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Conceptual bases of innovation studies: An analysis from the Micro and Meso perspective

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This paper analyzes the conceptual bases of innovation studies at the micro- and meso-levels of analysis. The analysis is carried out from a theoretical perspective and highlights the need to study the business unit (micro-unit) and the regional/local scope (meso-unit) as an indissoluble whole in which value creation and competitive advantages are reinforced and sustained, thereby creating winning regions. Likewise, this paper helps us understand the systemic aspect, nature, and dynamics of innovation, and the influence of the historical, social, economic, and technological contexts that affect it. Finally, this paper highlights the study of the micro- and mesoareas of innovation, including their main schools and research.

Keywords: Business innovation; territorial innovation systems.

Abstract

This article analyzes the conceptual bases that have guided innovation studies at two levels of analysis: micro and meso. The analysis is carried out from a theoretical perspective and highlights the need to study the business unit (micro-unit) and the regional/local scope (meso-unit) as an indissoluble whole in which the value creation and the competitive advantages are reinforced and sustained, also creating winning regions. Likewise, this article helps us understand the systemic aspect, nature, and dynamics of innovation and the influence of the historical, social, economic, cultural, legal, and technological contexts that affect it. Finally, the areas of study of innovation are highlighted - micro and meso-, main schools and research.

Keywords: Business innovation; Territorial innovation systems

1. Introduction

The development of an environment and a culture favorable to innovation becomes an indispensable requirement for both economic development and social development of the territories, becoming an objective that must bring together the state, the productive sector, the academy, and society. Likewise, advances in knowledge at a technological level have been recognized as an important factor that contributes to productivity and the economy. Therefore, the innovation process and actions to contribute to change are fundamental for firms, governments and academics (Greenacre, Gross and Speirs, 2012). The interest implied by actors from different social levels actively involved in innovation processes underlies various reasons. Previous studies have identified that efforts at innovation are positively manifested in impacts on economic growth.

Similarly, recognizing that the market is imperfect generates challenges that must be addressed from the dynamics of innovation, thus reducing the conflicts generated by asymmetric access to knowledge, limited rationality, power dynamics, corruption, and other dynamics that afflict contemporary society.

Thus, the innovation generated in the interactions between the agents, either due to their cooperation dynamics or the simple establishment of trust, makes it possible to reduce transaction costs significantly. Innovation also involves social developments that lead to the institutions achieving formal and legal agreements that maximize their benefits.

In this sense, the study of innovation constitutes a vast and fertile field, which implies the recognition of the failures and imperfections of the market and society, which means generating opportunities to intervene in the environment and promote transformations at different scales, from business with the development of innovations, to the social with the formulation of public policy interventions that transfer the result of innovation for the benefit of society in general (Nelson and Sampat, 2001). In this line of thought, innovation also assumes that knowledge is produced, used, and transferred through organized human relations. The concept of an organization that emerges

from these reflections leads to a reflection on the emergence of innovation as a collective development. Beyond the purpose pursued, innovation reappears as an element to enhance the achievement or development of human groups' goals.

In this way, we understand innovation as a perspective in which the business unit (micro-unit) and the regional/local level (meso-unit) form an indissoluble whole in which the creation of value and companies' competitive advantages are reinforced and sustain, also creating winning regions.

There is research that suggests a framework for the study of business innovation processes from a social process perspective where they integrate the knowledge of individuals, organizations and the spatial-institutional contextualization, referencing the levels of micro, meso and macro analysis (Manniche and Testa, 2018), as well as the use of tools to assess the territorial level of innovation and how they compare between regions and sectors (Ruhrmann, Fritsch and Leydesdorff, 2021). However, these types of studies are still scarce and some are confusing.

The main objective of this research is to improve the understanding of the concept of innovation and provide a set of arguments that contribute to its theoretical understanding. This article offers a series of perspectives on innovation as a field of study, and presents important contributions made on the management of innovation in companies and territories, by the main scholars of the subject.

