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The Role of Local Universities in Improving Traditional SMEs Innovative Performances: The Veneto Region Case

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In the Veneto Region, where the empirical analysis has been conducted, collaboration between local universities and traditional SMEs does exist, and these relations are mainly built around activities of process and product innovation of incremental nature aimed at improving firms' performance. However, this paper shows that in this specific Regional Innovation System (RIS) the potential of local universities have for enhancing the absorptive capacity of SMEs is not fully developed. The contacts between industry and university are mainly scattered in a series of individual and isolated initiatives.

Consequently, in a RIS perspective, the results in terms of benefits for the territory are less than what they could potentially be, and there is room for pushing the role of universities further on the path towards becoming territorial developing factories (Lazzeroni, Piccaluga, 2003).

Structures of intermediation like Innovation Brokering Agencies, which have widened their activities in the territory in these last years, can represent the leverage to direct the potential of the universities towards local firms' needs and make the Veneto RIS evolve.

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1. Introduction

Among other activities that overstep universities' traditional role in the educational system, universities are nowadays also recognized as important actors interacting with the industry sphere and sustaining the innovation strategies of firms (Etzkowitz et al. 1998; Etzkowitz and Leydesdorff 2000; Etzkowitz et al. 2000).

In this framework, the role of universities in sustaining firms' strategies is becoming one of the most interesting objects of academic studies, and particularly in the research on national and regional systems of innovation (Mowery, Sampat 2004; Chaminade, Cohenen, Vang, 2007; Benneworth et al. forthcoming). Many researches are also investigating the involvement and impact of universities in regional economic development (e.g. Bellini and Piccaluga, 2001; Delfino et al., 2005). However, most academic research on this topic is still focused on the study of the relations between universities and specific industries and industrial structures: high tech firms and large corporations.

On the contrary, it seems that little room is left for understanding the role of universities in sustaining innovation in traditional Small and Medium Enterprises (SMEs) that belong to medium and low tech sectors. As Bender (2004) underlines, these typologies of SMEs have been largely ignored in innovation research and policies, even though they are still important actors that contribute to the economic growth and development in many European countries (Smallbone et al. 2003; Hirsch-Kreinsen et al. 2005).

The goal of the present paper is therefore to contribute to disclosure how in a specific Regional System traditional SMEs can be sustained in their innovation upgrading by the local universities and by the Innovation Brokering Agencies (IBAs)¹ that can function as a bridge between Universities and local firms.

Section 2 of the paper is devoted to the theoretical framework leading to the problem formulation. Section 3 describes the method used for the construction of the empirical part. Section 4 analyses in detail the case of Veneto Region discussing the existence of University-Firms collaborations, the role of the local universities, and of IBAs in supporting the collaboration in the specific RIS present in the Veneto Region. Section 5 concludes with a discussion of the implications of these findings for the construction of future policy.

2. Theoretical framework

2.1 Problems and Needs of Italian SMEs Today

Recent economic studies on medium and low tech industry, Italian SMEs and industrial districts show that the traditional sources of knowledge upon which traditional SMEs firms have formerly based their success are "getting old" with respect to the technological change and the international competition the industry is facing today (e.g. Rullani, 2006).

Scholars investigating the industrial districts phenomenon (e.g. Becattini, Corò, Di Maria, Grandinetti, Micelli, Rullani) have explained that learning by doing (Arrow 1962), the main driver of traditional SMEs' internal learning activities, is not suitable enough to the current

¹ For example organizations that collecting the innovation needs of the local industry can transform them into concrete requests for the local universities.

needs of a continuous (and rapid) production of new knowledge where knowledge itself has to be created, manipulated, absorbed, codified and inscribed in the production and organizational routines.

For example, one of the main problems SMEs are facing today is the technical and professional qualifications of human resources and their capital in terms of skills, in particular when innovation comes into play (Kaufmann and Tödtling 2003; Smallbone et al. 2003, p.17). In order to manage new technological tools, to monitor the state of new machineries and technologies (Giuliani 2005), to rise the internal absorptive capability with respect to scientific knowledge (Cohen and Levinthal 1990; Kaufmann and Tödtling 2003 p. 87), to relate to a more complex external environment and to connect to external innovation networks (Kaufmann and Tödtling 2003), SMEs need to improve their learning process and the standard capabilities of their traditional workforce.

It is natural to see how not only tacit and contextualized knowledge, but also *codified and theoretical knowledge* play an important role; a role that SMEs had in some sense neglected in the past in favour of more spontaneous mechanisms of learning (Becattini, 1998; e.g. learning by doing and learning by imitation).

Codified and tacit-contextualized knowledge bases are therefore complementary resources (Nonaka and Takeuchi 1995; Lundvall and Borrás 1997; Asheim and Isaksen 2003; Rullani 2004a). On the one hand, codified knowledge and theoretical knowledge are fundamental to access general information and new technologies, to explore variations, to interface with new, competitive and different contexts, to update internal routines and procedures, to manage the complexity of external environment, to formalize relations, to generalize results and so on. On the other hand, tacit and contextualized knowledge makes the difference between one firm and the others; it marks its competitive advantage and its specificity, and contributes to sustain and generate its core capability and competence (Prahalad and Hamel 1990; Barney 1991; Lave and Wenger 1991; Zander and Kogut 1995). As underlined by Jensen et al. (2007) SMEs belonging to traditional sectors can excel in innovation activities and in facing global competition if they combine their mode of innovation based on learning by doing, using and interacting (DUI mode) with a mode of innovation based on Science and Technology (STI mode) which is centred on the access to explicit codified knowledge².

