The transformation of knowledge in business idea.
The catalyst role of Science and Technology Parks

Executive Summary

The increasing focus on innovation requires paying more attention to the way through which innovation can be developed. Based on this idea, attention should be focused on a cooperative approach that characterises the interactive technology transfer and the capitalisation of knowledge that generates innovation. Through the interconnected and cooperative relationships arising from learning processes and emphasised by the Industrial Network Approach, network actors can share resources and combine competences, thereby increasing their value. In this innovation process, Science and Technology Parks (STPs) play a significant role in supporting networking among key actors identified through the spiral model of innovation in firms, research centres-universities, and public institutions. Investigating the activities of Italian STPs, this paper aims to demonstrate how STPs can generate and achieve a competitive advantage for those participating in the innovation network, explicating their role as a catalyst in the interconnected relationships.

Key words
knowledge capitalisation, learning network, spatial relationships, resources sharing, triple helix model

1. Introduction

In order to meet the challenges of a global economy, innovation has increasingly become considered a key instrument to boost productivity and sustainable growth. Nowadays, strong innovation performances are more important than ever (OECD, 2009). This situation requires firms to give particular attention to the cooperative process of realising innovation based on technology transfer, through which firms can access and combine different resources. Interaction has also become an important means of gaining and transferring new knowledge, gathering relevant information about new business, finding external support and services, and accessing external resources that are not available in-house (Birley, 1985)[1]. Knowledge is presented as a key resource for innovation. Science is thus able to interact with technological knowledge, to which it is linked by recursive relations (Kline and Rosenberg, 1986)[2].
From this perspective, spatial dimensions increase the innovative environment founded on dynamic and creative synergies, thereby characterising the competitiveness of cooperative firms' agglomeration (Saxenian, 1994)[3] as well as the cooperation among firms, public institutions, and research centres (Etzkowitz and Leydesdorff 1997[4]). Traditionally, geographic proximity has supported the exchange of knowledge and, consequently, the learning process, but it also increased the risk of cognitive lock-in focusing on internal system processes (Sammarra and Biggiero, 2008)[5]. Innovation processes founded on interactive and joint learning require not only geographic localisation, but also collective and collaborative entrepreneurship. Such innovations are considered learning results.
In this context, the key to understanding the relation between innovation and proximity is not space, but knowledge (Rutten, 2003:95)[6]. Firms work together on innovation because they are dependent on each other's knowledge: They select competent rather than proximate partner. The interrelationships among different levels of space have been well emphasised by scholars of the

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Industrial Network Approach, in which place is considered a feature of resources, appearing as an embedded dimension (Håkansson et al., 2009)[7]. Through the development of relationships, resources are adapted to each other, and features of one resource become embedded into other resources (Håkansson and Waluszewski, 2002)[8].
Based on this context, the main aim of this work is to investigate how STPs can support the transformation of knowledge in business ideas from a collaborative perspective. More specifically, this paper investigates how STPs can generate and achieve competitive advantages for the actors of the innovation network through the management of interconnected relationships. The paper will be structured as follows. After a review of innovation in interactive approach and spatial relationships, the paper will present its research approach and the case studies. The attention will be focused on the role of STPs in the learning network in the development of relationships between the main actors of innovation characterised by different natures. In particular, this work analyses the role of four Italian STPs belonging to two Italian innovative Regions.

2. Innovation and technology transfer: a business-learning network perspective

Traditionally, technology transfer has been based on a hierarchical linear model in which a university, as the generator, transfers knowledge to firms or recipients. However, in an interactive approach, technology transfer can be considered an interorganisational process of exchange and adaptation as well as the learning of new technologies (Helmsing, 2001[9]). The process is co-managed and co-realised by different actors and, as such, requires a combination of technological and managerial competences (Sancin, 1999[10]). From this perspective, sources of innovation do not reside exclusively within firms, but in relationships among them, considering the systemic character of resource relationships (De Bresson and Amesse, 1991[11]; Freeman, 1991[12]; TiJssen, 1998[13]).
Significant attention has been focused not only on the object of the innovation (Schumpeter, 1934[14]), but also on the relationships between firms and partners as innovation is developed through strategic cooperation and, hence, through relationships making up the key asset of the firm (Fiocca and Snehota, 1986[15]). Firms specialise in their core competences and develop relationships to access external and complementary resources and competences. Among these resources, knowledge plays a key role. Indeed, innovation is considered as the creation and combination of knowledge (Gregersen and Johnson, 1997[16]). From this perspective, firms develop internal (knowledge in the organisation) and external (knowledge related to providers, customers, competitors, research institutes) source innovation operating in a systemic approach.
In order to increase the shared knowledge, strategic alliances can be developed with competitors as well as firms from different industries. Consequently, hyper competition becomes hyper co-operation. As firms do not have the control of all the knowledge they need, they access complementary knowledge through the interconnected relationships making up the innovation network (Lundgren, 1995[17]). The key element of the innovation network is the continuous learning based on the sharing of resources and capabilities. This development of innovation requires continuous interactive learning (Malecki and Oinas, 1999[18]) or joint learning based on collaboration

