

**REGIONAL INNOVATION SYSTEMS AND LESS DEVELOPED
BUSINESS ECOSYSTEMS: FUNDAMENTAL CONCEPTS AND
THEORETICAL TRENDS**

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Abstract

In an era of policy-driven systematic encouragement of local innovation processes, the concept of regional innovation systems has been arisen to produce, promote and cultivate the region's competitive advantage. The key reason for developing specific targeted policy measures within the regional innovation context is to focus on improving local business capacity, competitiveness and performance, including its business ecosystem. From this point of view, it is of crucial importance to promote interactions between different innovative actors who have good reasons to intersect, such as interactions between companies and universities or research institutes, or between small start-ups and larger businesses. These interactions may include interactive local learning and productive knowledge diffusion but they should also include the wider business community and governance framework. Therefore, this study investigates whether policy strategies could be geared towards the promotion of accessibility "to the development of a regional innovation system" and the "development of local comparative advantages" associated with the specific local resources, mainly in less developed business ecosystems.

Prior research studies undertaken in less developed business ecosystems indicate that companies themselves will grow in terms of regional development, mainly through innovating. Therefore, in order for local businesses in less developed ecosystems to lay the foundations for effective innovation they must adapt, improve and grow some essential internal business dimensions and variables, such as strategy, technology and management potential (Stra.Tech.Man. innovation theory). In this respect, the present study suggests the conception, analysis and interference of the mechanism of development in terms of the regional competitiveness web.

Overall, this academic paper is a conceptual research (Integrative review) that performs a literature review of several field research in regional innovation systems and less developed local business ecosystems, with the overall objective of identifying those variables (such as strategy,

technology and management) that could contribute towards effective business innovation and long-term stable growth.

Keywords: regional innovation system, regional competitiveness web, business ecosystem, less developed business ecosystem, Stra.Tech.Man innovation theory

1. Introduction

Since the early 1990s, the concept of the regional innovation system has attracted significant attention from policy-makers and academic researchers (Asheim, Isaksen, Nauwelaers & Tödtling, 2003; Asheim & Isaksen, 2002; Cooke, 2001). The regional system approach has received considerable attention as a very promising theoretical tool to promote understanding of the innovation cycle in the regional economy (Asheim et al., 2003; Asheim & Isaksen, 2002; Cooke, Boekholt & Tödtling, 2000). The prevalence of the concept of the regional innovation system is closely linked to the development of regionally identifiable nodes or industrial activity clusters as well as the growth of regional innovation policies, where the region is perceived to be the most suitable scale for supporting innovation (Isaksen, 2006; Asheim & Isaksen, 1997).

Regional innovation systems can be defined as the interaction between private and public interests, official institutions and other organizations, in accordance with organizational and institutional arrangements and interactions which favor the development, use and dissemination of knowledge (Doloreux, 2003). The main argument is that this collection of variables creates pervasive and structural results that enable businesses in a given region to establish unique forms of capital extracted from social relations, norms, principles and engagement within the community in order to promote, at an overall level, national innovation capacity and competitiveness (Gertler, Wolfe & Garkut, 2000).

- The concept is originated from two main research areas as starting with the systems of innovation (Edquist, 2004). Innovation systems are based on the evolutionary theories of economic and technological change where innovation is considered as an evolutionary social process (Edquist, 2004). Most stakeholders both internal and external to the business promote and impact creativity (Dosi, 1988). Social aspects of creativity include the learning process between various business areas (e.g. R & D development, procurement, marketing, etc.) as well as strategic collaborations with other businesses, organizations, knowledge providers, finance, training, etc. (Cooke et al., 2000).
- The second area of relative scientific research, gives a new approach of regional science which reflects on describing the overall socio-institutional setting in which innovation is evolving. From a regional point of view, innovation is identified as a locally integrated process (Storper, 1997; Malmberg & Maskell, 1997). The literature on this analytical direction of regional science therefore examines both the role of proximity, that is, the advantages of local adaptation and spatial concentration, as well as the predominant territorial bundles of rules, norms and standards through which the process of creating and disseminating knowledge takes place (Kirat & Lung, 1999). Said differently, in this analytical horizon a regional innovation system is characterized by the collaboration of business-to-business innovation and the institutions that develop and disseminate

knowledge, such as universities, educational organizations, R&D companies, technology transfer agencies and so on, as well as the culture of creativity which allows companies and structures to evolve over time (Kirat & Lung, 1999; Storper, 1997; Malmberg & Maskell, 1997).

