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Brazilian innovation ecosystems in perspective: Some challenges for stakeholders

Luiz Márcio Spinosa[a], Marcos Muller Schlemm[b], Rosana Silveira Reis[c]

[a] Dr. ès Sci. in Production and Informatics by Université d'Aix-Marseille III (FR). Professor at Pontifical Catholic University of Paraná, Curitiba. Visiting Scholar at Haas School of Business, University of California at Berkeley (USA). E-mail: m.spinosa@pucpr.br

[b] Ph.D. in Public Administration and Public Policy by University of Southern California, Los Angeles. Professor at the Pontifical Catholic University of Paraná, Curitiba, PR – Brazil. Visiting Scholar at Haas School of Business, University of California at Berkeley (USA). E-mail: marcos.schlemm@pucpr.br

[c] Ph.D. in Management by University of Bologna (IT). Associate Professor at ISG – International Business School, Paris (FR). E-mail: rosana.reis@isg.fr

Abstract

Worldwide, innovation ecosystems have been used as a framework to promote socioeconomic development. Brazil has been conducting several efforts to foster innovation ecosystems as a strategic option for its socioeconomic development and as a way of becoming a more aggressive actor in the global knowledge economy. However, these initiatives have fallen short of expectations. In this paper we argue that some of the frustrating results could be prevented by facing up to some strategic challenges like fostering an innovation culture, adopting a context-dependent definition and innovative ecosystems framework, providing an extended innovation policy mix, attempting to strike a balance between innovation ecosystems and knowledge-based regions and cities, and developing innovation management competencies. Despite the present context characterized by economic and political crisis, we argue that the propositions introduced in this paper can contribute to a positive agenda.

Keywords: Innovation Ecosystem, Innovation Cluster, Innovation Policy.

Introduction

The knowledge economy emerged from the need for generation, dissemination and use of knowledge in globalized and modern economies (DRUCKER, 2011; SMITH, 2000; POWELL; SNELLMAN, 2004). Its basis is related to the so-called information society or network society (CASTELLS, 1996; CASTELLS, 1997, CASTELLS 1998). It is a paradigm under discussion that characterizes knowledge and technology as new production factors, in addition to land, capital and labor factors.

The knowledge economy and the innovation dynamic nourish a mutual cause and effect relationship. Innovation can be considered as a strategic asset to improve competitiveness in the business environment and to foster regional and national socioeconomic development. The Organization for Economic Cooperation and Development (OECD) upholds that some regions and countries have achieved better results by strengthening their science, technology and innovation systems (OECDa, 2012). The World Bank argues that innovation is a key factor for socioeconomic progress and that it plays an important role in generating wealth and skilled jobs, which requires a clear development agenda in developing countries, (WORD BANK, 2010). In fact, knowledge and innovation became driving forces for economic growth, social development and competitiveness, not only for the industrial systems and corporations, but also for regional and urban areas (PERRY AND MAY, 2010).

Moreover, innovation may drive solid strong change. The Organization for Economic Cooperation and Development sustains that major solutions to diminish poverty and improve environmental sustainability that currently affect the global community will be originated by an innovation crusade (OECDa, 2012). Furthermore, to face the global challenges ahead, the problems need to be collectively addressed through bilateral and multilateral cooperation, and new governance models for cooperation should be designed. It should be taken into consideration that less developed countries face specific challenges in regard to innovation, including insufficient human and social capital, requiring policies to improve the educational system and the infrastructural means (OECDa, 2012; OECDb, 2012; OECDc, 2012).

From this shared context of knowledge economy and innovation efforts emerge the innovation ecosystems. They can be considered as a strategic option capable of fostering knowledge production and innovation harmonized with social and economic development. They typically result from a joint effort by several stakeholders like universities, engineering colleges, business schools, business companies, venture capitalists (VC), industrial and university research institutes, Centers of Excellence funded by the central government or industrial companies, and state and/or local economic development and business assistance organizations, funding agencies, policy-makers, etc., (JACKSON, 2011).

Like other countries, Brazil has been making efforts to foster innovation ecosystems as a strategic option for its socioeconomic development and as a way of entering the globalized knowledge economy. Several current initiatives including the academia and government and businesses that are seeking to deal with the domestic scenario. The purpose of this paper, based on ongoing research, is to briefly analyze five main challenges we deem most important at the moment. Needless to say, these challenges do not exhaust the issues concerning this problem in Brazil.

