

“Special organizations” and regional development

Processes of “productive transformation of knowledge” in the agri-food innovation center Tecnogrande s.p.a. (Cuneo, Italy)

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Abstract

The paper aims at underlining the key role played by extra-academic and autonomous organizations strongly connected with university institutions and researchers through formal and informal ties in the local and regional development. The emergence of a ‘third mission’ (Laredo 2007; Zomer, Bennenworth 2011) that universities carry out alongside their teaching and research activities has been widely acknowledged in recent decades and emphasized as an important driver of change, so much as a “second academic revolution” (Etzkowitz 1998; 2001). These studies consider such an issue in terms of knowledge (or, mostly, “technology”) transfer and tend to concentrate their attention on university-industry collaborations (OECD 2013; Varga, ed. 2009; Shattock, ed. 2009; Markman et al. 2008; 2005; Etzkowitz et al. 2000; Lee 1996; 1998). We suggest that this view, also looking at many empirical studies carried out over last decades, seems to be overly simplistic and unrealistic. The “knowledge transfer” paradigm must be replaced with the notion of “productive transformation of knowledge” (Bonaccorsi, Bucchi 2011, 257-259). This new frame draws the role of university institutions in a multi-actors and multi-dimensional non-linear process, which stretches over time. So, it is difficult to understand it just analysing, for example, university-industry relations in a given area and time. It is necessary to extend the glance to a more complex institutional and organizational field, looking at other actors and organizations that may be relevant in enacting and operating the process.

Through a particular Italian case-study, we suggest to pay much more attention to “special organizations” in order better to understand the knowledge transformation processes within a complex set of institutional relationships. Special organizations are collective actors located midway in the knowledge transformation chain. They are something else both from academic institutions and firms. Organizations like the one this paper analyses can be understood as organizational *relé* (Crozier, Friedberg 1977, 141-142), that is entities able to connect structures that normally are not connected. The productive transformation of knowledge involves different and complex activities: observation, sharing practices, methods and techniques, using and jointly transforming artefacts, drawings, prototypes and other kind of objects, negotiating time, spaces and resources (Carlile 2004). On account of this, the productive transformation of knowledge requires not only the involvement of individual knowledge holders, but also the creation of adequate settings of interaction. Territory-based linkages can facilitate the process and provide the conditions for both individual and inter-organizational cooperation. Since the

productive transformation of knowledge is a particular process based on the interactions of different actors, it requires specific resources, which are extremely context-dependent such as relations, cognitive sources, instruments, technics. This may suggest that the productive transformation process takes advantages from the various (physical and non-physical) dimensions of proximity: geographical, cognitive, organizational, social, cultural and institutional (see: Boshma 2005; Noteboom 2004; Lane, Maxfield 1997). Indeed such forms of proximity can facilitate the interaction and the exchange between both individual and collective actors. However, proximity as well as the desire for innovation are just preconditions. In order to get results, someone has to enact and implement the process.

The case study describes the role of a special organization, the “Tecnogranda” agri-food innovation centre operating in north-western Italy (Piemonte, near Cuneo), in the transformation of knowledge within a specific sector and local context providing an example of how inter-organizational relationships, tasks and resources are managed. The productive transformation of knowledge is a too complex and costly process to be implemented by a single individual. It requires an organization with enough resources, instruments, and legitimation. “Tecnogranda” is a research and innovation centre specialized in the agri-food industry. The organization is a relevant actor able to connect local and endogenous factors to the international and global dimensions, fostering regional development. Indeed, the company is strongly embedded in the institutional and socio-economic local and regional environment, historically dedicated to the food industry. Meanwhile, the organization carries out the function of local-global interface or gatekeeper (Bathelt, Malmberg and Maskell 2004; Camuffo, Grandinetti 2011) since it manages a vast and complex system of relationships, not only with local firms and external firms, but also with technology suppliers, similar institutions operating in other countries, universities and research centres, contributing to innovation at the regional level.

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1 From ‘technology transfer’ to the ‘productive transformation of knowledge’

1.1 The multiple dimensions of the university’s third mission

The emergence of a ‘third mission’ that universities carry out alongside their teaching and research activities has been widely acknowledged in recent decades and emphasized as an important driver of change, so much as a ‘second academic revolution’ (Etzkowitz, 1998; 2001).

Even though the notion of the ‘university’s third mission’ and of ‘community engagement’ are not new from a historical point of view (Gleeson, 2010; Roper & Hirth, 2005), it is however clearly unquestionable that the last quarter-century has seen increasing emphasis on improving the performance of universities’ societal contribution (Zomer & Benneworth, 2011, p. 82).

In the contemporary debate, when we talk about the ‘third mission’ of universities, we are talking mostly about how universities consciously and strategically make contributions driven by the wider environmental changes which universities have encountered. Universities engage with society in a wide variety of complex ways, influenced by their historical mandate and role, tradition, culture, and geographical location. This means that the main characteristic of the ‘third mission’, as underlined by Nedeva (2008), is ‘relational’.

