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Fostering Open Collaborative Innovation for Micro and Small Technology-Based Firms in Brazil

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Abstract: Innovation happens as a combination or a result of various phenomena (i.e. entrepreneurship, business environment, interactions, etc.); it is almost impossible for a single discipline to explain it. Given that there are many facets to explore to cover all aspects of innovation, the present paper approaches this theme from the sociological perspective. Innovation is not a solitary, but an interactive phenomenon, which requires firms to cooperate to reach innovation sources, new processes and technologies. As a theoretical reference, this paper develops the argument of the importance of the firms' interaction linkages and connections and their influence on the efficiency of the innovation system. So, in this context, the authors decided to adopt the survey method to examine whether or not interaction linkages have an impact on micro and small technology-based firms' innovativeness in Brazil. The findings showed that interactions between firms and other innovation agents such as universities, research centres, financial institutions and other partners is essential for the development of open, collaborative innovation activities and have a direct impact on the level of innovativeness. Finally, this paper concludes that innovation is a result of the combination of various interaction linkages and not an isolated phenomenon restricted to the firm. As such, it may be appropriately fostered.

Keywords: Open innovation, Networking-interactions, Business management and sociology

1. Introduction

In the last three decades, globalization has increasingly prompted firms and the whole economy to operate under pressure for new products and services. Under the increasing speed of globalization, many scholars such as Freeman (1995), Powell, Kenneth and Laurel (1996), Porter (1998) and Etzkowitz and Leydesdorff (2000) have agreed that only innovative firms can guarantee the long term capability to prosper and gain competitive advantage. In the past, the concept of competitive advantage relied on accessing and controlling raw materials. Nowadays, it relies on the creation of new technologies. Strategies that may have served firms before are not adequate in current or future contexts. To be competitive, companies must shift from an isolated organizational strategy to a more open mindset, which requires them to deal with different economic agents in different environments (local, national and even global).

This new scenario of competition has forced firms to develop products/services involving an increasing amount of knowledge-intensive activities. These activities range from product design, management procedures and marketing strategies to new interaction linkages between firms and economic agents such as universities, research centres and government. These agents can become key elements to the new sustainable innovation mode of production. This premise suggests that technological changes have the power to establish new standards for the transformation of the whole economy (Freeman, 1988).

Although innovation depends on many factors (i.e. entrepreneurial spirit, local infrastructure, legal and political dimensions and the presence of important innovation agents), one has been highlighted as essential: networking. Interaction processes between firms and other economic agents, to a great extent, have become an important element of competitive advantage. The creation of competitive advantage through innovation seems to suggest that firms need to

reach new sources of innovation to develop new technologies. Thus, networking plays a key role at the heart of any discussion on competitiveness and innovativeness; therefore, the current concept of globalization, based on technological development is undoubtedly different from the globalization of the past. Innovation is an economic and social phenomenon influenced by internal and external factors, establishing a new paradigm: networking permits to build new technological capability and specialization, leading to the improvement of a firm´s innovativeness.

Overall, there is certainly no recipe to succeed in a highly competitive environment. However, successful strategies facilitating innovation initiatives and encouraging environment for fostering entrepreneurship and innovation, include an understanding of the conjunction of some actors working together collaboratively, thus creating an interactive behaviour for innovation inducing climate.

2. Literature Review

2.1 Innovation - Modern History and Concepts

Historically, the emphasis on studies of innovation originated early 1930's and was prompted by an economist from the Austrian School of economics. Joseph Schumpeter (the so-called "founding father of innovation studies") was the most prominent economist from this school of thought and maintained that innovation is as a complex mechanism of the introduction of a new product, process, service, method of production, the opening of a new market, the new source of raw material or the establishment of new businesses (Schumpeter, 1979). He argued that modern capitalism was dynamic and evolutionary, and innovation drove firms' competitiveness and the country's economic growth. Since then, some scholars are investigating under what conditions this is allowed to happen.

More recently, authors such as Motta (1989) interpreted innovation as the discovery of a new opportunity. It is the use of unique tools or something new which provides a creative solution to problems detected and the outcome of the creative process. To Tidd, Bessant and Pavitt (2001), innovation is also a result of new knowledge, experiences and abilities to create new things (i.e. products, processes and services). It comprises of three phases:

Opportunities detected Choice of strategies

Introduction of innovation to the market.

At micro-level, within companies, the innovation process combines both internal and external elements organized systematically and always should be based on a landscape of abundant knowledge and cooperation (Chesbrough, 2003). At macro-level, considering the whole economy, innovation can be generated by a wide range of different agents such as universities and research centres; therefore, firms have to acquire new capabilities to manage a network of interactions with different actors and to become responsible enough to manage information and knowledge retained by a variety of different actors (European Commission, 2004).

Even though the concept of innovation seems to be very broad, for this paper, the authors consider the concept of innovation suggested by The Oslo Manual (2005): "innovation as the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations" (OECD/EUROSTAT, 2005).

2.2 Networking - Concepts and Perspectives

According to Castell (1999), the 21st century seems to be characterized by three features: global, informational and networked. In this sense, innovation initiatives are increasing substantially through networks of firms and other innovation agents. The expansion of the social-networked models is directly associated with the increase of innovation initiatives (Rothwell, 1994). This premise suggests that innovation combines both internal and external factors and is based on fruitful cooperation and networking environment. So, firms which do not cooperate and network will limit and reduce their capacity to innovate.