From the methodological point of view, this article is based on a documentary review, oriented by the knowledge of the authors' area, which allows an exploration of the context in which the concept of innovation is framed in order to identify the evolution of innovation studies, grouped into two levels of analysis: micro and meso. In this sense, business innovation will be analyzed first, followed by the study of territorial innovation systems. Finally, a discussion and conclusions on the subject are addressed.

2. Innovation from the micro and meso point of view

2.1 Business innovation

The analysis of the key aspects of innovation has generated significant interest, and relevant findings have been obtained that have allowed the development of new aspects to promote technological change. In recent years, the importance of this change has been widely discussed and academic researchers have studied the factors, such as the external factor of firms, that influence innovation trying to find new ways to improve their level of innovation (Du, 2018). These findings help understand the nature and dynamics of innovation and the influence of the historical, social, economic, cultural, legal, and technological contexts that affect it.

One of the evidence of interest in the study of innovation is the increase in the number of scientific-academic publications that are related to the study of innovation (for example, journals such as *Technovation*, *Research Policy*, *Regional Studies*, *Research-Technology Management*, *Journal of Small Business Management*, *Technological Forecasting and Social Change*, *Small Business Economics*, among others).

An analysis of the research published in the main journals in the area highlights the diversity of approaches that have been adopted. Finding a wide range of contributions ranging from sociology studies where the relationship between science, technology, and society is distinguished, to research focused on the study of business management, which focuses on understanding the relationship between innovation and organization strategy. In the literature, authors such as Nieto (2001) have presented a typology of the various study levels at which research on innovation has flourished - macro and micro levels (Figure 1 and Figure 2).