The Brazilian Challenges

In the last two decades, the Brazilian economy has experienced a significant incremental change in its' economic profile and growth rates. Due to currency stabilizing policies and the adoption of a fluctuating exchange rate, the Real has maintained an aggressive value vis a vis stronger currencies like the Dollar and the Euro, resulting in a flow of products imported from Asia, Europe, and other industrialized economies. With China maintaining impressive GDP growth rates, the Brazilian economy has benefited from the export of agricultural, mining and a few manufactured products, such as the medium-sized commercial airplanes produced by Embraer.

At the same time, the social policies that provided monetary support to the poor and the stabilization of the national currency expanded and consolidated the national consumer market. This scenario created an opportunity for a new social class to enter the market, just as it helped to expand the middle class. Nonetheless, there are still 40 million Brazilians living below the poverty line, and social problems like rampant crime are still a challenge for national and local policies.

Despite the present Brazilian crisis, both economic and social scenarios offer opportunities for entrepreneurship. In spite of a recent slowdown that can be observed from 2013 to 2015, there is still an entrepreneurial drive mainly among the young adult population, as reported in the Global Entrepreneurship Report (GEM, 2015). Conversely, GEM points out some critical entrepreneurial conditions in Brazil: (i) innovations still remain as non-sophisticated types of business; (ii) the sole aim of the entrepreneurial activities is to generate income to owners, often as a substitute or complementary source of income; (iii) the environment is less than favorable for new ventures and internationalization; and (iv) most of the entrepreneurial activities are not innovative nor expect to grow to a level that would really increase the job-creation rate.

GEM also brings out some basic and overall assumptions: (i) entrepreneurial activity is not a heroic act of an individual, regardless of the environment in which the activity is performed; (ii) entrepreneurial activity is an output of the interaction between an individual's perception of an opportunity and capacity (motivation and skills) to act upon it and the distinctive conditions of the environment in which the individual is located; (iii) the level of entrepreneurial activity varies among countries at a fairly constant rate and it requires time and consistency in policy interventions in order to build factors capable of contributing to entrepreneurial activity; and (iv) entrepreneurial activity, in its different forms (nascent, start-up, intrapreneurship), is positively correlated with economic growth, but this relationship differs along the phases of economic development.

Much of this entrepreneurial scenario clearly drives the Brazilian innovation results. According to the Global Innovation Index (CORNELL UNIVERSITY, INSEAD, and WIPO, 2015), Brazil is in an intermediary group (score around 35) and is seen as an inefficient innovator. However, Brazil ranks second in innovation quality among the middle-income economies. China leads this group. See Figures 1 and 2.

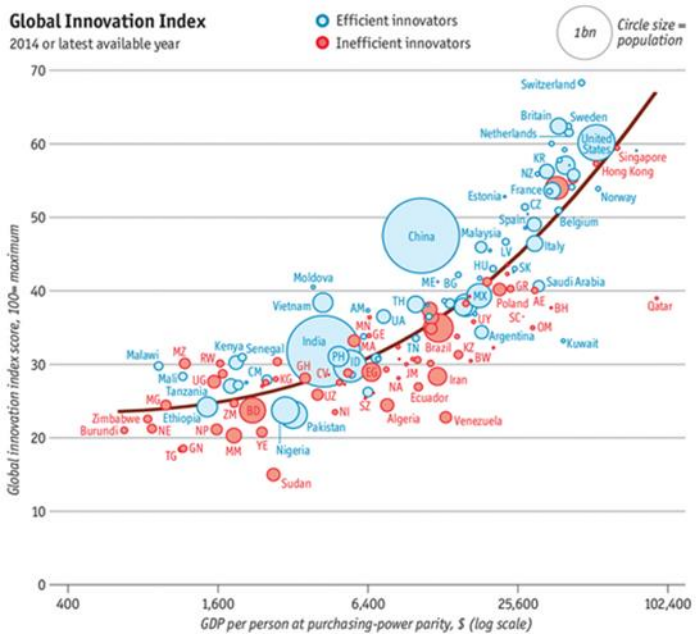

Figure 1 – Global Innovation Index Score. Focus on efficient and inefficient innovators groups