- In the current era of policy-driven systemic promotion of local learning processes, the concept of regional innovation systems arose to cultivate, ensure and reproduce the competitive advantage of the regions (Asheim & Gertler, 2004). The key reason for developing specific targeted policy measures within the regional innovation framework is to focus on improving local business capacity and performance, as well as improving its business ecosystem (Asheim & Gertler, 2004). In this regard, the promotion of interactions among various innovative actors who have good reasons to intersect is of crucial importance (Cooke, 2001). In this perspective, crucial interest is given to interactions between companies and universities or research institutes in the context of integrated public policies (the triple helix theory), or between small start-ups and larger (customer) businesses (Cooke, 2001). Such interactions may include interactive local learning but they should also include the wider business community and governance framework (Cooke, 2001).

Therefore, this study focuses on the following questions:

- i. Whether policy strategies could be geared towards promoting accessibility "to the development of a regional innovation system" (Andersson & Karlsson, 2002) and,
- ii. Whether the "development of local comparative advantages" is associated with the specific local resources in less developed business ecosystems (Maillat & Kébir, 2001).

2. Research Method

Throughout the field of business research, knowledge production is experiencing an exponential increase despite its fragmented and interdisciplinary nature. It is therefore difficult to keep up with the latest trends, to be a leading player in research and to analyze accumulated information in a given field of business analysis. Consequently, the literature review is more comprehensive as a research tool considering that conventional literature reviews are often insufficient and incomprehensive, and instead of adopting a particular approach, are conducted without following a specific methodology (Snyder, 2019; Torraco, 2005).

In the context of several field research studies on regional innovation systems and less developed local business ecosystems, this paper is a qualitative research which concentrates on general domain examination by indicating and submitting fundamental theoretical points of relative scientific fields papers. The ultimate objective is to define those variables (such as strategy, technology and management) that could lead to successful business innovation and long-term steady growth (Katimertzopoulos & Vlado, 2019).

Three kinds of literature reviews can be followed (Snyder, 2019): the systematic, the semi-systematic and the integrative review. One significant distinction between the semi-systematic

approach and the integrative with the systematic approach is that they could conduct a qualitative analysis and pose wider research questions in order to create a new theoretical structure. Moreover, one aspect which makes the semi-systematic integrative approach distinctive is that it may include research elements not only found in papers, but including books or other published documents.

Most of the integrative literature review methods, such as those used in this research article, are intended to address mature concepts and emerging new topics focusing on Regional Innovation Systems & Less Developed Business Ecosystems (Snyder, 2019; Torraco, 2005). The aim of using the integrative review method in this study is to provide an overview of the knowledge base and to critically review and partially reconstruct as well as expand the theoretical foundation of the specific topic as it develops

As such, the results coming from field-based surveys and literature have shown that innovation rates vary by region in the sense that inter-regional differences are due to regional heterogeneity rather than the difference in observed business characteristics. If the "innovation climate" is characterized by nationally defined institutions and processes, inter-regional differences in innovation levels would be determined, at least in part, by observed functional characteristics within the same national innovation framework (Snyder, 2019; Bathelt, Malmberg & Maskell, 2002).

3. Literature Review: The Utility of Developing Business Ecosystems Within Regional Innovation Systems

Prior research has identified three major dimensions of regional innovation systems based on literature review:

- a. The first dimension is the interactions between the various actors in the innovation process; in particular the interaction between users and producers, including the business ecosystems and the wider research community.
- b. Second is the identified role of institutions and foundations, and the degree to which innovation processes are institutionally embedded in the regulation of production systems.
- c. The third dimension can be analyzed as the dependence of policy making institutions on the analysis that attempt to operationalize the concept of regional innovation systems and business ecosystems (Vlados & Katimertzopoulos, 2019; Katimertzopoulos & Vlados 2017).

Ph. Aydalot (1986), the author of this pattern in developmental thinking, argues that it is not the innovating business but the 'innovation environment' that produces growth. In practice, creativity is often based in the social context in which it emerges, and the acquisition of knowledge in local environments' in particular is a prerequisite for progress. This creativity entails unrestricted

communication, informal events and actions that the strict mentality of large enterprises' cannot provide, which is, however, feasible in "openly local terms".

The growing popularity of the idea of regional innovation structures and interventional mechanism is due in part to the increased intensity of international competition in a globalized economy, the perceived weaknesses of "top-down" conventional regional development models and policies, and the emergence of successful business cluster industries in many parts of the world (Enright, 2001). One consequence was the rediscovery by many scholars of the value of local scale development dynamics and the significance of special and regional resources in promoting innovation and improving the productivity of businesses and regions (Isaksen, 2006; Asheim et al., 2003; Wolfe, 2003; Malmberg & Maskell, 2002). Indeed, the approach of local innovation systems today marks a profound change in the overall conceptual paradigm of socio-economic spatial analysis (see Figure 1).