Developing absorptive capacity is therefore crucial for Italian traditional SMEs to gain innovative capabilities (Cohen and Levinthal 1990; Giuliani 2005; Hirsch-Kreinsen et al. 2005). As underlined by Cohen and Levinthal (1990) the absorptive capacity of firms is defined as the collective abilities to recognize the value of new information, assimilate it and apply it to commercial use (Cohen and Levinthal, 1990 p. 128). These capabilities are relevant to exploit and access external knowledge, to create new knowledge and to assimilate existing knowledge (ibid.). Cohen and Levinthal focus in particular on the positive effect of absorptive capacity on R&D intensity. Anyway as Malerba (1993) has underlined the Italian system of innovation, connected to the traditional manufacturing SMEs, differs from those based on the R&D research because it depends more on learning by doing, by using and by interacting with users and suppliers (Malerba 1993; Malerba and Orsenigo 1993). These last learning processes are typical of the districts' traditional environment and they are frequently built on the basis of an unintentional propagation along the local circuits (Rullani 2004b).

² The study of Jensen et al. (2007) and their empirical analysis based on Danish firms also show that SMEs using a strong DUI mode of learning have a major innovation performance than the rest when they are able to combine it with a STI mode.

For that reason in the present paper a broader concept of absorptive capacity will be used as: *the general conditions to make firms become better receptors of the external complex environment in general and of innovative and useful knowledge in particular.*

2.2 The application of a Regional Innovation System perspective

Absorptive capacity is relevant not only to raise firms' innovation activities, but also for the growth of a whole cluster, which depends on the absorptive capacity of the area where firms are located (Giuliani, 2005). In this way, the argument can be put in terms of firms' collective learning and local innovation process (Capello and Faggian, 2005) so that importing external knowledge and novelties becomes a crucial strategy to keep the local productive system on the technological frontier (Plecherio and Rullani 2007). For SMEs and for the districts they belong to, the knowledge externalities that spill from the environment firms operate in (Capello and Faggian 2005) and the knowledge creation process that involve the whole local network (Asheim et al. 2007) become fundamental.

Taking an evolutionary economic perspective, innovation cannot be considered only as an individual process of a firm or a market mechanism. It also depends on the system that firms belong to. This raises the relevance of the institutional and social conditions connected to and supporting the innovation activities of firms (Nelson and Winter 1977; Freeman and Perez 1988). As the scholars of National Innovation System state (e.g. Lundvall) the problem of generating innovation is therefore connected peculiarly to the ability of the systems in which firms are embedded to create the right framework through policies and infrastructures that fit firms (express or latent) needs connected to innovation.

Following this idea, innovation is the result of a complex set of interactions between public and private actors (e.g. enterprises, universities, research institutes, agencies, departments of the government, suppliers, users...), and it is seen as a social process of constantly learning how to involve all the above mentioned agents (Lundvall 1992; Archibugi et al. 1999).

In this perspective, innovation activities are influenced by cultural, economic, political and social factors that are specific of the different countries because of path dependency, different regimes of social governance, impact of different institutions, knowledge accumulation, and the circumstantial way in which technology has been developed in specific areas (Zysman 1996; Archibugi et al. 1999; Dosi 1999).

At the beginning of the System of Innovations studies, great importance has been given to the level of the Nation as the level to study innovation capabilities and the source of competitiveness (Nelson and Rosenberg 1993). From the National level, today the literature has moved towards the regional level which is suitable to imagine policies that are able to improve the local environments, to face global competition at the territorial level, and also to understand the mutual determination between the relevant actors in specific local systems (firms, system of values, knowledge and institutions) (Lundvall and Borrás 1997; Belussi 2003; Asheim et al. 2003). Moreover, as underlined by Cooke (2001), the regional level represents a *“meso-level political unit set between the national or federal and local levels of government that might have some cultural or historical homogeneity but which at least had some statutory powers to intervene and support economic development, particularly innovation”* (Cooke 2001, p. 953).

The concept of Regional Innovation System (RIS) is therefore a concept that we can use to account for the heterogeneity of regions in the Italian context and to study the areas where

firms form clusters or industrial districts (Asheim and Isaksen 2003; Asheim et al. 2007). Through this perspective, it is possible not only to enhance the resources available in these territories and their specific typologies of knowledge and technologies, but also to augment the economic advantage constructed on cooperation between local players (ibid.). In this perspective interactive learning between firms and their local environment assumes relevance, and the organizations (in particular universities and research centres) as well as the infrastructures collocated in the Region become fundamental elements of this learning process at the system level (Lundvall 1992, Lundvall 1999; Asheim and Isaksen 2003).

2.3 The role of local universities

The universities present in a region represent one of the knowledge components³ of the regional system that can play a fundamental role for enhancing the collective learning and collective absorptive capacity of clusters and industrial districts present in Italy.

In order to understand which role local universities can play today in sustaining traditional SMEs in their innovation activities, and what kind of cooperation can be built between universities and firms, it is important to understand the process of the general change that universities have passed through in the last period.