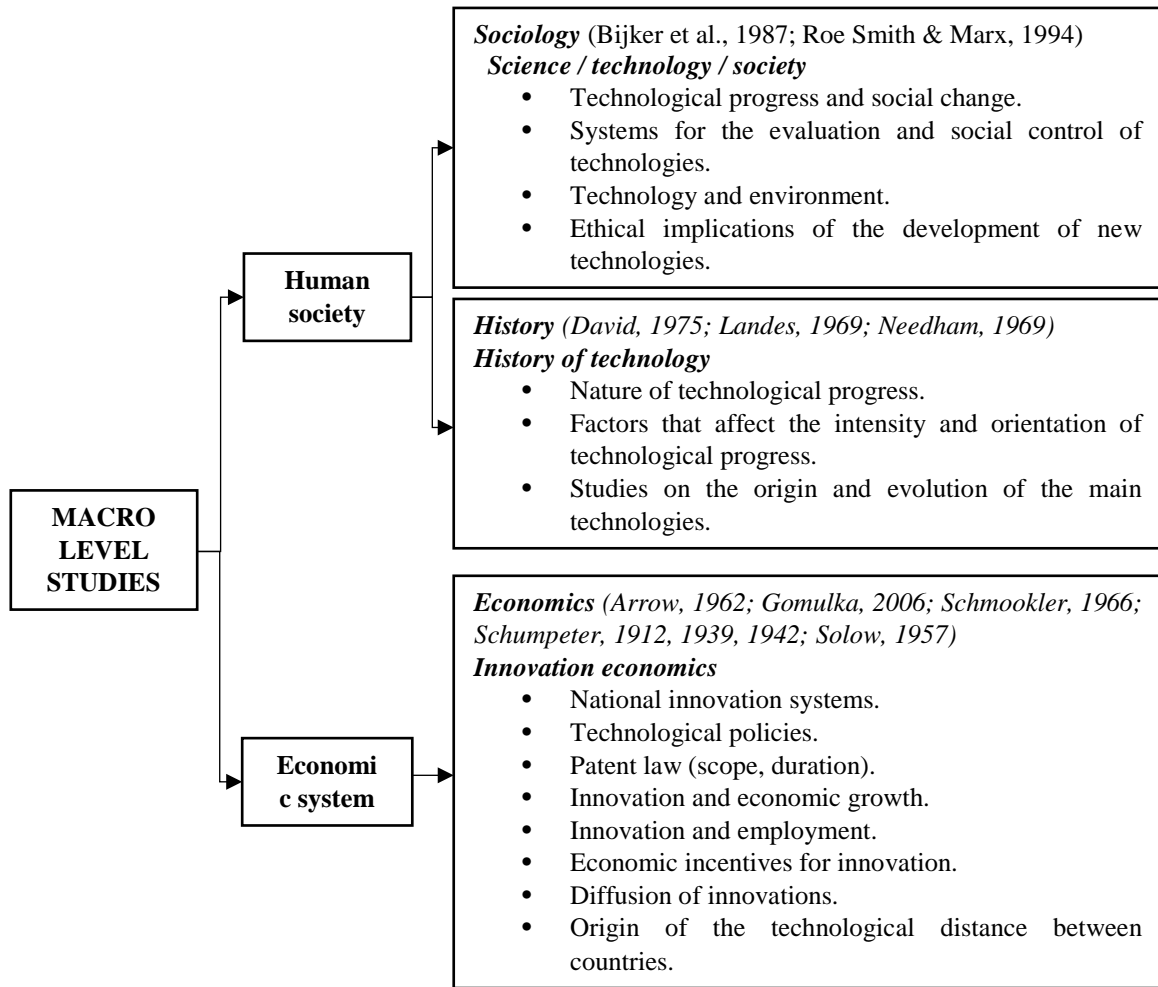


Figure 1. Macro level studies

Source: Adapted from Manjarrés –Henríquez & Vega –Jurado (2012)