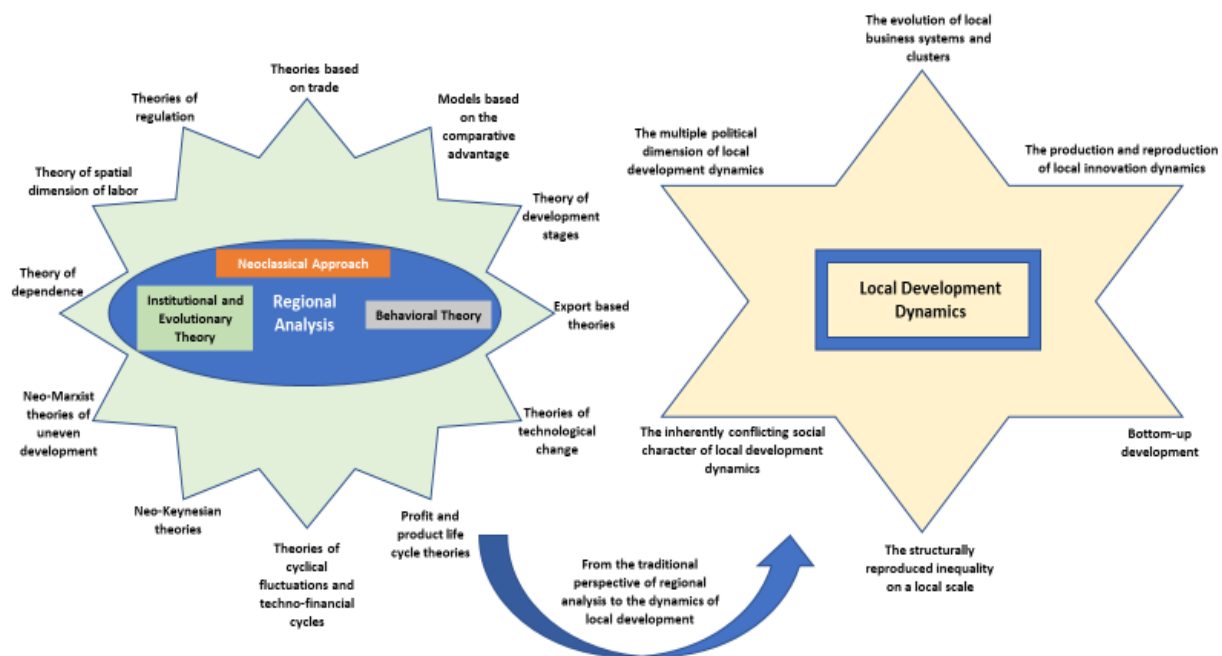


Figure 1. From the traditional perspective of regional analysis to the dynamics of local development. Vlado, Deniozos, Chatzinikolaou & Digkas, (2019)

The contemporary crucial reorientation which is taking place nowadays redeploys locally the idea of development from its origins in the Marshallian tradition of the "industrial districts" (Marshall, 1919; 1920). The Italian and French schools of urban growth were both based on these ventures (McCann & Ortega-Argilés, 2013; Courlet, 2008; Antonelli, 2006).

Furthermore, the Porterian "diamond competition" (Porter, 1990; 2000) is an important addition to this radical reorientation of spatial development. This basis for business ecosystems and clusters is now being laid for analysis (Rinkinen & Harmaakorpi, 2018; Iansiti & Levien, 2004).

The latest directions tend to have changed fundamentally the contemporary framework of regional development, entrepreneurship, competitiveness and public strategy (Dosi, 2016; Peneder, 2016; Aiginger, 2015; Acemoglu & Robinson, 2012), by putting the "living" enterprise centrally on their systems as a "cellular" component of the synthesis of international economic flows (Vlados, 2012).

On the basis of the above, this approach to the innovation environment promotes the method of continuously improving innovation potential at the local level, as the most effective route to improve the overall adaptability and reproduction of the productivity of socio-economic institutions and, as a consequence, to evolve within the context of globalization (see Figure 2).