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and related to the creation, exchange, and combination of knowledge (Håkansson and Johanson, 2001[19]).
Furthermore, as well emphasised by the Industrial Network approach, in which the network is based on knots (organisations) connected via interconnected relationships, business relationships arise through joint learning processes (Håkansson et al., 2009[20]).
Moreover, the sources of innovation are commonly found in the interstices of firms with universities and research laboratories (Pérez and Sanchez, 2003[21]; Debackere and Veugelers, 2005[22]).
At the local level, the combination of resources is strictly related to the externalisation of R&D activities that support the relationships development among public, private, and academic research, which represent the key factor of the Triple Helix model. The Triple Helix, as a spiral model of innovation, captures multiple reciprocal relationships among institutional settings (public, private, and academic) at different stages in the "capitalisation of knowledge" (Etzkowitz and Leydesdorff, 2000[23]). Within specific local contexts, as asserted by evolutionary interpretation of the Triple Helix model, the universities, public institutions, and industry learn to encourage economic growth by developing "generative relationships"—namely, loosely coupled reciprocal relations and joint undertakings that persist over time and induce changes in the way agents come to conceive their environment and how to act in it.
Within a local system, actors' synergies develop as part of the dynamics of production (exploration) and exploitation (exploitation) of scientific and technological knowledge. Such geo-spatial relationships are strictly related to geographical proximity. In this interpretation, spatial relationships at the base of innovation processes are developed by different actors operating in the same geographical area. Yet organisations are characterised by fluid boundaries. Thus, the process of learning in an inter-firm context is affected by the characteristics and dynamics of a network that overcome geographic proximity.

3. Knowledge and space: from geographic proximity to relational proximity

Geographic embeddedness has played a key role in the innovation process, promoting economies of time, agreements, and complex adaptation. The geographic environment influences a firm's development and its capacity for mutual learning (Keeble and Wilkinson 1999)[24]. By cooperating with several actors localised in the same geographic area, firms can access an extended knowledge base that increases their capacity for innovation (Archibugi and Lundvall, 2001[25]). Spatial dimensions increase innovative environment founded on dynamic and creative synergies, thus characterising the competitiveness of cooperating firms' agglomeration (Saxenian, 1994[26]).
As emphasised by Regional Studies, the accessibility of knowledge is bounded by geographic dimensions (Acs, de Groot, Nijkamp, 2002[27]; Acs and Varga, 2002[28]; Varga and Schalk, 2004[29]; Sternberg, 1999[30]). Relationships developed in a geographic area can promote a more rapid movement of ideas, supporting the sharing of knowledge—particularly tacit knowledge (Becattini,

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1987[31]), which differs from already established knowledge (e.g., scientific publications and patent applications) that is available without restriction. The local dimension of the tacit knowledge involved in technological externalities also influences the geographical agglomeration of R&D activities (Audretsch and Feldman, 1996[32]). As knowledge is so distributed across space within countries, economies become more geographically specialised, and important elements of innovation tend to become regional rather national. The regional context supports innovation, thereby facilitating the formation and transmission of social capital and leading to the emergence of a regional system and regional capabilities based on non-codified know-how acquired through learned behaviour (Malmberg and Maskell, 1997[33]). Furthermore, organisations belonging to a specific region are characterised by a technological and organisational learning process in a territorial context, outlining the emerging regional innovation system (Cooke, 2001[34]). In a system of innovation, knowledge is bounded by the nature of interactions among actors (Dosi, 1988[35]).

Regional dimensions are also evaluated by the Groupe de Recherche Europèen sur les Milieux Innovateurs (GREMI). Relationships are mainly informal and tacit. The milieu identity overcomes the identity of each partner (Camagni, 1991[36]). Collective learning here is defined as a dynamic and cumulative process of knowledge production, transfer, and appropriation taking place through the interactive mechanism of the milieu. An innovative milieu is defined as a set of relationships happening in a limited territory, encompassing a production system, different economic and social actors, a specific culture, and a representation system in a coherent way while generating a dynamic process of collective learning. GREMI research has highlighted the dynamic connection between the milieu and the global environment.

