Territorial dynamics of innovation: Perspectives of institutional economists and evolutionists

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ABSTRACT

This chapter discusses the importance of the territory as a space for innovation. And to better understand the situation studied, it was necessary to discuss the view of institutionalist and evolutionist economists who will form the basis for understanding the main institutional aspects that can influence the performance of companies, and the materialization of an institutional environment favorable to innovation, through interaction in formal and informal knowledge networks. It highlights the importance of knowledge as a central element of a new territorial economic structure that is emerging, where learning is its most important process, and innovation is the main vehicle for transforming knowledge into value. The chapter also presents the main concepts of Innovation Systems, making reference to the main authors, and finally, a discussion on the formation of business networks and the importance of cooperation between actors.

Keywords: Innovation, Territory, Knowledge.

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INTRODUCTION

This chapter discusses the importance of the territory as a space for innovation. And to better understand the situation studied, it was necessary to discuss the view of institutionalist and evolutionist economists who will form the basis for understanding the main institutional aspects that can influence the performance of companies, and the materialization of an institutional environment favorable to innovation, through interaction in formal and informal knowledge networks. It highlights the importance of knowledge as a central element of a new territorial economic structure that is emerging, where learning is its most important process, and innovation is the main vehicle for transforming knowledge into value. The chapter also presents the main concepts of Innovation Systems, making reference to the main authors, and finally, a discussion on the formation of business networks and the importance of cooperation between actors.

INSTITUTIONAL VISION AND TERRITORIAL FACTORS

Institutionalism emerged in the United States between the end of the nineteenth century and the beginning of the twentieth century, in different disciplines, such as economics, sociology, and political science (Cintra, 2011). Institutional theory was based on studies of structures, rules, and behaviors of institutions. When considering the institutional environment that surrounds the economy, the institutionalists diverged from the purely theoretical and mathematical models of the neoclassical economists, incorporating other perspectives of analysis, such as sociological and political (Pamplona, 2010).

Thorstein Veblen, John Commons, and Wesley Mitchel, who center their analyses on the importance of institutions, are considered the precursors. These authors defended the principle that economic analysis should be based on the study of the structure, rules, and behavior of institutions. Nowadays this movement is known as "old institutionalism".

According to Conceição (2008), Veblen's institutionalist approach focuses on three points:

1. the inadequacy of neoclassical theory in treating innovations, considering them as "given", and, therefore, disregarding the conditions of their implementation;
2. in the concern of how the change takes place and not in the "stable equilibrium", and
3. in the emphasis on the process of economic evolution and technological transformation.

In this logic, an institution can be defined as the result of a present situation, which shapes the future, through a selective and coercive process, guided by the way men see things, which alters or strengthens their points of view (Hodgson, 1993).

In 1960, due to the great interest in studies in the area of institutions, a new branch of institutionalism called New Institutional Economics (NIS) emerged. The main authors supporting this analysis were Ronald Coase, Oliver Williamson, and Douglass North.

The NEI is fundamentally concerned with microeconomic aspects, with an emphasis on the theory of the firm in an unconventional approach, mixed with economic history, economics of property rights, comparative systems, labor economics and industrial organization (Conceição, 2008). It also recognizes the importance of various aspects, such as: the distribution of power in society; the way markets operate, as institutional complexes acting within and/or in interaction with other institutional complexes; and the formation of knowledge, or what has led to knowledge in a world of radical indeterminacy about the future (Samuels, 1995).

According to Coase, in his work entitled "*The Nature of the Firm*", published in 1937, the firm is seen as a form of economic organization, an institutional arrangement alternative to the market. In other words, in its conception, the choice between the modes of coordination – market and company – is based on the transaction costs involved (Valle, 2002; Mello, 2000).

Oliver Williamson, according to Coase (1937) and the field of economics of organizations, talks about the theory of transaction costs, and places the firm as the center of analysis. This theory adopts the transaction (defined as the assignment of certain rights to use a good or service from one individual to another) as the unit of analysis and suggests that transactions can occur through the market or within the company itself, depending on the specific combination of human factors and environmental factors. In turn, these transactions entail certain costs, related both to the specification of the exchange and to the costs incurred on the agreements made.

According to Fiani (2002), transaction costs can be understood as the costs of negotiating, drafting and ensuring the fulfillment of a contract. Therefore, the essence of the transaction cost discussion is the contract.

In order to discuss the importance of these thinkers in the theoretical approach to the firm, it is necessary to understand the economic definition of the firm. According to Chandler (1992), there are at least three characteristics of the firm in the literature. The first characterizes the firm as a legal entity, in which it establishes contracts with suppliers, distributors, employees and consumers; the second as an administrative entity, whose activities managers must coordinate and monitor; and finally, a for-profit entity for the production and distribution of goods and services.

Coase (1937) makes a discussion about the existence of firms, where he justifies such existence as an advantage in relation to the existing costs in the market. Also according to the author, outside the firms, the evolution of prices guides production, which is coordinated by various market transactions. Already within the firm, these market transactions are eliminated.