Source: Global Innovation Index, 2015

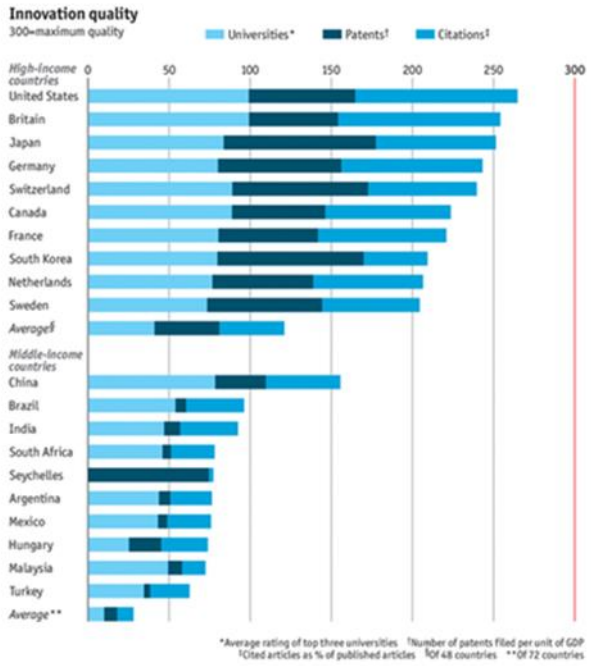

Figure 2 – Global Innovation Index Score. Focus on Innovation Quality

Source: Global Innovation Index, 2015

Several current initiatives including the academia, government, and corporations in Brazil are seeking to improve the Brazilian innovation indicators and trying to cope with the described entrepreneurial scenario. Establishing and nurturing Innovation Ecosystems in urban areas or a region emerges as one of the most important strategies. In 2013, there were 94 techno parks throughout Brazil (MCTI, 2013) and we argue that most of them are "nascent" innovation ecosystems. Many are the challenges related to the development of these recently formed ecosystems. The five that we deem most important at the moment are discussed below. However, this discussion does not exhaust the issues around the creation and induction of innovation ecosystems.

A Context-based Definition for Innovation Ecosystem

There is enough consensus regarding innovation ecosystems as specific to the context of the region and the industry where they emerge. Their induction and consolidation must necessarily observe local, regional and national characteristics. In a country like Brazil, of many cultural and regional contrasts, we can have more than one setting. Despite this multiplicity of factors to consider, some aspects seem to be common and are described below.

The term "innovation ecosystem" has been used in recent publications and has partly replaced the discussion on "innovation regions", "milieu innovateur" (innovative environments) and "clusters", as established by Porter, in the 1990s. Rosenfeld (1996) reports that a group of American specialists, in 1995, established that "cluster is a concentration of interdependent businesses on a delimited geographical area (...) interconnected by means of active commercial transactions, dialogue and communications that benefit from the same opportunities and face the same problems". Engel (2014) extended the concept and provided a framework to encompass clusters of innovation like "global economic 'hot spots' where new technologies germinate at an astounding rate and where pools of capital, expertise, and talent foster the development of new industries and new ways of doing business; they are vibrant, effervescent ecosystems composed of startups, businesses that support the startup process, and mature enterprises (many of whom evolved rapidly from a startup history); in these ecosystems, resources of people, capital, and knowhow are fluidly mobile and the pace of transactions is driven by a relentless pursuit of opportunity, staged financing, and short business model cycles."

The term "innovation ecosystem" is a more comprehensive and flexible one, accommodating the main elements of the concepts above and describes the function or role of independent factors that act jointly, but in a rather random and spontaneous way, enabling the action of uncountable entrepreneurs and innovators, allowing innovation to occur according to a sustained process in a given territory. Entrepreneurship is the expected behavior and innovation is the expected result of an innovation ecosystem, all of them needed to cope with competitiveness in a global knowledge economy.

We adopt these insights and propose a Brazilian context-based definition grounded on several ongoing actions: innovation ecosystems are competitive assets in the knowledge-based economy capable to foster socioeconomic development. They can be characterized as:

• Places for knowledge-based businesses and innovative entrepreneurship through continuous innovations development.

• Spaces for collective learning, exchange of knowledge and production practices and generating synergy among various innovation agents.

• Initially based but not restricted to technological parks, scientific parks or technopolis.