The work by Etzkowitz is among the most important contributions in the literature aimed at enlightening the recent development and orientation of universities (e.g. Etzkowitz et al. 1998; Etzkowitz and Leydesdorff 1999; Etzkowitz et al. 2000). Etzkowitz and his colleagues particularly underline the universities' evolution from "ivory towers" to "entrepreneurial institutions". The second "nature" is manifested when universities go beyond their academic missions and search for alternative financial income and for a match with the specific needs of industry (e.g. consulting, contract research, patenting, licensing, spin off companies' creation...) (ibid.).

Beyond the traditional role of educational institutions and academic research milieu, universities are today also recognized as players in the direct contribution to the economic growth and international competitiveness of regions and nations (Etzkowitz and Leydesdorff 2000; Etzkowitz et al. 2000; Mueller 2006; Nilsson 2006). Beside the first two missions, this branch of literature wants to enlighten a third mission of economic development. Through Delfino et al.'s words (2005, p. 3), by taking an RIS perspective this mission can be defined as "*the involvement of universities in regional economic growth, creating stronger links with industrial actors*".

Looking closer at universities nowadays activities, it is possible to identify 4 main functions of these institutional actors as described by Lazzeroni (2001) and Lazzeroni, Piccaluga (2003):

- *University as a knowledge factory*: where new knowledge and basic and scientific research are produced;
- *University as human capital factory*: where intellectual skills are created and human resources are trained through specialized education activities;

³ Edquist and Johnson (1997, p. 59) distinguish the 'knowledge components' of a system of innovation between organizations for knowledge production (e.g. University), knowledge distribution (e.g. Science parks) and knowledge regulations (e.g. patent offices).

- *University as a technology transfer factory*: where universities interact with firms to favour the exploitation of the result of the scientific exploratory activities;
- *University as a territorial development factory*: where a university is involved in the promotion and management of projects related to “territorial innovation” and collaborates with local economic and social actors.

Concerning in particular the last point – university as a territorial development factory – the analyses of the role of universities in sustaining innovation in the context of regional economic development (e.g. Bellini and Piccaluga, 2001; Delfino et al., 2005) principally look at the transformation of branches of traditional sectors into high-tech sectors or to the establishment of new science-based sectors in regions where they did not exist before. However, because of the role and the economic significance of traditional SMEs in Europe and especially in Italy (Smallbone et al. 2003; Becattini and Musotti 2004; Hirsch-Kreinsen et al. 2005), universities should be conceived also with respect to this typology of industries, and, consequently, their involvement in the promotion of innovation with respect to SMEs should be analyzed more in depth. Thus, it is necessary to understand what potential role universities could have in supporting traditional SMEs’ innovation activities in a specific territorial area.

3. Methodology

The empirical material needed to demonstrate that the role of universities can be relevant to sustain competitiveness not only in high-tech sectors and in large firms, but also in the traditional sectors and in SMEs; and to understand how their role in a specific RIS can be pushed towards that of a territorial developing factory, has been collected during the year 2007 in a specific region of Italy (Veneto Region).

Taking mainly a firm perspective a questionnaire has been sent to a sample of 28 innovative traditional SMEs. The aim of the questionnaires has been mainly to disclose the type and contents of firms’ relations with universities and the firms’ perception of the universities’ role in the region. The firms in the sample have been selected ad hoc taking into account their high average of innovation performances with respect to similar firms in the region⁴. In this way there were more probabilities to capture some forms of collaboration with local universities and to check the real innovation needs that firms exhibit with respect to their innovative strategies. It is worth to notice that, despite the small size of the sample and

⁴ The innovation performances for most of the firms selected for the sample have been previously tested within another research conducted in 2006 and published in Plechero and Rullani 2007. The rest of the firms were instead pointed at by some of the interviewed directors of intermediary organizations present in the region, who have a wide overview of the industrial system of the territory and of local firms performances. The firms selected for the questionnaire have been chosen also because they are deeply rooted into a system of “widespread entrepreneurship”. Therefore, being dynamic firms embedded in a territorial system, they can be seen as a sort of gatekeepers to the innovative and technological processes also for other firms in the territory and in general for their local supply chain (Giuliani 2005, p. 278).

probably thanks to the careful selection of the firms to be included in it, the response rate has been quite high: more than 70%, corresponding to 20 fulfilled questionnaires out of 28. Nevertheless, in order to be able to evaluate from a RIS perspective the social system where firms are embedded, the empirical analysis has given much effort to the qualitative aspects. As a consequence, the study has been deepened through a series of direct and unstructured interviews conducted in the territory aimed at highlighting the positive cases of Firms – University collaboration and the collection of opinions from stakeholders present in the region. Four interviews have been conducted with firms that have collaborated to some extent with universities. Four other interviews have been conducted with directors of IBAs present in the region.

Moreover, a review of the literature able to give an overview of the typology of the RIS of the Veneto region compared to other types of regions with a more formal and structured Innovation System has also been undertaken to properly frame the discussion in the specific empirical context.

4. The Veneto Region Case

4.1 University- Firms Collaboration and Perception of the University Role in the Veneto Region

The larger part of the firms responding to the questionnaire (80%) have shown an interest in developing the innovation they are mostly interested in together with other actors. This shows that for local firms belonging to local networks innovation is often seen as a system phenomenon.