For Coase, the enterprising entrepreneur should perform his function at the lowest cost within the firm. In this case he can acquire the factors of production at a lower price than by direct market transactions, which are substituted from the moment the firm is formed. If this does not happen, it

will always be possible to return to the market, that is, to allocate resources (factors of production) directly through the price mechanism.

Finally, the author concludes that firms exist when the costs of organizing transactions within the firm are lower than the same transaction carried out through the market, that is, Coase recognizes that there are costs in using market mechanisms.

From this approach, Williamson takes up the idea of transaction costs in order to construct a more elaborate theory of the origin and movement of the limits of firms in relation to markets, defending the idea that economic institutions with the firm aim to save on transaction costs (Williamson, 1987).

According to Fiani (2002) there are some determinants of transaction costs, namely: bounded rationality, complexity and uncertainty. His analysis is based on H. Simon's work on human behavior, where this author argues that although human behavior is intentionally rational, man has certain limitations. These limitations have neurophysiological (ability to accumulate and process information) and language (ability to transmit information) foundations.

If human rationality were unlimited, when contracts were drafted, they would incorporate clauses anticipating any kind of future situation. However, bounded rationality only becomes a relevant concept for analysis under conditions of complexity and uncertainty (Fiani, 2002).

But limited rationality, complex environment, and uncertainty can encourage opportunism. According to Williamson (1987), opportunism can be seen as one of the levels of promotion of self-interest, and according to Fiani (2002) as the transmission of selective, distorted information and "self-discredited" promises about the agent's own future behavior.

Transaction costs still depend on the conditions of exchange between the specific assets, which are those that are not re-employable except at a loss of value. Therefore, the main characteristic of a transaction must be expressed through the specific assets or specificity of the asset related to it. Specificity is a conceptual reference to the degree to which an asset can be reused for alternative uses or by other agents without loss of its capacity or productive value, and can present itself in several forms. Williamson (1991, p. 281) establishes six specific types of assets, namely:

1. geographic or locational specificity, the location in the mediations of the production units provides savings in transportation and storage costs, conservation, pollution control, or others;
2. Specificity of physical assets, physical investments made by any of the parties involved in the relationship that are specific to the activity. The distinction with *sunk cost should be* [2]noted, due to the fact that the latter is not always specific to the activity;

[2] Sunk cost.

3. specificity of human assets, obtained mainly through *learning by doing*[3];
4. specificity of dedicated assets, relationship of dependence of the investment on a made-to-order service or to exclusively serve a certain client;
5. brand specificity or assets of superior quality or related to standards;
6. temporal specificity, where the time involved in the development of the transaction may imply a loss of transacted values, as in the case of perishable products.

Therefore, it is from the analysis of the dimension of the specificity of the assets that the most efficient organizational models that minimize transaction costs will be chosen (Williamson 1996).

Therefore, one of Williamson's main contributions was to point out that any problem that is formulated in terms of contractual elements can be studied using the concept of transaction costs.

In turn, North examines the nature of institutions and the consequences of institutional changes on economic and social performance. This author adopts a broad conception of institutions, which includes the informal rules (sanctions, taboos, rules, customs, traditions, and codes of conduct) or formal rules (constitutions, laws, property rights) that define behavior.

For Silva et al (2012), the new institutionalists diverge from each other regarding several points, both theoretical and methodological, however, they agree on two fundamental issues, they are:

1. Institutions shape policy. The typical norms and operating procedures that make up institutions leave their mark on political outcomes insofar as they structure political behavior. Institutions influence outcomes because they shape the identity, power, and strategy of actors.
2. Institutions are shaped by history. History is important because it follows a trajectory: what happens before (even if it was in some way 'accidental') conditions what happens after. Individuals can 'choose' their institutions, but they do not do so in circumstances of their own making, and their choices in turn influence the rules within which their successors make their choices.

The new institutionalists seek a greater explanation of the organizational reality by interpreting the structure as the result of conceptions culturally constructed in a duality, which can involve both the relationships that are established within organizations and those that originate in the environment (Silva et al, 2012).

According to Bronzo and Honório (2005), the institutional structure of a given economic reality can provide firms with some advantages in carrying out specific activities. Thus, the

[3] A type of learning, based on learning by doing, creativity and the ability to innovate.

institutional support received may explain the reasons why certain organizations perform some activities more efficiently than others.

However, according to these authors and based on the institutionalist literature, firms are not solely capable of sustaining these specific types of activities, as it is necessary to have a common set of knowledge and beliefs that reflects the understanding that each firm has about its role and interests in interaction activities, as well as some trust in the institutions that support such activities (Bronzo and Honório, 2005). Remembering that the economic environment is formed by numerous and different actors that seek to rationally satisfy their interests by interacting strategically with other actors, such as individuals, companies, universities, research institutes, government institutions, among others.

Thus, it is understood that institutional processes and dynamics can affect the social context and individual actions, to the extent that they generate effects that modify in some way the pattern of an activity, the distribution of interests and resources, the organization of desires and demands, and, above all, the rules of conduct of individuals.