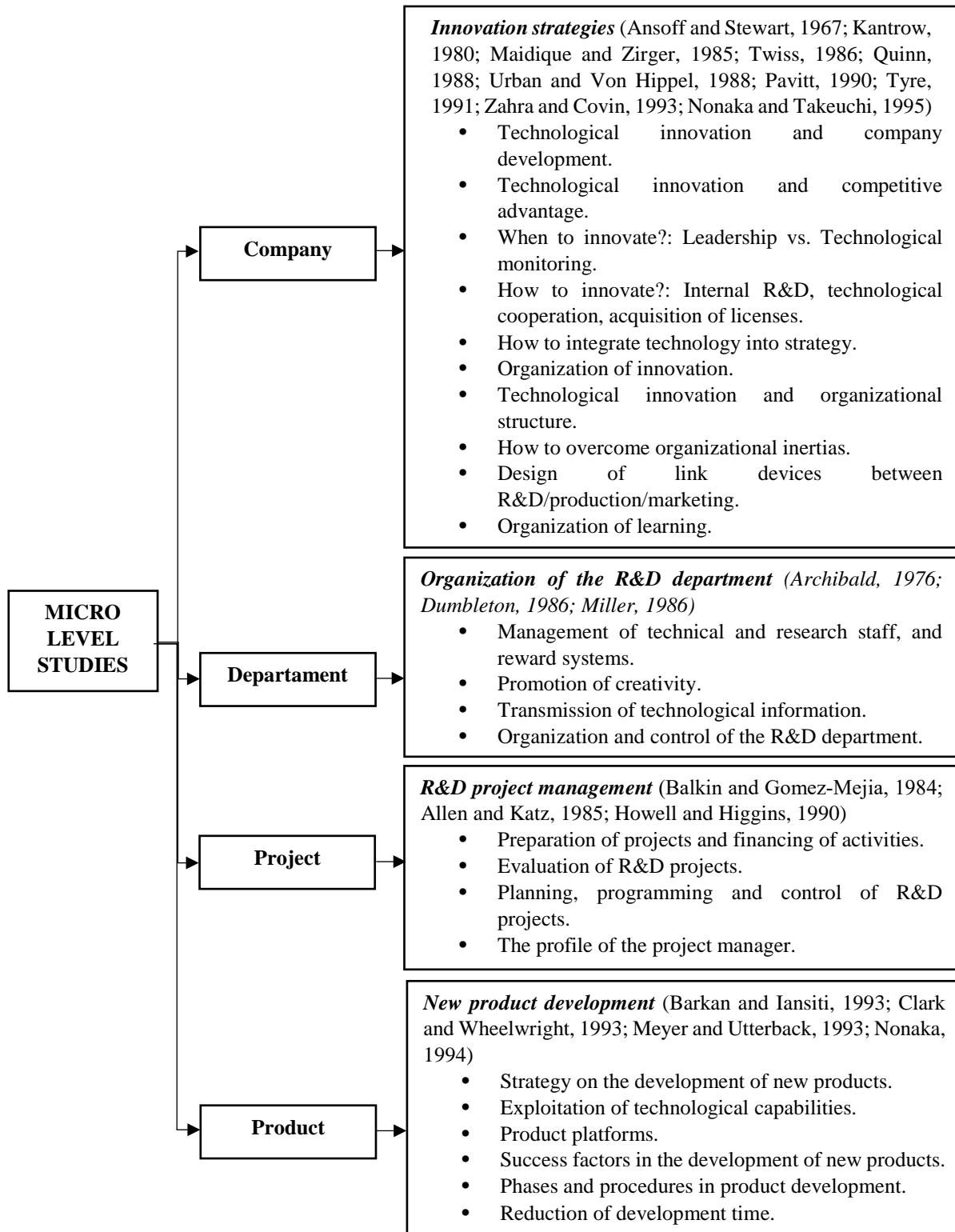


Figure 2. Micro level studies

Source: Adapted from Manjarrés –Henríquez & Vega –Jurado (2012)

Regarding studies at the macro level, it can be said that there is a wide tradition of studies that account for the relationship of innovation with human society and the economic system; however, innovation management is a more specific, recent and emerging area of study. The interests of studies at the micro-level of innovation frequently lie in the way innovation is managed and in the broader contextual factors that influence its management.

Along these same lines, authors such as Nieto (2001) have highlighted how the area of study of innovation management has emerged in a broad sense, in addition to how the concept in the field of business management has been particularly consolidated; however, his study is based on a wide range of academic disciplines (engineering, economics, psychology, sociology, history, among others). This plurality is inevitable because innovation management has multiple challenges. A great challenge for innovation studies is to consolidate a dominant paradigm, which manages to solidly define a methodological basis for technological management in the company and create synergies between the different aspects that are being studied.

The social sciences have approached many studies on innovation management. In this field, some studies are focused on analyzing how to overcome organizational inertias, and on understanding the process of business innovation through relationships between individuals and groups (Callon, Rip and Law, 1986; Bijker, Hughes and Pinch, 1987). Historians make other significant contributions to technology, such as Rosenberg & Nathan (1982), David (1985), Basalla (1988). They have helped to understand the origin and evolution of innovation and the factors that are immersed in the orientation and intensity of technological progress, identifying some historical patterns that have allowed us to denote a dynamic and progressive vision of the innovation process at the industrial level. Institutional academics have also focused on studying social, economic and environmental problems, offering an alternative on social innovation in relation to other perspectives, contributing to the management of knowledge about business and society (Van Wijk *et al.*, 2019). Similarly, economics contributions have had a fundamental impact on research on the direction of innovation at the business level (Schumpeter, 1912; Arrow, 1962; Nelson and Winter,

1982). Therefore, the study of innovation management is based on understanding the sources, nature, and results of the innovation and the economic, technological, and social context in which it occurs.

In addition to the socio-economic and technological context in which the company operates, in the last decade progress has been made in a varied field of research based on the theory of resources and capabilities, which establishes that the company and its set of resources and capabilities are the main elements to promote competitiveness (Wernerfelt, 1984).

