

Innovation in Clusters: a Study by Structural Determinants

Imane Kamal

FSIESAS Laboratoire LARNED

ABSTRACT: This work aims to present the cluster as a fertile ground for innovation, and for this we will shed light on the structural determinants of an innovative environment based on location theories. In this work we will opt for an approach of the cluster as "innovative environments", where skills training, financing of initiatives, circulation of information, socio-economic animation, basic services to the community takes place. population, territorial synergy, in order to serve the development of innovation.

KEYWORDS: cluster, agglomerations, innovative environment, innovation

INTRODUCTION:

Regional agglomerations of industrial activities in the form of clusters have long been recognized as potential sources of innovation and general economic growth. At the turn of the twentieth century, proximity was absolutely necessary for rapid communication and cooperation between businesses. It is therefore not surprising that Marshall (1890, 1919) took great care to explain the location of particular industries and the advantages of industrial districts. New theoretical components become essential with regard to the "innovative environments" approach, as it is presented in the scientific literature. In this work we will opt for an approach of the cluster as "innovative environments", where skills training, financing of initiatives, circulation of information, socio-economic animation, basic services to the community takes place. population, territorial synergy, etc. In the literature, the concept of innovation is already the subject of a certain number of convergent definitions.

1: The cluster as an innovative environment:

1.1. Innovation environment:

The innovative environment is defined as "a set of economic, social, political and cultural elements" (Maillat, 1992) or "as a set of relationships which occur within a continuous geographical area and which have certain properties » (raui, 1992). In 1984, Philippe Aydalot founded the European Research Group on Innovative Environments (GREMI) in order to address the issues linked to a new concept of "innovative environment". This research group considered the territory as a space of relationships between different agents including universities and public agencies could play an important role in the innovation process. The analysis or approach by environments is not entirely new. Most of its theoretical components find their origin in already known concepts or laws. The authors often reproduce Alfred Marshall's work on industrial districts, particularly the famous principle of external effects. The recapitulation of the writings allows, on the one hand, to identify some old observations, such as concentration, cooperation and polarization which are located in the contemporary context. And on the other hand to identify the achievements of the theory of industrial localization, the theory of community organization, the theory of the export base and some other theories of development are obviously considered implicitly.

The theory of innovative environments is obviously that of "meso-economics". Like biology, mesology seeks to scientifically explain the influence that the environment exerts on its internal components. "Meso" analysis presents itself as an intermediate approach between micro- and macro-analysis of societal, particularly economic, phenomena. The GREMI or European Research Group on Innovative Environments has for years brought together around fifteen teams who study, in around twenty local contexts, the processes which lie at the intersection of innovation and local development. "Innovative environments and regional developments", the meso approach focuses on space, using the "micro" and "macro" tools of these disciplines. We can then interpret that more and more the logic (cultural, social, administrative, political, environmental, economic) of the living environments of the population and organizations, through specificities of identity and interaction, would be rather local as regional (Ay dalot, 1984). These studies of theories of innovative environments support the growing economic importance of SMEs, which currently create the majority of jobs in countries, research is also carried out on the factors which influence their creation, their location and their growth. However, not being able to internalize all the inputs necessary for its production process (resources, skills, information), especially in a context of innovation and performance gains, the SME depends heavily on its environment.

Innovation in Clusters: a Study by Structural Determinants

The fruitful premises for the advancement of the general theory of regional development were largely supported by the observation of the existence, within national spaces, of sub-spaces not meeting the traditional criteria of growth and development, but nevertheless more fertile in economic activities than neighboring sub-spaces. In addition to famous American examples, there are examples taken elsewhere: Swiss Jura; Cambridge, Great Britain; Sophia Antipolis, Alès and Grenoble, in France; third Italy; Quebec Beauce, etc.

Traditional models are no longer sufficient, regional science is seeking an “alternative” model to explain this phenomenon of creative, dynamic, fertile, or innovative environments. Because if, according to the classic theory of innovation, technical progress spreads from large urban centers, we have observed more recently that innovation also arises from the internal dynamism of a territory. There are passive spaces which only capture innovation from the outside, and active spaces which are fundamentally creative and innovative through the play of their endogenous components (Aydalot, 1986). According to scientific benchmarks, the “good combination” of all the material and immaterial conditions of the environment would be the secret of its innovative character. Each space-territory must find the appropriate recipe, the combination of resources, skills and information which, in its case, will generate the environmental effect and allow the incubation of innovation in its various forms (services and products, process of social, cultural or economic production, market, decision-making, etc.) In the various activities. Therefore, we understand, the main postulate of this theory of innovative environments is that it is the environment itself which innovates, undertakes and secretes the activities. But the question of “how” remains open. Currently the formalization of the organizational factor under various labels: organizational culture, information networks, institutional partnership, community cooperation, convention systems, coalitions, collective learning, etc. Whatever the term chosen, the collective process of improving the immediate environment by endogenous private, public and collective organizations obviously becomes a key piece in the creation of an innovative environment.

1.1.1. Innovative environment and proximity:

The innovative environment is relatively recent. Schumpeter dealt very early with the phenomenon of innovation clusters where innovative entrepreneurs group together, but the question of space was not present in his analyses, and Perroux (1964), in his analysis of growth poles, was focused on the role of large companies able to drive growth in their economic environment. So it was after the work of evolutionary economists in the 1980s (Dosi et al., 1988) that the notion of a national innovation system appeared and they emphasized the importance of rules, and the different laws and economic policies of innovation processes in the territory. Following the definition of GREMI “European Research Group on Innovative Environments”, the environment is made up of a set of relationships occurring in a geographical area which brings together in a coherent whole, a production system, a technical culture and actors. The entrepreneurial spirit, organizational practices, business behavior, the way of using techniques, of understanding the market and know-how are both integral parts and constituent parts of the environment, this the latter presents itself as a pillar of perception, understanding and continuous action (MAILLAT and PERRIN, 1992; CAMAGNI, 1991). Let us add that the environment is based on a relational system of the cooperation/competition type of localized actors.