EVOLUTIONARY APPROACH TO INNOVATION

Other important concepts capable of raising questions about the economic environment, and the dynamics of the firm and the market began to emerge from the end of the 70's with evolutionists. Evolutionary theory emphasizes that technological development should be understood as an evolutionary process. Some concepts such as routines, learning, and innovation systems, which form the basis of the evolutionary view.

The milestone is Nelson and Winter's 1982 work called "*Evolutionary theory of economic change*", which has among its exponents Hebert Simon and Ronald Coase.

According to Saviotti and Metcalfe (1991), the aspects emphasized in the works of these authors that matter most directly to the development of evolutionary economics are:

- the emphasis on the imperfect or limited nature of knowledge, as opposed to the assumption of conventional economic theories that agents have perfect knowledge or that there are no costs to obtain it;
- the idea that firms behave not in a way that maximizes their profit (as conventional economics wants), but to satisfy or fulfill their objectives or goals;
- the existence of conflicts within organizations;
- the concern with understanding the external environment in which organizations operate.

Another aspect addressed by evolutionary theory is the notion of routines, which correspond to the regular patterns of behavior of institutions in various productive activities, which includes internal production procedures, hiring and firing, production regulation, R&D activity, investment

policies, product differentiation strategy, etc. (Valle, 2002; Mello, 2000). According to Nelson and Winter (2005, p.32), the decision rules of firms will depend on certain behavioral patterns, that is:

> The general term for all regular and predictable behavioral patterns of firms is routine [...] ranging from well-specified technical routines for the production of things, procedures for hiring and firing, ordering new inventory, or increasing the production of high-demand items, to policies concerning investment, research and development, or advertising. and business strategies related to the diversification of production and investment abroad.

The process of technological innovation depends on the organization's routines, which in turn refer to the skills and competencies held by the individuals and departments that compose it. According to Valle (2002), the innovative process is linked to the competencies present in the scope of any organization, where these competencies should be recognized as assets that have high specificity, capable of changing the firm's capacity and the market structure.

The routines accumulated by a firm and its human resources would be a kind of "genetic inheritance", that is, a specific set of genes that would give consistency to the firm's characteristics. It is from past experience, based on learning and competence, as well as on the solutions found by individuals or the firm, that the organization writes its trajectory and accumulates new routines (Zawislak, 1996). Thus, the firm becomes better able to face random factors or situations that are out of the routine. Drawing a parallel to Williamson's (1985) contractual analysis, for each established and effective routine, there will be a specific contract, formal or informal.

Coase (1937), when analyzing the nature of the firm, emphasizes that the creation of routines, with successful solutions, can be an alternative to circumvent transactional costs and reduce friction, generating a significant increase in the organization of the firm. For Dosi et al. (1992), routines are considered as paths of interaction that represent the successful solution of organizational problems. In other words, with the new routines, the firm's organization and technology evolve, which means the firm's own evolution.

However, in order for the routine to function well and successfully, it is necessary to create an information flow, where individuals have the ability to send, receive and interpret information from the environment, in order to better select and execute the appropriate routine to stimulate innovations.

For Nelson and Winter (1982), routines can be grouped into three categories, namely:

1. Operational Routines: routine activities of the firm, given its capital stock, equipment, plants and other factors of production;
2. Investment Routines: activities aimed at establishing the capital stock (factors of production that are fixed in the short term).
3. Transformation Routines: activities aimed at changing operational characteristics, carried out by marketing departments, research and development laboratories, etc.

Transformation routines are directly linked to the activity of changing routines, with the aim of adapting to changes in the economic environment or even trying to modify it and, through innovation, give it a new dynamic (Nelson & Winter, 1982).

Technological innovations are generally introduced on a technical basis that is already consolidated, adhering to a certain type of technological trajectory. Therefore, the actors that use and transform technologies follow certain evolutionary patterns. According to Furtado (1996) and the Organization for Economic Co-operation and Development (OECD) (1992), these evolutionary patterns are called technological trajectories, which in turn is defined as the set of evolutionary and cumulative characteristics that condition the development and changes experienced by technologies when they are disseminated and used in production and services.

For Dosi (2006), the technological trajectory is a usual pattern of activities that solve, based on a technological paradigm, the productive and reproductive problems that confront the decision-making processes of concrete agents in a specific context in the economic, institutional and social dimensions.

Taking into account the high level of uncertainty surrounding the adoption of technologies, the institutional environment plays a very important role in the configuration of technological trajectories, from the economic interest of organizations, through their respective histories and accumulations of expertise, to institutional variables *strictu sensu*, such as public agencies and geopolitical interests (Filho and Carrilho, 2011).

For evolutionists, another key consideration is that of learning. According to Lundvall (1992), the most important forms of learning can be understood as interactive processes. The economic structure and institutional environment form the frame of reference and strongly affect the processes of interactive learning, often resulting in innovations.

Innovations depend on broader elements focusing on knowledge, learning, and the set of institutions that interact with each other. The innovation process is conditioned by changes in the dynamics of knowledge formation, in the acceleration of the interactive learning process and in the growing importance of cooperation networks.