Regarding the relational feature, we can make a distinction based on the different partners of the third mission activities. Slowey (2003), for example, proposes a categorization of three types of connection: relationships with (1) government, ministries, other public bodies and ‘quangos’ (semi-autonomous, nongovernmental organizations), (2) the private sector, i.e. industry and business, and (3) civil society.

Although this classification could help to make a first distinction, there are still many different types of activities arising from such relationships. Thus, another important classification is the one based on the purposes or the contents of the ‘mission’.

On the one hand, as Zomer and Benneworth (2011, p. 84) clearly synthesize, ‘the rise of the third mission can therefore be regarded as an attempt by universities to secure necessary resources and by policymakers to stimulate universities to support strategic economic well-being’. On the other hand, it is widely acknowledged that the term refers

to a broader dissemination activity encompassing a plurality of social aspects beyond the strictly economic valorisation of academic knowledge (Pinheiro, Benneworth & Jones, 2012; Boffo & Moscati, 2012; Benneworth, Charles & Madanipour, 2010; Laredo, 2007; Gulbrandsen & Slipersaeter, 2007)¹.

Shoen *et al.* (2006) proposed gathering third mission activities around eight dimensions. While four of them (human resources, intellectual property, spin-offs, contracts with industry) refer to the economic sphere, the other four (contracts with public bodies, participation in policy making, involvement in social and cultural life, public understanding of science) refer to the broader societal and extra-economic sphere.

This paper focuses on the economic dimension, which has been the major focus for scholars and policy makers in recent times.

This dimension is already commonly established in the sense that it has been much researched and discussed, especially in the 1980s and 1990s, focusing on the contribution of universities to industrial innovation in terms of knowledge (or, mostly, ‘technology’) transfer (OECD 2013; Varga, ed. 2009; Shattock, ed. 2009; Markman *et al.* 2008; 2005; Etzkowitz *et al.*, 2000; Lee, 1996; 1998). These studies consider university-industry ‘technology transfer’ as the passing-on of previously developed research results from university laboratories to industry. However, looking at the many empirical studies carried out over last decades, this view seems to be overly simplistic and unrealistic.

The more problematic and richer approach illustrated in the next paragraph is an interesting attempt to change the perspective by studying the interactions between university and other relevant social and economic actors within a more complex and articulated framework.

1.2 The ‘productive transformation of knowledge’ approach

¹ In this respect, the Carnegie Foundation for Advancement of Learning (2007) has offered an extremely wide definition of ‘community engagement’, which seems to embrace the different dimensions of the third mission: ‘Community Engagement describes the collaboration between institutions of higher education and their larger communities (local, regional/state, national, global) for the mutually beneficial exchange of knowledge and resources in a context of partnership and reciprocity’. Similarly, the Green Paper on the ‘Third Mission’ prepared by a partnership of Universities with the support of the European Commission in 2008 points out that ‘every institution of Higher Education should 1) have an active Third Mission portfolio and 2) pursue a broadly based educational mission that is adapted to its circumstances and that articulates its role in the social and economic development of the wider society’ (E3M Project, 2012, p. 5).

Since concepts such as ‘mode 2’ knowledge production (Gibbons *et al.*, 1994) and ‘innovation system’ (see for example Lundvall, ed., 1992; Edquist, ed., 1997) tried to explain the way knowledge is generated, distributed, absorbed and used, it has become apparent that the narrow view of ‘transfer’ is the exception rather than the typical way in which the non-linear processes of scientific and technological knowledge creation and application in productive activities develop.

Therefore, the ‘technology transfer’ paradigm understates that not only applied research, but all learning processes which take place at or through university are part of the contribution that academic institutions make to industrial innovation (Schütze, 2000; 2010). In a broader and more complex view, all kinds of formal and informal relations between university researchers, professionals and managers from industry (training students within industry-sponsored research projects, consulting activities by academics outside the university, professional continuing education, and so on) should be considered as components of knowledge creation and exchange processes.

In this perspective, university is one among several knowledge-producing agents engaged in a wider interactive process. In this respect, the ‘Triple Helix’ university-industry-government relations model (Etzkowitz & Leydesdorff, 1997) emphasizes the increased interaction among these institutional spheres. According to the ‘triple helix’ approach, the major changes in the production, exchange and use of knowledge have resulted in a process of internal transformation in each of the helices (Etzkowitz *et al.*, 2000, p. 315). However, these authors devote most of their attention to the university side (Mowery & Sampat, 2005, p. 214) and consider the increased external interactions and the end of the ‘ivory tower’ syndrome to be associated with change in the internal culture and norms of universities².