1.1.2. The components of the innovation environment:

The innovation environment is equipped with certain components to prepare all the work carried out in this field, therefore the innovative environment is:

- ◆ A spatial whole: this is a geographical space which has no a priori borders, which does not correspond to a given region, but which presents a certain unity and homogeneity which can be explained by identifiable behaviors and specific, a technical culture;
- ◆ A collective of actors: (companies, research and training institutions, local public authorities, etc.) Who must have relative decision-making independence and autonomy in the formulation of strategic choices;
- ◆ Material elements (companies, infrastructure) but also intangible elements (know-how), and institutional elements (various forms of local public authorities or organizations with decision-making skills);
- ◆ A logic of interaction: the actors must be in a relationship of interdependence, which allows better valorization of existing resources;
- ◆ A learning logic, that is to say a capacity of actors, built up over time (historical dimension), to modify their behavior according to transformations in their environment. These learning interaction logics concern: The training of know-how, which allows mastery of the production process and the creation of new products and new techniques; the development of “norms of behavior” which relate to the relationship between actors, the search for a balance between cooperation and competition, to build a common work space; The knowledge and ability to identify, as an opportunity for interaction, the specific resources of the different actors as well as those of the environment; The environment is not isolated, it is located in a technical and market context which is international and evolving. Beyond the externalities which come from a common industrial culture, the interaction and mobility of individuals on the labor market, the ease of personal contacts and the transmission of information, the environment is therefore also characterized by more direct cooperation between local actors (private, public and collective). These cooperations which take place in a specific geographical area generally take the form of networks. Thus the environment, because it is characterized by “convention” type

Innovation in Clusters: a Study by Structural Determinants

phenomena, that is to say it is governed by a system of reciprocal expectations on skills and expected behaviors, can give rise to a reticular type organization.

2: Structural determinants of innovation in clusters:

approach using agglomeration externalities: For the structural design of innovation of companies co-located in a cluster, we must appeal to economics, geography and more recently strategic management. This theoretical current based on positive externalities, founded by A. Marshall (1890, 1920), and then by the work (Becattini 1992) this current which speaks of a spatial arrangement making it possible to benefit from the positive external economy resulting from the productive and technical interaction when firms group together within an organized territory, around a small town, with specialization in the manufacturing of products which requires the implementation of know-how assembled locally, the grouping of numerous specialized SMEs linked together by competitive and cooperative relationships. The importance of external economies lies in the geographical proximity and socio-cultural homogeneity of the territory, an atmosphere favorable to learning and innovation, a segmented and very flexible labor market, a strong social consensus, collective institutions and a strong sense of belonging to the community.

2.1. Approach using agglomeration externalities:

The effect of the geographic concentration of economic activities on business performance is not a new problem. Alfred Marshall (1842-1924) is one of the first authors to be interested in the effects of the geographical agglomeration of activities within the framework of what he called industrial district. He defines it as “the concentration of a large number of small businesses of the same nature in the same locality” (Marshall, 1890, p. 230).

Marshall's first work (1890), "Principles of Political Economy", was in the form of an observation of the production concentrated on a space of certain products in particular cities or regions. Plus the availability of the specific comparative advantages of a city or region, there is also an organization in the form of an agglomeration which attracts specialized labor and which is formed according to the needs of the producers in question. The development of "factories without walls", where the division of labor is between a large number of small independent specialized units rather than in a single integrated company, is to be found in the concept of agglomeration economies (this is i.e. external economies of scale linked to the geographical proximity of co-located companies) which result from “the pooling of infrastructure, services and know-how” and from which these companies benefit (Benko et al. ., 1996, p.5). For Marshall (1890), producers thus realize external benefits by sharing the costs of common resources such as infrastructure and services, a market of specialized suppliers and a local market for skilled labor (Kukalis, 2010). Agglomeration economies can be defined as a type of external economies of scale depending on the concomitant decisions of different entrepreneurs, which allows concentration on a given geographical area (Paniccia, 1999).

A century later, Italian sociologists and geographical economists (Brusco, 1982; Becattini, 1992; Garofoli, 1992) took up the concept of Industrial District (ID) conceptualized by Marshall to evoke the success of certain regions of Northern Italy at the end of the 1970s. Indeed, the strong growth of the “Third Italy” around traditional trades such as textiles, tannery, leather work in Tuscany and Veneto, knitwear and wool work in the Prato district, or even interior furnishings near Florence or Venice, industrial activities which represent certain specificities studied by researchers. In the lineage of Marshall, Becattini (1992) then developed an approach centered on the division of labor but broadened this economic vision by introducing a socio-economic perspective as shown in his definition of the Italian industrial district: “a socio-territorial entity characterized by the active presence of a community of people and a population of businesses in a given geographical and historical space” (Becattini, 1992, p. 36). From the combination between these two categories – business population and community of people – the performance of the Italian district is born: the presence of a specialized, flexible workforce coupled with a proportionally homogeneous system of values and thoughts explains the success of these districts. One of the main characteristics of these “modern” industrial districts would then be their “institutional thickness” (Keeble and Wilkinson, 1999). The New Economic Geography was born in the United States in the 1990s thanks to the analysis of certain emblematic examples of success such as Silicon Valley (Krugman, 1991; Feldman and Florida, 1994; Audretsch and Feldman, 1996). NGE announces itself as a school of thought in the agglomeration externalities approach. The difference between previous trends which had not explicitly mentioned the notion of innovation in industrial districts except to conceive it as a product derived from the division of labor, the NEG is interested in innovation as a real phenomenon geographical. Krugman (1991) thus developed a theory on the regional specialization of industrial activities based on the advantages of a specialized labor market and the presence of intermediate goods. He introduced the notion of knowledge externalities but does not consider that they can constitute a sufficient agglomeration force, their measurement being very difficult due to the intangible nature of knowledge (Breschi and Lissoni, 2001). Feldman and Florida (1994) retain this notion of knowledge externalities and deepen it by highlighting the existence of a particular technological infrastructure in the territory as a major determinant of business innovation. The Marshallian district, the Italian or modern district and the new geographic economy – these are trends which tend to link the performance of a cluster, to the innovation capacity of member companies, and to the presence of externalities of agglomeration. We then distinguish two main types of agglomeration economies (Marshall, 1890, 1920; Krugman, 1991; Breschi and Lissoni, 2001a; Bahlmann and Huysman, 2008):

Innovation in Clusters: a Study by Structural Determinants

Agglomeration externalities of an economic nature, this externality can be pecuniary or technological, and from which we distinguish industrial specialization, characterized by the presence of a large local labor market, specialized and qualified, the reduction of transaction costs, particularly due to the co-location of suppliers and customers. • knowledge externalities, which we have identified through two concepts from the literature: the notion of industrial atmosphere and that of technological infrastructure.

