

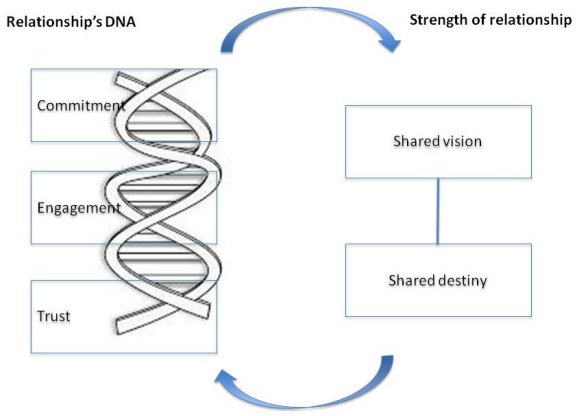
By its nature, a territory is not an epistemic community. In this context, a local system has great potential if it belongs to the circuits of many epistemic communities. Territorial actors (institutions, private and civil society) are asked to share the same vision of priorities and the knowledge on which to develop identity. The spread of knowledge is therefore through a community that shares the same epistemological basis and access to the specific field of knowledge. Epistemic communities are then extended communities that are not defined by

membership in the same territory, the same company or the same profession, but by the same vision of the world and by the same cognitive approach (Rullani, 2005: 121).

The concept of shared vision, combined with convergent objectives and shared values, allows the understanding of collaborative relationships (Morgan & Hunt, 1994; Parsons, 2002). In this perspective, the shared vision includes collective goals (Tsai and Ghoshal, 1998; Nahapiet and Ghoshal 1998).

The shared values and mutual understanding between the parties, facilitate communication of meaning that is essential in the combination of resources for the knowledge creation. The transfer of knowledge is therefore not out of pure "contact epidemiology." The knowledge sharing is founded on stakeholder's commitment, engagement and trust (figure 5)

Figure 5 - Relationship's DNA and strength of relationship



Cantù, 2013

These dimensions influence the strength of relationship founded on shared vision and shared destiny (Cantù, 2013). In addition to this the stronger relationships generate the improvement of relationship's DNA and the development of relationships characterized by high relational proximity that is the basis for trust and competitive advantage.

6. **Conclusions**

The main contribution of this paper is the analysis of the key role of the Science Parks in the process of innovation development. More and more the R&D projects require the management of inter-organizational relationships with heterogeneous stakeholders (such as providers, customers, universities, research centres, laboratories, public institutions). In this context, a key role is undertaken by Science Parks that, as knowledge intermediaries support the sharing and the combining of heterogeneous knowledge outlining the Outsourced Innovation and the Co-managed Innovation.

STPs allow the emerging of a common vision not only for tenants (characterized by geographical proximity) but also for actors' belonging to a local or international network. From this perspective STPs facilitate the relationships between actors that operate in different places but that are characterized by relational proximity and thus by the convergence of objectives and by shared values.

The replication of virtuous business models, founded on high-value services offered by the STPs will help firms stay focused on their core competences and access external resources, thus improving productivity.

On the basis of previous considerations, the Science Park becomes a driver of innovation for the Epistemic Network in which it operates and that is characterized by relational proximity.

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