In the ‘triple helix’ framework, in addition to the spiral pattern of linkages between university, industry and government, each institutional sphere takes the role of the other. Thus, universities assume entrepreneurial tasks and firms take on an academic dimension, sharing knowledge among themselves and training their employees to an increasingly higher level of skills. Etzkowitz and co-authors call this the ‘mutual influence of institutional spheres’ (Etzkowitz *et al.* 2000, p. 17). It follows that firms are to a

² Such an institutional, organizational and cultural transformation is frequently epitomised in the concept of ‘entrepreneurial university’ (Slaughter, Leslie 1997; Clark 1998; Etzkowitz *et al.* 2000; Etzkowitz 2001; Gulbrandsen & Slipersaeter 2007).

progressively smaller degree merely ‘users’ of the knowledge produced and transferred by laboratories, but rather increasingly knowledge-creating entities, as Nonaka first indicated (1994; see also: Nonaka *et al.* 2000).

Bucchi and Bonaccorsi recall all these critics to the ‘technology transfer’ approach and conclude that the expression ‘technology transfer’ itself should be abolished and replaced with the notion of ‘productive transformation of knowledge’ (Bucchi & Bonaccorsi, 2011, pp. 257-259).

According to the two authors, the ‘productive transformation of knowledge’ process is different from ‘technology transfer’ on account of some main characteristics (Bucchi & Bonaccorsi, 2011, pp. 259-260).

Indeed, it is necessary to consider that:

- it is a time-consuming activity (frequently highly consuming);
- it is a process that requires the active involvement of knowledge-holders;
- it must engage people in three dimensions: the cognitive one (individual intentions and values), the emotional one (intimate satisfactions and personal gratifications), and the behavioural one (system of incentives);
- it requires the permanent or, more often, temporary mobility of people;
- it is characterised by risk and uncertainty because the consequences, outcomes and paths of the transformation process are impossible to predict;
- it is itself an entrepreneurial process;
- it takes place within institutional contexts which are not always able to support the process by providing legitimation, motivations and incentives.

The proposal of a perspective based on the notion of the ‘productive transformation of knowledge’ is related to the growing body of research on knowledge within organizations. Here the ‘transforming knowledge’ process (Carlile 2004; Carlile & Reberich, 2003) has been analysed from the perspective of managing different actors and specialized domains in settings where innovation is desired. Such an approach offers the possibility to better understand the effort required to adequately share and assess domain-specific ‘knowledge boundaries’ (Brown, Duguid, 2001; Carlile, 2004; Rosenkranz, Vranešić & Holten, 2014)³.

³ More particularly, according to Carlile’s view, the ‘transforming knowledge’ process occurs at a ‘pragmatic boundary’, that is when actors have different interests. Under these circumstances domain-specific knowledge, as well as the common knowledge used, may need to be transformed. Shared artefacts

The ‘communities of practice’ literature (Brown & Duguid, 1991; Lave & Wenger, 1991; Wenger, 1998) also emphasizes the importance of similar activities and particular settings in order to develop shared meanings between different actors.

This paper tries to integrate these approaches with the studies on the ‘third mission’ and the role of universities in economic development. It argues that extra-academic and autonomous organizations with strong formal and informal ties with university institutions and researchers play a key role in the process of the productive transformation of knowledge.

As a consequence, much more attention must be paid to such ‘special organizations’, in order better to understand the knowledge transformation processes within a complex set of institutional relationships. These actors are neither academic institutions nor firms. Since such bodies are located midway along the transformation chain, one could assume that they are the ‘organizers’ of the whole process. In this case the concept of ‘organizing’ is used in Weick’s terms (1977), i.e. principally as an activity of ‘enactment’ and ‘sense-making’.

1.3 Enacting organizations

The complex transformation of knowledge described above is mainly associated with the nature of knowledge.

A preliminary basic distinction must be drawn between knowledge and information⁴. Knowledge empowers its possessors with the capacity for intellectual or physical action. So the concept of knowledge is primarily a matter of cognitive capability. Conversely, information takes the shape of structured and formatted data which stay passive and inert until knowledge-holders interpret and process them (David & Foray, 2002; Foray, 2000).

The following three properties of knowledge derive from this fundamental distinction.

First of all, as Polanyi (1966) demonstrated, knowledge is a combination of ‘tacit’ and ‘explicit’ dimensions. Since, as illustrated above, knowledge is primarily a personal

and methods, as well as objects (drawings, prototypes...), play an important role in providing the capacity to negotiate interests, represent different functional goals and transform knowledge (Carlile, 2004, p. 259).

⁴ The first to advance this distinction was the French economist Jean Louis Maunoury in his seminal book *Économie du savoir* (1972).

capability, then part of it is highly individual and attainable only through personal practices and experiences, which may even be unconscious⁵. This may explain why knowledge is something which is extremely hard to appropriate. The combination of tacit and explicit knowledge, in fact, makes it hard to formalise and codify. So, productive knowledge requires investments to be acquired, it needs a complex process of transformation requiring time, resources and specific settings where different actors interact, share artefacts and methods and also produce objects together.

