

The technology transfer in network perspective. The case of Torino Wireless Technological District

Abstract

The Italian industrial districts are characterised by a fully concentrated structure (Cedrola 2005), where all the predominant activities are kept in a sole area, allowing firms to operate under special conditions and creating a sort of shield. In a traditional point of view, intra-district relationships allow firms to develop resource sharing. All firms need resources in order to operate and develop a supply system (Ford et al., 2003) but not a single company has all the knowledge, competencies, expertise and resources to bring about innovations. This fact accelerates firms accessing external sources process (Lam 1997).

The technological district is based on a “scientific production chain” which is different from the traditional production chain of the traditional district, and it is considered as the regional aggregation of high technological activities, including research activities and industrial production. In this context relationships allow knowledge and technology transfer.

This working paper aims to understand if the belonging to a geographical organization (the district) could affect a technology transfer among actors and how this process occurs. We will consider the points of view of different actors in the network (district’s technological foundation, firms and research institutes), since we suppose that the different actors interpretations could affect the effectiveness of technology transfer in relationships.

As empirical evidence, we will analyse Torino Wireless, recognised as the first Italian technological district centre of excellence. The research is still in progress and, at the moment, we are deepening on the role of Technological Foundation.

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Introduction

The Italian industrial districts are characterised by a fully concentrated structure (Cedrola 2005), where all the predominant activities are kept in a sole area, allowing firms to operate under special conditions and creating a sort of shield. Here, distinct capabilities are based mainly on the ability (of firm and its resources) to produce specialized and protected (“embedded”) solutions. In this context vertical dual links are vital to the success of the firms involved in the district.

These existing vertical links along the value chain (production network), and the related advantages, can be hardly reproduced outside the district, and in particular abroad.

In districts, through resource sharing and relationship development, actors realize solutions to support knowledge and the experimentation of new technologies. All organisations need resources, in order to operate and develop a supply system (Ford et al., 2003).

A particular type of district, in which technology is a key resource around which relationships between actors are created, is the technological district.

The technological district is based on a “scientific production chain” which is different from the traditional production chain of the traditional district, and it is considered as the regional aggregation of high technological activities, including research activities and industrial production. The empowering of the technological district will allow the valorisation of networking. In technological districts we can consider the actor of the “production chain” but also different types of stakeholders, and other actors belonging to the same sector and/or to different sectors.

The technological district is characterised by labour division among local firms united by production interdependences, and by a local accumulation of knowledge and competences. The interaction between production and the social educational system generates opportunities for the local area.

The main objective of this working paper is to investigate if and how the belonging to a geographical network supports technology transfer among actors. Considering the properties of districts, particularly the technological ones, we want to study how the different actors consider the impact of the district organization on actor bonds, resource ties and activities patterns.

For an empirical evidence, a case studies analysis will be reported. This method was commonly and successfully used in the study of business networks, particularly in the IMP tradition (Halinen and Törnross 2004).

Yin (1994) suggests that case study research suits well to the examination of why and how contemporary, real-life phenomena occur. Within these research situations the boundaries between the phenomenon and its context are not clear cut, and multiple sources of evidence are used.

This methodology allows to capture the dynamics of the studied phenomenon, providing a multiple point of view of situation or of the studied object in a specific context (Halinen and Törnross 2004, Easton 1995).

Precisely, we will analyse the case of the Technological District of Torino Wireless, recognised as the first technological district centre of excellence. First of all we provide an overall overview of the district (history, characteristics, evolution, principal actors, main outcome, etc.). In a second step of research we will deepen the following actors perspectives: the district foundation, firms and research centers.

Single case study is particular adequate when the boundaries evolve during the analysis. The task of the analysis is often to progressively construct the context and boundaries of phenomenon, as theory interacts with empirical observation (Dubois, Araujo, 2004). In a first stage of research we conducted semi-structured interviews to the Torino Wireless Foundation’s referents of SME Coaching Department and of Communication area. At the moment the empirical research is still in progress.

1. INDUSTRIAL DISTRICT VS. GROUP OF FIRMS

Management literature which deals with industrial districts follows two main points of view: The first is firm-centric and the second is district-centric.

The first view is supported by Ferrucci and Varaldo (1993). They consider the firm and its strategic behaviour as the units of analysis that represent the key variables which are necessary to understand the development of the district.

Beccatini (1990), instead, sees the district first of all as an homogeneous system, where common values and views are shared on family, work, interpersonal and market levels and constitute the basis for the creation of the system and for its reproduction.

The district-centric view is supported by Dei Ottati (1995) as well, who states that a high level of trust, deep-rooted knowledge about production processes, the presence of strong social ties and a strong reputation,

constitute a sort of communitarian market. In this market cooperation and competition reinforce reciprocally and agreements among firms are coordinated by mutual commitment, building a dynamic equilibrium capable of recreating the conditions of success.

Districts are defined by Corò and Grandinetti (2001) as “peculiar organizational forms of the business/economic activity characterized by the presence of a great number of small and medium enterprises, vertically and horizontally specialized, and by a structure of relationships generating on the territory a wide and integrated basis of competences and an efficient coordination system”.

The district is a closed but dynamic system, where the continuous birth and death of firms can be observed as a consequence of mergers, splits, spin-offs, etc.

Belussi (2006) provides a classification of districts dividing them into four typologies:

- canonical Marshallian district: characterized by the presence of only SMEs, family-owned with strong communitarian practices and limited external links (Val Vibrata textile district)
- satellite districts : where there are both external firms and large firms; socio-economic links tend to be less important and there are limited external links other than from subsidiaries of MNCs located in the district. The biggest firms have central positions in the local network (Timisoara footwear district in Romania)
- science and technology based districts: they show a high variety of large and small firms characterized by a strong social community and the presence of (technical) Universities and Schools, R&D laboratories and government research agencies. The strongest links are external sources of knowledge (Biomedical district of Mirandola)
- evolutionary post-Marshallian districts: there is a dual system, large firms (normally technical and market leaders) and a multitude of SMEs. Strong communitarian values and many supporting agencies active in the creation and development of external links are present (Montebelluna sport system district).

Most firms located in the Italian districts are relatively small, organizationally simple and mainly family-owned. The versatility and multiplicity of these firms have been the key elements of their success, enabling them to compete in different constraints and conditions (Baker 1992).

In fact, their prosperity depends on the manufacture of customized products that contain substantial design elements, which for many years allowed them to face the competition represented by mass production companies.

District firms can be grouped into four main typologies (Cantone 2005):

- Leading firms: they are able to exist in the market autonomously, having developed competences which aliment sustainable competitive advantage on competitors. Their most important characteristic is their ability to coordinate the network.
- Trained firms, which cover marginal spaces left by direct competitors; they tend to imitate rival products, trying to obtain cost advantages.
- Specialized firms, that focus particularly on special production phases, but operate with a limited autonomy in the creation of a competitive strategy. They strictly collaborate with leading firms and contribute to their competitiveness.
- Closed firms; they operate as sub-contractors without being connected with a single customer. They are fundamental to assure the flexibility and cheapness of the district system and they can be easily substituted because of the instability of their relationships with buyers and the difficulties to expand their production competences.

District firms are particularly able to process the feedback received by other connected firms, thanks to their ability to observe and copy success stories with care and creativity (Brusco 1999).

According to Belussi (2006), there are increasing feedbacks driven by the systemic properties embedded within local systems, and precisely:

- reductions of transaction costs;
- innovation and technological development depending on local knowledge interactions;
- reduced costs through effective learning (learning by imitation and emulation);
- benefits deriving from localized external economies (specialized labour market, specialization created by the increased local division of labour, and presence of competent specialized suppliers);
- first mover advantages from the initial territorial specialization;
- benefits of being customer-driven organizations.