The interrelationships among different levels of space have been effectively emphasised by scholars of the Industrial Network Approach, which considers place as a feature of resources: Products, facilities, organisational units, and business relationships acquire space-related features from the places with which they are associated (Baraldi, 2006: 301[37]). Places can both enable and constrain inter-firm interactions and resource combination. The dynamic features of place influence different resources as generated by their combination (Håkansson, Tunisini and Waluszewski, 2006[38]). Interactions with places occur through the resources that the firm handles on a daily basis. The features of heterogeneous spaces become embedded in the resources related to locations. The analytical scales of space are divided in micro, meso and macro spaces. Micro spaces are confined in buildings, meso spaces range from collections of buildings, and macro spaces are extended to whole nations and countries.

Based on the network position and relationships developed, each organisation identifies a different network horizon (Holmen and Pedersen, 2003[39]). It is possible to make an analogy between position and place that appears as a combination of a set of resources (Johanson and Mattson, 1992[40]). A business network can be considered a space connecting different actors that occupy certain place (i.e., positions). Every position in a network is based on certain resources, but the network is also defined by the positions of the counterparts and their resources. Consequently, the key interactions take place both within the focal geographical area and through connecting resources activated at different places, recognising both the central role of local area and interconnections among different local areas.

Based on these considerations, a regional network can be considered a meso network that interacts

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with other micro, meso, and macro networks, characterised by relational proximity, in order to explore and exploit innovation; actors localised in the regional network develop relationships with actors localised in different geographical areas through the process of co-evolution.

4. Research approach

The main aim of this work is to investigate how a Science and Technology Park can support the transformation of knowledge in business ideas. More specifically, this paper investigates the role of STPs in the process of knowledge transformation analysing the relationships developed among firms, research institutes/universities, and public institutions from a collaborative innovation perspective. Focusing on the idea that STPs facilitate the creation and growth of innovation-based firms through incubation and spin-off processes and provide other value-added services together with high quality space and facilities (IASP, 2002), this paper investigates the role of STPs in the innovation network. The paper analyses the context of Italian STPs, presenting four case studies: Area Science Park, Friuli Innovazione, Kilometro Rosso and Como NExT.
These case studies are part of a research project whose objective is to investigate the support of spatial relationships in technology transfer, focusing on networks involving Science and Technology Parks. 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 and Technology Parks (STPs) based on their peculiarities in technology transfer and innovativeness. In order to develop a general picture, results of interviews with STPs experts were combined with secondary data in the form of firms' reports and websites. Stage 2 involved semi-structured interviews with key referents of selected STPs (i.e., general managers and CEOs, those responsible for technology transfer, marketing and communication managers). During stage 3, the R&D projects realised by STPs 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 task of the analysis is to construct the context and boundaries of the phenomenon as theory interacts with empirical observation (Dubois and Araujo, 2004[41]). The research development is based on a systematic combination of the continuous interaction between theory and the empirical world (Dubois and Gadde, 2002[42]; Piekkari, Plakoyiannaki and Welch, 2010[43]).
Founded on Industrial Network Approach, the research is based on the Actors Resources Activities (ARA) model that focus on the evolution in the relationships among actors, underlining the interdependencies among the changes in actor bonds, activity links and resource ties (Håkansson et al. 2009[44]). More specifically the research is founded on the Resource Interaction approach (Håkansson and Waluszewski, 2002[45]) investigating the resources provided by different actors and the resource combination generated by actors' interaction through the analytical tool of the 4R model (Baraldi, 2002[46]; Bengtson and Håkansson, 2008[47]). The 4R Model divides resources into products, facilities, organizational units and relationships. Physical resources are articulated in product (an artifact exchanged between and within firms, components, finished and semi-finished goods) and production facilities (equipment, machinery, IT systems and tools utilized to produce or transform products), while social resources involve organizational units (competences, capabilities, and skills) and business relationships.

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This research began at the end of 2007, when 13 STPs were selected for single-multiple case studies considering the projects analysed. Among these STPs, 10 were Italian and 3 international. The following section presents the cases related to four Italian STPs within two Italian regions that particularly support the transformation of knowledge based on networking. The cases selected are considered to be benchmarks in Italian and international contexts; these parks overcome the impasse related to STPs focused on short–term operation in order to activate a long competitive advantage. These STPs are related to two main innovative Italian regions: the Friuli Venezia Giulia Region (FVG - Area Science Park and Friuli Innovazione) and the Lombardy Region (Kilometro Rosso and Como NExT).