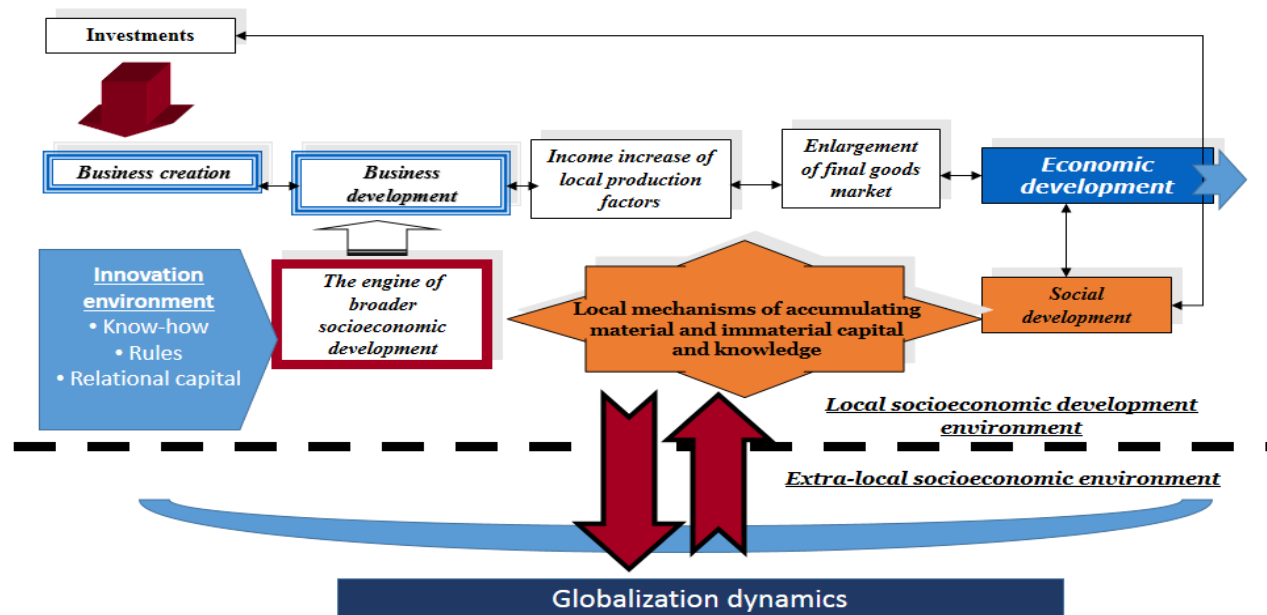


Figure 2. Innovation environment and local development. Vlados, Deniozos, Chatzinikolaou & Digkas, (2019)

In this respect, several contemporary research studies seem to expand the theoretical view of local development and innovation (Balland, Boschma & Frenken, 2015; Carlino & Kerr, 2014). It is therefore argued that specific skills and training processes within local business ecosystems can produce competitive regional advantages, if they are based on established capacities such as specialized skills, expertise, institutions and portion of shared social and cultural values (Maskell & Malmberg, 1999). Regional development seems to be able to thrive as competition and growth is generated in areas where regional features, such as institutional endowment, built-up structures and established skills, are present (Maskell & Malmberg, 1999).

Based on previous analysis in this context, the business ecosystem tends to be viewed mainly as a strategy in the sense that its presence as well as its sustainability and development depend on the wider institutional and political context (Iansiti & Levien, 2004). At the same time, however, the business ecosystem plays a crucial role in regulating and constituting the institutional social and political context through which intervention policies develop in the under-operation areas (Benedek, 2016). In addition, the business ecosystem allows researchers and policymakers to take advantage of a better understanding of spatial business collaboration (Benedek, 2016).

4. The Analytical Bridge Between Regional Innovation Systems & Less Developed Business Ecosystems

The 'success stories' of some specialized industrial settlements or regionalized networks of media and industrial clusters are the reasons behind the perception of innovation as a partly territorial phenomenon (Asheim & Gertler, 2004). There is also increasing empirical evidence that, in many cases, parts of the learning process and knowledge transfer are mainly based on local resources (Maskell & Malmberg, 1999). It is increasingly recognized that important elements of the innovation process take place both at the regional, sub-regional and at the local level (Katimertzopoulos and Vlado, 2019; Asheim & Gertler, 2004; Maskell & Malmberg, 1999). Many key features are illustrated by theoretical discussions about the regional and local development of business ecosystems.