The fact that 40% of the sample has declared that they would like to collaborate with their supply chain also shows that these ‘traditional spontaneous entrepreneurial initiatives’ often organize and diffuse innovation among suppliers, sub-suppliers, customers, distributors and other firms located in the area. Together with this, half of the sample has shown an interest for possible collaboration with universities and/or research centres. The bidirectional approach shown by the ‘economic fabric’ of the region, pointing towards the local actors as well as towards universities, seems to show that our analysis caught the territory in the moment of a transformation. The local market and supply chain, traditionally the loci of innovation construction and spreading for the firms in the area, have always been mostly focused on exchange of tacit, embedded and situated knowledge transferred mainly through practices observation and imitation (Nonaka 1991, p. 99; Becattini 1989; Porter 1998). However, nowadays firms’ increasingly need to access new technological, codified and scientific knowledge, as certified also by the answers received during the interviews. The competitive pressure they face calls for coupling of the ‘old structure’ with the establishment of new contacts with potential complementary actors professionally specialized in knowledge with an scientific and analytic nature. This knowledge - when combined with the internal firms’ knowledge – is able to originate defensible competitive advantages and nourish exploitation activities (Rullani 2004a). To reinforce this idea, consider that if we look at how many firms of the sample have established concretely some relations with universities only 3 firms out of 20 have no relationship. Furthermore, these three firms have

declared that it could be useful to establish one. The rest of the sample has already established some contacts⁵, mostly with local universities (65%).

The main activity that firms have built with universities concerns collaboration for the development of new products (53% of the sample) and new process (35% of the sample). These activities usually do not have a radical but instead more an incremental nature. This is consistent with the picture other studies have given of the economic system in the area. The type of innovation that characterise the traditional SMEs of Veneto Region is more connected to exploitation than exploration activities, such as innovation in design, in product functionality and performance (with the adaptation to customers' needs), in the discovery of new uses of the product, which create both geographical and content alternatives at the level of applications and economy of variety for the creation of strategic niche markets (Plecherio and Rullani 2007).

Coming to the content of the university-firm collaboration, one firm has judged the content of this relationship very good, considering it very important to improve innovation performance. 31% of the sample has declared that the content of the relationship was good and has brought some internal improvements (e.g. skill improvement, creation of new ideas, change of routines...). Moreover, 50% has judged the content good enough because it has indirectly helped the improvement of some internal routines. Only two firms have judged the content under the expectations or bad. The results show that even if universities are not considered to be the most important actors for the innovation performances of the firms, their contribution is in general recognized by the firms.

Despite the wide academic supply in the territory⁶, only 15% of the firms belonging to the sample judge local universities in the Veneto Region in a positive way, and consider universities' activities important for the local industrial system and for training human resources for the territory. Nevertheless, none of the firms have expressed a complete negative judgment of the contribution that local universities can give to the local system, and therefore acknowledging the role university *can* have if some problems are overcome. The majority of the sample (50%), for example, has specified that local universities can be important in sustaining the regional industrial system, but their performance in this role is underdeveloped and it can be improved. Another 30% of the sample considers the universities to be important in sustaining the territorial development but just "on the paper" because local universities are still considered too slow in translating their intentions in concrete actions.

⁵ Two firms do not actually have relations with universities, but they did in the recent past.

⁶ Four universities are located in the Veneto Region: Ca' Foscari University of Venice, University IUAV of Venice, University of Padua and University of Verona. Nevertheless, in the area there are also co-located branches, foundations and consortia participating from these universities or from other Italian universities like Ferrara University, where they run specialization courses. For example, the Engineering Department in Vicenza, part of the Padua University, is very dynamic with its specific courses in Management Engineering, Mechanical Engineering and Mechatronics Engineering. Another important institute is the free University Institute of Modern Languages (IULM) in Feltre with courses specialized in Public Relations and Advertisement and a Master in Management and Relations for the Development of SMEs.

The fact that the firms of the sample, despite the known problems, generally recognize the role of the local academic world is confirmed also by the value that the firms have given to the different roles the universities can have (also potentially) in the Veneto Region in sustaining the competitiveness of traditional SMEs (see Tab. 1).

Tab. 1 – Judgment on the roles local universities can have in the Veneto region in sustaining competitiveness of traditional SMEs

Roles in order of relevance	Average value (N=18)
1. Producers of research in specific fields connected to local reality	4.60
2. Institutions favouring the exploitation of new technologies in the territory	4.30
3. Partners for firms that have not a sufficient internal R&D	4.10
4. Institutions training human capital to be employed in the SMEs	4.00
5. Institutions offering consultancy and guidance to keep firms up to date	3.70
6. Institutions offering testing, codification of knowledge and certification	3.60
7. Producers of academic and general scientific research	3.40

Value 1=totally not relevant; 2=somewhat irrelevant; 3=neutral; 4=somewhat relevant; 5=very relevant.

Ranking the identified answers in order of average relevance, we can see that firms highly consider the role universities can have as producers of researches in specific fields linked to the local reality, and as institutions favouring the exploitation of new technologies applied in the local industry. Through these roles universities can function as *complementary sources of codified knowledge* which can complement the local system of production mainly based on sources of “practical knowledge” and learning by doing.

Why is this complementarity so important? In the districts, context innovation and problem solving activities are mostly based on *trial and error* processes (Rullani, 2004a). This represents an “evolutionary learning process” by which a firm favours search for new inventions. This process, however, has a cost. Moving “blindly” can result in the waste of time and resources. Logical and rational learning coming from codified knowledge allows the use not only of new schemas and procedures to feed internal innovation activities, but also of a base of preventive and structured measures to innovate effectively and efficiently.