5. Italian Innovation and STPs

During last years three main challenges can be identified in the Italian innovation system: innovation financing (especially venture capital); mobility of talents (especially brain drain), and improvement of technology transfer mechanisms. As emphasized by European analysis, Italy performs well in the R&D activities and employment in medium-high, high technology and knowledge-intensive services sectors, community trademarks and design in "made-in-Italy" production.
In this contexts new directions have been given both in terms of support of technology transfer for innovation. This includes, for example, the concentration of strategic guidelines, both for research and innovation policies, on selected strategic priorities, thematic fields, sectoral, and in some cases also on territorial excellence (e.g. technology districts).
In the Italian context, a key role is undertaken by industrial district (ID) and more recently by technological district (TD). ID are based on a scientific chain (Bellandi, 2003; Lazzeroni, 2004) that involves several actors of different nature. TD are based on proximity and influence the production and diffusion of new knowledge and new technologies in an open local network.
Essential drivers for technological districts' activities are identified and developed by STPs.
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 (APSTI), which represents Italian parks, includes more than 30 members working together in a network of 600 high-tech firms: 140 incubated, 14 incubators, and 150 private/public research centres. In addition, 2500 firms with 6300 employees have benefited from STPs. They also facilitate the process of innovation for SMEs characterising the Italian context as well as the regional context.

5.1 AREA Science Park

AREA Science Park is the first multi-sectoral Science and Technology 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 activities.
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. Employing 2.400 workers, the park reached 150 million euro of turnover. The park focuses on technology transfer into companies, supporting 2.944 companies, implementing 1.897 innovation actions, and filing 112 new patents.
The management company the Consortium plays a key role in the park's development process. The Consortium was founded in 1978 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 companies, 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. Through these interrelationships, the

park promotes the diffusion of innovation to enterprises, enhancing the results of research and bringing these results to the market. From this point, the park supports the creation and growth of new business initiatives related to high knowledge content, thereby enhancing the competitiveness of the territory.
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. 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 Venezia Giulia [FVG] region in Italy), 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).
The selection of innovations is based on the main principles that technological research is meaningful if it produces results that are translated into product, process, method, and service innovation.
AREA further supports collaboration to increase local competitiveness, as evident in the Domotics FVG and Sister Liaison Office projects.
Sister Liaison Office is an AREA project dedicated to enhancing research in the FVG region. Thanks to collaboration with regional research institutions and funding from the FVG region, AREA has implemented the creation of a permanent system for the efficient transfer to business of all the knowledge and innovation within the region's research system. One activity promoted by Sister Liaison Office has been the drawing up of a map of competences existing in regional research institutions that are applicable to industry, with the aim of encouraging technology transfer to businesses.
In addition, AREA supports the development of innovative industries that have shown tremendous results in the region.
Domotics FVG is a key industry for the FVG region. Domotics 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, renovate monitoring devices, and manage house appliances. The Domotics FVG 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, 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). The organizations involved provide services and assistance for the scientific research and innovation technology (Pordenone Technology Centre) and to improve the quality of life at home by promoting multi-disciplinary research and stimulating creativity (Rino Snaidero Scientific Foundation). 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.
Today the park operates a total of 350 partnerships in 33 nations, including cooperations with the Massachusetts Institute of Technology (MIT) of Boston and the SRIC-BI in the European region. AREA has become an international member of MIT's Industrial Liaison Program, through which the park enables tenants to access MIT's technologies. In addition, AREA provides business intelligence services through the Consulting Business Intelligence organization.
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.

5.2 Friuli Innovazione

Friuli Innovazione was set up in 1999 by the University of Udine, the Udine Industrial Association, the Fiat Research Centre, Agemont, the Pordenone Industrial Association, and the CRUP Foundation.

In 2004, the Friuli Venezia Giulia Regional Authority made a major contribution to the initiative by appointing Friuli Innovazione to launch and manage the Luigi Danieli Science and Technology Park at Udine.
As previously mentioned, Friuli Innovazione has worked with AREA to take part in the Domotica FVG project, which was promoted by the Friuli Venezia Giulia Region to develop and distribute domotic systems for application in any environment. This strategy aims to research and engage in pre-competitive development, technology transfer, and research of innovative solutions as well as networking for the business-research territory.
From a local perspective, Friuli Innovazione supports the development of local relationships, such as those related to the supply chain of wooden chairs made 100% in FVG. By combining the firms' competences in a regional productive chain, it was possible to create a new product realized totally in the chair district. Using this supply chain, born in collaboration with the University of Udine, Friuli Innovazione sought to test a new approach in order to strengthen the link between research and enterprises, with a particular focus on the wooden chair sector, which is primarily characterized by micro enterprises.
Six companies from the chair district have been involved in this initiative. The main objective was the aggregation of those companies in a regional productive chain as a combination of existing capacities performed by specialised micro enterprises.
The partners are Friuli Innovazione (the project leader) and the University of Udine. While the main firms involved are Forsed, Alema, Levigatura Musig, Romanutti Legno, Leatherland, Segheria Rosa, and Baldanello Design Studio.
The partners aim to realize wooden chairs characterized by clear and different aesthetic settings that are still based on common elements. Each actor provides specific competences, such as research (University of Udine), production of wooden chairs for the contracting sector (Forsed), production of chair components (Alema), wood smoothing (Musig), sawmill activities (Rosa), design development (Badanello), chair production (Romanutti), and production of chairs and armchairs (Leatherland).
From an international perspective, the cooperation intensity in the field of technology and innovation in the CORINNA partner regions lags behind that of other comparable regions. The main objective of the CORINNA project is to develop the regions' innovation systems by stimulating cross-border cooperation in technology policy and company innovation efforts.
The project aims to increase the mutual knowledge of the partner regions' innovation systems, policies, and strategies in order to ensure stronger coherence in the regions' approaches. The partners operate to find the best practices for promoting regional innovation potential and to develop cross-border cooperation in fields of common technological strengths and complementarities identified in the project. The main partners are Carinthian Economic Promotion Fund (KWF)–Klagenfurt, Joanneum Research Institute–Graz; Austrian Research Promotion Agency (FFG)–Vienna; Economy Service Burgenland (WIBAG)–Eisenstadt; Hungarian Science and Technology Foundation–Budapest; West Hungarian Research Institute–Gyor; Institute for Economic Research (IER)–Ljubljana; and Stuttgart Region Economic Development Corporation–Stuttgart.
Each partner is responsible for a particular action. The main activities related to the project can be summarized as research and analysis (mapping the partner regions' innovation systems), policy benchmarking and development of synergic strategies (collecting good and bad practices of innovation policy measures and instruments), creation of synergetic strategies, organization of visits to help regional companies identify partners for R&D cooperation and production, and interregional database of R&D organizations.