Resources and capabilities are focused on the set of routines (the pioneering idea of Nelson and Winter, 1982), resources, or capabilities that sustain competitive advantage and are directly related to business performance, shaping an economic theory from the Ricardian perspective (David Ricardo). This theory has derived into Teece, Pisano, & Shuen (1997) theory of dynamic capabilities, which addresses competitiveness in the company based on the knowledge generated or learned by it. Dynamic capabilities theory is based on organizations' ability to structure their resources (Teece, 2009) to adapt to changing and uncertain environments. Various dynamic capabilities are discussed, including the ability to search for new ideas, prioritize them, and then create and capture value. A key aspect of these capabilities is measuring organizations' ability to adapt to change and exploit business opportunities (Dodgson, Gann and Phillips, 2013).

From the above, we emphasize that research on business competitiveness could be expanded by including a new element that generates and drives organizations' competitiveness: the meso or territorial level, referring to the local and regional level.

2.2 Territorial innovation systems

From different economic approaches such as innovation economics, economic geography, sociology, regional science, economic policy, as well as the literature of the industrial districts (Becattini, 1990; Bellandi, 1989; Brusco, 1986; Pyke & Sengenberger, 1992; among others), localization economies has been emphasized as an approach that allows us to distinguish the

existence of a collaborative factor between the company and the sector, an essential aspect of business competitiveness. This approach of considering the location or the territory in which the company is located has also been approached from the perspective of the resources and capacities of said territories (Hervás-Oliver and Albors-Garrigós, 2007). Therefore, Figure 1 illustrates the various theories and/or schools that consider the study of business competitiveness, focusing on the micro and meso levels as the main points to understand innovation. Thus, as we can see in Figure 3, in addition to the previous theories, other disciplines have covered competitiveness from the meso approach (Economics of innovation, Sociology, Regional Science, among others).

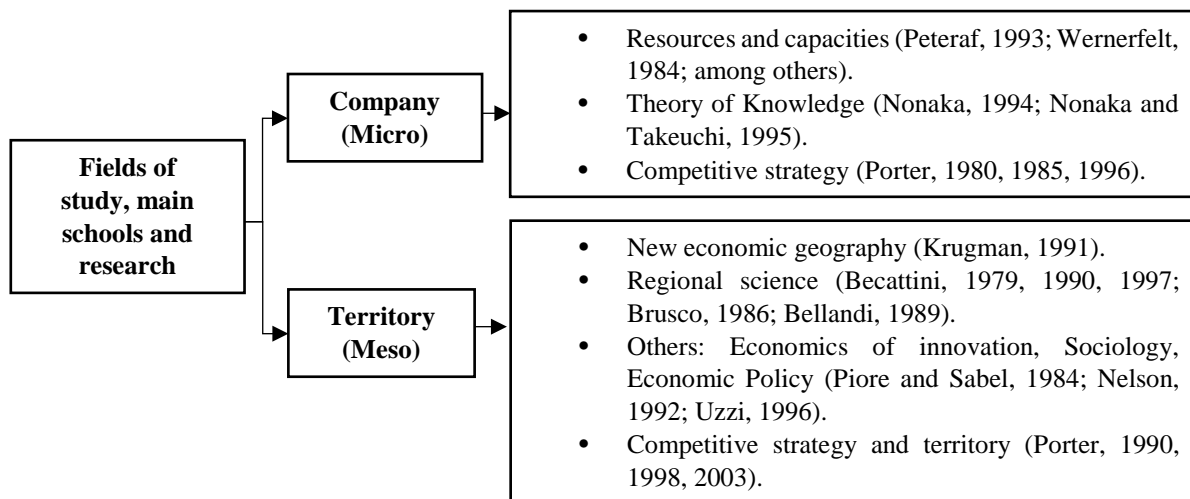


Figure 3. Study areas of micro and meso innovation, main schools and research

In this way, we understand innovation as a perspective in which the business unit (micro-unit) and the regional/local level (meso-unit) form an indissoluble whole in which the creation of value and companies' competitive advantages are reinforced and sustain, also creating winning regions. Specifically, we will refer to the study of industrial agglomerations, such as those locations or concentrations of companies and institutions from related sectors where it is easier to be competitive, forming territorial innovation systems.