2.1 Expensive or financial agglomeration externalities:

There are three costly or technological agglomeration externalities:

A/ an industrial specialization which allows the attainment of specialized resources (inputs), B/ access to a specialized and qualified local labor market and C/ the minimization of transaction costs due to the geographical proximity of the actors (Marshall, 1890; Krugman, 1991; Becattini, 1992; Kukalis, 2010). A/ Industrial specialization and complementarity of activities:

A/ Industrial specialization and complementarity of activities:

Following the work mentioned previously, the complementarity of companies and the diversification of their activities on the same value chain is a condition for the development of the cluster, one of the things which allows both to have flexibility of work based on a vertical division rather than horizontal, and to offer employment opportunities to all categories of the population. According to the Marshallian district, this has given rise to a dense network of very dynamic small and medium-sized businesses, often traditional, competitive in a market and focused on a specific industry. These SMEs coexist within an industrial organization based on a mixture of competition, emulation and cooperation (Becattini, 1992; Benko et al., 1996. For Piore and Sabel (1984), the success of the Italian DI is proof that the mass production of the Fordist years must succeed, because the DI is also based on flexible, flexible, and territorially spatialized specialization, to replace an organization of production less flexible. Flexibility would represent a factor in the efficiency and performance of DI for two main reasons (Courlet and Ferguene, 2003): • As a productive organizational practice, flexible specialization relies on flexible equipment (multiple uses) and a versatile workforce. Firms can then benefit from a high capacity to adapt to changes in demand, by very quickly modifying the manufacturing process of their products (Scott, 2004). • As a regulatory practice, the use of flexible specialization requires the maintenance of market rules combined with informal relationships (knowledge, social networks) developed between district members. This has an effect on competition which is based less on prices than on quality. However, this interpretation of industrial districts is today considered historically dated (the 1970s and 1980s) and questionable (Lescure, 2006). The flexible specialization strategy for supply and demand is no longer the only condition for possible adaptation to new production conditions.

B/ A qualified local labor market:

In the analysis of industrial districts, Marshall (1890) highlights the specialization of the local labor market, one of the determinants of economic performance, it is the specialized workers who have at their disposal multiple employers who then have costs low recruitment and transactions (De Langen, 2002; McCann and Folta, 2011). In Italian DIs, the presence of a specialized and flexible workforce (importance of home and part-time work) is also a guarantee of performance (Becattini, 1992). The reorganization of human resources within districts is even “a sine condition for its competitiveness and productivity” (Becattini, 1992). One of the main characteristics of DI is the provision of technical training and apprenticeship (Paniccia, 1998), which in turn improves the entire quality of the labor market (Langen, 2002). Some researchers criticize the concentration of companies on access to qualified personnel, or other key inputs, to the detriment of their margins. It is therefore important that this local labor market is sufficiently broad (De Langen, 2002; Poudet and St John, 1996; Beaudry and Breschi, 2003). Also in the context of an innovation cluster, the specificity and qualification of the workforce is considered one of the important determinants for the innovation performance of the cluster (Porter, 1998). Updating the workforce will allow companies to stay ahead of their competitors, maintain their competitiveness on an international scale, and also an update of all functions of the firm without exception is necessary. The permanent qualification of personnel represents a major advantage for the firm, which is the reduction of costs and uncertainty associated with the innovation activities of companies (Breschi and Malerba, 2001). In conclusion, the availability of a sufficiently large, specialized and qualified local market has positive effects on the innovation performance of cluster companies because they benefit from qualified human resources allowing the appropriation of skills for innovation.

C/ Geographic proximity of suppliers and customers Marshall (1890) sees the co-location of suppliers and customers as a source of positive agglomeration externalities. Following studies on the megacities of the West Coast of the United States, proponents of the school of flexible specialization have extended this analysis (Scott, 1988; Storper and Scott, 1988; Storper and Harrison, 1992; Storper, 1997) a rereading of the theory of transaction costs which was mobilized by (Coase, 1937; Williamson, 1983). Their main postulate is the minimization of inter-company transaction costs thanks to the agglomeration of the latter, since companies tend to outsource part of their production, which generates a vertical disintegration of activities with the major disadvantage of an increase in transaction costs. Spatial agglomeration allows companies to minimize their costs, and also allows them to have flexible specialization (Scott, 1988). A company will have additional income if it sets up close to its suppliers and customers in order to reduce its transaction costs, particularly in terms of logistics. These agglomeration effects lead to the creation of new companies

Innovation in Clusters: a Study by Structural Determinants

which see in the proximity of their customers an increase in sales volumes, and a reduction in their logistics costs (Krugman, 1991). The spatial agglomeration of companies thus makes it possible to benefit from significant economies of scale effects both at the level of industrial production and in innovation activity which are beyond the reach of individual companies (Keeble and Wilkinson, 1999). Indeed, the advanced specialization of small companies allows them to obtain a high rate of return from their production machines, as well as being very costly because they are specific, and this by maximizing the exploitation of their machines by the Co-companies. located. The economy of scale due to agglomeration does not stop there because it allows a reduction in transaction costs, when purchasing raw materials or establishing local price subsystems for example, which makes them competitive (raw materials or industrial equipment), to offer customers new products or services that meet their expectations, as well as a faster upgrade on the innovation market with a better guarantee of successful broadcast. In conclusion, the geographic proximity of suppliers and customers positively influences the performance of cluster companies by reducing transaction costs and facilitating DI interactions and collaborations between principals and suppliers.

2.2 Knowledge externalities:

The most significant agglomeration economies for innovation performance are knowledge externalities (Bathelt et al., 2004; Tallman et al., 2004; Gilbert et al., 2008; Arikan, 2009). Since the work of Marshall (1920) on the “industrial atmosphere”, an abundant literature on knowledge externalities and their impact on the performance of clusters and companies has developed. We speak of “knowledge spillovers”, that is to say that knowledge is disseminated implicitly or within an industrial cluster becomes accessible to members of the cluster without financial compensation. So “knowledge spillovers” are based on a logic of communicating knowledge via face-to-face and the mobility of activity, the responses between people who know and trust each other designing privileged vectors of knowledge: knowledge is then considered a “public good” (Breschi and Lissoni, 2001b). We will also study knowledge externalities, firstly its effects linked to the socio-economic context specific to DI through the concept of “industrial atmosphere”, and secondly those linked to the technological infrastructure specific to the cluster. Marshall underlined the importance of complementarities at the technical level between the main industry and the supporting industries. The grouping of firms promotes innovation by opening up to the experiences of other neighboring firms (Corolleur, 1999). Marshall and his “industrial atmosphere”, Becattini (1992) and the proximity between the “business population” and the “community of people” as an explanatory factor for the spread of technical and commercial knowledge, as well as skills. This sectoral, social and geographical joint ownership of companies among themselves within the DI facilitates access to knowledge concerning developments in products, equipment, materials but also markets.