5.3 Kilometro Rosso

Kilometro Rosso (KR), 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, KR 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, KR is operated by a private management company (the firm Kilometro Rosso); meanwhile, the real estate operation is supported by the firm River.
Covering 200.000 square metres, KR 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 members 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) was opened.
KR 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. The last edition collected 140 applications focused on design and parts, health technologies, the environment, and robotics. In addition, to promote the growing of the local economy, in 2006 KR—together with Bergamo Industrial Association and Servitec (the management company of POINT Science Park)—founded Intellimech, a consortium specializing in mechatronics. Twenty-four 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. Intellimech provides technical and assistive consultancy and supports the training of employees as well as the diffusion of technologies.
The main aim of Intellimech is to benefit from the opportunities related to automation, robotics, and mechatronics while managing R&D projects. For instance, focusing on Cometha, this project aims to increase the competences related to the dynamic behaviour and control strategies of electro-hydrostratic actuators (power by wire).
The project was developed in the laboratory localized at KT, together with scientific competences and technological competences of industrial and academic international network. Several actors, such as Turin Polytechnic, have been involved in developing this project, providing different competences.
The main cooperative agreements of KR also involved international actors such as Kista Science City (Stockholm) and MIT (Boston).

5.4 Como NExT

In 2006, the local chamber of commerce founded Sviluppo Como in order to revitalize the economy and productivity of the Como district by fostering new entrepreneurship, encouraging strategic industries, and driving growth through an innovative and technologically advanced approach.
In 2007 Sviluppo Como founded the consortium ComoNExT (new energy for territory), with the purpose of creating and managing the STP. ComoNExT provides information, assistance, and advisory services, to local companies and promotes the transfer of technology from universities and external R&D centres to the businesses.
In this context, the operational management of ComoNExT is overseen by ICOMO, a division of the Scientific Culture Centre that was set up by the Como Chamber of Commerce in 2005.
ICOMO was born as “factory of ideas” specialized in technology transfer and dedicated to firms localized in the territory. Among the services provided, ICOMO organizes periodical meetings between firms and the university to realize technology scouting. Firms can test their business ideas and market sustainability. Services provided are related to the process from idea structuring to idea prototyping. In performing its operational management activities, ICOMO has established a close relationship with the Milan Polytechnic Foundation as well as with the business incubator of the Como branch of the Milan Polytechnic.
ComoNExT is identified with a technological and scientific hub that hosts business laboratories, research and company innovation centres, and fully innovative businesses in spaces equipped with technological services. ComoNExT supports initiatives designed to encourage and assist the startup and incubation of fast-growing, technology-based, innovative businesses by providing them with leading-edge infrastructures. The most sought-after companies are those operating in the automation sector, domotics, research and production of alternative sources of energy, as well as materials and nanotechnologies research.
ComoNExT STP focuses on knowledge sharing and innovation development. The aggregation of resources and energies in STP boosts the flow of knowledge and technology transfer among universities, R&D institutes, industrial companies, and markets.