For example, one of the investigated cases is a small family-business in the industrial bag manufacturing sector that, through the relationship with the Chemistry Department of Ca’ Foscari University, has learnt and applied scientific methods and formal processes, and has acquired the capability to rationalize the results of a series of specific and original process innovations produced internally by the entrepreneur himself.

The research universities can undertake in specific fields connected to the local reality (judged by the firms with an average value of 4.6 out of 5) can be useful in particular to feed the exploitation activities SMEs are used to carry out in order to develop new incremental innovation. This way they would generate important innovation in the territory in the “use” of products. This can sustain the creation of new economies of variety widening the single firm’s innovation and moving it from the context-specific use of the codified knowledge produced by universities to, for example, new applications for alternative geographic and cultural markets that firms in the area can generate by contextualizing the university transferred codified knowledge.

The complementary function of universities is also confirmed by the value (4.10 on average) given to their role as partners for firms that do not have sufficient internal R&D activities.

This is possible because universities can assist exploration and radical innovation, while a lone small or medium firm has inevitable constraints, due to its dimension, in the application of its financial and human capital to the development of specific competences necessary to confront completely new problems.

One positive case where this complementary function has been taken by the university is represented by one of the investigated firms. A mechanical firm located in the area of Vicenza specialised in the production of rotating cylinders and handling systems. Starting a profitable collaboration with a local university, the firm was able to realize strategies of diversification creating a new product and a new division focused on renewable energy.

Universities are not only important because of their complementary function. In a system perspective they can favour the exploitation of new technologies in the territory (judged as important by the firms in the sample with an average value of 4.3 out of 5, tab. 4.14) and bring in general “*global state-of-the-art science and technology into the region*” (Benneworth et al. forthcoming).

Interesting is the case of another investigated firm producing plastic products that, together with other local firms belonging to different sectors, has created a consortium to update their knowledge relative to new technologies that can find applications in the local traditional sectors. The consortium has created a common laboratory to test products and to analyze the material characteristics of process and product innovations. Here the role of academic professors and universities (in particular through the direct contact established with academics) participating in the initiative has been relevant, in a system perspective, to sustain the local diffusion of scientific and technological knowledge.

Despite the crucial and multifaceted role universities are recognized to have –at least potentially-, if we look at how university-industry relations inside the sample and in the investigated cases are managed and what are main contacts firms have with these institutions, we can see that these relations are mainly informal and established directly *with professors and/or researchers* (Tab. 2). The percentage of firms that have direct contact with specific departments and faculties or with specific technological transfer offices is low. This further confirms the general idea that universities, especially in Veneto Region, are not very well-organized to respond to needs expressed by the local SMEs⁷.

⁷ The “green paper on competitiveness of Veneto Region” (Libro Verde 1, 2006) underlines that activating an organizational system to be able to manage the technological transfer from universities to the local industrial system is a necessity today. Moreover, some of the interviews have highlighted the difficulties in contacting the departments and the technology transfer office of universities because the institutes could not give a complete and structured framework relative to all the projects and activities taking place.

Tab. 2 - Contact points with universities and the management of the main relation

<i>Contact point</i>	% of firms (N=17) (possible more answers)
Specific professors and/or researchers	71%
Specific departments or faculties	29%
Specific university offices (e.g. Technology Transfer Office)	12%
Other	6%
<i>Management of the main relation</i>	% of firms (N=17)
Direct contact	76%
Use of different kind of institutions and agencies	12%
Both	12%

4.2 Coupling with an Informal and Embedded Regional System

As Belussi (2003) argues, in the Veneto region the innovation system is mainly organized along initiatives that emerge spontaneously through a bottom-up process. In this system, private and collective organizations such as entrepreneurial associations have the determinant role in innovation policies. In contrast, planned strategies organized by public institutions and encouraged by public administration do not have an equally important role, as happens in other Italian regions like the Emilia Romagna region. In particular the Veneto model enhances the spontaneous entrepreneurial initiatives and the diffusion of good practices to be imitated inside the local circuit and the external relations which are useful to expand firms' knowledge are basically tied to the markets that firms know already. In this sense, the Veneto RIS mirrors the embedded regional system described by Asheim and Isaksen (2003) where each actor of the social economic network has organized its role on the basis of others' roles.

In an embedded RIS as the Veneto Region, because of its features, the specific roles of universities cannot be efficient if planned through a top-down approach by the public administration that operates at National and Regional level. Instead, to better link these functions to the firms' needs, it is necessary to construct a *more horizontal structure* based on University-Industry cooperation. Nevertheless, as said, this collaboration between University and traditional SMEs still appears problematic (Plechero and Rullani 2007⁸; Ntinidou 2006). Therefore, it could be important to identify structures that can work as bridges between the academia and the industry (STEP 2003; Garofoli and Musyck 2003; Ntinidou 2006), and that can help the two spheres (Industry and University) to mutually interact and create networks.