This allows DI companies to remain in an atmosphere of constant innovation, however more incremental than radical (Lévesque et al., 1998; Panicia, 1998). Knowledge coming mainly from the company itself, industrial associations, scientific and professional institutes, networks of complementary firms and support services, is “private” knowledge. And Knowledge coming from institutions that support R&D in scientific and technological fields, mainly universities, and government science and technology transfer programs, is “public” knowledge (Feldman, 1994). Knowledge must be sought in men and institutions (Feldman, 1994). The central thesis of Feldman (1994), which she extends with Florida, explains that the sources of knowledge, are the public and private institutions in a region, the latter form a technological infrastructure, which allows the transfer of knowledge, facilitates the resolution problems and reduces the risks and costs of innovation. Therefore, the cluster will develop a capacity for innovation, regenerating knowledge, and which can take the form of an original technology (Feldman, 1994) and constitutes the breeding ground for technological advance and a competitive advantage for joint companies. -localized in the cluster: “It is in this way that geography plays an essential role in innovation, and in the growth of advanced, capitalist societies” (Feldman, 1994, p.2). In an empirical study, Aharonson et al. (2007) explained that knowledge spillovers are closely linked to the co-location of specialized companies and universities by sharing a relatively small base of common scientific or technological knowledge. Public innovation or technology transfer consulting agencies (Doloreux, 2002) also influence the circulation of new knowledge and innovations. Marshall (1920, p.385) mentioned the role of professional unions in the expansion of knowledge within the industrial district as “an admirable agent for the dissemination of technical knowledge and its evolution so far as it results from teamwork. The associative nature of the clusters makes it possible to create professional associations which forge links within the cluster between institutions and private companies, facilitating exchange by setting up research programs or specific training to the needs of the cluster, and the conveyance of information on managerial problems, still organize professional fairs or set up common supply centers (Porter, 1998). By summarizing this paragraph on knowledge externalities, we can retain three key dimensions which are organized in a logical sequence:

- Knowledge will be transmitted from innovative companies and universities to companies co-located in the cluster;
- the knowledge that is radiated becomes a public good since it is freely accessible to those who wish it and can be exploited by several users simultaneously.
- Knowledge that spreads in an implicit way, that is to say very contextual, is difficult to codify. Because it is easily transmitted through face-to-face contacts and personal relationships requiring geographic proximity. “that geography plays an essential role in

Innovation in Clusters: a Study by Structural Determinants

innovation, and in the growth of advanced, capitalist societies” (Feldman, 1994, p. 2). In this empirical study, Aharonson et al. (2007) confirmed that the co-location of specialized companies and universities sharing a relatively small base of common scientific or technological knowledge and which are located within a maximum radius of 500 meters, directly influences the production of knowledge externalities.

3: Structural determinants of innovation, an approach based on business competition strategies:

The second current based on the work of Porter, these main works, “The Competitive Advantage of Nations” (Porter, 1990) and “On Competition” (Porter, 1998) the concept of cluster is popularized thanks to the work of Porter by the introduced from a more “strategic” vision based on the effect of competition and cooperation strategies at the cluster level, the diversity of activities of co-located companies and the internationalization of the cluster, these are all characteristics of clusters, and which can constitute determinants of innovation. The highlighting of structural characteristics attached to the geographical proximity of actors as determinants of business innovation is the basis of these two currents of (Marshall and Porter) (Vale and Caldeira, 2007). But geographical proximity does not remain sufficient to explain the degree of innovation of companies belonging to the same cluster (Boschma, 200 Boschma, 2005; Torre, 2006). Porter's work (Porter, 1990a, 1998b; Porter and Stern, 2001; Porter, 2003) marked the analysis of the influence of clusters on the performance of companies, on both economic and innovation levels, including the notion de (business cluster) quickly became the standard concept in the theoretical field of economic location (Martin and Sunley, 2003). The cluster is defined as “a geographically close group of related companies and associated institutions in a given field, between which common elements and complementarities exist” (Porter, 2004), p.207). According to “Porter” the analytical concept of clusters makes it possible to measure and evaluate the development of the cluster on a regional scale, the determination of the competitive advantage of the territories and of the companies grouped in this dynamic. And therefore Porter's analysis can constitute an extension of the contributions of the NEG new geographic economics through the central place it gives to innovation in the analysis of clusters.

The central thesis of Porter's work on clusters is based on the concept of the "competitive diamond" (Porter, 1990). This model suggests that competitive advantage, which varies from one industry to another, is based on four interdependent factors. : 1) Specific production conditions, 2) Local demand, 3) Mutual stimulation, i.e. the existence of an interdependent industrial center can contribute to the construction of a competitive advantage, 4) and competition between firms which can be a favorable factor for success on an international level: search for excellence, competitive spirit. If the interactions between these four sets of strategic factors are developed and intense, the productivity of the companies concerned will be significant (Porter,1990). “In addition to enhancing productivity, clusters play a vital role in a company's ongoing ability to innovate. Some of the same characteristics that enhance current productivity have an even more dramatic effect on innovation and productivity growth (Porter, 1998, p.83). The choice of a relevant location therefore remains a truly strategic issue for innovative companies. The difference between Porter's analysis and previous theoretical trends focused on agglomeration externalities is the introduction of a strategic dimension of companies in agglomerations which is the transformation of their environment: “Location matters for innovation and companies must broaden their approaches to management of innovation accordingly: by developing and commercializations innovation in the most attractive location, taking active steps to access locational strengths, and proactively enhancing the environment for innovation and commercialization in locations where they operate. (Porter and Stern, 2001, p. 29). Porter's study in relation to DI goes beyond the traditional effects associated with agglomeration externalities by introducing voluntary action by cluster members around the implementation of specific organizational schemes. We will use Porter's work in order to analyze the structural determinants of the cluster leading to an impact on business innovation, three main factors are distinguished:

(1) a collaboration of actors who rely on a balance between cooperation and competition, (2) a diversity of the cluster, in terms of size and sectoral composition of member companies and (3) the internationalization of the cluster to promote innovation of member companies.

3.1 Competition and cooperation within a cluster:

According to Porter (1990), a cluster based on relationships composed of competition and cooperation between member companies, these relationships which will be at the origin of its performance. Informal relationships of trust are forged between cluster members to facilitate the development of new knowledge. According to Porter, establishing strong cooperative links with local universities and research centers in order to avoid the leakage of knowledge outside the cluster is essential. Simultaneously with these cooperative relationships, it advises the existence of internal competition in order to constantly maintain positive competitive pressure, accelerating the innovation process (Porter, 1998). Competition is a stimulator of business activity, which pushes companies to improve and innovate. This opposition between firms is all the stronger when they are geographically close, which constitutes a determinant of their performance. Local competition internal to the cluster positively simulates innovation activity. Empirical studies on Italian industrial clusters confirm the impact of combined relations of cooperation and competition on the development of innovations, which are often more incremental than radical (Paniccia, 1998). However, some more recent empirical work demonstrates the positive effect of extensive competition on the innovation performance of companies in a cluster. A

Innovation in Clusters: a Study by Structural Determinants

comparative study carried out on clusters in Italy and the United Kingdom provides clear results: whether the location in a densely populated cluster of other innovative companies belonging to the same industry positively affects the probability of innovating, and whether non-innovative firms from the same industrial sector are present in the cluster, benefit from this circulating innovation (Beaudry and Breschi, 2003).