According to Tigre (2009), Lundvall in partnership with Bjon Joohn developed the concept of "learning economy", where the authors state that interactive learning can occur both between people and between companies socially inserted in the institutional and cultural context of a system of innovations.

Johnson (1992) also presents another concept, that of "institutional learning". For this author, the ability to learn, adapt and change the institutional frame of reference is what defines institutional competitiveness and the ability of institutions to survive in the global market.

Therefore, for evolutionists, coordination is the result of combinations of learning, and of institutional structures; and the balance between learning and selection involved in each evolutionary process varies according to technologies, countries, institutions, and historical periods (Dosi and Orsenigo, 1988).

INNOVATION SYSTEMS

In the current moment of rapid technological transformation and considering the character of uncertainty and "destruction" associated with the innovation process, no organization can live in isolation. Thus, the innovation process is increasingly understood as an interactive process between companies, between companies and universities, and between companies and government institutions (Lundvall, 1988).

This iterative process facilitates greater technological cooperation and interconnection. Thus, Freeman (1992) considers that the ability to adapt to major changes in technology has historically depended on the development of a network of scientific and technological institutions, both in the private and public sectors.

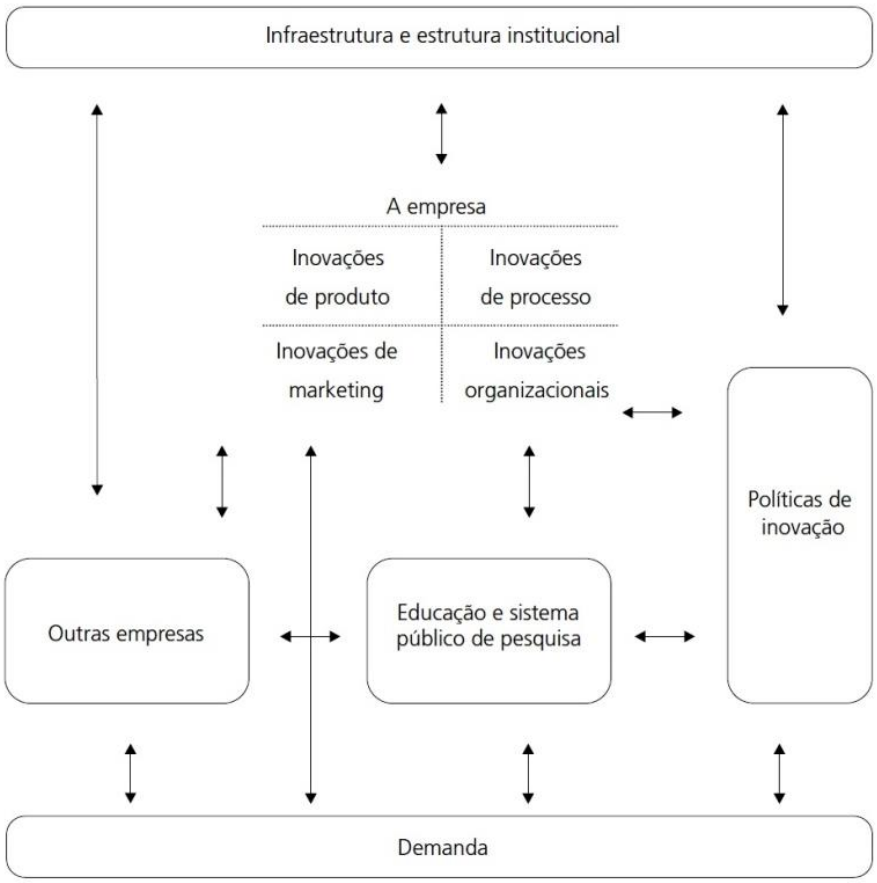
According to the Oslo Manual (2005), the innovation systems approach (Lundvall, 1992; Nelson, 1993) studies the influence of external institutions, broadly defined, on the innovative activities of companies and other actors, emphasizing the importance of the transfer and diffusion of ideas, experiences, knowledge, information and signals of various kinds.

From this approach several concepts have been introduced, initially in terms of national innovation systems, but they also apply to international, regional, local and sectoral systems.

According to Asheim (2007), the concept of innovation systems can be understood in a restrictive or broader way. The restrictive definition encompasses the R&D activities of universities, research institutions, and public and private companies. The broader concept, on the other hand, includes the economic aspects, as well as the institutional arrangements that affect learning and the dissemination of knowledge (Quintero-Campos, 2011).

Institutional arrangements involve the agreements and cooperation contracts between firms, universities, research institutes, and government agencies in the innovation process. These actors are related to each other by an institutional framework, as shown in figure 1.

Figure 1 – Innovation measurement framework



Fonte: Oslo Manual (2005).

Like any system and interrelated (with the integration of innovation activities at national, regional, local or sectoral level), the concept of "innovation systems" is still very broad and therefore undefined. This difficulty was recognized by Nelson and Rosemberg (1993) who question the concept of a national innovation system, which can be interpreted, as a whole, in several and different ways. These multiple ways of approaching this concept have led to various interpretations. We will briefly demonstrate some of the most significant ones below.