The study of industrial agglomerations arises from Marshall's (1890) pioneering approach in which he distinguished between two types of economies - external and internal. External economies have been recognized as those that depend mainly on the progress of the industry. These comprise, for the local market/industry, suppliers, skilled labor, and the process that involves disseminating knowledge that includes innovations in products/processes. These elements facilitate an organization with significant advantages in the localized industry. On the other hand, internal economies depend on those internal factors to the organization, so these depend on the company itself.

Authors like Hoover (1948) show that external economies arise from industrial agglomerations and differentiates between external economies of location and external economies of urbanization. The first of them refers to the industrial activity itself, while the second - also known as de Jacobs (1969), indicates that the main externalities are generated from outside the industrial sector, that is, when unrelated sectors interact with each other, as usual in big cities.

In turn, within the industrial agglomerations in which the external economies occur, different kinds of relationships and hierarchies are created. There will be informal relationships, stemming from Marshall's original idea, but there will be other formal relationships as well. In this way, the key benefits lie in geographic proximity, which results in a more powerful way for companies to use market knowledge and workforce, among others.

Consequently, the benefits from the external economies created in agglomeration areas would connect particularly with the theory of transaction costs (Coase, 1937; Becattini, 1997); therefore the cluster is a highly viable option, since it is less expensive for these economies - which would reduce production costs, and also because there are values, beliefs, and languages that form a trust in themselves that is a pillar for the reduction of transaction costs and for an exchange of tacit knowledge. According to Porter (1998), clusters are concentrations of companies and institutions from related sectors that favor the competitiveness of the companies located there. And for Giuliani and Bell (2005, p. 47), the clusters are "geographic agglomerations of economic activities that

operate in the same or interconnected sectors", therefore they have been considered as a source of dynamic development, where the companies of the clusters benefit widely from the skilled workforce and the generation of new ideas between companies due to geographic and social proximity, promoting incremental innovation. Therefore, we refer to the agglomerations of companies that carry externalities or positive benefits.

Likewise, there are other classifications when conceptualizing and defining a theoretical framework for the particular phenomenon of business agglomerations. On the one hand, the pure agglomeration model is born from the idea of Marshall. He understands that the workforce's specialization is driven by a concentration of companies in the same area, and this concentration can also improve the provision of inputs for the industry and increases the information and ideas between them. The central aspect of these benefits lies mainly in geographical proximity, which produces a more efficient way for companies to use labor and information, thanks to transaction costs. On the other hand, the industrial complex model is identified by being made up of groups of stable and identifiable relationships between the companies in the complex, which are specialized in commercial relations of purchases and sales among themselves. The analysis is based on the spatial transaction costs in which the company is immersed (for example, communication, and transportation). The companies in the complex will have made capital investments to establish and sustain commercial relationships (for example, the Toyota supplier park). Finally, based on the sociology literature, there is the social media model. The companies' relationships in this complex are based on strong interpersonal relationships, which go beyond the companies' limits. So the interaction between them is based on trust and the informal nature of these relationships (Gordon and McCann, 2000).

In turn, industrial districts are recognized as concentrated companies immersed in an interdependent production process, often in the same industry or segment, and are established in the local community and restricted by the usual route to work (Sforzi, 1989). A clear example of this is

the Italian industrial districts (in Becattini, 1987; Brusco, 1992; Piore & Sabel, 1984; Pyke & Sengenberger, 1992).