The second characteristic is that knowledge is often invested within a given practice. ‘*Wissen*’ and ‘*Können*’, ‘knowing that’ and ‘knowing how’ (Ryle, 1949, Chapter II) are strictly connected one another. One increases proportionally to the other, unlike what the rationalist-idealist philosophy has taken for granted for a long time. This statement leads to the consideration that often both product/service and process innovation require the combination of different types of knowledge. Actors involved in the productive transformation of knowledge must share and match not only different ‘specialized domains’ across the boundaries between disciplines or specializations (Carlile, 2004), but also different cognitive levels, such as, for example, the two fields of ‘knowing that’ and ‘knowing how’.

Finally, the third property of knowledge is localization. The concept of ‘situated knowledge’ (Lave & Wenger, 1991) focuses attention to the importance of social and cultural contexts in knowledge-based processes. Situated knowledge, like information and solutions generated in specific contexts, is ‘sticky’ (von Hippel, 1994), or, rather, costly to move from the site where the information was produced to other sites. Since the productive transformation of knowledge is a particular process based on the interactions of different actors, it requires specific resources such as relations, cognitive sources, instruments, technics, artefacts, drawings, and prototypes which are extremely context-dependent.

The three properties of knowledge shown above may suggest that the productive transformation process takes advantage of the various (physical and non-physical) dimensions of proximity: geographical, cognitive, organizational, social, cultural and institutional (see: Boshma, 2005; Noteboom, 2004; Lane & Maxfield, 1997). Indeed such

⁵ Polanyi encapsulates the essence of tacit knowledge in the phrase ‘we know more than we can tell’, and provides further clarification in such commonplace examples as the ability to recognize faces, ride a bicycle or ski, without the slightest idea to explain how these things are done (Polanyi, 1966, p. 4).

forms of proximity can facilitate the interaction and the exchange between both individual and collective actors.

With respect to the ‘third mission’ intended as the university’s contribution to innovation and knowledge exchange, the previous analysis suggests two main considerations.

Firstly, the productive transformation of knowledge is a multi-actor and multi-dimensional process, which stretches over time. So, it is difficult to understand just by analysing, for example, university-industry relations in a given area and time. It is necessary to extend our observation across a more complex institutional and organizational field, looking at other actors and organizations that may be relevant in enacting and operating the process.

The second suggestion refers to the importance of adequate settings for interaction and knowledge transformation. Transformation of knowledge is not just about transferring something from producers to users. It is a creating and generating process, in which actors learn, exchange and observe each other doing things. Therefore, someone has to implement the proper setting, involve the actors, provide instruments and set out the objectives. The special organization enacting the process can be neither a university nor a firm.

The next section will illustrate a case which is considered emblematic in this respect. Tecnogrande in Dronero (Cuneo, in the North-West of Italy) is an organization which is fairly well embedded in the social, institutional, economic and local cultural environment. It focuses on a specific sector of application, namely the agri-food industry.

The organization operates in a sector which is considered strategic with respect to the development and the competitiveness of Italy. Here, the desire for innovation comes from local actors, particularly municipalities and small and medium sized enterprises. This demand matched an already ongoing program for economic development of the regional government. In order to promote and pursue innovation, these actors set up Tecnogrande S.p.A.

The analysis of the case aims to explore how this kind of organization can be considered a key-actor in the process of knowledge transformation⁶. The inquiry takes

⁶ To develop the case study Giacomo Balduzzi collected information carrying out some in-depth interviews with managers and stakeholders of the organization. The field work was carried out in March 2015 in the frame of a National research project co-coordinated by Michele Rostan.

into consideration the different dimensions of the process (actors, time, settings). Thus, the description will provide a short account of its history and context, its organizational and institutional structure, its inter-organizational relations, and its activities.

2 Tecnogranda S.p.A.: A case study

2.1 History and context

Tecnogranda S.p.A. was established in 2002 as a public-private joint venture in Dronero (Cuneo). The company received funding from the European Union, according to the Single Programming Document (SPD) 2000-2006, Objective 2.3.

After a first incubation period, the company's business started in 2005. At that time, the focus of the organization was in innovation for mechanical and electronic components. However, within a year some difficulties arose. In late 2006, the deficit in the balance forced the shareholders and the promoting institutions to rethink the objectives and business plan of the company.

A program of reorientation of Tecnogranda was defined between mid-2006 and early 2007. The plan included a new specialization in the agri-food industry, considering also that the Regione Piemonte was projecting a science and technology park to support and develop competitiveness in that sector.

Local economic stakeholders, especially employers' associations and local authorities, strongly supported the decision to focus on the agri-food sector. This view stems from the specialization of the area where the company was, and is, located. In the province of Cuneo (south of Turin, Piedmont) both traditional local artisanal food producers and giant enterprises like Ferrero (best known for its chocolate spread "Nutella") contribute to increase the overall agri-food production capacity of the area and its economic performance.

With regard to the structure of the cluster, the last Istat census counted 394 farming firms and 1,196 food or drink manufacturing companies (Table 1).