3.2. Cluster diversity:

For Porter (2000), the diversity of the cluster's members positively influences its capacity for innovation, diversity in terms of sectoral or demographic composition, in order to avoid excessive rigidity (Bocquet and Mothe, 2009). The capacity for innovation is also strongly dependent on its degree of internationalization. We have already mentioned the importance of industrial specialization developed by Marshall (1890) and formalized by Glaeser et al. (1992), to generate agglomeration economies for co-located companies. On the other hand, Jacobs (1969) spoke of complementarity and no longer the similarity of companies so that the knowledge developed within one industry can be applied in other industries. A complementarity which will develop the potential for innovations, in particular radical innovation. The exchange of complementary knowledge between various companies and economic agents facilitates research and experimentation in the innovation process (van der Panne, 2004). Porter tried to combine two effects, the first effect is the need for complementarity in terms of product offering and the production sector, the second effect is the presence of a very specialized and qualified labor market, allowing us to stay one step ahead of the competition in innovation, and sectoral concentration with in particular the stimulating effect of developed competition on innovation. Feldman and Audretsch (1999) revealed that innovation activity tends to be weaker within a specialized industry than when it is carried out among a set of diversified but complementary industries such as the case of districts industrial companies to high innovation performance of cluster companies (Canina et al., 2005). In the United Kingdom, around ten empirical studies carried out on industries, by Baptista and Swann (1998), these studies demonstrate that Marshall's regional specialization is an essential factor for innovation. In a study on a sample of 675 Canadian biotechnology companies, between 1991 and 2000, by Aharonson et al (2007), confirmed the positive link between the geographic concentration of companies with the same technological specialization and innovation. The debate is far from over on the advantages of specialization or sectoral diversification for the innovation performance of companies co-located in a cluster; it is also difficult to determine an optimal threshold for companies.

Cluster size and demographic composition In line with the work of Marshall and that of the NEG (new geographic economics), Porter (1990) placed emphasis on the achievement of a crucial threshold in terms of the number of companies as a determinant of the performance of innovation. Establishing alongside other businesses increased net profits (Arthur, 1990). To ensure production flexibility it would seem that a sufficient number of specialized, competing and complementary companies is necessary (Courlet and Ferguene, 2003) to maintain innovation and have flexibility of action. However, no precise indication is given on the optimal number of companies within the cluster. Too strong an increase in the size of the cluster can have a negative effect on the growth and innovation performance of companies. Strong growth will increase the price of real estate around the cluster, as well as the cost of living, and consequently salaries, something which will negatively impact the innovation performance of companies in the cluster. This phenomenon was well marked in Silicon Valley (Castells and Hall, 1994), in order to limit congestion costs, certain Silicon Valley firms chose to set up in non-conurbated, rural or semi-rural regions.

Based on a study conducted by Folta et al in 2006 among 800 American biotechnology firms, they perceive that the marginal benefit linked to agglomeration economies seems to decrease with the increase in the size of the cluster: agglomeration economies, in the case of patents, would even be higher than the profits when the cluster exceeds the number of 65 companies. The introductory models of industrial districts, very focused on the co-location of small and medium-sized companies, often family-owned, Storper and Harrison (1992) differentiated the presence and influence of large companies in certain clusters, such as those created around the aerospace industry in Southern California or Toulouse or those around the automobile industry like in Detroit in its beginnings. The concentration of large and small companies would even have a positive effect on the innovation performance of the latter (Acs and Audretsch, 1990): to overcome the disadvantage of their size, small companies would have developed a strategy of creating a "niche" innovative. This pressure to create innovative niches was apparently greater in highly concentrated sectors (Audretsch et al., 1999). Similarly, Aharonson et al. (2007), in their study on the biotechnology sector in Canada, note that their initial hypothesis is rejected, because the most recent companies having between 3 and 5 years of existence and around fifty employees who benefit the most from the knowledge externalities generated by the co-location of activities, rather than less young and less smaller companies.

3.3. Internalization of clusters:

To parameterize the internationalization of the cluster, it is necessary to measure both the links it maintains with other clusters abroad and the external links of its companies, measure these effects on innovation performance, and in particular that of SMEs (Wolff and Pett, 2006). The knowledge flows that support innovation in a cluster would then be both local and global in nature through the opportunity to develop national and international links (Wolfe and Gertler, 2004). Bathelt et al. (2004). For Porter (2004) it is also the export-oriented cluster links that drive regional wealth.

Innovation in Clusters: a Study by Structural Determinants

4: The structural determinants of innovation, an approach through knowledge dynamics:

This third current is interested in the dynamics of learning and knowledge creation between the actors of the cluster through the pooling of complementary technologies, the learning of the partner, as well as the sharing of risks and costs of research and development (Iammarino, 2005; Buesa et al., 2006). Previous studies have also examined how collaboration improves innovation at the firm level to explain their good innovation performance. This work focuses on the multiple exchanges, formal and informal, and the sharing of experience between members of the cluster, but also within inter-organizational networks. This knowledge approach explicitly shifts the focus of clusters from economic development to innovation, with national and regional innovation systems remaining a core area of economic analysis. It is above all supporting the work of institutionalists around national innovation systems which are based on the growing importance of the influence of the national education system, industrial relations, technical and scientific institutions, government policies, traditions cultural and many other national institutions is fundamental (Freeman, 1987; Lundvall, 1992) then regional, or Learning Regions (Florida, 1995; Morgan, 1997) before being extended and clarified by the emerging trend of Knowledge Based View of Cluster (subsequently called KBVC) otherwise the vision of the knowledge-based cluster, and which considers knowledge as the strategic resource of the cluster (Bahlmann and Huysman, 2008).