The increasing tendency towards an increase in industrial district concentration leads Brioschi et al. (2002) to develop the concept of district group, as “a plurality of firms located within the district and operating in the reference sector of the district”.

The first research on this theme was provided by Balloni et al. (1997), with reference to the Marche Region.

Results showed three main characteristics of the groups of firms: close relationships between the activities of the originator firms and the other groups of firms, growth of the groups through the creation of new companies in similar or complementary activities and, finally a decreasing degree of separation between property and control.

These groups are emerging not only among big firms but also among small firms and SMEs. In fact, through the foundation of groups, small firms can overcome their size limits and face the increasing market competition (Cedrola 2005)

Summarizing the advantages related to the creation of groups of firms, we can mention:

- lower domestic competition that allows to converge efforts towards global competitors
- an enlargement of the production line
- a rationalization of the production chain
- the specialization of tertiary functions
- international development.

On the contrary, as far as the entire district is concerned, benefits consist of a greater concentration of the district turnover and of the increased value of the district (Corò and Grandinetti 2001).

According to Brioschi et al. (2002), the existence of district groups, that introduce some forms of hierarchy, alters the nature of the district. On the contrary, from another point of view, they are a powerful element of continuity, as they provide a competitive edge for the district and for its firms.

2. DISTRICTS AS NETWORKS

Boari and Lipparini (1999) underline that there is a tendency by district firms to aggregate themselves in groups, networks and constellations.

Districts can be distinguished from the other network systems for some features (Antonelli et al. 2004):

- the concentration in a limited area of multiple activities that constitute a specific value chain;
- the presence of an integrated local community, composed by both firms and non-economic institutions with robust communitarian ideals and social homogeneity;
- the circulation of knowledge and competences among the actors of the district;
- the specialization of production units in single phases of the production process.

In this particular typology of network system, various processes co-exist: specialization, emulation, imitation, learning and innovation, all characterized by both cooperative and competitive relationships and fuelled by communication flows among firms (Corò and Grandinetti 2001).

A firm should consider the network of relationships in which it operates. The relationship is bi-directional: the firm, with its decisions, influences the network, and the network, at the same time, influences the behaviour of the firm.

Naturally, relationships among firms follow complex logics of interaction, including both cooperation and competition elements, the so called “coopetition” (Bengtsson and Kock 2000). Localization fosters cooperation and competition among firms, supporting the competitive advantage of both district and individual firms (Boari and Lipparini 1999).

Networks help small companies “think and act big” (Selz 1991), allowing them to access knowledge, resources and customers that might only be available to larger firms. Geographic proximity simplifies knowledge transfer and technical exchange among firms (Marshall 1920).

They benefit from the local networking activity, since they do not have the organizational resources which are necessary to exchange information (Almeida and Kogut 1997) and their technological and business systems are usually very simple.

Through the network approach firms can start to change their strategies and exploit the national and international relationships of the network of which they are part. SMEs which join inter-organizational networks can access resources which belong to third parties connected, directly or indirectly, with the firm without changing radically their structure and minimizing the disadvantages deriving from their limited dimensions (Rutashobya, Jaensson 2003). Moreover, Provan and Human (1999) underline that network participation provides an opportunity for SMEs to learn about their own capabilities and competitors in ways which are not available through market arrangements.

The district can be characterized by different typologies of networks with different structural features, depending, for example, on the presence of a focal firm or on the degree of formalization of contacts. In any case, they share a common effort in the coordination of reciprocity, reputation and trust (Soda 1998).

Finally, industrial districts are not homogenous and static entities but they develop and change in the course of time. According to Whitford (2001), recent developments in industrial districts do not fit into the ideal district model since the local production system has gone through a process of transition.

3. TECHNOLOGICAL DISTRICTS: AN OVERVIEW

Among the various typologies of districts introduced in the previous paragraphs, we will now focus on technological districts. These forms of organization, although they preserve the typical features of district reality, have some peculiarities, on the level of actors, resources and activities, which we think deserve more attention, as they are strictly related to the prevalence of a network logic.

Technology Districts are “local-regional aggregations” of high-technology content activities, as they include both research activities and industrial production. Technological districts repeat virtuous district dynamics and, specifically, the features which the technological district and the traditional district side by side are:

- competitive and cooperation dynamics, that support cost reduction and innovation development (Dei Ottati, 1994);
- high horizontal-vertical mobility of the labour force that supports knowledge sharing and entrepreneurship;
- and local intangible resources, such as know-how and culture, characterized by cumulative processes and spill over.

From the comparison of the traditional district with the technological district, however, a series of significant differences emerge.

As Beccatini said (1989, 1990) industrial districts cannot separate economic-production perspective and social perspective. The social capability is based on involvement of local community in labour division. The industrial district is based on formal and informal relationships and it is founded on values and on a cognitive system. Technological Districts, on the other hand, require more specialized and qualified resources (Bellandi, 2003), as the profiles of human resources are characterized by a high specialization of skills and competences. Consequently technological district involves a limited group of human local resources.

In addition to this, in industrial district intra-district relationships can guarantee flexibility in production and competitive advantage but inter-district relationships are not considered as relevant. Differently this type of relationships are considered very important in technological district. This consideration is generated by “scientific chain” on which technological district is based, and that involves also actors belonging to different sectors and different state. These actors are characterized by a different nature as we can find public and private organizations.

Moreover, unlike the traditional district, the technological district is born from a “top down” process as the public “actors” play a leading role in the individuation of the potentials of the territory and in the subsequent choice of the area of district specialization. The process of constitution that characterized the Technological District is less bottom up as the local government plays a crucial role in the identification of the area of District specialization, identifying the potentials of the territorial area.

Moreover, another main characteristic of technological districts is the presence of both public and both private research centres. There is also a relevant presence of projects to support start-up and financial services for highly innovative solutions.

Due to these considerations Technological districts are viewed as environmentally based on relationships elements that influence the production and diffusion of new knowledge and technologies. In this perspective, according to Lazzeroni (2004), technological districts are characterized by factors that influence specialization in high technology (as consistency of high tech sector and sector with a high technology level) and by factors that provide information on innovation considering specialized human resources, universities and research centres and entrepreneurial culture, the industrial atmosphere embedded in the territory.

Through relationships actors can access resources of other actors and realize increased value solutions. A large number of recent studies on industrial districts have emphasized the capacity of districts to support processes of knowledge acquisition and innovation as the basis for the creation of competitive advantage (Mac- Kinnon et al. 2002).

4. LOCALISED RESOURCES TO SUPPORT JOINT LEARNING

Helmsing (2001), quoting Lawson (1999), describes learning in Industrial district as the “emergence of basic shared knowledge and procedures among a group of geographically close firms that facilitate co-operation and problem-solving”.

Geographic and psychological proximity among firms facilitates firms' learning, including the rival ones (Loasby, 1998: 175). This may also increase potential learning for the industry as a whole. Considering territorial differences, the agglomeration of firms can be positioned in the market firstly as the network collective image, and then as the firm's specific image (A.Gurrieri, L.Petruzzellis, S.Romanazzi: 2).

In this perspective inter-firm interaction is based on embedness (Granovetter, 1985), through which a firm becomes part of the local structure, involving the creation of social ties with the local environment (Jack and Anderson 2002).

In technological district we can find both social and technological ties. In fact at a first step of analysis, "making sense of IT in business networks requires getting deep into a sub-micro level of analysis in order to understand how IT interplays with specific resource in business networks" (Baraldi, 2002). In addition to this, it also requires being broad, at an inter-firm and network level of analysis, "in order to understand how IT interplays with the informational dynamics that involve dyads of firms and whole business networks" (Baraldi, 2002).