Table 1: Agro-industry firms and employees in Piemonte and in the province of Cuneo

PIEMONTE			PROVINCE OF CUNEO		
	firms	employees		firms	employees
farming	1299	2346	farming	394	779
food and drink industry	4788	38277	food and drink industry	1196	14257

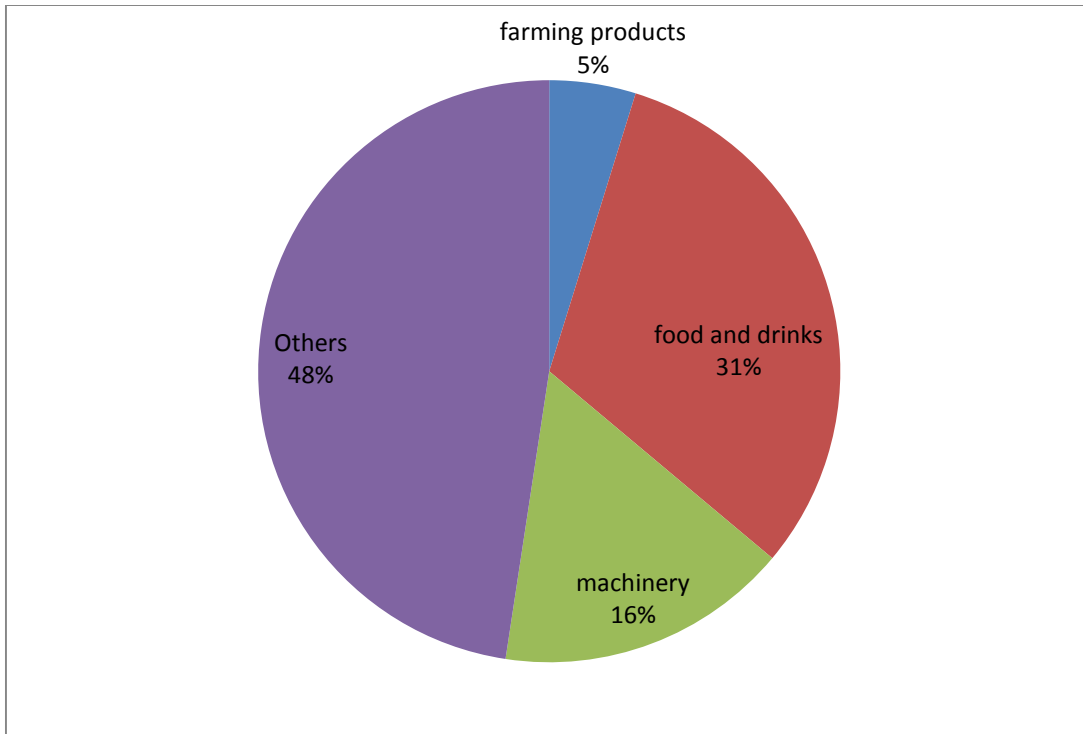
Source: authors' elaboration of Istat, industrial census data (2011).

The table just above shows that the 14,257 employees in the Cuneo's food cluster represent 37 per cent of the regional food sector workforce. Meanwhile, the 779 employees in the Cuneo's farming sector are 33 per cent of the regional agricultural workers.

According to Istat data, the province of Cuneo is the major exporter of foods in Italy. In 2012 Cuneo's exports in this sector amounted to a total value of 1,979 billion euro (Osservatorio Nazionale Distretti Italiani, 2014, p. 118).

Food and drinks with farming products have an extremely high share of the province's export volumes as a whole (Figure 1). This figure is even more significant considering that the machinery sector, representing 16 percent of province's export, is largely formed by companies producing machines for the agri-food industry.

Figure 1: Export sectors of the province of Cuneo (year 2013)



Source: authors' elaboration of data from Camera di Commercio di Cuneo (2014, p. 250).

Therefore, the new focus of Tecnogranda on the agri-food sector is closely associated with the traditional productive specialization of the local cluster. The new business plan of the company, differently from the previous one, pooled local political, economic and social willingness, rapidly transforming the corporate partnership and the management of the company. In 2008 twelve new shareholders joined the company. These include private companies, local banks, employers' associations and the Municipality of Cuneo, now a major shareholder of the company (Finpiemonte, 2014, p. 3; Tecnogranda, 2011, p. 74). Meanwhile, the company has acquired new assets, particularly highly specialized managers and employees in the agri-food sector (Tecnogranda, 2011, pp. 73-75).