One of the first definitions of "national innovation system" was proposed by Freeman (1987), in his study of Japan, where he relates the system to the network of institutions in the private and public sectors, whose activities and interactions allow the initiation, modification and diffusion of new technologies.

According to Freeman (1988), when there is a technological gap between countries, this is not only due to scales of R&D activities, increased invention and innovation activities, or innovation *clusters*; but also to institutional changes in the innovation system, new forms of organization of production, investments and marketing, as well as the new combinations between invention and enterprise. The study on the Japanese system allowed us to identify that technological forecasting,

both formal and informal, provided subsidies for the formulation of technological and industrial policies based on new technologies (Mello, 2000).

It is possible to point out the contribution of a group of authors, among them, those concerned with the area of innovation economics, who, when proposing the adoption of the concept of national innovation systems, argue that national performances, with regard to innovation, clearly derive from a particular social and institutional confluence and from historical-cultural characteristics (Freeman, 1987 and 1995; Lundvall, 1992; Nelson, 1993).

Freeman and Lundvall, for example, define a national innovation system as a system made up of elements and relationships that largely determine a country's learning capacity and, therefore, that of innovating and adapting to changes in the environment. In other words, for Lundvall (1988), the national innovation system is essentially a cumulative process of learning-doing, learning-using, and learning-interacting with the market, and not only with a set of laboratories. It thus reinforces the role of intangible investment (knowledge) within the system.

Lundvall points out that one of the striking characteristics of the global economic environment in recent decades is the acceleration of the processes of creation and destruction of knowledge. This phenomenon has caused new challenges for society, i.e., individuals and institutions need to be aware of market and technological trends and use their capacity to seek and incorporate new knowledge, and also to abandon old skills, when these block the learning of the new.

In this context, the new theoretical matrix on innovation policies and S&T systems is based on the advent of new, more complex and multilateral institutional arrangements aimed at innovation and technological learning, revitalizing the relations between university, industry, government and, finally, on the promotion of sustainable systems that create dynamic competencies for the emergence of innovation (Leydesdorff and Etzkowitz, 1998; Johnson and Lundvall, 2000 *apud* Carvalho et. al., 2000).

For Carvalho et. al. (2000), science and technology systems constitute a part of innovation systems, playing a vital role in knowledge-based economies, particularly by building links of cooperation and partnership between companies, government and universities, which allows them to acquire a certain growing relevance in the social demands of the most diverse areas such as health, biotechnology, education, environment, agriculture, aerospace and communication.

Indeed, public research laboratories and educational institutions can be considered the center of the S&T system, which includes government infrastructure, research councils, funding agencies, and public policies, enhanced by the construction of endogenous innovation hubs in these economies, protected in strong local and national innovation systems (Nelson, 1993; Lundvall, 1992).

On the other hand, according to Campanário (2002), the Innovation System can comprise the public agencies for the promotion, support, support and execution of R&D (Research and

Development); universities and research institutes that carry out R&D; companies that invest in R&D and the application of new technologies, public programs aimed at subsidizing the adoption of technology; the laws and regulations that define intellectual property rights, among other institutions.

In other words, the innovation system includes universities, governmental and private scientific and technological research centers, government agencies, and consists of the industrial park, the agricultural sector, and the service sector.

These and other authors, when discussing the elements that constitute national innovation systems, emphasize that differences related to historical, linguistic and cultural experience imply idiosyncratic characteristics that are reflected in the general institutional configuration of countries. And so, therefore, they are reproduced in the internal organization of firms and of the producer and consumer markets, in the role of the public sector and the financial sector, in the intensity and organization of educational and innovative activities, etc. It should be noted, however, that there are important differences in the approaches currently used, for example, by the authors listed above. Some authors argue that the different approaches of national innovation systems are structured in three basic conceptual pillars, which allow them to be distinguished and differentiated according to the emphasis placed on each of them (Cassiolato and Szapiro, 2002). They are:

- The idea that economic behavior rests on institutions, "rules of the game" established legally or through customs that evolve in view of the advantages they offer in reducing uncertainty. Thus, different modes of institutional organization lead to different behaviors and economic outcomes.
- The idea that technological knowledge is generated through fundamentally interactive learning, usually taking the form of training distributed among the different types of economic agents that must interact, in some way, so that it can be used.
- the idea that competitive advantages result from variety and specialization and that this fact has *path-dependent* inductive effects. That is, specializations that are economically successful – with the creation of systems being a result – occur particularly around specific industrial structures.

According to Cassiolato et al. (1999), in the case of analyses of national innovation systems, history is evidently considered an important source of such diversity. From the latter point of view, institutional development and different national technological trajectories contribute to the creation of national innovation systems with very diverse characteristics. Thus, the diversity between national innovation systems is understood as the product of different combinations of their characteristics. One implication of this idea is that the emphasis on the diversity and localized character of learning processes, and thus on the local dimension of innovation, makes it possible to conceptualize local

innovation systems as a definition somewhat close to, for example, "regional or local technological systems."