In this perspective we can consider technology as knowledge, associated with practice and communities of practitioners (Araújo, 1998: 330). As a consequence the notion of agglomeration becomes a set of connected relationships, differentiated and changing continuously towards knowledge communities. In this context, the geographical proximity influences relationships dynamics, supporting and generating the access to knowledge. Through interconnected relationships firms can generate joint learning (Håkansson, 1993) or interactive learning (Lundvall,1993). Those type of learning require stability and a degree of continuity of association among firms and, at the same time, continuity of association helps firms to specialise them self. Firms will need to interact with the counterparts over a period of time, to evaluate what counterparts can offer.

Analysing the two network paradox - "The network simultaneously enables and restricts a company", "relationships are developed and defined by companies but companies are also developed and defined by relationships" (Ford, Gadde, Hakansson, Snehota, 2003: 27 - the process of learning has to consider relationships within the network, but in an open perspective (Holmen, Pedersen, 2003).

"The development of a specialised skill depends on a variety of experiences, but a variety that can be encompassed within a network of connections" (Loasby, 1998: 156). The growth of knowledge within any firm requires a degree of closure and agreement, which limits the range of variations that can be successfully pursued (Loasby,1999). Consequently the overall growth of knowledge requires further sources of variety, allowing a broader set of combinations and recombinations that can be successfully accomplished within firms. Moreover, each relationship can be developed both inside the network context and with actors that potentially coming to contact with the Network Horizon. These relationships can be connected to other relationships and so firm's network can be characterized by a wide network horizon (Holmen, Pedersen, 2003).

This means that aspects related with the trajectory (or path) of firms, like vertical integration, subcontracting, promotion of joint actions, and access to other institutions (e.g. technological centres) are set in the context of a network of relationships.

Joint learning also requires special indirect capabilities that involve mutual learning about how to use the resources kept by the counterparts. Furthermore those capabilities helps the development of technical knowledge and communication codes. Nooteboom also notes that "reputation, trust and bonding are best achieved in a small spatial environment through specific relationship investment" (1999: 141-142).

4.1 KNOWLEDGE AND TECHNOLOGY TRANSFER: THE FRICTION IN THE INTERACTIVE PROCESS

In the "4-Resources" model, resources are articulated in organizational/social, namely organizational units and business relationships, or technical/physical, namely products and facilities (Baraldi, 2002).

The four 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). Resources are adapted to each other, the features of one resource become embedded into other resources (Håkansson, Waluszewski, 2002:18).

Analysing organizational unit we can also consider how resources have been combined and the development of co-operation process. As it entails mutual commitment over time a relationship creates interdependence, which is both positive and negative for the parties involved. A relationship develops over time as a chain of interaction episode – a sequence of acts and counteracts. It has a story and a future. In this way a relationship creates interdependence as much as it is a way to handle interdependence (Håkansson, Snehota, 1995:25).

The interaction processes develop and establish the interfaces among the activated resources. Those interfaces, determining the use and the value of resources, outline the features of those last ones. The interface features are the result of interaction processes over time, “in which resources have been systematically related and where a solution of how to combine them has been gradually chiselled out” (Håkansson, Waluszewski 2002). Resources’ interface is the result of previous interactions, considering both the interaction processes and the other related interfaces. Friction, as a force influencing the activation of other interfaces, can have a strengthening effect on certain aspects in a process of change.

Due to the interdependence of resources, such processes can influence each other in different ways. When processes are connected, new interdependencies can be created and existing interdependencies can grow stronger, but they can also decrease or even dissolve (Håkansson, Waluszewski 2002).

The interdependencies between interfaces generate reaction in network, being a friction that disconnects the effects from the original force.

In IMP perspective we can find that in technological district the process of friction for resource interface is very significant, because they require particular specialized knowledge. We can find this process in the technology transfer. This one, that can be realized both at intra-organizational and inter-organizational level, represents a complex process that involves many organizational different stages. It is necessary to analyse their different dynamics in order to realize the total value of technology.

Generally in technology transfer people consider only the scientific knowledge and technology issues, neglecting important aspects such as relationships with partners (Dudley, 2006). Taking into account only one of this aspect means having a partial view of the problem.

As a consequence, excellent competencies and abilities or high level of innovation may not be enough to reach a competitive advantage: in order to realize an effective technology transfer it is crucial the capacity to create and maintain relationships characterized by trust and commitment.

In Williams and Gibson approach (1990) technology transfer is considered as a communication process that, to be effective, need to overcome some barriers (formal and informal): different languages, motivations, styles, cultures, incentives, etc. According to a communication based perspective, technology value depends on how actors interpret information. Reciprocal feedbacks among actors helps the convergence towards important relationship dimensions. This approach is simultaneously demand pull and technology push.

Furthermore it is relevant to mention the two variables that according to Cesaroni (2005) affect technology/knowledge transfer: the market in which the firms operates and the degree of technology codability.

Considering technology as a knowledge, we can investigate the transfer of this resources within industrial district. Keeble and Wilkinson (1999) identify three major mechanisms for the spatial transfer of knowledge within the boundaries of an industrial district:

1. inter-firm mobility of the labour force within the district;
2. interactions between suppliers and customers, the makers and users of capital equipment
3. spin-off of new firms from existing ones, universities and public owned research laboratories.

Moreover in industrial districts the processes of knowledge transfer create cumulative local know-how that goes over the boundaries of the firm but remains within the spatial boundaries of the district (Capello 1999).

The modality of information, personnel and resource transfer distinguishes the Italian industrial districts from other typologies of districts, such as the Silicon Valley ones. In the first case, information circulates mainly through personal and family ties, while in technological districts information spreads through professional networks. Also in this case without an interaction logic there are many barriers to knowledge sharing among network members (Helmsing 2001) and the necessary condition to create this logic consists of the belief that cooperation and knowledge sharing can create value. If relationships are based on trust and reciprocity it will be easier to transfer distinctive knowledge and resources. In fact, the presence of trust among firms allows them to share valuable knowledge and to accept the risk of spill over to competitors (Dyer and Singh 1998) in a cooperation perspective. This perspective outlines a collaboration atmosphere in the district-network, promoting a management approach of win-win relationships, a modality which is influenced by relationships and which influences them as well. Cooperation can be considered as the willingness by both parties to work towards common benefits or as “an attitude towards joint work” (Hallen and Sandstrom, 1991). This joint work provides benefits to both parties (at some stages).

Therefore, in social network perspective, knowledge and technology cannot be considered as resources of the single firm as the sharing of these resources among the actors of the local area generates some externalities (spill over). Considering local districts, it is possible to find localised knowledge spill over, through which innovative knowledge overcome firm boundary. The properties of knowledge generate its imperfect degree of appropriateness (Arrow, 1962), and in this way the R&D investments generate positive externalities (Audretsch et Feldman, 1996).

Co-localization generates relevant effects. Local spill over is generated by a formal network of knowledge. As Cohen et Levinthal (1990) stated, the ability to absorb supports the use of knowledge resources with a combination of innovative knowledge and internal competences.

Marshall Arrow Romer's Model considers spill over of localized knowledge but only in firms that operate in the same area. According to Jacob (1969), the highest performance in a concentrated industrial area, comes from the possibility to internalize, recombining, the innovative knowledge which belongs to other sectors. In the ICT sector, an economic impact may be carried out in other sectors.