• Specialized organizations that aim to (i) promote the innovation culture, the competitiveness of enterprises and research institutions; (ii) stimulate and manage the flow of knowledge and technology among universities, R&D centers, enterprises and their markets; (iii) facilitate the creation and consolidation of enterprises through incubation and spin-off process, in addition to providing other aggregates to help with high-quality infrastructure; (iv) generate synergy among the various actors identifying local and regional vocations, seeking economic and technological feasibility.

• Sometimes the cause, sometimes the consequence, of innovation policies issued by government action in order to encourage production, dissemination and use of innovations for socioeconomic development.

• Involving an integrated effort from government, academia, corporations, and non-governmental enterprises. The latter are particularly important in Brazil, since they provide several specialized services for the public and private sectors.

Considering that the vast majority of innovation ecosystems in Brazil is fully inserted in or near cities, our work proposes additional considerations. In fact, cities are seen as knowledge centers, as loci of cultures that produce and recognize the value of knowledge (YIGITCANLAR; VELIBEYOGLU; BAIM 2008; KNIGHT, 2008). Alvim (2008) argues that urban planning, coupled with new forms of production, may contribute to redefining local development.

Thus, in a broader sense, innovation ecosystems could be understood as: competiveness assets in the knowledge-based economy, fully or partially integrated within urban spaces, capable of fostering regional and socioeconomic development. This definition results in additional tasks for the innovation ecosystems. They should be able to:

• Generate urban and environmental development, i.e., to promote conservation, development, and integration of natural and built environments.

• Establish a strong spatial network relationship between urban development and knowledge clusters.

• Encourage the socio-cultural capital, that is, to increase the skills and knowledge of residents to improve individual and community development.

• Stimulate institutional development, that is, to democratize and humanize knowledge by means of interdisciplinary and collective learning processes in organizations.

• Take into account decision-making on urban planning, public policy, environmental sustainability, social and technical network, among other factors, in order to organize and facilitate intensive knowledge means and activities.

• Operate as openly as possible (based on open innovation models) in order to foster the flow of knowledge from inside an innovation ecosystem outwards, thus accelerating internal innovation and market distribution.

The gains achieved by implementing innovation ecosystems can be listed according to the interests of their stakeholders:

• For governments, whether local, regional or national, it is a strategic choice for development, involving a clean industry (the knowledge industry). There is an increase in income and, consequently, in taxes, compatible with high value-added production. There is an opportunity to generate direct high-level jobs, since they require intense use of intellectual capital, and indirect jobs to support the direct ones.

• For Universities and Science and Technology Institutions, there is a chance to improve the quality of teaching and research based on more applied and real problems. Some of these institutions consider the innovation ecosystems as a means to promote local harmony, transferring the knowledge they produce to society. Quality teaching and research increase the demand for higher education, a survival factor for some of these institutions.

• For businesses, mainly the technology-based ones, there are gains in competitiveness due to the continuous generation of innovation. A survey conducted by the Boston Consulting Group, involving approximately 1,600 business leaders, in 40 countries, reveals that innovation, in 2010, was among the top three priorities for 72 % of companies, while 26% considered it the first priority (ANDREW et. al, 2010).

• For the three stakeholders mentioned above, there are still other advantages. Regions that have decided to induce innovation ecosystems have significantly increased their attractiveness to new businesses and investments. Additionally, by creating a dynamic environment that generates wealth and jobs, the ability to attract and retain talents is expanded.

A More Efficient Police-Mix and Instruments

Brazilian government has made significant efforts to define a policy framework, mainly through legal means, a framework capable of promoting innovation at national and local levels, taking into account the assets and tax scope available to each level (DE NEGRI; KUBOTA, 2008; PACHECO; ALMEIDA, 2013). The framework relies on fostering the inclusion of the country and regions in the global economy (knowledge and innovation economies). This effort is justified by the positive results that innovation has introduced in the economy and by the advances in competitiveness and quality of the national production system (ARBIX, 2007).

This effort undertaken by the central government can be illustrated by two main examples of federal laws to foster innovation in Brazil: the Innovation Act (Law No. 10.973) and the Well Act (Law n. 11,196 / 05). Basically both created tax incentives for businesses conducting R&D for technological innovation. More recently, a bill called National Code for Science, Technology, and Innovation (Bill 2177/11) was passed by the Congress to further improve innovative processes. The Code helps with the creation of innovation environments like business incubators, technology parks and techno poles, allowing more effective participation from public organizations (scientific and technological institutes and agencies). Another more specific piece of legislation is the Information Technology Act, created before the previous ones (laws 8.248/91, 10.176/01, 11.077/04, and 13.023/14). It grants tax incentives for Research and Development on hardware and industrial automation.