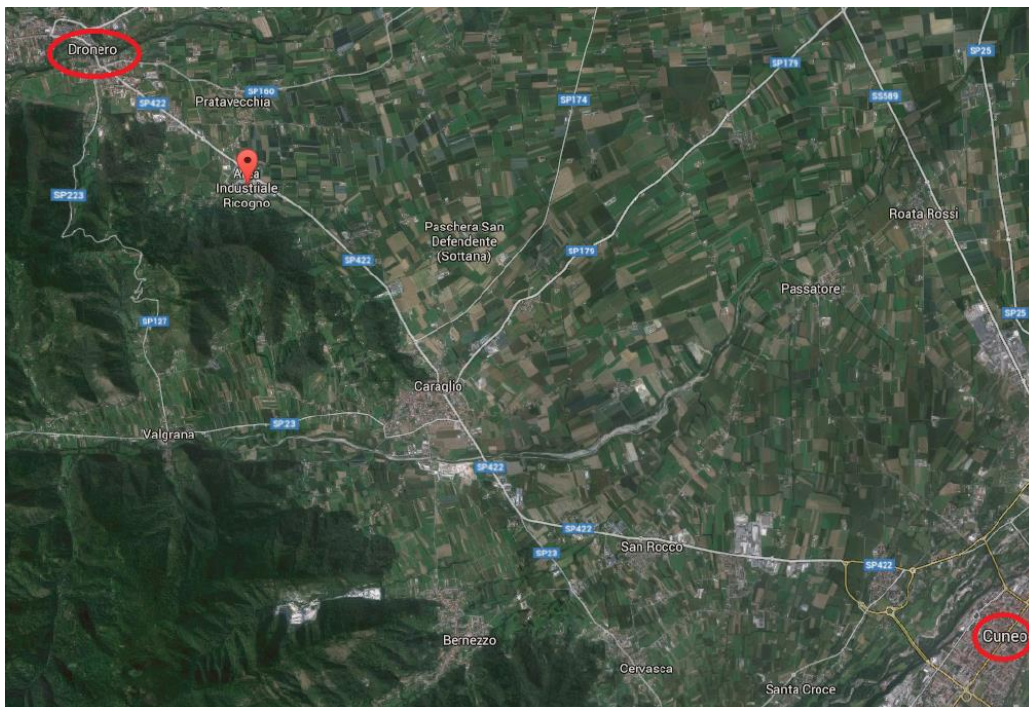
In 2009 Regione Piemonte officially assigned the role of agri-food innovation cluster manager to Tecnogranda. Within three years the number Tecnogranda's services users nearly quadrupled from 100 in 2009 to about 400 at the end of 2011 (Tecnogranda, 2014a, p. 10). Currently the innovation cluster involves more than 460 companies (Tecnogranda, 2014b, pp. 2-3). Small and medium-sized enterprises account for 80% of these companies. Further, with regard to the location, only 2 per cent of the services users

are outside the region, whereas 45 per cent operate in the province of Cuneo, as 53 per cent are located in other areas of the region.

2.2 Structure and organizational field

Tecnogrande S.p.A. is based in the small industrial area of Ricogno, near Dronero, north-west of Cuneo (Figure 2).

Figure 2: The site of Tecnogrande's offices and laboratories (Dronero, Cuneo)



Source: own elaboration from Google Maps

Considering the science park as a whole, Tecnogrande covers about 11.000 square metres of buildings with offices, laboratories and other rooms for meeting, conference and so on. Cluster member firms can use the laboratories, also installing their own equipment. Further, they are able to establish their own representative office either any operating activity.

Science park laboratories with specialized equipment aim at offering to firms high-level research and development services related to new materials, new technologies and ability to solve problems production. Particularly, the park include:

- a laboratory for research and experimentation on nanostructured materials;

- a laboratory providing chemical, microbiological and biomolecular analyses of agri-food products (water, meat, sweets, dairy products, fruit and vegetables, pasta...);
- a laboratory focusing on food packaging innovation;
- a laboratory specialized in innovative technologies for decontaminating and sanitizing packaging and food products, such as cold atmospheric plasma, microwave, CO₂;
- a laboratory equipped for the electromagnetic compatibility (EMC) testing.

Tecnogranda has nine permanent employees, including one general manager and one mid-level executive. Moreover, four temporary employees are working for the organization as project contractors (Tecnogranda, 2014a, p. 28).

With regard to the stock ownership, just five public members hold the 59,86 per cent of shares (Finpiemonte, 2014, p. 4). The most important of them is Finpiemonte S.p.A., a financial company controlled by the regional government. Since its foundation in 1977, the mission of the company has been to foster Piemonte's economic and productive system. As for the other public shareholders, the Chamber of Commerce of Cuneo (5.11 per cent of the shares) and the Mountain Community of Valli Grana and Maira (0.14 per cent) are added to the municipalities of Cuneo and Dronero, which have respectively 6.57 and 11.48 per cent of the shares.

The remaining private owners are holding rather small blocks of shares, all of them lower than 1 per cent (Finpiemonte, 2014, pp. 3-4). The list of private organizations holding shares of the company includes local banks, entrepreneurial associations and firms. Most of the shareholders are small or medium-sized enterprises, but larger companies such as Venchi, one of the oldest and famous Italian chocolate producer, are also present.

Tecnogranda carries out various and different sets of activities:

- business services for the development and diffusion of technological innovation (as "science park");
- assistance to start-up and existing companies in order to accelerate their innovation abilities (as "incubator");
- stimulus of the local agri-food system growth and competitiveness (as "cluster manager" of the agri-food innovation pole).