The geographically situated clusters of productive activities exploit the advantages deriving from the processes of external technological absorption. In social network perspective, spill over induced by forms of tacit knowledge between the units represent the competitive advantage of networks, considering relation between the division of labour and spread of knowledge. Spill over not only contribute to the competitiveness of firms but also of local area (Gurrieri, Petruzzellis, Romanazzi, 2006).

5. TORINO WIRELESS TECHNOLOGICAL DISTRICT

Torino Wireless is the first technology district in Italy to provide central coordination in order to constantly and coherently dialogue with other districts in the world.

The Torino Wireless District combines the most relevant ICT players in the Piedmont region in a shared system of values, strategies, and actions in order to increase the competitiveness of the territory, through a strong integration of research and development (R&D), entrepreneurship and venture capital.

The effort is focused on the creation of a "virtuous circle" where excellence in R&D, the creation of new entrepreneurial activities and the growth of existing ones, and the availability of funds are closely interconnected.

The main aims of Torino Wireless are to favour synergies among public and private players coming from research, entrepreneurship and finance, guaranteeing a direct connection between the development of research activities and market evolution, creating a shared set of values and behaviours.

The technological district favours the circulation and the sharing of knowledge, within Italy and with international leaders in this field, and develops a precise identity for the Cluster and an international brand.

We now present the macro network Torino Wireless Districts and the micro network of SME project, focusing on actors involved, resources developed and activities realized.

We have elaborated the case in a qualitative research approach based on the Grounded Theory. In a first stage of research we have conducted semi-structured interviews to the Torino Wireless Foundation's (referents of SMECoachingDepartment, and referent of communication area). In the second stage of research we will consider different point of view investigating relationships among firms and research centres.

5.1 LOCALISED NETWORK

The characteristics of Turin and the Piedmont region have led to the creation of the technological district Torino Wireless. Universities and research centres are capable of high quality research and are able to provide the market with innovative technical and scientific knowledge and highly skilled human resources. We can find over 2,000 ICT researchers (almost 20% of the Italian total), 700 of whom are in the wireless area. In this context there are world class big ICT companies, and more than 6,000 small and medium enterprises (SMEs).

In the district there is the availability of public and private funds to support both research activities and the creation of new entrepreneurial initiatives. It is possible to find the support of local government to create the best environmental and infrastructural conditions for new enterprises

In this context the District dedicated to ICT, focuses on wireless, a central area of the ICTs and of the economy of the Piedmont region.

Collaboration with research entities enabled to organize various competences and knowledge present on the territory, in order to implement specific projects of common interest. The ability to network, share knowledge and competence, determines a competitive position to the territory supporting innovation diffusion. The main projects developed by Torino Wireless in this area are:

- 1) Torino Wireless Network brings together the companies in the Cluster. It promotes opportunities for cooperation between companies, and interaction between them and other Italian and international districts. Researchers, entrepreneurs, venture capitalists, potential customers and suppliers can all consult the fact files about companies in the Network. Each fact file indicates their ICT sector (application developers, platform

developers, software, components/equipment, electronics/microelectronics, services), their end market and the technologies they use.

2) Cluster Towards greater competitiveness of infomobility in Piedmont. In the framework of systemic actions to support the growth of companies, the Torino Wireless Foundation launched in October 2005 Infomobility Cluster, a pilot program aimed at developing the infomobility sector. The Infomobility Cluster project operates to achieve a wide analysis of infomobility services, to detect strategic segments offering greater development potentials for the companies of Piedmont. In addition, the project can trigger concrete actions to stimulate both supply and demand, to favour cooperation among enterprises with complementary abilities

5.2 THE MACRO NETWORK OF DISTRICT: ACTORS AND RELATIONSHIPS

In December 2000, Torino Internazionale invited some of the key players of the territory - the Piedmont Region, the Mario Boella Institute (ISMB), the Unione Industriale (Employers' Association) of Turin and ITP - to discuss the creation of an ICT district in Piedmont and involve them in the Torino Wireless project.

During 2001, several workshops were organised in order to investigate the current ICT situation and the potential development of the District in the Turin area.

In December 2001, all the partners signed the Memorandum of Understanding, which established the common goal of creating the Torino Wireless District.

In 2002, a steering committee was created in order to define the actions leading to the creation of the District and a promotional committee was formed by local institutions in order to provide the necessary organizational structures.

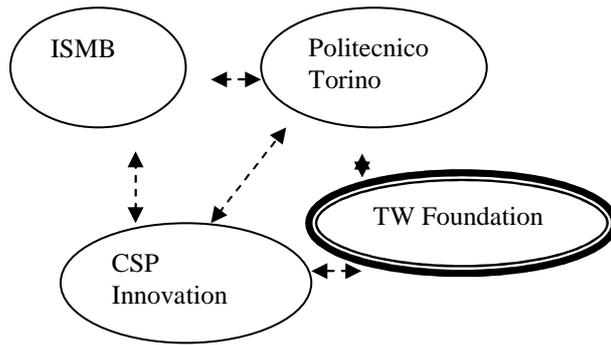
In December 2002 the Torino Wireless Foundation was established.

Full functionality was achieved in May 2003 when the Negotiated Planning Agreement was signed. This agreement defines each partner's contribution to the definition of common actions and plans and confers on the Torino Wireless Foundation the autonomy necessary to carry out the coordination of activities.

The Torino Wireless Foundation has agreements with three entities, that outline the network of TW Foundation (fig.1):

- ISMB-Istituto Superiore Mario Boella: The association "Istituto Superiore Mario Boella sulle Tecnologie dell'Informazione e delle Telecomunicazioni" (in acronym ISMB) was founded on July 2000 by Compagnia di S. Paolo and Politecnico di Torino. On March 2001 ISMB was enlarged to a number of entities having a common interest in research and development in ICT, namely Cerved, Telecom Italia Lab, Motorola and ST Microelectronics. The key goals of ISMB are: building a European ICT pole of excellence in Torino and surroundings; promoting highly innovative projects and integrated programmes in the ICT sector in cooperation with public and private partners; promoting new entrepreneurial activities on ICT topics.
- Politecnico di Torino: the Politecnico di Torino offers excellence in technology and acknowledges its historical context. It promotes the ability to carry out theoretical or applied research, and also the capacity to achieve concrete and reliable productive processes or organise services and facilities. Attention is paid to practicality without forgetting design, and striving for quality while keeping costs under control. At the Politecnico, today's needs are analysed to design a sustainable tomorrow. By the end of his or her degree, a Politecnico di Torino graduate has gained a vast, many-sided range of skills and knowledge.
- CSP-Innovation in ICT. CSP - Innovazione nelle ICT - is the Information Society Technologies innovation and research centre for Piedmont's public administrations. Its shareholders are: CSI-Piemonte, Politecnico di Torino, Università degli Studi di Torino, Comune di Torino, Unione Industriale di Torino, Confindustria Piemonte and Iride Energia S.p.A. Since 1998, CSP has been developing the new mission entrusted to it by shareholders after it concluded its experience as Centro Supercalcolo del Piemonte. CSP has changed considerably in eight years

Figure 1: The network of Torino Wireless Foundation



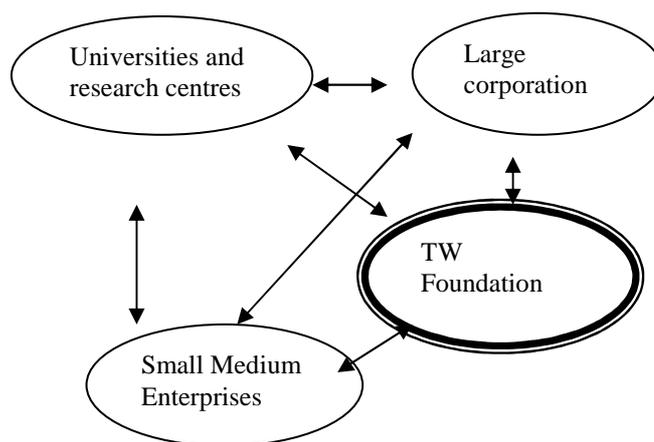
The Torino Wireless district can use the new laboratories created by the Compagnia di San Paolo, the Polytechnic of Turin and the Mario Boella Institute: these 4,000sqm laboratories are the symbol of technological excellence in Turin and the driver for future growth of the city.