On this point, the notion of "innovation brokers" developed by Garofoli and Musyck (2003) is interesting. These brokers can be, for example, technology centres, research institutions or industrial service providers that operate as intermediate structures and as links between the business community and the research community to make the firms' innovation needs

⁸ As many entrepreneurs managing SMEs that belong to traditional sectors pointed out, the problems in the University-SMEs relations are sometimes due to 1) the different logic guiding the researches in the two "realms" (practical vs. theoretical level); 2) the bureaucracy and "slow reactivity" of universities; 3) the difficulty SMEs encounter in the recognition, codification and communication of their needs (see Plechero and Rullani, 2007).

emerge (ibid., p. 129). Thus, they represent the milieu where new relations between firms and the academic world can be established. In particular, in an RIS perspective the intermediary role of some innovation brokers in the territory can be relevant to sustain the absorptive capacity of the industrial territorial system side by side with the activities undertaken by local universities - as many of the interviews confirmed. This is also further confirmed by the firms of the sample. 75% of the firms have answered that in general a higher level of attention of the university for the industry's needs is necessary, but since it requires more structural actions from the side of the university, the intervention of some intermediary structures that are able to facilitate and promote these relations could be needed. 55% of the sample trusts that the entrepreneurial associations are able to collect stakeholders at the aggregate level, confirming again the central role of these associations in an embedded regional system of innovation as that of the Veneto. Instead 20% of the sample has answered that the number and importance of other innovation brokering institutions have to be increased.

4.3 The Intermediary Role of IBAs in the Territory and their Contribution to the University-Industry Cooperation in a RIS Perspective

In the section 4.1 it has been shown that collaboration between local universities and traditional SMEs in the Veneto Region does exist, but even if firms recognize the potential role of these institutions in sustaining their competitiveness and their innovation activities, the relations and their contents could be seriously improved. Indeed, the relations the firms in the sample have with these institutions for the most part concern direct and informal support (organized mainly through the direct intervention of single academics) to the punctual product and process innovation activities. If this is the main contribution universities are expected to give to the territorial system - as also many opinions collected through the interviews state – their role still appears underdeveloped.

From an RIS perspective the local universities' role of potential *territorial development factories* (Lazzeroni 2001; Lazzeroni e Piccaluga 2003), shaping the *social constitution of knowledge in the territory* (Lorenz and Lundvall 2006) is crucial to sustain the local industrial system. If in the relationship between firms and universities problems still exist and the contribution of universities to the collective local industrial system is still underdeveloped, it could be important to identify structures that can work as bridges between the academia and the industry (STEP 2003; Garofoli and Musyck 2003; Ntinidou 2006) at the more aggregate level, and that can help the two spheres to interact and create networks. Box 1 shows, for example, some of IBAs presents in the Veneto Region.

Box 1 – Some IBAs present in the Veneto Region

Veneto Innovazione (*Veneto innovation*) is the regional agency for innovation that sustains the technology transfer process in the territory helping the identification, exploitation and licensing of the technological know-how and of the innovation activities potentially interesting for the territory. The agency is a branch of the Regional Government and in particular it coordinates initiatives in the research and innovation fields participating and financially sustaining regional projects that help the diffusion of innovation and the transfer of relevant and codified knowledge that could have positive impact in the local industry. Relevant is then the collaboration this agency has established with other innovation brokers in the territory not directly depending on the Regional Government, but nevertheless fundamental collectors of explicit and implicit firms' needs. Recently, in order to give visibility and to promote good practices, Veneto Innovazione became in charge of providing firms engaged in an important innovation process with specific grants financing, among other purposes, also firm-university collaboration.

Sources: Interview with the director, internal material, webpage: <http://www.venetoinnovazione.it/>

Centro Produttività Veneto - CPV (*Veneto Centre of Productivity*) is a foundation located in Vicenza and built during the fifties in the context of the Marshall Plan. Today it is a special agency of the Vicenza Chamber of Commerce, but it is also participated by other chambers of commerce from the Veneto region and other institutions (e.g. municipalities, entrepreneurs' associations), so that its influence extends to the whole Veneto area. It is in charge of education, consulting and of technological services (especially for laboratories and patenting activities) in particular for SMEs of the traditional sectors. Even if it is participated by several institutions, the original imprinting of this agency, "the idea of the self-organizations of firms", is fundamental still today. Many entrepreneurs, managers and technicians of local firms have organized into the institution some "think-tanks" (called "gruppi di studio") on specific themes, participating also to the board of directors and in the executive committee of the foundation. They organize (better: self-organize) education activities paying attention to the state of the art of technological and scientific knowledge on particular topics of interests. These activities are relative both to some specific sectors present in the territory (e.g. gold or mechanical sectors) and to some actions of general interest for local firms. The "gruppi di studio" are, for example, constituted also around production organization, marketing, design, automation. Thanks to the stimulus of the foundation, in the last 2-3 years also academics of local universities have entered these groups and participated to the debates. Moreover, all initiatives (events, seminars, laboratory activities) try to create a favourable milieu for industry-university cooperation.

Sources: Interview with the director, internal material, webpage: <http://www.cpv.vi.it>

Treviso Tecnologia (*Treviso Technology*). Labelled "Azienda Speciale per l'Innovazione Tecnologica" (Special Company for Technological Innovation) and born in 1989, it is owned by the Chamber of Commerce of Treviso, and it is in charge of education, consulting and technological services for a particular area of Veneto (Treviso) densely populated by traditional SMEs. Having a role of "facilitator" of information, knowledge and innovation exchange and production for the local industry, this agency collects needs from the territory and offers 3 main typologies of services. The first one is related to training and education, even with the

organization of specific master courses, for entrepreneurs, managers and employees of local firms, and for the development of new professional figures to be employed in the SMEs. This agency is also one of the main promoters of a new university course in industrial design that fits the exigencies of local industries. The second one is related to the exploitation of projects of technological transfer with particular attention to the innovation activities related to ICT. The third one is a consulting activity concerning particular fields of interest such as: patents, quality, safety on the workplace and environmental policies. The agency is also equipped with a laboratory to test and certify new products. Treviso Tecnologia has also a role of intermediation between the academic world and the industry world. Contacts with universities and conventions on particular projects are organized not only with the regional universities, but even with universities outside the regional area. Fundamental is, for example, the convention the agency has stipulated few years ago with the Fraunhofer Institute, dedicated to the research on industrial applications. In less than two years, through the Treviso Tecnologia intermediation and the related missions of local entrepreneurs in Germany, it was possible to constitute 20 research projects concerning institute-firms collaboration.