Cassiolato & Szapiro (2002) start from a broader definition of agglomerations that aggregate networks of suppliers, customers, and knowledge institutions, which jointly create and add value. This applies to any of the types of productive clusters referred to in the literature - such as industrial districts and poles, *clusters*, networks and others. Therefore, within the evolutionary framework, the suggested concept of local innovation systems refers to clusters of economic, political and social agents, located in the same territory, which present consistent links of articulation, interaction, cooperation and learning aimed at the introduction of new products and processes.

In relation to the role and recent evolutionary trajectory of local and innovative productive arrangements[4], the main questions raised in this research are related to the importance of the local dimension for innovation – and, therefore, of local arrangements – and of policies for the promotion of this type of formats.

It is also considered that local arrangements with some learning dynamics and innovative capacity should be reinforced, especially when focusing on developing countries. In this sense, Cassiolato et al. (1999) argue that – the role of the state should be to promote the consolidation of different forms of organization that are well adapted to the specific space and environment, both of large companies and of networks of large and small companies and even of small business arrangements. It is also argued that the prior existence of the latter should certainly be supported by governments, in view of the possibilities for innovative, economic and social development that may be embedded in such arrangements.

According to Cassiolato and Lastres (2000), there are important differences between the innovation systems of countries and regions, depending on each social, political and institutional context. Still in the authors' conception, innovation is a process of search and learning and, to the extent that it depends on interactions, it is socially determined and strongly influenced by specific institutional and organizational formats, such as: regional diversity, local specificities, etc.

Evidently, the main point to be highlighted in the analysis of Brazilian state systems refers to something that the analyses carried out on national innovation systems have emphasized as a fundamental characteristic: their diversity. History is, of course, an important source of such diversity. Institutional development and different national and regional technological trajectories create and are created by innovation systems with very diverse characteristics. Several studies show that different productive and technological trajectories and different institutional developments have created state innovation systems with very diverse characteristics. The importance of innovation

[4] For Porter (1998), local productive arrangements are geographical concentrations of interrelated companies, specialized suppliers, service providers, companies in related sectors and other specific institutions (universities, standardization bodies and associations), which compete but also cooperate with each other.

systems linked to state-owned companies in Rio de Janeiro, the characteristics of the community (private) university system in Rio Grande do Sul, the greater importance of the federal university system in some states, the different agro-industrial specialization of the different states are just a few examples of this intense diversity that requires a differentiated action of industrial and technological policy (Cassiolato et. al., 1999).

From these considerations, it can be seen that innovation and learning capacities are strongly rooted in the social, institutional, and productive structure of each region.

According to Cassiolato et al. (1999), the innovation systems approach already has at least two built-in policy guidelines to guide *policy-makers*[5] regarding new ways of promoting innovation:

- that the innovation process, and the policies to stimulate it, cannot be seen as isolated elements of their national, sectoral, regional, organizational, and institutional contexts; so
- the importance of focusing on the relevance of each subsystem involved and the articulations between these agents.

That said, there is a definition of "national innovation system" that best fits within the context of research. This is the proposal of Niosi, Saviotti, Bellon and Crow (1993), who suggest:

> ... The National Innovation System is the system in which private and public companies, universities, and government agencies interact with the purpose of scientific and technological production within the borders of a country. This interaction between the various entities can be technical, commercial, legal, social, and financial, provided that the objective of this interaction is the development, protection, financing, or regulation of science and technology.

Innovation can be understood as an increasingly interactive process, from the basic research phase, through commercialization and dissemination. According to the Oslo Manual, innovation comprises the introduction of technologically new products or processes on the market or significant improvements to existing products and processes.

The innovative process is also characterized by necessary interactions between different departments within a given organization (production, marketing, R&D, etc.) and between different organizations and institutions. Interaction then becomes a strategic key that generates competitive advantages, taking into account that competitiveness is increasingly allied to innovative capacity. (Cassiolato and Lastres, 2000).

This process, in a broader sense, is not only a social and interactive phenomenon, but also a systemic one. It is systemic because the innovative process requires the participation of some elements that are not directly related to the scientific-technological area, but play a very important role, such as, for example, financial, political and social aspects and industrial relations (Gaytán, 1996). The joint action of all these elements that make up the system, linked directly or indirectly to

[5] *Policy-makers* has been translated as "policymakers"

the center of research and technological development, results in institutional and interactive learning, which, in turn, will determine the pace and direction of the innovative process.

BUSINESS NETWORKING AND COOPERATION

The current scenario of globalization and rapid technological change, such as that of the recent period, make companies seek partnerships, acquiring competitive advantages associated with the new scientific-technological paradigm. Obviously, this environment encourages collaboration between companies and scientific and technological institutions, creating the most favorable means for this in the form of networks and associations.

According to Garcia et. al. (2010) This new globalized scenario of the economy reflects the transition from individual efficiency to collective efficiency of firms. In other words, the competitiveness of companies is increasingly related to the performance of interorganizational networks and not of isolated companies.