Over 200 researchers and PhD students of ISMB and Polytechnic undertake research and higher education activities. Moreover, in these laboratories enterprises are invited to collaborate with the University research system.

The actors involved in Torino Wireless district, that outline a macro network, can be identified in (fig.2):

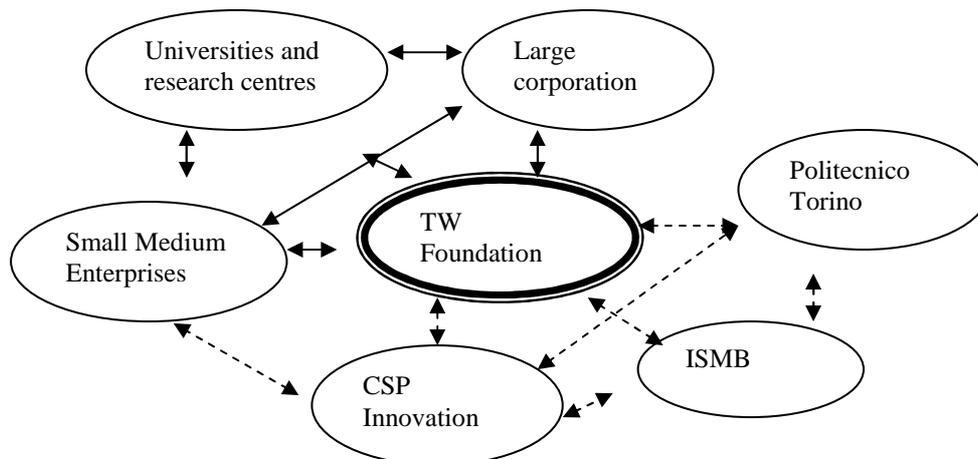
- Universities and research centres: the district of Torino Wireless is characterized by the presence in the region of universities and research centres, to provide scientific-technological knowledge on the specializing sector of the District which is about to be born.
- small and medium enterprises: the characteristics which associate this technological district with traditional ones can be traced back to a strong presence of industry, to receive and utilize such knowledge; a system of small and medium enterprises, play the role of “technology partners” and thus become an interface between universities and larger corporations; ad hoc governance structure, to attract businesses and research centres around high-technology content programmes
- large corporation
- the Torino Wireless Foundation: The District activities are coordinated by the Torino Wireless Foundation, a leading structure that is committed to emphasize resources and knowledge assets already present in the area, by developing the contributions of each player and promoting their integration within medium- to long-term strategies.

Figure 2: The macro network of District



Considering the network as a whole (Fig.3) we can analyse

Figure 3: The global network



Relationships are based on different activity that characterise different actors. Considering the Foundation point of view, this one promotes the growth of the ICT District in Piedmont, in synergy with the other local players. The Torino Wireless Foundation works out the strategic guidelines of the District and fosters synergies among the different developing players, assuring coherence and integration to the ICT development policies of the local area.

The mission of the Foundation is to create and sustain a technological District in the Piedmont Region.

The organisation is subdivided into three main departments:

- one dedicated to start-ups and SME financial support activities, assistance in obtaining funds (investor readiness), and the Foundation’s self-financing activity;
- one oriented towards generation, management and valorisation activities relative to intellectual property and legal activities supporting the Foundation’s actions and “accelerator” organizations
- a third dedicated to company acceleration activities, through the following actions: promotion of research activities, thanks to the activation of specific financing lines and the management of joint research projects between large and small companies; networking and internationalisation, encouraging the creation of relationships between companies, activating company internationalisation and training courses; support for SMEs and start-ups, starting from the selection of companies, their evaluation and the definition of support interventions.

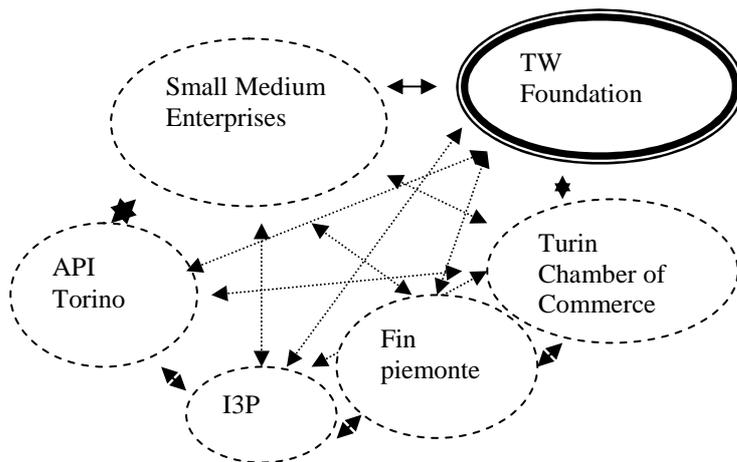
5.3 THE NETWORK OF SME PROJECT: “OPEN” MICRO NETWORK VS “WIDE” NETWORK

The SME Project is the Torino Wireless tool for the acceleration of Small and Medium Enterprises and of the most promising business ideas, in order to facilitate technological and process innovation by providing access to information, knowledge and skills from which SMEs would by their nature be excluded.

The SME Project is directed to all SMEs, whether already existing or potential (start-ups, spin-offs), which operate in Piedmont and are active in the Information and Communication Technology sector (ICT), or which make use of ICT technologies in order to produce innovation.

As far as the technological aspects are concerned, the SME Project involves the Mario Boella Institute (ISMB), the Polytechnic of Turin, the CSP and can engage also other public and private research centres on the basis of their specialization. The project was established with the collaboration of various entities (Fig.4) working with SMEs, such as I3P (the Incubator of Innovative Enterprises of the Polytechnic of Turin), the Turin Chamber of Commerce, the Unione Industriale di Torino (Employers' Association of Turin), API Torino (the association of small enterprises in Turin) and Finpiemonte (the financial body of the Piedmont region).

Figure 4: The micro network of SME project



The SME project is based on *basic intervention*, such as technical and market analysis (industry analysis, technological assessment and study of the competitive environment relative to the technological and product solution developed by companies), search for sources of funding, assistance with transfer of technology, planning assistance and consultancy services. It is also referred to support in marketing and communication strategy definition.

The *Advanced intervention* is referred to applied research projects (once the project with the supported company is ready, Torino Wireless provides researchers and labs necessary to the project realization), prototyping and engineering, field experimentation, business planning and networking. Advanced interventions are positive evaluation of the Evaluation Committee, consisting of qualified experts outside of the Foundation, based on the following criteria: the business's growth potential, the market's growth potential, the degree of technological innovation, potential return on investment for the District

In addition to this the Foundation can support *Education and managerial training*.

For the SME project a key role is assumed by the Networking and Internationalization department, that works together with the other local bodies in order to promote and encourage exchanges between companies and the territory, facilitating an interaction of supply and demand and conveying resources and competences for the pursuit of common objectives.