- A. Firstly, the economic, political and social context in which innovation emerges. The region is the place of economic interaction and growth (Storper, 1997), or the "way" for regional innovation (Doloreux, 2002). These arguments are based on innovation as a fundamental geographical and economic growth process supported by regionally shared knowledge-based communities (Maskell & Malmberg, 1999; Asheim & Isaksen, 1997). A higher emphasis on regions as the best geographical scale for a learning economy based on innovation highlights the importance of national and regional resources in fostering innovation and business competitiveness (Doloreux, 2002). For instance, Porter (1998) argues that, due to the concentration on specific skills, knowledge, (formal) institutions, related companies and customers in a given area, the sustainable competitive advantage in the international economy is often found at a local level. This was supported by research on the regional structure of innovation, which showed that innovative business practices are largely based on local business ecosystems and resources such as specialized labor markets and workforce, subcontractor and supplier networks, local learning processes and local traditions (Vlado & Katimertzopoulos, 2019; Katimertzopoulos & Vlado, 2017; Asheim et al., 2003; Tödtling & Kaufmann, 2001; Cooke et al., 2000).
- B. Furthermore, innovation can be considered an integral part of social relations, developed over time in culturally defined lines (Johnson, 1992). The set of rules, conventions, and standards that define behavioral roles and shape expectations are dominated by the regional context (Katimertzopoulos & Vlado, 2019; Johnson, 1992). These rules originate from socio-cultural and economic factors such as common values, culture

expectations and trust that promote local interaction and mutual understanding in the exchange of information and knowledge (Katimertzopoulos & Vlado, 2017). As Crevoisier and Camagni (2001) states, in a small geographic area the "whole" or complex network of mostly informal social ties also defines a certain identity and inner representation and sense of belonging as well as innovative potential through synergistic and collective learning processes. The strength of the local learning system largely depends on a series of intangible assets which include the internal dynamics of regional, socio-cultural and political assets (Vlado, Katimertzopoulos, Chatzinikolaou, Deniozos & Koutroukis, 2019; Storper, 1997). The informal flow of knowledge between local actors generates the majority of territorial externalities that provide the opportunities for the region to build and maintain its discretionary power (Storper, 1997). Thus, the development of these intangible assets is crucial in building regional innovation capacity in local business ecosystems and enhancing learning ability (Landry, Amara & Lamari, 2002). These assets might be seen to some degree as a specific capital form derived directly from social relations, rules principles and interaction within a business community (Katimertzopoulos & Vlado, 2019; Wolfe, 2002). Social capital and trust as an element of social capital can help to overcome market failures and reduce market costs for businesses in densely connected business ecosystems by stable and mutually beneficial engagement (Wolfe, 2002).

- C. Thirdly, when geographic proximity and concentration co-exist, innovation usually occurs easier and the regional cluster thus takes center stage in such processes (Feldman & Audretsch, 1999; Malmberg & Maskell, 1997). A regional cluster is described as a group of companies in the same industry, or in closely related industries in near geographical closeness, which include geographically concentrated industries, as known as "industrial districts" (Enright, 2001). These clusters include government education institutions and other public institutions, supporting services with complementary cluster boundaries between institutions and industries (Porter, 1998). Clusters have a shared expertise, proximity and cooperation that lead to interaction and synergy within a system of regional innovation (Porter, 1998). Innovation activities benefit from combining similar and related economic activities into one cluster, promoting the dissemination of knowledge and promoting diverse forms of adaptation, learning and innovation (Malmberg & Maskell, 2002; Feldman & Audretsch, 1999). As Malmberg and Maskell (2002) are pointing that out by stating that 'in such environment, chances are greater that an individual firm will get in touch with actors that have developed or been early adapters of new technology. The flow of industry-related information and knowledge is generally more abundant, to the advantage of all firms involved' (Malmberg & Maskell, 2002). The general argument, according to these authors, is that local industries with many companies competing in or collaborating in the same industry tend to cause processes which not only generate dynamism and flexibility in general, but also learning and innovation (Vlado & Katimertzopoulos, 2019). Clusters therefore seem to be a central pillar for local business ecosystems development and for expanding regional innovation networks (Katimertzopoulos & Vlado, 2019).

Much of the perception of the local socioeconomic formation as an epicenter of innovation comes from research in those areas characterized as: “learning region” (Morgan, 1997), “Innovative milieu” (Crevoisier & Camagni, 2001; Maillat & Kébir, 2001), “clusters”, “industrial district” (Becatinni, 1992), “regional innovation systems”, “local productive system” (Courlet, 2001), “innovative regions”, “high-tech areas”, “clusters of knowledge based industries” (Todtling & Kaufmann, 2001; Asheim & Gertler, 2004; Feldman and Audretsch, 1999; Cooke & Morgan, 1998) and finally the local business ecosystems. Studies in the above areas provide evidence for a better understanding of regional development and they considered as ideal institutional environments for promoting an economy based on learning and innovation (Katimertzopoulos & Vlado, 2017; Cooke & Morgan, 1998).