Most Brazilian states have also spurred on innovation. Innovation legislation at state level derives from the federal Innovation Act. It promotes measures to strengthen the regional State Innovation System, including measures that benefit technology parks and technology incubators. It also provides financial subsidies like tax incentives for business innovation projects. Similar efforts are also made at local level in several cities.

Concomitant with legal changes, several organizational tools have been created in recent years to nurture the innovation life cycle. The most relevant are: (i) EMBRAPII (Brazilian Enterprise of Industrial Research and Innovation), created "to promote business cooperation projects and national research institutions, supporting projects in the pre-competitive phase, proof of concept and technological scale-up that enable the development of innovative businesses" (http://embrapii.org.br/); (ii) SIBRATEC (Brazilian System of Technology), created to integrate the scientific and technological community and innovative enterprises and set up funding options to promote a favorable environment to technological innovation within companies (www.mcti.gov.br); (iii) ISI (Innovation SENAI Institutes) basically intended to increase productivity and competitiveness of Brazilian industrial companies through innovative solutions for large, small, and medium-sized companies (http://www.portaldaindustria.com.br/).

However, the efforts previously described did not produce the expected results, as pointed out in a recent report by a higher council for innovation and competitiveness of the most relevant federation of industries – FIESP, in the state of São Paulo (CONIC 2014). The results fall short of expectations as far as the level of innovation and overall economic growth are concerned. The incentives have not helped to overcome the regulatory and financial barriers or to strengthen the relationship between universities and business communities. According to the same report, there are several factors that may be constraining innovation initiatives and entrepreneurship in Brazil, namely the poor structural assets, the underdeveloped logistical means, and the lack of some critical cultural factors like openness, trust and collaboration.

The legal uncertainty is also a case in point. There is considerable conflict between the legal innovation framework and other legal issues related to employment, competitiveness, environment and industrial conditions, particularly when public resources are involved, often requiring intervention by external audit courts. These courts demonstrate an enormous lack of understanding about the process and dynamics of innovation.

Based on studies carried out in the Silicon Valley (US) (SCHLEMM et al., 2015) and in the Brazilian cities of Recife, Rio de Janeiro, Porto Alegre, and Curitiba (SPINOSA AND KRAMA, 2015), the authors argue that a more harmonious option to turn around the current scenario is to adopt an extended policy-mix. The term policy-mix usually refers to the balance and interactions between monetary and fiscal policies. The extended notion adds a social development dimension, which gains significance in Brazil due to the need to include the lower economic classes into the country's development process. Also, this extended notion covers the need for a more equitable regional and urban development, which is considered in the next section.

A policy-mix essentially highlights the interdependence of policies and a more holistic perspective to understand the scenario we are seeking to change. Any interven-

tion aimed at improving performance or change in behavior should be based on an understanding of how they will interact with existing agreements – for example, if they are complementary, neutral, or conflicting (OECDa, 2010). We argue that the holistic perspective has to cover the National and Regional Innovation Systems and consider them as innovation ecosystems as previously defined with a high degree of mutual interaction. The dynamics of the actors and factors of the ecosystems must be seen as components of the innovation performance.

Additionally, Edquist (2010) lists a number of initial issues to be taken into account by public policy-makers in this area: (i) the intensity of knowledge generation through R & D activities, qualification, training and learning; (ii) special attention to the increasing and more complex market demands; (iii) the strengthening of production and knowledge networks, with interaction among the stakeholders that make up the innovation system (government, universities and businesses); (iv) the entrepreneurial context (organizational skills, funding, and entrepreneurial risk); (v) the existence of a network with agile and efficient services (including adequate physical infrastructure); (vi) the existence of funding programs, consulting, business support, business incubation, and risk sharing; and (vii) the creation and adaptation of institutions to innovation, in order to remove barriers, reduce risk and provide incentives, tax and intellectual property registration.

Balanced Guidelines for Urban, Region, and Innovation Development

Together with the need for more effective public policies there is also the need to further explore the relationship between innovation ecosystems and the urban and regional environments. It is necessary to better understand this relationship and encourage the city to become a relevant promoter and organizer of a knowledge chain capable of supporting the innovation chain.