All these activities involve many public and private actors (Ceravolo, Garavaglia, 2013) like universities, research and training centres, companies, associations, consortia, institutions, banks, through a variety of territorial levels. Collaborations in research and innovation projects with universities, companies and research centres in Italy and abroad provide a continuous improvement and flow of knowledge, with a positive feedback to the local actors and activities. On this basis, Tecnogranda carries out the function of local-global interface or gatekeeper (Bathelt, Malmberg & Maskell 2004; Camuffo & Grandinetti 2011).

In order to manage its complex system of relationships, Tecnogranda has established two committees (Interview 1). The steering committee aims to foster relationships with the production system of the regional agri-food sector. The steering committee represents the demand side, so firms. Members of the committee are Unioncamere Piemonte, representing all regional producers, along with the chambers of commerce of Cuneo and Asti, representing the local areas involved in the agri-food innovation cluster. On the other hand, the technical-scientific committee aims to boost cooperation between actors in research and innovation field. Members of the committee are representatives of all universities in the region, of prestigious regional, national and international research bodies and of the research and development offices of important companies in agri-food and packaging sectors.

2.3 Main activities and objectives

As we have seen, Tecnogranda carries out numerous projects and diversified activities. Just between 2009 and 2013 Tecnogranda managed 130 funded projects (Interview 1). In order to shed light on the activities and relationships of Tecnogranda, this paragraph will go more into detail by analysing three projects recently carried out by the institution.

The first project is 'F&F Biopack'. The chemical company Novamont S.p.A. managed this project together with Tecnogranda and University of Turin between 2011-2013. The project aimed to develop innovative biodegradable materials for food packaging, zootechnical products, fruits and vegetables. The project involved research institutes, universities, associations, cooperatives, companies and farms. The role of Tecnogranda within this research and development project concerned the morphological

characterization of the films by electron microscopy analysis in addition to checking the safety of packaging with suitable simulation. Indeed, in order to test the shelf-life of each fruit and vegetable product, the assessment need specific timing and conditions. It is clear in this case that Tecnogranda has acted as a bridge between the different stakeholders of the network, testing the prototypes of universities and big corporate research centres and then transforming them into suitable products for farmers and local producers.

The second initiative is “Salux”, a European project aiming at reformulating manufactured foods in terms of reduction of the levels saturated and trans fats, salt and sugar. Tecnogranda is the leader of a network of SMEs, food industries associations, consumers associations, universities, public authorities and NGOs coming mainly from 12 European member states. SALUX objectives are:

- to analyse the EU context and to identify and exchange the best practices, especially among new European member states in the field of food reformulation all over the EU;
- to follow-up the reformulation of the manufactured foods among SMEs and to perform a cost-effectiveness analysis of the major reformulations identified.

Looking at the objectives and the partnership of this project, it is clear that it deals with an important issue for small and medium sized enterprises: to assess the technical and economic aspects of food reformulation, estimating the costs and benefits of regulation. As a “gatekeeper”, Tecnogranda establish local and external relations between different actors, contributing to transform knowledge in new localized practices and approaches.

In the third case Tecnogranda assisted a local medium-sized enterprise in developing an innovation. Here, the desire for innovation comes from the “Dolciaria Orsobianco”, a confectionary factory located near Cuneo. Tecnogranda provided technical assistance, adequate partners and funds to develop the research project. As a result of the collaboration the firm developed and patented a new method of freezing food, using liquid nitrogen. Following this innovation the firm expects to increase its turn over from 2 million to 30 million because of this innovation. This experience shows how Tecnogranda, through transforming knowledge and providing the conditions for both individual and inter-organizational cooperation, contributes to local and regional development, boosting innovation and internationalization of enterprises.

3 Conclusions

3.1 Findings

Considering the case study analysed, it is possible to point out the following conclusions.

Firstly, in local contexts like the one analysed here, autonomous extra-academic organizations strongly embedded in the institutional and socio-economic environment play a key role in the process of productive transformation of knowledge. In these contexts it is impossible to study the contribution of university's to industrial innovation without looking at such 'special organizations' located midway along the knowledge transformation chain.

Secondly, the approach focusing on knowledge transformation processes leads to understanding the diffusion and productive application of knowledge in a multi-dimensional and multi-actor perspective. Individual actors, as well as collective ones, have different interests and objectives, different resources, different cognitive approaches and specializations. The productive transformation of knowledge involves different and complex activities: observation, sharing practices, methods and techniques, using and jointly transforming artefacts, drawings, prototypes and other kinds of objects, negotiating time, spaces and resources.

Thirdly, the productive transformation of knowledge requires not only the involvement of individual knowledge holders, but also the creation of adequate settings of interaction. Territory-based linkages can facilitate the process and provide the conditions for both individual and inter-organizational cooperation. However, proximity as well as the desire for innovation are just preconditions. In order to get results, someone has to enact and implement the process.