The KBVC reintroduces the importance of the “socio-economic” vision developed by the Italian industrial districts (Becattini, 1992) through the formal and informal exchanges of knowledge between the companies in the cluster (Arikan, 2009). But which has the particularity of assimilating the cluster to a spatial configuration of activities conducive to the creation, transfer and exploitation of knowledge. Unlike the Porter cluster (1990), this approach considers that the creation of knowledge at the cluster level no longer depends exclusively on its structural characteristics but on the socio-economic and institutional context in which it takes place. The notion of knowledge cannot therefore be excluded from social and territorial processes (Maskell, 2001). The concentration of this current on knowledge, considered not as externalities accessible to all members but as strategic resources which can only be reached through interactions between companies in a network (Arikan, 2009). The creation of knowledge and learning to innovate is achieved through an interactive process in which actors possessing different types of knowledge and skills, with the aim of solving certain technical, organizational, commercial or intellectual problems. We also notice strong borrowings from two schools of thought:

1) the concept of learning region (Florida, 1995; Morgan, 1997) and 2) institutional work surrounding national innovation systems (Freeman, 1987). ; Lundvall, 1992) then regional (Cooke et al., 1997; Cooke, 2001b; Edquist et al., 2002). These approaches have in common that they consider collective learning processes as the main contribution to the success of innovative clusters (Breschi and Malerba, 2001). Interactive learning is “the interactive process of producing knowledge shared by innovative actors and determined by institutional routines and social conventions” (Doloreux, 2002, p.249). In the institutionalist current, collective, interactive learning is in fact formed on the existence of intra- and inter-organizational institutions (routines, norms, conventions) regulating collective action as well as on implicit mechanisms facilitating absorption of codified knowledge (Asheim, 2007). The concept of the learning region is based on the principle of regions functioning as collectors and keepers of knowledge and ideas providing the appropriate environment for learning (Florida, 1995). From this perspective, knowledge is considered as a new form of capital (Florida, 1995) and as a main characteristic of contemporary competitive dynamics.

“learning economy” or organizational learning is part of a broader trend of “learning economy” the learning economy developed by Danish economists, particularly around Lundvall, who affirm that knowledge constitutes a strategic resource, and Learning also considered to be the most important process for innovation (Lundvall and Johnson, 1994; Asheim, 2001). In the context of the learning economy which is mainly based on the ability of its actors to learn (Bahlmann and Huysman, 2008). Innovation is directly influenced and stimulated by its immediate environment, and strictly depends on the quality of infrastructure which results from proactive public policies and investment programs put in place by local institutions, and industrial public policies. , and financial for innovation trajectories (Coriat and Weinstein, 2002). After this nationalist evocation, a regional vision was then developed by Cooke (1997) on regional innovation systems, which suggests that, for conceptual and methodological reasons, mainly concerning problems of scale and complexity, this approach can be significantly complemented by a subnational approach around the concept of a regional innovation system (RIS). The objective of this new analytical framework is to consider the local level as an essential basis for economic dynamics (Edquist et al., 2002) based mainly on financial capacity, institutionalized learning and productive culture for the systemic innovation. The interactions between companies and other organizations (private companies, public institutions, universities, research laboratories) are at the heart of its analysis and highlight the interactive learning process. Based on the often tacit nature of the knowledge exchanged, to be able to produce new knowledge requires a high level of trust, reliability and cooperative interactions (Cooke et al. 1997). More than the result of a research activity, the SRI current sees in innovation a creative process, no longer only technological but also social and organizational (Moulaert and Sekia, 2003).

The literature on learning regions and SRIs focuses on the embeddedness of companies in an innovation system; this trend concerns two dimensions: 1) the implicit dimension of knowledge and 2) the embedding of this knowledge and learning processes in a social and territorial context (Doloreux and Bitard, 2005; Bahlmann and Huysman, 2008). From this perspective, personal and organizational measures are examined as a necessary substance for knowledge transfer, thus leading to geographical proximity and

Innovation in Clusters: a Study by Structural Determinants

concentration of innovation activities. This vision, both explicit and tacit, of knowledge that must be created, processed and transferred is at the origin of competitive advantage, because it is highly personal, difficult to formalize and therefore difficult to imitate (Nonaka et al. 1996). Our literature review on KBVC (Knowledge Based View of Cluster) and its theoretical foundations leads us to identify three structural determinants of innovation:

(1) the role of socioeconomic and territorial factors (Rocha, 2004; Wolfe and Gertler, 2004; Bahlmann and Huysman, 2008). In this reminder of the innovation performance of co-located companies is the anchoring in the social networks which tie the companies together (Granovetter, 1985; Ayalot, 1986; Becattini, 1992; Soulage et al., 1993).

(2) the role of knowledge and learning interactions, represent an externality present in the “climate” of the cluster with the objective of supporting innovation and new advances (Bahlmann and Huysman, 2008).

(3) the role of the institutional context in providing support to the knowledge dynamic to the extent that it complements individual and inter-organizational links to create an atmosphere favorable to knowledge sharing and innovation (Breschi and Malerba, 2001 ; Wolfe and Gertler, 2004; Bell and Zaheer, 2007). Although anchored in the daily operations of the company, the process of creating new knowledge is strongly influenced by a complex set of institutions that has developed over time (Maskell, 2001). Innovation is a territorial process stimulated by the social and institutional context in which it develops (Maskell and Malmberg, 1999; Asheim and Gertler, 2005).

4.1. Territorial anchoring:

The territorial embeddedness of economic activities consists of identifying the innovation performance of companies co-located in a cluster.

Territorial embeddedness is defined as the strengthening of usual links between members of the cluster, resulting from a common history of exchanges within a group or community (Granovetter, 1985; Gulati, 1998; Gilsing et al., 2008). It is a mode that detaches itself from the individualist vision of social relations within innovation clusters. Gulati (1998) distinguishes two types of embeddedness in localized networks: relational embeddedness and structural embeddedness. For relational embeddedness to be located at the individual level, and in the network of links woven between the actors of the cluster, this requires the creation of social networks, and relational fabrics created by the actors within the cluster and outside. And structural embeddedness is obtained rather at the organizational level and is understood as the position of companies within the network (Rowley et al., 2000; Inkpen and Tsang, 2005; Grossetti, 2008).

A/ Territorial anchoring at the individual level For Granovetter (1985), the actors, as individuals, are part of a concrete system, in perpetual movement, of social relations which influence their behavior and decisions, the history of the relations of the individuals between them must be taken into consideration, what Granovetter (1985) calls “the historical and structural embeddedness of relationships” (ibid., p. 486). These social relationships play an important role in establishing relationships of trust, thus facilitating the exchange of knowledge and information. Competitive relationships, leading to the development of new knowledge and therefore innovations (Rowley et al., 2000; Inkpen and Tsang, 2005; Gilsing et al., 2008; Bunker Whittington et al., 2009). In Silicon Valley, Gordon (1992) observes that agglomeration goes beyond the pooling of resources for the benefit of firms belonging to the cluster, towards a sharing of knowledge which positively influences technological developments. Ozman, (2009), Saxenian (1990) even sees in Silicon Valley a different form of industrial districts compared to European centers, this difference which resides in the dense network of relationships, professional experiences within the cluster and the development of lasting relationships both professional and friendly: one day customer, the next day supplier, another day boss and perhaps subordinate. (Saxenian, 1990). Informal relationships help replicate the sense of community that characterizes the Silicon Valley region and help in the exchange of new technical and business knowledge. On the other hand, these informal arrangements in these networks can ultimately limit creative and innovative activity, and therefore opening the clusters to the outside world will be the obvious choice for innovation (Gordon, 1992; Porter, 2003). But the disadvantages of too strong a territorial anchor can lead to a refusal of new entrants allowing the renewal of ideas (Benko et al., 1996; Boschma, 2005).