Torino Wireless Network brings together the companies in the Cluster. It has been set up to promote opportunities for cooperation between these companies and to increase interaction between them and other Italian and international districts. Researchers, entrepreneurs, venture capitalists, potential customers and suppliers can all consult the fact files about companies in the Network, keeping up to date with the latest news and finding out about Torino Wireless Foundation networking activities

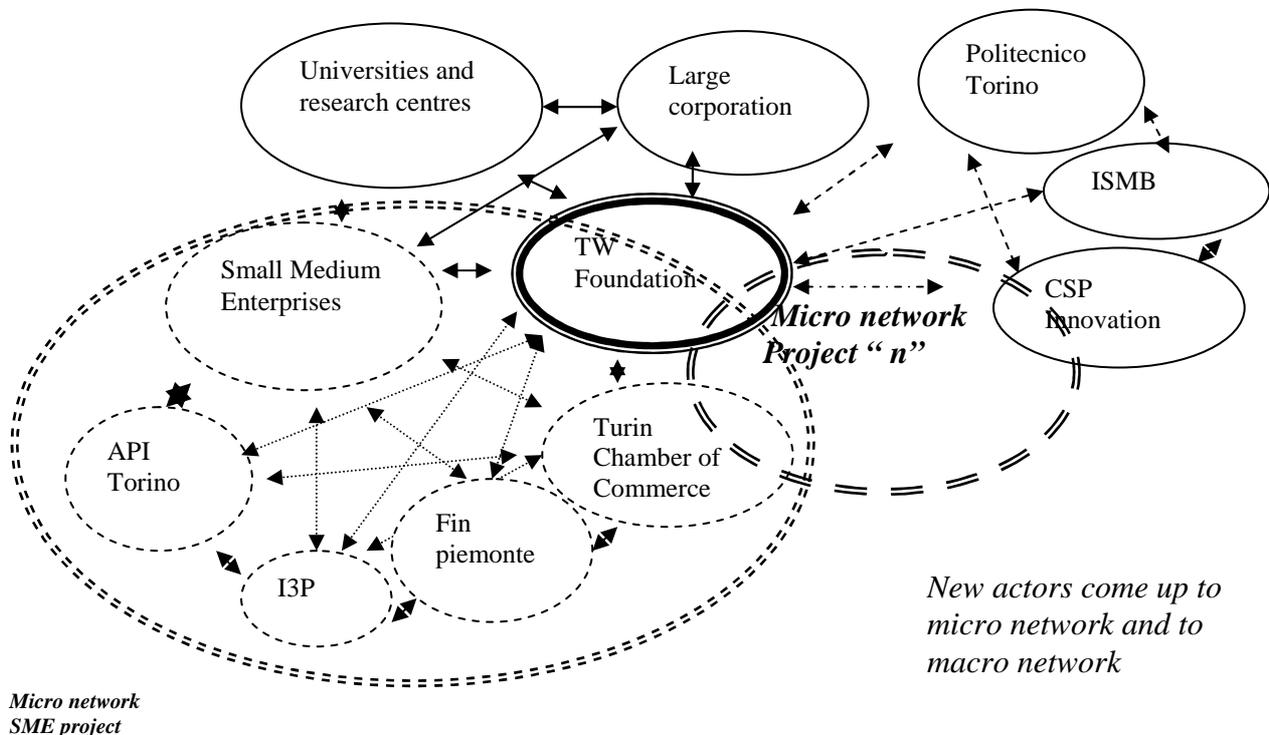
The activities are developed by means of four main themes:

- Torino Wireless Network – information and loyalty-enhancement activities of companies enjoying greater potential, through both the organisation of thematic seminars and study days, informal meetings, participation in trade fairs, and through the creation of a community on the web;
- Clustering activities – study, definition and application of collaboration models between the companies in a chain to jointly develop complex products and services using complementary technologies;
- Sales & Marketing Desk – support in the development of commercial capacities, in the definition of marketing plans and in the opening of commercial and assistance channels aimed at excellent companies in the structuring of a distribution and sales network;
- Business internationalisation – promotion of projects and industrial and commercial cooperation with entities committed to or interested in the development of ICTs also outside the Piedmont Region, in collaboration with other entities in the territory (Piedmont Chambers of Commerce Foreign Centre, Torino Chamber of Commerce, ITP). The reference countries are the USA, France and China and, in 2006, relationships were strengthened with Japan, Australia, Chile and Canada.

The resources committed to the activities of the department are characterized by a complex design management and project planning capacity, ability to evaluate high tech initiatives concerning particularly innovative themes, ability to carry out business analyses and develop business plans, strong interdisciplinarity. Through this analysis we can find macro relationships among actors that belong to Torino Wireless District, and micro relationship referred to SME project network (fig. 5). The relationships referred to micro network

can influence the relationships referred to other actors' of macro network, and can be influenced by them. Considering different project of Torino Wireless it is possible to outline different micro networks, that can influence, and can be influenced, by other micro networks. In addition to this, micro relationships and micro networks can be influenced one another, and can influence/ be influenced by macro network (district).

Figure 5: The micro network of SME project in the macro network of District



In a wide perspective, to realize knowledge sharing and technology transfer, the actors involved in SME project can activate direct relationships between them, but also indirect relationships with other actors that belong to other project and/or to district.

The Foundation activates resources in order to develop project, testing, and control process. These activities belong to SME project action. The development of prototypical phase is essential for product development and partners' trust creation. The sectors involved in prototype process are E-Health, RFID, sensor area, Web & Multimedia, eSecurity, Remote Mgmt & Control, mechatronic, and other projects developed in health, energy and aerospace.

Foundation supports firms also in testing phase, through its competences and laboratories. In this approach the potentialities of knowledge sharing and technology transfer may be increased considering the development of "open" micro network in a wide macro network. In addition to this, also the district can be considered as a "open" macro network, as it can be comprehensive of relationships with actors "near" the district in a local or international area. The networking become the "leverage" to reinforce small and medium enterprises knowledge, and technology as knowledge, and their abilities to manage them.

In this context a key role is played by Torino Foundation that, as a facilitator, supports networking that is at the base of knowledge sharing and technology transfer. In addition to this Torino Wireless Foundation is responsible for initiatives to address research and development activities in the District, and for applied research to increase the excellent competences of the District. Torino Foundation realizes intellectual property valorisation to improve and support innovative development, and supports enterprise acceleration to create and develop ICT companies. The Foundation also promotes the diffusion of innovative financial instruments to sustain the development of the quality and dimension of companies.

In this perspective the knowledge can be considered as a force that influences the existing resources' interface modifying their development's trajectory. The knowledge can be also considered as a resource that can develop new potentialities through relationships among actors, influencing the micro and macro network.

6. PRELIMINARY OBSERVATIONS

Considering that our research is still in progress we decided only to formulate some consideration about technological district and the district foundation perspective on technology transfer in the SME project. Next steps will be to analyse also districts firms and research centres and compare them.

At general level we can observe that in the industrial districts, the social and cultural features of territory influence the economic dynamics and the competitive advantages of firms (Porter, 1998; Becattini, 1991). Spatial knowledge spill over (in social network perspective) is not a natural result of activities concentration but a formal network is the basis for a synergic development of research and innovation. The technology production of a firm does not depend on its activity but also depends on the activity of other actors belonging to the local network or interacting with it. Technological spill over is very important for the growth of local system and for the technological innovation of the firm, but the effect greater if we consider the internal and external firms of the technological district.

Paradoxically, technological spill-overs are born from the anchorage to the local area, but can also develop beyond the boundaries of this area, going beyond sectorial boundaries (thanks to the pervasiveness of technology) and geographical borders (considering the dynamism which distinguishes technology). The interchangeability of technology obliges to focus on the relationships which can develop both between the firms which have ICT as a core activity, and between the firms which carry out activities which require the presence of ICT.