STP further supports the development of relationships between local firms and international firms. Through its SME^2 project, STP encouraged SMEs to undertake training (VET–Vocational Training and Education) in mobility. The project is based on training periods for SME employees within firms that want to adopt proven methods for research topics and development and to promote the adoption in the VET field. ICOMO cooperates in a consortium with INNOVAFOR, the partner and coordinator for Portugal, and the Foundation for Promotion of Entrepreneurship, a partner for Poland.
ICOMO also cooperates in the development of Innovation Community Como-Ticino, which brings together companies, universities, research centres, and technology centres located on both sides of the Swiss-Italian border in an effort to become a landmark immediately usable by companies in the Como and Ticino regions. The innovation community aims to support local firms in innovation development through training, sustainable feasibility studies, and support in startup creation.
Focusing on one of the projects supported by the park, ComoNExT is the leader of a project related to DRIADE (Regional Districts of Innovation Attraction and Dynamism of local economy) Plan, which aims to contribute to the process of evolutionary maintenance of the meta-district model. In this Plan, the DAFNE action promotes the business combination in production systems and clusters in new subject areas to those of the specialized industrial districts and meta-districts.
The project was developed by ComoNExT in cooperation with the Milan Polytechnic Foundation, Milan Polytechnic, Clac–Old Wood Furniture, CLBN–Job Centre North Brianza, ADI–Industrial Lombardy Design Association, Lombardy Industrial Association, and COT Centre. The organizing committee consists of 95 subjects (including 70 SMEs, three large companies, 4 universities and research centres, 4 associations, 4 trade unions, 4 business consortia, 4 service centres, a development agency, and 5 public institutions). In September 2010 Lombardy Region approved the "Systems for a safety-secure, accessible and sustainable home living context" project in which each actor provides different competences related to the home living context.

6. Discussion and Managerial implications

The four STPs investigated present competitive performances in the Italian and international contexts. AREA and Kilometro Rosso have been recognised as among the 10 best places for Italian innovation (Censis, 2009). In the same year, Friuli Innovazione and Como NExT received a national innovation award; Friuli Innovazione received the national award for the establishment of the Agency for the Promotion of European Research (APRE), which offers information on European financing possibilities for research and technological innovation. While Como NExT received the award for the best business idea (start cup award). All of these STPs are also involved in international projects with international organisations.
The research results are mainly ascribable to the ability of STPs to support the transformation of knowledge in business ideas, through networking, among several organisations. All STPs considered and all projects analysed involved local universities as well as public institutions (region, industrial union) and firms (mainly SMEs). In addition, the actors involved in the AREA project can access MIT services, while the partners of Friuli Innovazione can access Austrian and Hungarian organisations; partners of KR can access MIT and Kista Science City, and partners of Como NExT can access Swiss partners. Such access emphasises the key role of the Triple Helix model: Innovation is generated by cooperation within firms, universities/research centres, and institutions.
The interconnections among these organisations are based on sharing resources and combining competences. Actors look for external resources that can be shared and combined only through interaction. In this way, resources can be divided into tangible and intangible resources as well as physical and social resources. Among these, knowledge plays a key role. Knowledge can be exchanged and thus created through the process of learning. As a result, the sharing and combining of resources increase the value of starting resources and, consequently, of starting knowledge.
As well emphasized by interaction model of Industrial Network Approach a single economic resource alone is passive and without value. Value is determined by the interconnections and combinations of heterogeneous resources (Penrose, 1959[48]) related to different actors. Interaction in the relationships shapes the flow of resources (e.g., Baraldi and Strömsten 2009[49]).

[48] Penrose, ET. (1959), *The Theory of the Growth of the Firm*. Oxford University Press: New York
[49] Baraldi, E. and Strömsten, T. (2009), Controlling and combining resources in networks -from Uppsala to Stanford, and back again: The case of a biotech innovation. *Industrial Marketing Management*; 38 (5): 541-552.

The first proposition can be so summarized:

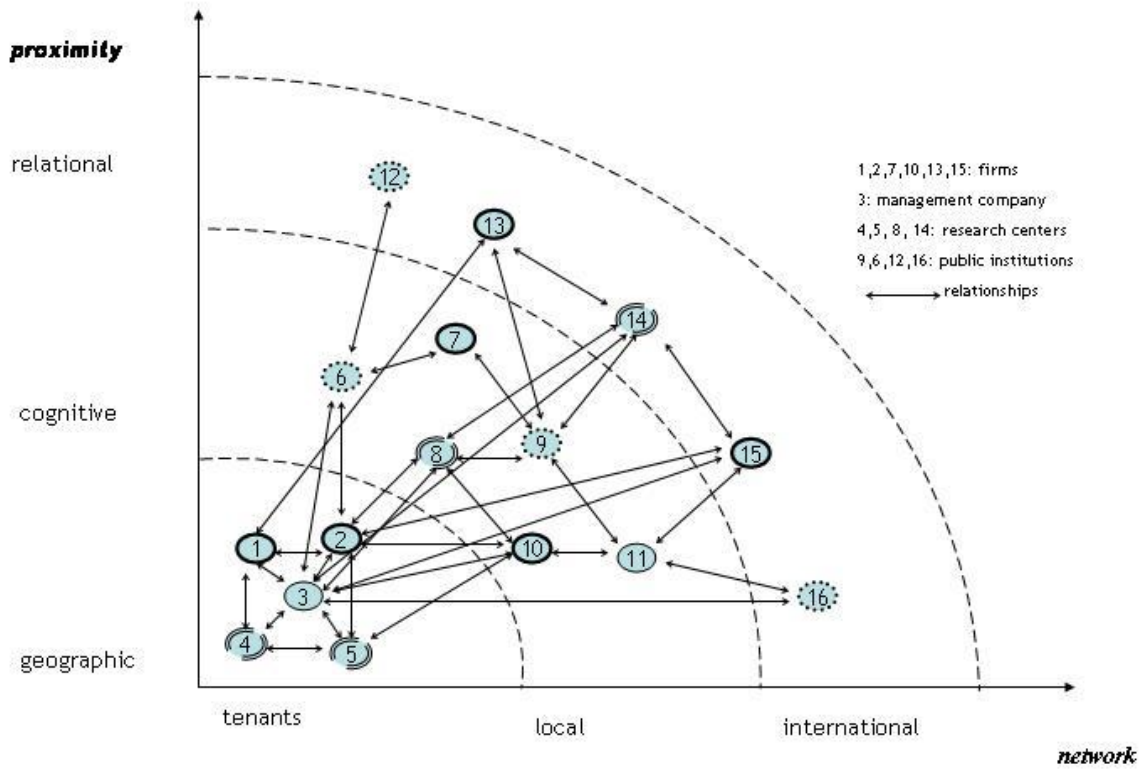
P1: The STPs support the interrelationships among heterogeneous actors, facilitating resource sharing and competence combining at the basis of knowledge exchange and, consequently, at the basis of the learning network.

The STPs' activities are developed through the support of other STPs and involve different competitors from a co-operative perspective. The Domotics Project is realised by AREA together with Friuli Innovazione. The strategy is to pursue both the aim of integrating the technologies available in a competitive key and expand domotics' technology to the wider industrial world. Similarly, Intellimech is co-managed by Kilometro Rosso and POINT, another STP in the Lombardy region.
Through such cooperation, STPs operate in order to support the spread of innovation in a local area and thus the development of the local economy. Through the Domotics project, AREA—as well as Friuli Innovazione—promote the development of local industry that is very interesting for the FVG region. In the same way, KR through Intellimech supports mechatronics, the key industry for the territory, while Como NExT promotes the home living context.
The second proposition becomes:

P2: Through the STPs, the competition among firms becomes co-operation between competitors while considering different STPs. Promoting this cooperation, STPs take on a key role in the local business development.

Furthermore STPs develop relationships also with actors that belong to different geographic area.
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 1 – Network and proximity



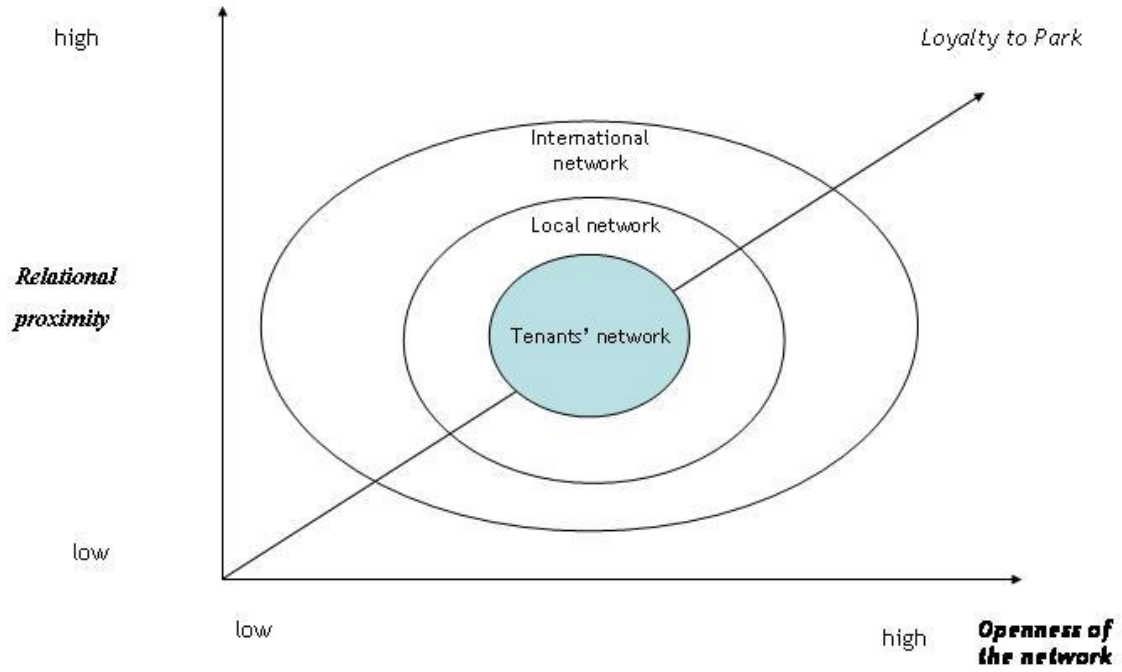
The third proposition is so synthesised:

P3: 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 relational proximity.