In recent years, as globalization is transformed, where capitalism's "tectonic plates" are gradually moving, the dynamics of entrepreneurship and innovation seem to play a vital role in regional growth and underdevelopment. Regions as well as business ecosystems naturally contain intercultural dynamics in the sense that they include, regardless of size or technological capacity, partnerships, competition, challenges and synergies from various globalizing sectors (Katimertzopoulos & Vlado, 2019; Laudicina & Peterson, 2016; Wei, 2015).

It should be noted, however, that empirical research is steadily improving the approach to regional innovation systems and local business ecosystems. It is possible to distinguish two basic lines of relative research development:

- first, regional systems of innovation focus at regional opportunities for innovation to explore in detail key elements and local business ecosystems;
- and second, certain elements characterizing the main institutional players are investigated, including businesses that are an integral part of the system (Katimertzopoulos & Vlado, 2017; Burke, 2011; Calamel, Defelix, Picq & Retour 2010)

Also, the regional innovation system approach examines the region's main innovative profile, characterizing innovation performance with indicators such as education, regional Research & Development intensities, technological bases, and technological outputs - such as patents. Another important part is that of investigating regional differences, in particular innovation activities and regional competitiveness. Such studies are particularly used by local and government authorities in defining a region's characteristics and the elements that could involve the region into an innovative business ecosystem (Katimertzopoulos & Vlado, 2019; Capron & Cincera, 1998).

On the basis of the above, it seems that many questions are raised about how the innovation process takes place through the strategic, technological and managerial change which is an integral part of any socioeconomic processes; either those tightly connected (such as local business ecosystems) or loosely bound (such as regional systems) (Vlado & Katimertzopoulos, 2018).

5. Less Developed Business Ecosystems: Innovation and Change Management in Stra.Tech.Man Terms

This paper explores the entire concept of regional development in the less developed local and regional ecosystems as well as how the prospects of developing effective innovation in terms of strategy, technology and management (Stra.Tech.Man innovation theory) can help reverse of this environment. The disadvantages of remote and less developed regions and business ecosystems are examined: the increased transport costs (expressed both in economic and in time terms) as a result of being distant from the main population centers and economic activity, and the lack of concentration advantages (external economies of scale) as found in less remote areas. "Distance" (not only in spatial distance, but also in terms of development, in symbolic terms, in operational terms, in biological and ethical aspects, etc.) thus has an effect both directly and indirectly on competitiveness as businesses are less able to enjoy the benefits of dynamic business ecosystems development. Moreover, in less developed business ecosystems, a low level of knowledge innovation production and diffusion has been identified. These regions are reliant to primary activity; local and inter-regional infrastructures are not particularly well-developed. As such, the added value of production remains relatively low, as there are minimal R&D activities and a significant lack of influence on general (local or regional) administration (Vlados, Katimertzopoulos, Chatzinikolaou, Deniozos & Koutroukis, 2019; Vlados & Katimertzopoulos, 2018).

These areas manifesting all the symptoms of the regionality syndrome explain the reason why several economic, social, demographic problems are found with different intensity between border and other "central" regions, such as towns in other geographical entities (Katimertzopoulos & Vlados, 2019). As a consequence, there are considerable costs to take into account when a region becomes divided and "regionalized":

- a. Financing: high operating and distance living costs.
- b. Infrastructure: market fragmentation causes economies of scale and positive external economies are to be low or absent.
- c. Opportunities: poor economic opportunities and social benefits.
- d. Information: comparatively in slower rates and marginally higher prices for the acquisition of advanced knowledge in remote regions (Vlados & Katimertzopoulos, 2018).

According to this context, an effort is made to understand how the capacity of innovation processes within regions and business ecosystems is evolving. The focus is not as much at the level of the "autonomous" sector, but at the level of research and technology ability, information and training capabilities, and business skills (Ziesemer, 2018). Undeniably, the national macroeconomic environment is essential to regional development, as it defines horizontal policies such as social inclusion policies, sovereign debt management and economic policies (Andrikopoulos, 2013) and policies to improve the business environment (Dao, 2017). Macroeconomic environment indicators therefore have a direct impact on business development, especially in small and medium-sized (SMEs) businesses, which are the majority in many

developing countries around the world (Poufinas & Polychronou, 2018). Nevertheless, in parallel to the macro-economic environment and the macro-economic policies for regional development and underdevelopment, micro-meso-level policies are becoming increasingly important (Vlados & Katimertzopoulos, 2018; Hazakis & Ioannidis, 2014). These are the policies that aim to improve business development, on one hand, and the eventual growth of the region's business ecosystem on the other hand, in particular in areas that are disadvantaged in terms of their overall technological and competitive capability (Blackburn, 2016; Golejewska, 2018).