For Casarotto and Pires (2001), establishing partnerships to work in association between companies or establishing a cooperation network between small and medium-sized companies is a way for them to become more agile and flexible in their processes and to be as competitive as large companies. For the author, this association between companies can take place through two types of networks, they are:

- Top-down *networks*, in which small businesses can become suppliers to a large company, producing part of its product with the ultimate goal of competing for cost leadership. In this case, small businesses are dependent on the strategies of the anchor company and have no power of influence over the network; and
- Flexible networks, where each company contributes a part of the product, which is marketed, disseminated and technically assisted, and all are responsible for the result. In this case, there are consortia that promote international competitiveness to companies that alone would not achieve competitive advantage.

This network of relationships between companies triggers learning and improves the ability of actors to modify their behavior and find new solutions in response to competitive changes (Porter & Solvell, 1998 *apud* Suzigan et. al, 2006).

According to Oliveira (2008), the network approach is not limited to institutional boundaries, it allows the study of the underlying relationships in a broad way, whether they are between individuals belonging or not to the same organization, or those that occur between organizations. In this way, networks allow, at the limit, to capture the role played by people (or groups of people) and artifacts in shaping interactions and knowledge flows.

Another very representative author who portrays the theme "Networks" is Callon (1992), who uses the concept of networks not only to map and characterize the relationships between actors, but also to offer normative instruments for the elaboration of innovation policies.

It is in this sense that proposals such as Callon's seem to be useful. For this author, networks are a coordinated set of heterogeneous actors (public laboratories, technical research centers, companies, financial organizations, users and government) that collectively participate in the design, development, production and distribution or dissemination of procedures for the production of goods and services, being able to achieve large market transactions and generate local competitiveness. (Callon, 1992).

The strengthening of business networks, in addition to generating local competitiveness, provides companies with a qualitative leap in terms of their international insertion, promotes favorable results for all companies in the productive cluster, and enables access to differentiated technologies, creating a virtuous cycle of development in the region (Mais et. al., 2010). Chart 1 shows the main effects between the actors in a network of companies.

Table 1 – Effects of synergy between actors in a network of enterprises

Economic Effects	Scientific Effects
New Jobs	Innovation
New Businesses	Technological progress
Added value	Creation of new products
Benefits in general	Evolution of research

Source: Based on Courson (1997).

The development of a given region will depend on how the network is articulated to generate new ideas, disseminate and use innovation that really has economic value for the market (Yam et. al, 2011). Innovation is not only determined by internal factors isolated to a single company, but also by an interactive process involving the relationship between all the companies in the network. Companies cannot innovate in isolation, as they tend to complement their ability to create knowledge within the network through partnerships and using knowledge from external sources of innovation through cooperation (Lengrand and Chatrie, 1999; Foray, 2000).

Cooperation can be carried out both with local companies and with companies located outside the territory. In the case of the Information and Communication Technology (ICT) sector, the importance of local partnership relationships can be understood from the observation that for firms whose development is based on scientific knowledge, being close to high-quality academic research centers can be an advantage. At the time of the creation of a firm, the location in a dynamic scientific environment is essential, even if, as the firm grows, the importance of geographical proximity decreases (Morgan, 2001 *apud* Amin and Coehendet, 2005). Geographical proximity, by providing greater contact between firms, means fluency of knowledge in that place, circulation of ideas and

know-how, in addition to the increase of the latter thanks to specialization and the union of workers (Morgan, 2001 *apud* Amin and Cohendet, 2005).

In this context, the partnership between the actors of a network should be understood as a set of procedures and actions of mutual respect and convergence of interest between institutions, or between units of the same institution that results in collaboration. The parties involved do not have supremacy among themselves. Partnership is characterized, therefore, by an action between equals. Equality is independent of the size of the organization or its financial position. In this case, institutional commitment to common goals and flexibility to respond to the demands presented by partners prevail. In the partnership, there is the shared use of human, financial and physical resources (Rodrigues & Barbiero, 2002). Within these shared resources is codified knowledge, which can be displaced from its original environment and used elsewhere, and tacit knowledge, which is "context-dependent and socially accessible only through direct physical interaction" (Morgan, 2001 *apud* Amin and Coehendet, 2005). Learning processes can be facilitated between entrepreneurs in a spatially concentrated network, and by the geographical proximity between them. This is because firms located in the same environment have the ability to monitor, compare, select and imitate "neighbor" solutions to similar problems.

According to Rodrigues, Casarotto Filho and La Rovere (2013), partnership relationships are the basis for establishing cooperation ties. These links are a necessary but not sufficient condition for the development of networks of enterprises in a territory. This is because there is another dimension inherent to the relations between companies that will condition the architecture of the network, namely the hierarchical relations (Garofoli, 1993). A non-hierarchical and spatially concentrated network of firms will develop forms of horizontal cooperation, where firms divide tasks along the production chain or divide production batches. This is the case in the so-called Marshallian industrial districts. A hierarchical and spatially concentrated network of companies will develop another type of cooperation link, where the companies of the territory provide services to the company that is the center of the network. Markusen (1996) called this structure a center-radial district; In this type of district, although there is a generation of positive externalities linked to the specificity of the assets, the possibilities for the development of innovations by small companies will be reduced, since their capacity is developed to meet the needs of another company, and not of the market.