B/ Territorial anchoring at the organizational level On the basis of the relationships existing between individuals, links are established between the organizations to which they belong:

The existence of local interindividual networks encourages localized exchanges between organizations (Grossetti, 2008). Writings rely on the learning capacity provided by belonging to a network and the social control that it involves, in particular through the mutual trust generated: “the network constitutes a form of voluntary cooperation which involves both information sharing and/or mutual learning as well as exchange between their members, and also social control” (Johannisson et al, 2002, p. 298). Thanks to the roots of companies in the cluster, relationships of trust develop between members. This trust is the result of the anchoring of economic, social, political relationships, norms and tacit rules (Benko et al., p. 124). The trust that is created between individuals sharing a common base of references (culture, language, norms, values) has positive repercussions on exchanges, the communication of knowledge, specific and quality information (Rowley et al., 2000; Bell and Zaheer, 2007). Partnership relationships allow the building of inter-organizational trust, respect for contracts and the smooth running of transactions on the basis of common cultural

Innovation in Clusters: a Study by Structural Determinants

and institutional roots. The transfer and creation of knowledge between organizations are all the more important when the companies are geographically close: on the one hand, because the opportunities for meetings, particularly informal ones, and the frequency of interactions are greater (Saxenian, 1994; Bell and Zaheer, 2007), on the other hand, the managers of companies operating in the same geographical area, share mental models of business management which facilitate the understanding and sharing of circulating information. On the other hand, Poudier and St John (1996) nevertheless warn against the negative effects, in the long term, of too strong a territorial anchoring at the organizational level: companies will develop imitation relationships between them which slow down their capacity for innovation. due to too much connection of their strategic and innovative visions. However, in their analysis of the “jewelry district in Birmingham in the United Kingdom”, Propriis and Wei (2007) clearly expose the importance of the territorial anchoring of commercial relations, more precisely of vertical production relations within the district, on inter-company cooperation relations, something which has repercussions on the processes of learning dynamics. Also Oerlemans et al. (2001) in a survey on R&D, innovation and networks in Holland among 365 industrial and service companies, obtain similar results and demonstrate the impact of organizational embeddedness on innovation. In particular, they prove that the interactions developed with actors in the distribution chain (suppliers and customers) affect the innovation performance of the most innovative companies.

Territorial anchoring influences the innovation of companies in a cluster, also consists of shaping the mode of knowledge sharing between co-located actors and the resulting organizational learning constitute another structural determinant of company innovation (Cohen and Levinthal, 1990; Powell et al, 1996; Eisingerich et al, 2010). First, membership in a network plays the role of a diffusion channel thanks to the transfer of knowledge from one company to another, whether for knowledge that already exists or for that which will be produced (Gilsing et al. 2008, Granovetter, 1973, 1983). Second, networks can be the sites for creating new knowledge at the network level (Inkpen and Tsang, 2005; Gilsing et al., 2008). Territorial learning dynamics are defined by distinguishing them Different notions addressed in the literature on innovation and those on clusters: we have organizational learning (Powell et al., 1996) or interactive learning (Edquist and Johnson, 1997). Concerning the literature on organizational learning (Powell et al., 1996) Powell's team identifies in inter-organizational networks a source of innovation ("locus of innovation" *ibid.*, p. 119) with the aim of provide businesses with timely access to inaccessible knowledge resources that cannot be produced internally. Therefore, companies that want to integrate a network not because of a lack of resources but because of the desire to explore and exploit new knowledge bases (Ozman, 2009), something which is due to the complex and evolving aspect of the knowledge base (Powell et al. (1996). Organizational learning therefore allows both access to knowledge plus the prior knowledge of the organizations and the diversity of backgrounds this allows the development of capacities for using this knowledge and construction of news on this basis (Powell et al., 1996). Through this thinking, organizational regularities helping and accelerating access to credible knowledge produce a real competitive advantage for network companies (Powell et al., 1996). Continuing work on organizational learning in the context of clusters, Lawson and Lorenz (1999) develop the concept around three main ideas: Learning depends on sharing knowledge among members of an organization; this knowledge is often implicit and symbolized in organizational routines and procedures. Combines diverse and varied knowledge to create new knowledge within an organization (Nelson and Winter, 1982). Organizational slack can limit the effective use of this new knowledge due to resistance to change in the organizational routines and procedures in which the knowledge is represented. In these modalities, what matters for innovation in clusters is not the abundant availability of information but rather the process allowing this information to become exploitable for the reproduction of knowledge (Lawson and Lorenz, 1999). Keeble and Wilkinson (1999, p. 296) thus arriving at the following definition of regional collective learning as: “a system of producing common or shared knowledge between individuals which makes it possible to coordinate their actions in order to resolve technological and organizational problems they encounter. Along the same lines, Steiner and Hartmann (2006) consider clusters as institutions for collective organizational learning and knowledge management on a cluster scale. In this sense, they classify the cluster's actions as informal participatory learning opportunities. These cluster-wide learning processes create resources specific to the cluster (Mendez, 2005) which have four characteristics (Pecqueur, 2008): 1) they only appear when actors combine to solve a new problem; 2) they are not measurable and therefore not transferable; 3) they are complementary to the market; 4) they are produced in a specific space, with institutional geographical proximity, and on the basis of reciprocity.

These distinctive means used within the cluster constitute a source of innovation for member companies, participating in the collective learning process. The local competitive advantage lies in the unexpressed nature of innovation, that is to say it is difficult to imitate, understandable, accessible and transferable to other organizations outside the cluster (Maskell and Malmberg, 1999). From the perspective of innovation, the combinatorial dynamics of knowledge based mainly on the local anchoring of composite knowledge which are determining (Crevoisier and Jeannerat, 2009). This distinctive knowledge is generally concentrated in successful high-tech clusters (Lawson and Lorenz, 1999) while some empirical studies have found it in more traditional clusters dominated by SMEs (Bocquet and Mothe, 2010). The vitality and innovation performance of the cluster would then depend on the capacity of its members to absorb the knowledge and innovations revealed outside the cluster while dispersing them within their own cluster so as to enrich the contribution of knowledge and innovation developed in the cluster (Bathelt et al., 2004; Giuliani, 2005; Giuliani and Bell, 2005).