Research studies undertaken in less developed business ecosystems indicate that companies themselves will expand in terms of regional development, mainly through innovating. Therefore, in order for local businesses in less developed ecosystems to lay the foundations for effective innovation they must adapt, improve and grow those essential variables, such as strategy, technology and management potential and capabilities (Stra.Tech.Man. innovation theory) (Vlados & Katimertzopoulos, 2018; Katimertzopoulos & Vlados, 2017) .

According to the Stra.Tech.Man analysis, any innovation is always and inevitably defined by an endogenous Stra.Tech.Man triangle. Both innovations continuously and inevitably, require a part of Strategy, a part of Technology, and a part of Management. There are no innovations that can occur and be successfully achieved without at the same time changing the three inner Stra.Tech.Man spheres of the socio-economic organism. As a consequence, any form of innovation is inevitably within the scope of Stra.Tech.Man. In reality, invention may always be viewed as coming from one of the Stra.Tech.Man spheres, concentrating solely on one specific area, however, in the long-term, every innovation requires simultaneous relocations and re-adjustments for the whole organization. In this regard, this study proposes the conception, analysis and intervention on the phenomenon of development in terms of the regional competitiveness web (Vlados & Katimertzopoulos, 2018; 2019; Vlados, Katimertzopoulos & Blatsos, 2018) (see Figure 3).

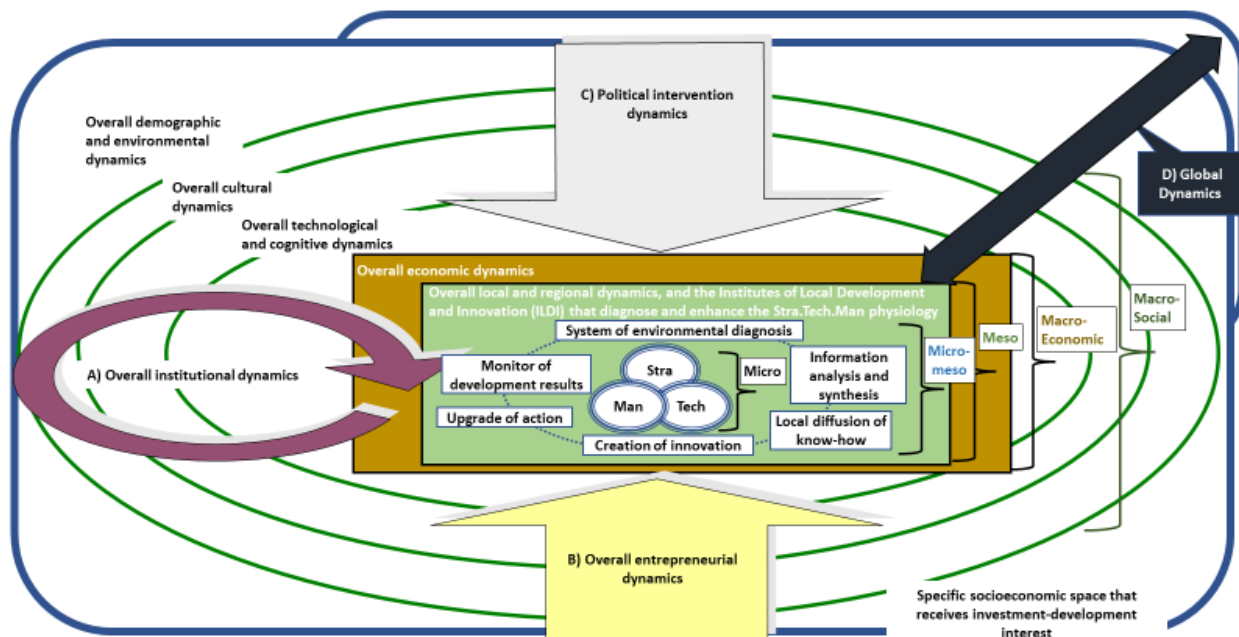


Figure 3. The “competitiveness web” and the different levels of policies to strengthen entrepreneurship. Vladoš & Chatzinikolaou, (2020)

This approach thus transforms structurally the environment (meso-macro-socio-economic level) for both the company and the entrepreneurship of its people. Such systemic interactions between the various layers show that dynamic processes structurally connect all environments. According to Vladoš (2019), space levels are "a competitive web" where structural interaction occurs continuously through the different sub-systems, from the broader macro-social framework to the company's micro-subsystem.