Sources: Interview with the director, internal material, webpage: <http://www.tvtecnologia.it/>

Politecnico Calzaturiero (Shoemakers' Consortium): the consortium is an institution located in the Riviera del Brenta where an important district of shoe production has emerged. The institution has a long tradition of training activities (80 years). Developed initially through a bottom-up approach by local entrepreneurs to answer to the training and education needs of the shoe firms, in the 2001 it has changed its name and has now among its members not only the Brenta Riviera Shoe Factory associations (ACRIB) but also other public agencies, a bank, entrepreneurship associations and municipalities. Today this institute is not offering only training and education for the entrepreneurs, managers and technicians of the regional shoe industrial districts (Verona, Riviera del Brenta and Montebelluna) through the constitution of specialized course and masters⁹. Many other services, in particular in research and technology transfer, are now well established. For example, relevant is the collaboration of the institution with some local universities and national and international research centres aimed at experimenting, developing and diffusing new technologies in the territory, thanks also to the contribution of local shoe-fashion firms in spread best practices and in creating codebooks that diffuse the state of the art of the technologies.

Sources: Interview with the director, internal material, webpage: <http://www.politecnicocalzaturiero.it/>

If on the one hand we have a regional agency as Veneto Innovazione belonging to the public sphere offering financial support and coordination in the territory, on the other hand the other agencies are born and often managed essentially through a bottom-up approach, confirming one more time that in Veneto there is a RIS built for the most part on entrepreneurs' initiatives and spontaneous organization of firms into systems (Belussi, 2003). For example, the Politecnico Calzaturiero Veneto, was initially created through the self-organization of firms. The other two institutions (Centro Produttività Veneto and Treviso Tecnologia) are participated by agencies of local chambers of commerce, but they mainly take firms and entrepreneurs' interests into account which are also represented

⁹ For example, masters to become Product Managers or Coordinators of collections.

through the latter's participation to the board of directors and to the internal committees of the agencies.

These IBAs do not only sustain innovation in the territory, but since they contribute to the diffusion of codified knowledge and technologies in the regional system, they frequently create, directly or even indirectly, contacts between the university and the industry, linking therefore the regional academic world to the innovation processes taking place in the area.

From the interview with the directors of these agencies it emerged that usually the direct contact with academics which they are able to establish is usually preferred, rather than the contacts with university technology transfer offices or with departments. The same situation exists at the level of the university-firm relationship, where contacts for the most part are informal and through single researchers. Anyway, the difference is that, being the agencies representative of local industry and thus aggregating industrial territorial needs, they can act as gatekeepers aggregating and organizing the common needs into specific requests to be proposed to the local universities.

This solves the problems connected to the atomistic relationship between the firm and a single researcher who does not have the economies of scale to ask for training courses and other services of the same typologies to the universities. At the same time this bypasses the bureaucratic structure of the universities which often lacks the internal managerial knowledge to efficiently organize their potential supply to the local system.

And in fact, what has emerged from the analysis of the internal agencies materials¹⁰ and from the interviews with the directors is that these agencies are acquiring importance in the territory for the most in the *formation of human resource for local SMEs*. They usually create and organize specific events related to technology development themes, specialized seminars for entrepreneurs and workers build on firms' needs and specific professional courses with a strong connection of industrial local requests, often financed by EU or Regional projects, all with the aim to train not only the SMEs' employees, but also new potential human capital to be employed in these firms. Treviso Tecnologia, for example, is the main promoter of an academic course on industrial design in the Treviso area where 95% is financed by the chamber of commerce and 5% from IUAV University.

In a framework where training is mainly directed to knowledge of practical and professional nature, however, the training supply is also composed by Master Courses at the university level to train specific high professional figures who fit to the local and sectorial specific exigencies. Moreover, the events, seminars and courses are built with an increasing participation by professors and academics from local universities, contributing to spread scientific information and academic knowledge in the territory.

Some representatives of these IBAs also participate in scientific committees where academics and representatives of the industry try to direct the constitution of new academic courses more suitable to sustaining local industry in the territory. Through these actions, the IBAs can function as representatives that are able to influence the regional academic education supply aimed at re-qualifying firms' internal human resources and to feed local firms with external intellectual capital.