The case study describes the role of a special organization in the transformation of knowledge within a specific sector and a regional context providing an example of how inter-organizational relationships, tasks and resources are managed.

The productive transformation of knowledge process is process which is too complex and costly to be implemented by a single individual. It requires an organization with an adequate amount of resources, instruments, and legitimation.

In the case analysed, the main source of local legitimation for the organization is a strong connection with local institutions, regional authorities and industry associations.

On the other hand, the organization is a relevant actor able to connect local and endogenous factors of development to the international and global dimensions. Indeed, the company we have studied is closely intertwined in a dense network of various actors, most of which are universities, firms or others centres for research and innovation at a national and international level.

The case study shows how an autonomous and extra-academic organization such as Tecnogranda can be an important driver of knowledge sharing and productive transformation of knowledge, involving academic actors and institutions. As we can clearly see observing the ordinary activities and the research projects, Tecnogranda is well equipped to implement the development of practices of knowledge sharing. In other words, through assistance, applied research and laboratories activities, Tecnogranda builds up localized and physical settings where different actors (entrepreneurs, researchers, managers) interact across domain-specific 'knowledge boundaries' (Brown & Duguid 2001; Carlile, 2004; Rosenkranz, Vranešić & Holten 2014).

From the organization theory perspective, this kind of social actor can be conceived as an organizational *relé* (Crozier & Friedberg, 1977, pp. 141-142), that is, an entity able to connect structures that normally are not connected.

Relations 'at the boundaries' recall the relations of 'nonredundancy' in network analysis which are 'visible only by their absence' (Burt, 1992, p. 4). According to Burt's definition, 'a structural hole is a relationship of nonredundancy between two contacts' (*ibidem*, 18). From a strictly sociological point of view, this approach leads us to consider knowledge boundaries as structural holes between different 'expert systems', in the sense that Giddens (1990, pp. 27-29) gives to this expression.

Looking at the characteristics of the cluster where Tecnogranda is located, it is possible to point out some possible reasons why an organizational *relé* between firms and research institutions is needed. Firstly, the small and medium sized enterprises of the agri-food cluster lack the organizational resources and skills to address their demand and

requests of knowledge, directly to universities and research institutions. Secondly, the Italian university system does not include many teaching and research activities covering all the agri-food sector-related skills. The education system of the country assigns the task of vocational training in this field to non-academic schools. As a consequence universities do not have any direct experience and relationship with the relevant stakeholders.

In more traditional productive contexts, special organizations connecting universities and economic operators are required because the cognitive, institutional and cultural distance among different social actors is too large. In similar situations the contribution of universities to industrial innovation and development (for short, the “third mission”) occurs through a process of knowledge transformation.

As the case study clearly highlights, the specific trait of an organizational *relé* like Tecnogranda consists in the ability to transform and negotiate different aims and objectives between firms and university departments.

“Special organizations” implement settings where different actors can learn, create and exchange new knowledge, observing each other doing things. For this reason they represent underestimated resources for universities’ third mission.

Adequate interaction settings are very difficult to create and reproduce, because knowledge is sticky and requires time to appropriate. Thus, these ‘special organizations’ are generally embedded in places, even if they indeed establish relationships with companies, universities, research centres on a national and international scale.

3.2 Implications for further research and policy making

Considering the technology transfer approach as too simplistic and unrealistic to study how academic institutions can contribute to industrial innovation and economic growth, has led to a deeper investigation of the complex way in which actors can generate, circulate, transform knowledge.

The ‘productive transformation of knowledge’ framework has the advantage that it deals with complex and time-consuming processes within an institutional context.

The paper has tried to understand which actors enact the process and how they manage tasks and resources in such multi-actor and multi-dimensional activities applying this framework to a specific case using an organizational point of view. By analysing the

‘organizational field’ level (Di Maggio & Powell, 1983) it is possible to understand how different organizations engage in the process.

The main suggestion resulting from this contribution is that the organization playing a key role in enacting the process can be neither a university nor a firm. To study the problem by looking at the role of such ‘special organizations’ could be a promising way to address further research. University-industry relationships are indeed a core issue for innovation and economic growth. Such relationships, however, have to be seen in a more complex institutional and organizational context, where other actors can play a role which is sometimes a crucial one.

This point can be relevant to the strategic action of universities. Universities may strengthen their involvement with autonomous organizations in order to bridge the cognitive, institutional and cultural distance hindering cooperation with business actors.

At the policy-making level, the possibility to identify such organizational *relé* could be a potentially fruitful ground to invest in. These *relé* probably assume different institutional and organizational forms, but substantially they perform a similar function which is very significant in strategic policies aiming at fostering innovation, education, and research.

Thus, one possible line for further investigation may aim at understanding which institutions support them, where they tend to locate, and which their main objectives are. Collecting information on these issues could be the first important step in order to set up effective future policies to support or encourage innovation.

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