Based on studies about innovation ecosystems carried out in Brazil (Porto Alegre, Recife, Rio de Janeiro, and Vale dos Sinos, including seven cities), we argue that the relationship can be addressed by the Knowledge Based Urban Development perspective previously used to compose our definition of an innovation ecosystem.

Additionally, the concept involves some basic guidelines for urban planning (YIGITCANLAR, 2010): (i) encourage and nurture local production of science, innovation and creativity within the context of a knowledge economy; (ii) foster the integration of physical and institutional assets of the city with the functions of a science park; and (iii) promote the region's ability to attract, generate, retain intellectual capital for sustainable development based on the knowledge economy.

In Brazil, the Master Plan is the technical and legal framework guiding municipal development (Law No. 10.257) (BRAZIL, 2001). It brings together urban planning, tax and legal instruments, aims and goals to ensure the effectiveness of urban policy and democratic management, as well as full compliance with the social functions of the city and property (AMVALI, 2013).

In practice, it seeks to reconcile traditional urban planning with specific aspects of the dynamics of innovation, involving decision-making on: (i) land use and occupa-

tion; (ii) physical and natural conditions; (iii) social and economic conditions; (iv) infrastructure and public services (mobility issues); (v) social infrastructure (hospitals, facilities, etc.); (vi) institutional conditions (specific legislation, among others); (vii) legal framework for encouraging innovation; (viii) knowledge producers; (ix) knowledge of consumers/clients; (x) knowledge organizers; and (xi) knowledge transfer.

Innovation Culture

We argue that innovation culture is critical for the performance of innovation ecosystems. The challenge of how to create, induce, and improve an innovation culture is a topic for current discussion. The appropriate approach to dealing with this challenge can have a positive impact on the causes of most of the problems faced by businesses, the public sector, and the academia, resulting in a real mobilization towards innovation.

By request of the Higher Council for Innovation and Competitiveness of the Industry Federation of the State of São Paulo, in Brazil, the authors developed a research project in partnership with the University of California at Berkeley, USA (SCHLEMM; SPINOSA; REIS, 2015). The study clearly showed that innovation culture is the glue that binds and generates a myriad of interactions and interconnections, which leads to collaborations and interactive dynamics among the components of an innovation ecosystem. These dynamic practices occur mainly in a spontaneously, randomly and ad hoc ways. They are clearly observable in Silicon Valley and constantly generate new ideas, insights and solutions, resulting in market innovations.

The study also helped to identify eleven initial critical factors that characterize an innovation culture as follows: (i) knowledge dissemination of iconic and successful models – their stories are widespread circulated and discussed among people and organizations; (ii) open environment and curiosity to experiment – it involves risk and error acceptance and receptiveness from educators, citizens and potential investors to unconventional propositions; (iii) to do differently – it comprises the understanding that other ways to make and test things are possible; (iv) collaboration, cooperation and paying-forward in retribution; (v) diversity of races, creeds, cultural systems and knowledge; (vi) interaction mechanisms, such as meet-ups, business round-ups, idea and start-up contests, elevator pitch presentations, entertainment spaces and agendas, etc.; (vii) trust in relationships, in personal fulfillment of agreements between parties for the exchange of information and ideas; (viii) belief in innovation, a built-in confidence that you can make and innovate with a chance of success and reward; (ix) knowledge disposal, meaning that scientific and technological on-the-edge knowledge, are widely available and affordable; (x) abundant research originated by local and foreign academics, scholars, students, autonomous researchers, and so on; to this end, we must have highly qualified universities and technology centers, which serve as anchors to maintain the intellectual capital around; and (xi) territorial proximity among the different stakeholders.

According to the Higher Council for Innovation and Competitiveness (CONIC, 2014), in order to promote regional innovation ecosystems in Brazil we must find ways

to insert the above-mentioned factors within the cultural ecosystems environment, fostering their assimilation by local actors and taking into consideration their cultural diversity.

Improve Innovation Management Skills

We argue that there is a need to better manage innovative practices within the innovation ecosystem. Innovation is something possible and desirable to be managed in order to achieve the best results and to minimize risks, and it should be conducted in a professional and high-standard manner. The great challenge is how to conduct innovation in a systematic and continuous manner, ensuring the strategic choice of the organizations.