These initiatives based on training and education increase the absorptive capacity of the area and enable firms to learn and become receptors of the external complex environment, widening the capabilities of the territorial system to innovate even under the increasing

¹⁰ Brochures, files and internal papers documenting agencies' activities and manuals printed by the agencies themselves.

global pressure (e.g. Lorenz and Lundvall 2006). But the function of IBAs is broader than that. They can create a favourable milieu for the industry – university collaborations e.g. organizing events on technological and scientific themes which connects the local reality to the scientific community so that entrepreneurs and managers of local SMEs can see what activities local universities undertake and at the same time understand what can be relevant to complement their practical competences. Events that sometimes become an opportunity to establish a more solid collaboration with the academic sphere, and a way to point out firms' specific needs relative to scientific knowledge. Moreover, IBAs can involve the academic sphere in their activities sustaining and structuring the *developing factory function of local universities*. These agencies can combine their activities to the universities' initiative to participate, for example, in the codification processes of the knowledge in the territory. Developing manuals and creating procedures and models to exploit new technologies and to apply analytic knowledge to traditional sectors can be a concrete way to think about this type of contribution¹¹.

Eventually, some innovation brokers such as CPV established conventions with local universities to use academic structures and machineries to multiply the efficacy of their internal laboratories to test certify and study new products or new materials.

5. Conclusion

The empirical material collected shows that traditional SMEs have relationships with universities, and that these relations are mainly built around activities of process and product innovation, especially of incremental nature, that can sustain firms' improvement in their performance.

Anyway the contacts that firms have with universities are in general developed through informal and direct contacts with academics (professors and researchers) who can respond and sustain the needs of specific individual firms. This dynamics scatters the contacts between the industry and the university into a multiplicity of one-to-one relationships, where professors and researchers become the bearers of specific one-firm-based projects inside universities. However, a single academic working for single firms cannot scale up the services offered to the local firms and generalize the offer to create a series of many-(firms)-to-many-(universities) relations.

The result is that there is a clear under-supply of university services in the area, which mirrors local firms' request for a university closer the whole local industry, as the need for more researches in the specific fields connected to the local reality or for institutions favouring the exploitation of new technologies in the territory. Consequently, in a RIS perspective, the results in terms of benefits for the territory are less than what they could

¹¹ For example, the Politecnico Calzaturiero, with contributions of other institutions, and the University of Padua has created many manuals on specific technologies that can be applied in the shoe/fashion sectors (e.g. construction of prototypes, use of 3D cad-cam, possible applications of nanotechnologies). The CPV has supported the activities of the technology and management department of Padua, which in turn has originated an important manual for the product configuration, the codification of methods, estimation and intervention. Treviso Tecnologia, for example, has collaborated with Venice University to a project of knowledge management and e-networking, and to the construction of online communities of practices between specific professionals employed in local firms.

potentially be, and there is room for pushing the role of universities further on the path towards becoming *territorial developing factories*.

Structures of intermediation like IBAs, which have widened their activities in the territory in these last years, can represent the leverage to direct the potential of the universities towards local firms' needs and make the Veneto RIS evolve.

At the present stage, the IBAs are just at the beginning of this process. As said, the relationship between these agencies and the universities are often still informal and not structured. In particular, even if they act as collectors of the industry needs, they are under the level of efficiency in transforming the demand into a complex and structured request for universities. On the contrary, an effective scale for these processes asks for a formal link between IBAs and the universities, where the former have to act as organizers and coordinators of a supply which has the potential to become a real *factory* of the local development. Aggregating the local industry needs and organizing them into a plan that can involve different universities, according to their specialization, over a period of time of several years is thus a suitable policy to be applied in this case. Of course, this can be done only by involving the universities into the construction of the plan, and thus creating a formal coordination structure between the agencies and the universities through the formalization of the agreements and their organization into a coherent and codified structure. Through such a structure, the problems of the informal embedded regional system which is typical of the Veneto region can also be partly avoided. Bottom-up processes, as the one described in the region, can take different directions according to the complex nexus of interactive relationships between the involved subjects. The system cannot be easily headed to a specific direction and hence runs the risk of being stuck into a local optimum, far from the global one.

A better coordination structure could be an opportunity to pursue the manage of a self-organizing network without imposing a top-down approach. If the interaction between the subjects is tightened *and* at the same time formalized and structured into a coherent picture, the energies of the system can be directed towards a higher exploitation of its real capabilities.

At the same time, an action at the level of the IBAs is not enough. As suggested by Nauwelaers and Wintjes (2003), in order to sustain University-Industry cooperation in a RIS such as Veneto it is necessary to construct a policy portfolio able to target both firms and the system as a whole. Moreover, this has to be done not only through the use of reactive tools, with the goal to give financial and technical support (e.g. grant, intermediation activities, and so on), but also through pro-active tools acting on the targets' innovation behaviours.

An interesting future direction for the research in this field could be therefore exploring more in dept the design of policies directed to favour and stimulate researchers' mobility towards firms and, at the system level, policies fostering a stronger and well organized RIS able to stimulate, for example, the social capability of the local system to cooperate.

Moreover, to increase the level of the coordination in the system, all the involved subjects have to be ready to interact. Thus, it is necessary also to foster the transformation of universities from ivory towers isolated in their general and abstract research from every contextual knowledge to entrepreneurial institutions able to detect the local capabilities and needs and to react to the explicit - and tacit - demand of the firms in the area. To do that, an extra effort is needed to direct the autonomy that universities have acquired in the management of their activities (Etzkowitz et al. 2000) towards the coordination of this

interaction with the local industry. This requires, on the one hand, that universities hire professional profiles that are able to manage these new activities, and, on the other hand, an extra effort to foster the passage from an underdeveloped role of the universities to an enlargement of the scope and of the scale of their supply to the local area.

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