Highlighting the influences of the territory (agglomerations) on the companies, we have flourishing literature that, from various disciplines and approaches, has been able to understand the advantages (externalities) produced by the territory to the company. Thus, a conceptual framework has been formed from different theories and disciplines. It is configuring a mainstream of innovation and territory, always starting from the original ideas of Marshall (1890), passing through the contributions of the GREMI group, the geographers of the American school from the economic geography that characterized the New Industrial Spaces (Scott, Storper, Amin, Robins, among others), the group of the IILS (International Institute for Labor Studies) with Sengenberger, Piore, and Sabel, to the Italians based in the industrial district with a high social component such as Brusco, Sforzi, Signorini or Becattini, among others. More generically, we can mention that great interest has been awakened in the study of this socio-economic paradigm, which has forged a large number of works approached from different areas of knowledge. As wide and varied, for example:

1. Regional science, specifically the Italian version of the Neommarshallian research flow of the industrial districts (Becattini, 1979, 1990, 1997; Brusco, 1986; Bellandi, 1989; Pyke and Sengenberger, 1992) and the current of the GREMI group referring to the milieu innovateur (Aydalot, 1986; Camagni, 1991);
2. The sociological (Saxenian, 1994; Uzzi, 1996);
3. Economic policy (Piore and Sabel, 1984; Best, 1991);
4. The economy and innovation systems (Lundvall, 1992; Nelson, 1992); and,
5. The organizational economy, based on the theory of resources and transaction costs (Foss, 1996; Lawson, 1999; Maskell and Malmberg, 1999), and competitive strategies applied to territories/clusters (Porter, 1990, 1998).

Framing the agglomerations in an appropriate conceptual framework, we highlight that when studying agglomerations or clusters, it is about the territorial systems of innovation. In summary, we find three large families or schools of thought that make up territorial innovation systems (according to Moulaert & Sekia, 2003). A first "social" group where local institutions (norms,

values, cooperation, among others) are key to the GREMI group and the Italians of the industrial district (Brusco, 1982; Aydalot, 1986), even with contributions from the Uzi sociology, among others. A second group where the concepts of institutional coordination of national innovation systems towards the regions are applied, defending regional innovation systems (example, Cooke, 1996). A third group of the American school of geographic economics studies new industrial spaces (Scott and Storper, 1988; Saxenian, 1994). Additionally, the fourth could be Porter's school (Porter, 1990, 1998).

Other lines from the innovation literature characterized by innovation systems (Lundvall, 1992; Nelson, 1992) have also served to emphasize the concept of innovation systems applied to geographical realities (countries) that later spread to the regions as systems regional innovation models or territorial innovation models (Cooke, 1996; Morgan, 1997). In this last school, the most important thing is learning the knowledge that takes place in the regions, and the institutions are those that determine the "rules of the game" that must be followed, which are those that regulate and coordinate the elements of the system. This discipline has relevant exponents such as Morgan, Cooke (editor of the European Planning Studies magazine), Asheim, the CIRCLE School (Chaminade, Coenen, Edquist), and others from Utrecht (Morrison, Balland, Crespo, Boschma, among others).

In general, in the previous territorial innovation models, we find three essential aspects, such as innovation is interactive (between various local/regional agents); innovation depends on regional/local institutional rules (norms, values, cooperation, among others); innovation also has a high social component.

Another school of thought considered as the most applied to the business strategy can be framed within the work of Michael E. Porter, where the creation of the US Cluster Map is currently led, and which is between strategy and regional development, being responsible for having popularized the concept of the cluster. According to Porter's model, productivity is the most crucial factor in competitiveness, pointing out that it is in two dimensions: the company and its micro-environment.

In this context, Porter (1990) establishes four fundamental components that determine the competitiveness of the sectors of a nation, a model that was called the National Diamond. These factors interact forming a dynamic model, such as the conditions of the factors, the conditions of the demand, the related and support sectors, and the strategy, structure, and rivalry of the companies that form them (Baixauli, 2010). This model develops the cluster concept, relying on sectors, territories, and their companies and ultimately explaining why a country is competitive in certain product-markets. The model applies to those sectors that are concentrated or located territorially in clusters and gathers from another perspective many of the factors listed in the previous GREMI-Industrial District schools, regional innovation system, and new industrial spaces.