In the case of information and communication technologies (ICT), there is another element to qualify the debate on the development of a local innovation system based on a network of local enterprises. In this industry, there is another type of proximity relevant to the development of cooperation ties, since the product is intangible and can be transmitted quickly from one country to another. Cooperation ties may then emerge from companies located in distant territories, driven by

common interests, characterizing what several authors call relational or organizational proximity (Amin and Cohendet 2005).

It should be noted that the concept of spatially concentrated networks is only one of several concepts that can be used to understand the phenomenon of territorial agglomerations of companies. Scholars of this phenomenon propose several concepts, such as industrial districts (Pyke, Beccatini and Sengerberger, 1990), *cluster* (Nadvi and Schmitz, 1994, Porter, 1998, Breschi and Malerba 2001), local productive systems (Pommier, 2002) and local productive arrangements (Cassiolato and Szapiro, 2003). These concepts are used to analyse territorial and sectoral agglomerations of enterprises. When it comes to an agglomeration of high-tech companies that have a relationship with local universities and research centers, the concept of a technological hub is proposed. When this pole is established from an initiative of national or local institutions, the concept of technology park or Science Park is proposed (ANPROTEC 2006, Hansson 2004, Squicciarini 2009).

The differences between the various concepts are related, in the first place, to the object of study itself: while the authors who work with the concept of *cluster* focus more on the analysis of companies, the authors who work with technology parks also focus on the role of institutions linked to the generation of knowledge, such as incubators and universities. On the other hand, authors who work with industrial districts and with local productive systems and arrangements take into account, in addition to companies and universities, local support institutions such as business associations and development banks (La Rovere and Shehata, 2008).

Secondly, there are differences among the authors as to the role attributed to the advantages of agglomeration. The advantages of agglomeration can be divided into two main groups. The first group is static or production-related advantages, such as pecuniary advantages from purchasing consortia or location-related advantages, such as infrastructure sharing. The second group is the dynamic or technological advantages, linked to the possibilities of sharing information and knowledge, which leads to the development of innovations. While some authors who work with the concept of *cluster* understand that agglomeration provides static and dynamic advantages, other authors, such as Malmberg and Power (2005), warn that it is not always possible to empirically verify the presence of dynamic advantages related to agglomeration in *clusters*. Squicciarini (2009) and Hansson (2004) make the same observation in relation to technology parks.

It is important to draw attention to the diversity of cases in spatially concentrated networks in order to qualify the debate on their benefits for a region. Several support policies in Europe and Brazil seem to be based on the assumption that the formation of spatially concentrated networks of companies will be positive for regional development, as cooperative relations between firms allow the generation of local learning and the development of innovations. However, these positive results do not always materialize (La Rovere and Shehata 2008, Martin and Sunley 2003). As observed by

Lastres et al. (2003), this is often due to the inadequacy of policies for the development of local micro and small enterprises. Breschi and Malerba (2001) point out that *clusters* are not easily replicable phenomena, so it is necessary to analyze concrete experiences of attracting high-tech companies to certain territories to assess whether these companies actually contribute to the generation of local knowledge.

According to Bittencourt (2008), some territorial components can favor the emergence and development of innovation networks, namely: the existence of teaching and research institutions; an agglomeration of technology-based companies; the occurrence of projects involving companies and universities; and a minimum organizational structure that promotes the governance of the network.

Therefore, taking advantage of the various sources of technology external to companies through partnership and cooperation agreements between companies, development institutions and universities can be a competitive factor that, in addition to stimulating the innovation capacity of software companies, can minimize costs and maximize existing physical resources. In addition, one of the decisive factors for the formalization and consolidation of technological partnerships and support for companies lies in the bases of trust and common interests between entrepreneurs and their business strategies. The interaction between the actors of the network can obviously accelerate this process of cooperation and strengthening the bases of trust.

Therefore, the benefits of network interactions will depend on trust, values, and how knowledge is shared and used among companies to develop new products, processes, and other innovations.

CONCLUSION

Throughout this chapter, the importance of the territory as a space for innovation has been demonstrated, where interactions between companies, institutions and individuals play a fundamental role in economic development. To better understand this dynamic, we resorted to the view of institutionalist and evolutionary economists, who provide insights into the main institutional aspects that shape the business environment and influence innovation.

Knowledge is also highlighted as a central element of this new emerging territorial economic structure, where continuous learning and innovation are the main drivers of the transformation of knowledge into economic value. In this context, Innovation Systems emerges as an important theoretical framework, providing a conceptual basis for understanding how interactions between various actors, such as companies, universities, and government, contribute to the process of innovation and economic development.

In addition, the formation of business networks and the importance of cooperation between actors as a means of promoting innovation and increasing competitiveness were presented.These

networks, both formal and informal, are believed to play a key role in exchanging knowledge, identifying opportunities, and overcoming common challenges.

This chapter also emphasized the importance of understanding the role of the territory as a space for innovation, where social and economic interactions are key to driving economic development and promoting competitiveness. By analysing institutional aspects, innovation systems and business networks, we sought to provide relevant knowledge to understand how companies can benefit from the territorial environment to promote innovation and achieve economic success.

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