Specific management capabilities, like the ones required to manage innovation, can contribute to those purposes, based on steps that include all the technical, managerial, commercial, and financial issues. Innovation management has many definitions (BIRKINSHAW, HAMEL; MOL, 2008). For organizations, innovation management handles the development of new technologies, new organizations processes and transformation of the several variables of new market opportunities, products and successful services. Innovation management can be considered a new field that combines concepts, techniques, methods and models from other disciplines, particularly engineering and administration.

A common approach for innovation management is a process-based organization (TIDD; BESSANT; PAVITT, 2013). This approach should consider habits, culture, skills and expectations of managers, employees and customers, as well as their technical skills and ability to mobilize tangible and intangible assets. All of them are limited by the organization's workforce, the economic, political and developmental conditions involving the ecosystem. The processes handle several activities, starting with the generation of an idea, then the transformation of the idea and, finally, the transformation into a new product, process, service, marketing and/or organizational form. These processes all concur, in the end, to make the innovation available to end users in existing markets, or in new markets.

Several innovation management models have been developed in recent years. Initially, we adopted an adapted model derived from the work developed by Joe Tidd, John Bessant, and Keith Pavitt (2013). It comprises eight macro processes, which conduct the innovation in a systemic and continuously way (SPINOSA; NOGAS, 2014). The macro-processes are: 1) Innovation culture training to increase awareness in the organization about the benefits of innovating; 2) Identification of opportunities or promotion of ideas and creativity; 3) Strategic evaluation in order to align the new ideas with the corporate strategy; 4) Investment and risk analysis; 5) Resource allocation in managing the innovation process (financial, intellectual capital, technologies, etc.); 6) Implementation, where the new product, process, or service, is actually developed; 7) Diffusion of innovation involving the market for the new products, processes, or services, sometimes involving the creation of a new market; 8) Learning, which mainly gathers knowledge management techniques and takes place in parallel with the other phases.

Special attention should be given to knowledge management. Sveiby (1999) identifies two basic knowledge management approaches. The first one considers knowledge management as specific information process management, where knowledge is equivalent to objects, identified and treated with the help of information systems. In the second one, knowledge management is equivalent to people management, and knowledge is equivalent to processes, like a dynamic set of qualifications and know-how leading to the learning and creation of abilities. Furthermore, from the originally proposed classification of Polanyi (LIEBOVITZ, 1999), it is possible to identify two basic types of knowledge in the organization: explicit (or codified) and tacit (NONAKA; TAKEUCHI, 1997).

Conclusion

The Brazilian context is subtle and complex. It is currently troubled by an economic and political crisis that will certainly have social and institutional impact, with significant consequences for the development of the country. However, Brazilians reached a favorable consensus on innovation as an instrument to foster the global insertion of the nation into the world economy. A positive agenda should be pursued, despite the obstacles.

In this paper we propose five working areas that can contribute to this agenda, focusing on the encouragement of innovation ecosystems. The need for a contextual setting for innovation ecosystems, considering the specifics of Brazilian culture and institutions, particularly the diversity of its regions, is a first step. A minimal consensual definition accepted by diverse stakeholders can generate an integrated vision and deflagrate a combined effort to meet the expectations of the different actors. This consensual definition can also become a starting point to revise the current innovation policy, our second step, which we call an extended policy-mix. This mix would allow an integrated view of monetary, fiscal, social, regional and urban developments. We argue that special attention should be given to urban and regional spaces to promote the production of knowledge and generation of intellectual capital, our third proposition. Both factors are key requirements for the success of an innovation ecosystem. We believe that cities and urban areas have several assets that should be properly deployed and thus contribute to this purpose. Among these assets we emphasize a fourth point, a culture of innovation, which needs to be promoted in cities, regions, and nationwide. A creative and productive culture works as the backbone of successful world innovation ecosystems. Finally, as our final proposition, it is necessary to develop decision-making capabilities about innovation. Thus, well-trained actors – inside and outside the innovation ecosystems – with a clearer understanding of this approach would be better equipped to make better decisions on innovative processes.

Certainly, the work presented here does not exhaust the issues around innovation ecosystems. Questions not addressed here, such as macro and micro economy, or anthropological, sociological, and management issues are also important and require further research.

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