These contributions are part of the concept of territorial models of innovation, coined by Moulaert and Sekia, which has been used in a generic way to refer to the various regional innovation patterns in which the actions carried out by socio-institutions, regional or local actors, have a significant role.

A generic determinant that favors the competitive advantage of a sector is the presence of suppliers. These related or auxiliary sectors are internationally competitive, in the sense that said sectors could transfer knowledge and solutions to the sector in question that will favor their competitiveness.

Consequently, following Camagni (2002), the concept of territory includes three key aspects, such as a system of localized technological externalities, of material and immaterial factors; a system of social relations; and a local government system, which provides a collective assembly of companies and institutions (Lleó de nalda, 2015).

3. Conclusions

Reflection on innovation requires an understanding of the bases for its study. A key element to understand it is that its study involves investigating the change and the future, to the detriment of being and the present. Developing this vision involves understanding that the world is dynamic and

that it has speed and direction. Thus, the need to involve change as a central element of the understanding of economic phenomena is emphasized, since the imperfections that arise from this are the primary input for the promotion of innovation processes (Nelson, 1993; Nelson and Winter, 2002).

In Veblen's words, innovation in itself is a mutation (Veblen, 1898). It is from the approaches of evolutionary economics that it is understood that economic and social systems can be analyzed in a similar way to that presented by Charles Darwin in the 'Origin of Species', incorporating essential elements such as selection and adaptation, but without ignoring a determining element for the analysis from these disciplines: the agents' ability to influence change through their actions (Nelson and Winter, 2002). The use of the evolutionary process as a metaphor has been widely accepted in the various branches of the social sciences (Lovera *et al.*, 2008).

So, although the challenge of understanding and developing innovation is not new, its importance is currently underlined with the development of the globalization agenda being advanced in most countries (OCDE, 2015). Due to the dynamism of the markets, which are increasingly open, integrated and even more demanding; innovation has become a key strategic factor for competitiveness, where consumers are more often more informed and specialized in technical changes than they advance at an accelerated rate (Kyläheiko *et al.*, 2011).

Innovation constitutes a dynamic and social process, so the study of its management in the business field cannot be separated from the characteristics of the environment/ecosystem in which it takes place. That is why, any analysis of this process requires not only the consideration of the relationship between innovation and business strategy, but also the analysis of more generic aspects related to the role that other agents play in this process and, in general, the importance that science, technology, and innovation have in the competitive development of nations (Escobar, 2018). At this point, we highlight the importance of the perspective of analysis of the territory, and in particular the concept of industrial agglomeration that highlights the influence of internal and external factors that facilitate (or not) the competitive performance of companies in the territory.

The contribution of evolutionism to the study of innovation assumes that each innovation generates changes in the entire economic and social system, which makes it pre-eminent to recognize that innovation is not now a linear process, but rather a feedback process in which developments and ideas they flow to and from markets, to and from science, and to and from technologies, in an established social and cultural order. Similarly, evolutionism influences innovation as it focuses on 'know-how', highlighting the importance of managing tacit knowledge over explicit knowledge, and prioritizing that innovation is not carried out until it has an effective transfer towards contexts and generate learning (Peña Cedillo, 2003; Godin, 2016).

Along the same lines, economic evolutionism understands innovation systems as joint institutions that determine companies' innovative behavior as a result of culture and interactions between different agents. This implies that creating innovation environments requires the standardization of a value system and the adoption of dynamics of internalization of current and future results. The innovation process is more efficient and less inequitable when the dynamics of open and shared knowledge are developed in cooperation networks that transmit information transparently and share qualified talent (Freeman, 2000).

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