As emphasised in the following figure (figure 2), increased relational proximity and the openness of STP networks support the outlining of a loyalty of firms and organisations to STP. This consideration is related to the tenants' area, local area, and international area. Relational proximity is influenced by commitments. Lenney and Easton (2009)[50] consider commitments concept as agreements made between actors and range from the specific and everyday to the general and strategic. Fulfilling commitments involves the use of resources that are many and varied.

Figure 2 – Relational proximity and network openness

[50] Lenney, P. and Easton, G. (2009) Actors, resources, activities and commitments, *Industrial Marketing Management*, 38 (5): 553-561.



In addition, the development of interconnected relationships is strictly related to interactive 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. These flows of knowledge are the constituents of a regional innovator network when instances of collective learning are aggregated at the regional level. From a broad perspective, collaborative learning is strictly 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)[51]. Collaborative entrepreneurship is more focalised on value generated by external knowledge. Thus, the interconnected relationships outline a relational embeddedness and a network embeddedness as the development of a firm depends on the development of its network (Echols and Tsai, 2005)[52].
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. The proposition can be summarised as follows:

P4: STPs allow tenants to benefit from the shift from geo-spatiality to relational spatiality.

Supporting networking in the relational perspective, STPs allow the transformation of knowledge and the launch of innovation to the market. STPs support geographic proximity in order to create an environment that promotes collaboration, technology transfer, and innovation (Vedovello, 1997[53];

[51] Miles, R, Miles, G. and C. Snow, 2006. Collaborative Entrepreneurship: A Business Model for Continuous Innovation. *Organizational Dynamics*, 35: 1-11
[52] Echols, A. and Tsai, W. (2005) Niche and Performance: The Moderating Role of Network Embeddedness. *Strategic Management Journal* 26: 219–238.
[53] Vedovello, C. (1997). Science parks and university-industry interaction: geographical proximity between the agents as a driving force. *Technovation*, 17, 9: 491-502.

Hansson et al. 2005[54]). The innovation is generated within synergies produced through interaction among tenants as well as between tenants and outsiders, in an open network perspective (Lofsten and Lindelo, 2002[55]). Through these collaborations, STPs explain their role related not only to technology transfer, but also to economic development, supporting the creation of start-ups and new firms by improving the performance of the local economy.
STPs operate in order to turn ideas into projects and research into products. STPs promote a shared commitment to innovation. STPs can be considered technological hubs that collect several organisations among them, thereby serving as catalysts that support the spread of innovation through different geographic and relational perspectives. The proposition can be synthesised in:

P5: STPs are not only intermediaries, but also generate innovation-learning networks that create benefits for each knot of the network.

7. Conclusions

The development of innovation is based on a cooperative approach that allows for the sharing and combination of tangible and intangible resources in order to reach a competitive advantage. From this perspective, R&D activity requires focusing attention on interconnected relationships that outline the innovation network based on the involvement of firms, institutions, universities, and research centres. In this network, STPs play a key role as relationship facilitators. The STP role is not limited to real estate operations or the development of tenants; indeed, the analysed STPs are able to support the development of networks that include tenants as well as local and international actors.
Through the action of STPs, the geo-spatial proximity can become relational-spatial proximity based on a convergent vision, which enables several organisations to benefit from combining resources that belong to different spaces in order to transform knowledge and develop innovation. From the relational proximity perspective, the growing loyalty of tenants and other organisations to the Park is based on the openness of the network and on the convergence of their visions. These dimensions support long-term relationships that generate value for the network and for each knot.
The main drivers of STPs performances are related to their ability to support and manage network relationships, as well as to the collaborative entrepreneurship that characterises the management company and that this one promotes among the actors of the innovation network. This allows achieving efficiency and effectiveness objectives. From this standpoint, STPs should be considered the driving force for the development of the innovation-learning network.

[54] Hansson F., Husted, K. and Vestergaard, J. (2005). Second generation science parks:from structural holes. jockeys to social capital catalysts of knowledge society. *Technovation*, 25, 9: 1039 - 1049.
[55] Löfsten, H. and Lindelöf, P. (2002): Science Parks and the growth of new technology-based firms -academic-industry links, innovation and markets. *Research Policy* 31: 859-8.