In another perspective, considering technology as knowledge the notion of agglomeration becomes a set of connected relationships, differentiated and changing continuously towards knowledge communities. Through interconnected relationships firms can generate joint learning (Håkansson, 1993).

The growth of knowledge within any firm requires a degree of closure and agreement, which limits the range of variations that can be successfully pursued (Loasby, 1999). Consequently the overall growth of knowledge requires further sources of variety, allowing a broader set of combinations and recombinations that can be successfully accomplished within firms.

Moreover, each relationship can be developed both inside the network context and with actors that potentially coming to contact with the Network Horizon. These relationships can be connected to other relationships and so firm's network can be characterized by a wide network horizon (Holmen, Pedersen, 2003).

In this context in order to realize an effective technology transfer it is crucial the capacity to create and maintain relationships characterized by trust and commitment.

As far as innovation within the district is concerned, we can see how in the traditional district the introduction of mainly incremental innovations prevails, which do not present a break with the previous technological state. This is strictly connected with the slowness with which the process of change take place within these typologies of networks. In districts, continuous and gradual processes of adaptation take place. These behaviour favours incremental innovations and tend to minimize the possibility of introducing radical ones: a consequences is the opening of important gaps between the technological set of competences inside and outside the district (Bianchi 1994).

Usually in districts the leading firms introduce radical innovations, breaking the state of the art and generating a process of discontinuity; these innovations can be applied to any part of the business, from products to processes, from the entrepreneurial formula to the organizational structures and processes.

In all contexts it is difficult to imitate any radical innovation. In a district environment, imitation seems to be more difficult for two reasons: radical improvements tend to be "systemic" (which means that they "touch" a number of elements at the same time) and there is the weakness of a common (business) language between the innovator and the imitator which obstructs a process of innovation sharing (Corò and Grandinetti 2001).

On the contrary, in incremental innovation processes the capability to differentiate products and services is more connected with the cooperation between workers and entrepreneurs than with the level of investments in R&D. Competition based on costs without technological innovation can harm the firms of the district.

With reference to this matter, technological districts, as against traditionally districts, are strongly dynamic and are characterised by rapid technological cycles, which lead to the presence of radical innovations together with incremental innovations. The positive effect which is created in the technological districts as against the traditional districts is the reduced performance differential between the leading firms and other actors that operate in the district. The technological district is based on knowledge sharing and on know how transfer. For this reason the district represents an instrument of high potentials also for the diffusion of a technological innovation, thus increasing the competitiveness of the innovator firm and of the local area to which it belongs.

The development of innovation is also supported by public actors as outlined in the case analysed. Another element which emerges from the analysis of the case is the role played by the Foundation as a public actor

which is able to coordinate the network and favour the exchanges of knowledge and technology within the district, and between the district and the external areas. In fact, in many manufacturing districts network agencies and other organizations of the sector tend to play a secondary role, and are often unable to reach their own aims, due to little trust by the actors of the network and to the usual suspicions towards knowledge sharing. Part of this behaviour can be explained by the nature of the high tech district, in which the combination of various technologies and knowledge becomes an indispensable element for value generation. Another explanation, probably not complementary but alternative, can be found in the larger presence of the State within the district and which, as such, is confirmed in its role as a crucial actor and propelling element of the development of the network.. It appears the relevant role of co-ordinator that supports the sharing of resources (tangible and intangible) among actors characterized by the same “language” based on knowledge and technology sharing.

Analysing the Torino Wireless District it has been outlined the development of “local-regional aggregations” of high-technology content activities. Supporting networking between firms and research centre, the Foundation valorises the local resources, such as knowledge, technology, and their transfer. The SME Project, for example, is directed to all SME, whether already existing or potential (start-ups, spin-offs), which operate in Piedmont and are active in the Information and Communication Technology sector (ICT), or which make use of ICT technologies in order to produce innovation. All those companies which interact closely with the Foundation are members of Torino Wireless Network. They are selected according to their potential for growth, their key market, their technological and innovatory characteristics, and their potential for giving the Cluster a return.

The ability to work in a network, systematising specific competences and knowledge, or creating a critical mass, in an entrepreneurial system characterised by a wide variety of SMEs, is one of the main development opportunities for the territory, since it simplifies access to innovation, stimulates competitive processes and reinforces commercial and design capacities. The district’s activities are based on relationships embedded in the localised network . The foundation encourages exchanges between companies and the territory, facilitating an interaction of supply and demand and conveying resources and competences for the pursuit of common objectives. The organization supports SME in the development of commercial capacities, in the definition of marketing plans and in the opening of commercial and assistance channels aimed at excellent companies in the structuring of a distribution and sales network. The activities of Foundation, in its perspective, increase the value of technological transfer as the organization support the development of relationships and facilitate the activity referred to this processes. Considering results of Torino Wireless Technological District, at the moment 258 enterprises have availed themselves of the support and the technological, managerial and financial services activated by the Foundation. The district attracts financial resources (117 millions euro attracted, of which 32 million euro coming from public investors and 85 million euro from private investors). In the network actors are characterized by a different nature as we can find public and private organizations. The district is born from a “top down” process considering the presence of public “actors”.

In these years the Foundation develops a system approach for SMEs acceleration through 632 interventions and 13,7 million euro invested

The network is developed within local territory but it’s horizon is open to actors that come up to network horizon. The district realizes promotion of projects and industrial and commercial cooperation with entities committed to or interested in the development of ICTs also outside the Piedmont Region, in collaboration with other entities in the territory.

In this perspective we can outline different micro network for each project developed by the District Foundation. The actors that belong to SME project develop direct relationships between them, but they can also develop indirect relationships among actors that belong to different project’s micro network and, in general, among actors that belong to the macro network.

These relationships, based on networking, support knowledge sharing and technology transfer, considering technology as knowledge. This one as a force, influence the resources’ interface as it can modify their evolution trajectory. The knowledge can be also considered as a resource that develop its potentialities through relationships, increasing the value for actors direct or indirect involved.

A key role in the network is taken by Torino Wireless Foundation that, as a facilitator, can co-ordinate different activities and promote innovation.