In the interconnected "competitiveness web" system, firms (micro), markets, and other business subareas and networks (meso), including the social demographics, cultural as well as technological spaces hosting this action (macro), represent a single entity, an "organism" that exists in today's dynamic global environment. In this sense, the "competitiveness web" clarifies the scope of each stage of research and its policy goals (Vladoš & Katimertzopoulos, 2018):

- The micro-level covers the complexities of the firm in terms of strategy, technologies and management and the particular progress that the company synthesizes by assimilating the elements of the current economic capital, legislation and every other associated flow.
- The meso-level covers the local dynamics and other spatial aggregations between firms (industries) and other actors in development.

- The macroeconomic level incorporates economic conditions primarily understood through development or decline of economic quantities, which contains aggregated financial and economic results.
- The macro-social level encompasses all those external influences that form the system's developmental outlook, such as the expansion of technological and cognitive trends, the dynamics of the cultural environment, and the demographic-environmental forces that affect the other subsystems.

6. Conclusions and Limitations

Tracking back the initial research questions, this study is investigating whether policy strategies can promote the accessibility to development of a regional innovation system, as well as, whether the development of local comparative advantages is associated with specific local resources in less developed business ecosystems. As we have seen above, the overall approach of regional systems of innovation is prominent in part because it provides a comprehensive story regarding the intangible aspect of local business growth and the mechanisms of dissemination of information and learning on an even more achievable geographic scale (Katimertzopoulos & Vlado 2019, 2017; Vlado, Katimertzopoulos, Chatzinikolaou, Deniozos & Koutroukis, 2019).

As such, the following summary of findings can be drawn based on the analysis undertaken during this research which will address the scientific questions posed above:

1. The implementations of the regional approach to the innovative system and its possible impact on regional and industrial development in various regions are difficult to fully understand, according to Staber (2001) and Doloreux (2002). Yet a comparative case study enables to better examine the hidden variables that might be present when observing one phenomenon in one event, raising questions as to why this is not the case in another event (Freel, 2002; Gertler, Wolfe & Garkut, 2000). Field surveys on less developed regional and local innovation business systems have shown that variables vital to business development such as strategy, technology and management can help understand and connect regional and local business systems through effective innovation (Vlado, Katimertzopoulos, Chatzinikolaou, Deniozos & Koutroukis, 2019; Katimertzopoulos & Vlado 2017).
2. Questions have been raised about the need to address the role of extraterritorial networks and institutions as mechanisms for the production and dissemination of knowledge beyond processes (and institutions) in regional innovation systems (Doloreux, 2004; Hommen & Doloreux, 2004; Cumbers, Mackinnon & Chapman, 2003). These questions arise from the fact that successful regional innovation systems use endogenously created and externally available knowledge to enhance competences and maintain competitiveness (OECD, 2001). As pointed out by Asheim and Gertler (2004): regional and local innovation structures alone are not adequate to stay competitive in a globalized economy. Production systems tend to be the most important innovation mechanism at the regional level. Therefore local companies should also have access to national and transnational innovation systems as well as corporate innovation systems from local

enterprises. This logic is followed to a point where the peripheral innovation system extends beyond its boundaries through an open innovation process.

3. The phenomenon of open innovation should not be equated only with the "exchange", i.e. a two-way knowledge flow, but with a one-way transfer "from the environment in business" (input) or "the environmental business" (outflow). Evidence indicates that, in reality, the benefit is on the former side, especially in relation to SMEs. In addition, it has been believed for many years that 'openness' relates only to large business organizations and that small ones have been completely ignored in this regard. The transition process from the concept of "closed innovation" to "open innovation" often requires business organizations to change their thinking and perception of the reality. In practice, this requires a change in the company's business strategy, often in its organizational structure and, above all, in the development of its absorptive capacity which leads to improved resources. This ensures that their performance relies not only on the internal resources of the organization, but also on the incentives to implement innovative approaches, solutions, concepts and technologies. This is the core principle of open innovation, in which exploration takes on a new sense and is considered a source of wealth of information, allowing more innovative business development (especially SMEs) (Ollila & Elmquist, 2011; Dodgson, Gann & Salter, 2006).

Overall, this academic paper is a conceptual research that performs a literature review of several field research in regional innovation systems and less developed local business ecosystems, with the overall goal to identify the central analytical dimensions and variables that could help effective business innovation and long-term stable growth and development.

Future research in this area could be twofold. Firstly, it should investigate whether the development and innovative dynamics of enterprises inside less developed business ecosystems are affected by variables such as strategy, technology and management (Stra.Tech.Man innovation theory) as well as other quantitative and qualitative variables. And, secondly it should examine which economic policies in the context of real innovation systems could help the development and extroversion of less developed business ecosystems, including all those entities located within them.

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