4.2. The interactive dynamic of knowledge and learning:

Innovation in Clusters: a Study by Structural Determinants

The interactive dynamic of knowledge and learning began well with the work on regional innovation systems, and subsequently with the KBVC current, where the analysis of the influence of companies' knowledge bases on performance innovation takes into consideration the institutional contexts in which cluster actors interact (Arikan, 2009; Keeble and Wilkinson, 1999). We also note the close interdependence between the specific economic activity of a cluster and the particular institutional environment which can influence, by promoting or preventing territorial learning dynamics (Crevoisier and Jeannerat, 2009). The institutional dimension is inseparable from the creation of new knowledge, the transfer of knowledge and collective learning within the cluster; its institutional practices facilitate inter-company cooperation and collaborative projects. Knowledge management is increasingly complex within the cluster given the multiplicity of actors in the knowledge exchange process, in addition to the presence of different institutional actors (Corno et al., 1999, Bathelt 2005,)the concept of institutions is multidimensional: there is the formal normative dimension of organizations with a very specific objective of developing innovation, and an informal dimension which takes the form of routines, habits, rules and laws which influence also the territorial dynamics of learning and innovation (Edquist and Johnson, 1997; Edquist, 2005).

For Corno et al. (1999) the institutional actors of the cluster – politicians, local missions of government agencies, local authorities, academics, public research institutes, professional or cultural associations – act as controllers of knowledge flows and ensuring the presence of favorable conditions for support the processes of creating new knowledge. Molina-Morales (2002), in her study carried out on the ceramic industrial district in Spain, local institutions – universities and public research institutes – play the role of intermediary agents thanks to the knowledge she was able to provide on the cluster industry technologies and markets.

CONCLUSION:

In this chapter we presented the characteristics of company innovation linked to the structure of the cluster to which it belongs. In the abundant work on clusters, we have been able to identify three series of structural determinants which correspond to three major theoretical trends: Agglomeration externalities linked to Marshallian and Italian industrial districts. And in this current we distinguish between pecuniary or paid externalities (sectoral specialization, skilled labor market and reduction of transaction costs) and knowledge externalities. Porter's model is based on competitive and cooperative relationships between actors in technological clusters, a model that relies on dual interactions between cluster organizations, created on the basis of strong competitive intensity and organized cooperation, despite the strong heterogeneity of the members (size, activity, demographics, sector). The Porter model is based on governance as a means of coordination and also on the internationalization of activities, at the company and cluster level. Interactive knowledge dynamics are at the heart of the debate which considers knowledge as the main strategic resource of the cluster. And institutional work is the focus of this approach.

REFERENCES

- 1) GIULIANI, E. (2005), Cluster Absorptive Capacity: Why Do Some Clusters Forge Ahead and Others Lag Behind?, *European Urban and Regional Studies*, 12(3), 269 -288.
- 2) HAMEL, G., Doz, Y., Prahalad, C. 1989. "Collaborate with your competitors and win". *Harvard Business Review*, No. 67, p. 137-139.
- 3) HAIR JR, J. F., HULT, G. T. M., RINGLE, C., SARSTEDT, M. (2013), *A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM)*, Londres, Sage Publications.
- 4) HENDRIKSE, G., Windsperger, J., Tuunanen, M., Cliquet, G. 2008. "Strategy and governance of networks: cooperatives, franchising, and strategic alliances". Edition: Physica-Verlag H.D, 392 p.
- 5) JEFFREY, H., Dyer, H., Singh, H. 1998. "The relational view: cooperative strategy and sources of interorganizational competitive advantage", *Academy of Management Review*, Vol. 23, No. 4, p. 660-679.
- 6) OKE, A., WALUMBWA, F. O., MYERS, A. (2012), *Innovation Strategy, Human Resource Policy, and Firms' Revenue Growth: The Roles of Environmental Uncertainty and Innovation Performance*, *Decision Sciences Institute*, 43(2), 273 - 302.
- 7) NIU, K. H. (2010), *Industrial Cluster Involvement and Organizational Adaptation: An Empirical Study in International Industrial Clusters*, *Competitiveness Review: An International Business Journal*, 20(5), 395 -406.
- 8) NIU, K., MILES, G., LEE, C. (2008), *Strategic Development of Network Clusters*, *Competitiveness Review*, 18(3), 176 - 191.
- 9) DYER, J., Nobeoka, K. 2000. "Creating and managing a highperformance knowledgesharing network: The Toyota case". *Strategy Management Journal*, vol. 21, No.3, p. 345-425.
- 10) DiMaggio, P., POWELL, W.W. 1983. "The iron cage revisited: institutional isomorphism and collective rationality in organizational fields", *American Sociological Review*, Vol. 48, p. 147-160.
- 11) DOZ, Y. 1996. "The evolution of cooperation in strategic alliances: initial conditions or learning processes?", *Strategy Management Journal*, Vol. 17, No.1, p.55-83.

Innovation in Clusters: a Study by Structural Determinants

- 12) KALE, P., Singh, H., Perlmutter, H. 2000. "Learning and protection of proprietary asset in strategic alliance: building relational capital". *Strategy Management Journal*, Vol. 21, No. 3, p. 217- 237.
- 13) KENIS, P., Knoke, D. 2002. "How organizational field network shape interorganizational tie formation rates", *Academy of Management Review*, Vol. 27, No. 2, p. 275-294.
- 14) PHILLIPS, N., Lawrence, T.B., Hardy, C. 2000. "*Interorganizational collaboration and the dynamics of institutional fields*". *Journal of Management Studies*, Vol.37, No. 1. P. 23-43.
- 15) PRAHALAD, C.K., Hamel, G. 1990. "*The core competence of corporation*", Harvard Business.
- 16) PROVAN, K.G. et Milward, H.B. 1995 "*A preliminary theory of interorganizational network effectiveness: a comparative study of four community mental health systems*", *Administrative Science Quarterly*, Vol. 49, p. 1-33.
- 17) PROVAN, K.G., Kenis, P. 2008. "*Modes of network governance: Structure, management, and effectiveness*". *Journal of Public Administration Research and Theory*. Vol. 8, No. 2, p. 229- 252.
- 18) PROVAN, K.G., Amy F., Joerg, S. 2007. "*Intereorganizational networks at the network level: a review of the empirical literature on whole networks*". *Journal of Management*, Vol. 33, p. 479- 516.