BIBLIOGRAPHY

- Almeida, P. and Kogut, B. (1997), "The exploration of technological diversity and the geographic localization of innovation", *Small Business Economies*, Vol. (9), 21-31.
- Antonelli V., D'Alessio R., Iuliano G. (2004), *I network system – Un modello interpretativo delle reti tra aziende e non aziende - Evidenze empiriche dal distretto di Solofra*, G. Giappichelli Editore: Torino.
- Araujo LM and Dubois A, 2004, 'Research methods in industrial marketing studies', in *Rethinking Marketing: Developing a New Understanding of Markets*, (eds) Håkansson H, Harrison D and Waluszewski A, John Wiley and Sons Ltd, Chichester, pp 207-228
- Arrow K. (1962) "The Economic Implications of Learning by Doing", *Review of Economic Studies* 29,155–173
- Audretsch D. B., Feldman MP. (1996). "Innovative Clusters and the Industry Life-cycle." *The Review of Industrial Organization*, 11: 253-273.
- Baker, W. (1992), "The network organization in Theory and Practice", *Networks and Organizations: Structure, Form and Action*, in N. NOHRIA and R. ECCLES eds., Boston: Harvard Business School Press, 397-429.
- Balloni, V. and Iacobucci, D. (1997), "Cambiamenti in atto dell'industria marchigiana", *Economia Marche*, 16(1), 29-66.
- Baraldi E. (2002) *Making Sense of IT in Business Networks. A Conceptual Framework on Resources and Information with Empirical Illustrations from IKEA and Edsbyn*, 18th IMP-conference in Perth, Australia
- Becattini G. (1989), "Riflessioni sul distretto culturale marshalliano come concetto sosio-economico, Stato e mercato", 25, 111-128
- Beccatini (1990). G. Beccatini, *The Marshallian industrial district as a socio-economic notion*. In: F. Pyke, G. Beccatini and W. Sengenberger, Editors, *Industrial districts and inter-firm co-operation in Italy*, International Institute for Labour Studies, Geneva , pp. 37–51.
- Becattini G., Sengenberger W. (a cura di) (1991), *Distretti industriali e cooperazione tra imprese in Italia*, Edizioni Banca Toscana, Studi e Informazioni, Quaderni n.34, Firenze
- Bellandi M (2003), *Mercato, industrie e luoghi di piccola e grande impresa*, Bologna, Il Mulino
- Belussi, F. (2006), "On the theory of spatial clustering: the emergence of various forms of agglomeration", in Belussi, F. and Samarra A. eds., *Industrial district, Relocation and the Governance of the Global Value Chain*, Padova: Clueb.
- Bengtsson, M. and Kock, S. (2000), "Coopetition in business networks—to cooperate and compete simultaneously", *Industrial Marketing Management*, 29, 411-426.
- Boari, C. and Lipparini, A. (1999), "Networks within Industrial Districts: Organising knowledge Creation and Transfer by means of Moderate Hierarchies", *Journal of Management and Governance*, 3.
- Brioschi, F., Brioschi, M. S. and Cainelli, G. (2002), "From the Industrial District to the District Group: An Insight into the Evolution of Local Capitalism in Italy", *Regional Studies*, 36(9), 1037-1052.
- Brusco, S. (1982), "The Emilian Model: productive decentralisation and social integration", *Cambridge Journal of Economics*, 6, 167-184.
- Cantone, C. (2005), *Relazione di Carla Cantone, Convegno Distretti e Sistemi Locali-la crisi, le risorse, la prospettiva*, Roma, 13 ottobre 2005, <http://www.cgil.it/settoriproduttivi/index.asp>.

Cedrola, E. (2005), *Il marketing internazionale per le piccole e medie imprese*, Milano, McGraw-Hill.

Cesaroni F., 2005, *Strategie tecnologiche e competitività delle imprese*, Franco Angeli

Cohen W., Levinthal D. (1990). Absorptive Capacity: A new perspective on learning and innovation. *Administrative Science Quarterly*, 35: 128-152

Corò, G. and Grandinetti, R. (2001), "Modalità di apertura internazionale e modelli evolutivi dei distretti industriali italiani", in *Distretti, network e rapporti interaziendali*, G. Ferrero (edited by), Aspi/Ins.Edit: Urbino.

Dei Ottati G. (1994), "Trust, Interlinking Transactions and Credit in the Industrial District", *Cambridge Journal of Economics*, 18, 529–546

Dei Ottati, G. (1995), *Tra Mercato e Comunità: Aspetti Concettuali e Ricerche Empiriche sul Distretto Industriale*, Milan: Franco Angeli.

Dudley J. (2006), "The soft side of technology transfer", *Pharmaceutical Technology*, October

Easton, G. (1995), "Methodology of Industrial Network", in *Business Marketing: An Interaction and Network Perspective*, Möller, K. and Wilson D. T., eds., Kluwer Academic Publishing, Norwell, MA, 411-491.

Ferrucci, L., Varaldo R. (1993), "La natura e la dinamica dell'impresa distrettuale", *Economia e Politica Industriale*, vol. n. 80, pp. 73-97

Ford D., Gadde L., Hakansson H., Snehota I.(2003), *Managing Business Relationships*, 2nd Edition, John Wiley, Chichester

Garofoli G. (2006), "Strategie di sviluppo e politiche per l'innovazione nei distretti industriali", 77-114, in *I distretti industriali dal locale al globale a cura di Quintieri B.*, Fondazione Manlio Masi, Roma

Gurrieri A., Petruzzellis L., Romanazzi S., (2006) *Local Networks to Compete in the Global Era. The Italian SMEs Experience*, 22nd IMP Conference, 22 Milan

Granovetter M. (1995) Economic action and social structure: the problem of embeddedness. *The American Journal of Sociology [AJS]*, 91(3), 481 - 510.

Hakansson H., Snehota I. (1995), *Developing relationships in business networks*, Routledge Edition, London

Hakansson, H. (1993) Networks as a Mechanism to Develop Resources. In P. Beije, J.Groenewegen, and O. Nuys (eds), *Networking in Dutch industries*. Leven- Apeldorn, Garant.

Halinen, A. and Törnroos, J. A (2004), "Using Case Methods in the Study of Contemporary Business Networks", *Journal of Business Research*.

Hallén, L./Sandström, M. (1991): "Relationship Atmosphere in International Business"., Paliwoda, S.J. (Ed.) (1991): "New Perspectives on International Marketing", London: Routledge.

Holmen E., Pedersen A.C. (2003), "Strategizing through analysing and influencing the network horizon" in *Industrial Marketing Management*, n.32

Jacobs J. (1969), *The economy of cities*. Random House: New York

Lam A. (1997), "Embedded Firms, Embedded Knowledge: Problems of Collaboration and Knowledge Transfer in Global Cooperative Ventures," *Organization Studies*, 18 (6), 973-996.

Lazzeroni M (2004), *Geografia della conoscenza e dell'innovazione tecnologica. Un'interpretazione dei cambiamenti territoriali*, FrancoAngeli, Milano

Loasby B. (2004), *Un distretto industriale*, in Bellanca N. Dardi M. e Raffaelli T. (a cura di), *Economia senza gabbie*, Il Mulino, Bologna.

Loasby B. (1998), *Industrial districts as knowledge communities*, in Bellet M. and L'Harmet C. (eds.), *Industry, Space and Competition. The contribution of Economists of the Past*, Cheltenham, Elgar.

Lundgren A. (1995), *Technological innovation and network evolution*, Routledge, London

Lundvall, B.-Å. (ed.) (1993), *National Innovation Systems: Towards a Theory of Innovation and Interactive Learning*, London, Pinter Publishers.

Marshall, A. (1920), *Principles of economics*, London: Macmillan.

Porter M (1998), "Clusters and the New Economics of Competition", *Harvard Business Review*, (November-December 1998): 77-90

Provan, K. G., Human, S. E. (1999), "Organizational learning and the role of network broker in small-firm manufacturing networks", in *Interfirm Networks – Organization and Industrial Competitiveness*, Anna Grandori (edited by), Routledge, London, 203.

Rosenberg N. (1984), "Innovazioni tecnologiche", in *Innovazioni tecnologiche e struttura produttiva* (a cura di) Antonelli G. Il Mulino, Bologna

Rullani E. (2004), *La fabbrica della conoscenza*, Carocci, Roma

Rutashobya, L. and Jaensson, J. E. (2003), "Exploring the network phenomenon among small exporting firms", IMP-conference in Rotterdam.

Selz M. (1991), "Networks help small companies think and act big", in *The Wall Steer Journal*, November 12, B2.

Whitford, J. (2001), "The decline of a model? Challenge and response in the Italian Industrial districts", *Economy and Society*, 30 (1), 38-65.

Williams F. e Gibson D. V., 1990, *Technology Transfer*, Sage Publications: California, pp. 13 e ss.

Yin R.K. (1994), *Case Study Research: Design and Methods*, 2 nd ed., CA, U.S.A., Sage