Oliver (1990) argued that networking was a response to the pressure caused by the globalization phenomenon; so, to reduce the pressure of the external environment, firms decided to participate in business networks. The networking approach resulted in competitive gains for firms which could not be obtained by individual efforts (Balestrin and

Verschoore, 2008).

Networks also involve many definitions. One of these definitions considers that business networks, in general, involve a group of firms, business units, universities, governments, customers or other actors which cooperate on a joint developmental project or objective to overcome common problems and to achieve collective efficiency to penetrate in new markets (Unido, 2001). Other authors such as Hunt, Doyle, McDermott and McCormack (2005) advocated that business networks are about fostering cooperation, facilitating the transfer of knowledge and information between companies, enhancing the learning process, allowing firms to share costs and risks. Finally, the authors agreed with Cooke (1996) who defined business networks as a formal and informal non-hierarchical organizational arrangement in which firms make relational contracts with each other through a set of linkages to facilitate the exchange of information and technologies.

Most of the authors share the common idea that the business network is emerging as a relevant tool to promote the development of innovation initiatives leading to the general improvement of the overall firm´s performance. So, the increase of the firm´s innovation activities depends on the rise of the interaction linkages that they maintain (Ahuja, 2000). In the business domain, collaboration manifests through collaborative arrangements and is structured according to the following typologies: alliances, joint-ventures, coalitions, consortia, cross-licensing and business network (Tidd, Bessant and Pavitt, 2001). However, there is a tendency for innovation to be associated increasingly with local and non-local interactions; therefore, firms must search for innovation sources regardless of whether they are geographically close or not (Melo, 2011).

Although it is clear that networking is of significant importance to the development of innovative activities, it does not seem to happen by its merit. It depends on factors such as cooperation and collaboration. Authors such as Gray (1996) argued that partnership offers an antidote to turbulence by building a collective capacity to respond to these conditions. This process, whereby two or more parties work together for mutual benefits is of immeasurable importance and is at the heart of any discussion about networking.

Porter and Fuller (1996) argued that the primary motivation for firms to cooperate stems from external factors such as the search for the economy of scale, reduction of risks response to market pressures or the need for technology or market access. Other authors such as Huxham (1996) advocated that the fundamental motive for firms to engage in collaborative activities is the focus on outputs where results could not be achieved individually and materialized into joint advantages. To Hunt et al. (2005), by collaborating, firms are enabled to achieve competitive advantages faster, cheaper and with less risk and disruption of operations. Overall, the benefits of collaborative activities are numerous with substantial success to firms´ improvement of competitiveness through networking. To Huxman (1996), collaboration and cooperation between firms happen due to the perception of mutual gains, and it is highly motivated by self-interest, but by such account, it is not implied that self-interest is at the expense of others.

In this context, it is reasonable to suggest that successful innovation initiatives result from successful firms´ participation in business networks on a collaborative model with constant flows of knowledge, information and resources, improving innovativeness collectively.

3. Results

This very subject outlines the basic methodological premises of this study. The strategy of examining whether or not interaction linkages have an impact on micro and small technology-based firms' innovativeness in Brazil was based on the survey strategy. We approached the research question to investigate the relationship between innovation and interaction. The presumable existence of this relationship (not causality) as well as the effectiveness of the impact on firm´s innovativeness and gains in competitive advantages is defended by many other authors, such as Ahuja (2000) and Balestrin and Verschoore (2008).

The key methodological points of this study are as follows: Qualitative research;
Explanatory mainly;
Cross-sectional study;

Data collection strategy was conducted by carrying out interviews and through the administration of a structured closed-ended questionnaire (the questionnaire was based on the Oslo Manual (OECD/EUROSTAT, 2005).
To approach this problem, the authors decided to perform this study in Brazil, in particular, the Brazilian micro and small technology-based firms located in the technology pole of Campinas, State of São Paulo and Porto Digital Information and Communication Technology Cluster located in Recife, State of Pernambuco. Both locations are internationally recognized as niches of excellence pole in technology.

4. Findings

This section discusses empirical findings regarding the investigation of the firm´s interaction behaviour and innovation process. The conclusions were results of the PhD thesis submitted by Paulo Melo to Waterford Institute of Technology (WIT) in Ireland. Topics related to interaction behaviour were focused only on those interactions directed towards the development of innovation activities.

The authors of this study summarize the main findings as follow:
1) Firms surveyed: 19 firms in Campinas and 13 in Recife;
2) Firm´s size: Campinas - (74%) predominantly micro-sized firms (less than ten employees) Recife - (69%) mainly small sized firms (11- 50 employees);
3) Overall firms engaged in innovation activities:
Campinas - 18 firms (95%)
Recife - 13 firms (100%)
4) Interaction behavior

The findings showed that 100% of firms surveyed in both locations had interactions linkages for the development of innovation activities: Campinas - 19 firms and Recife - 13 firms.

Another finding was related to the perception of the importance of interaction linkages to the development of innovative projects. According to Cortrights (2006), to improve the firm´s innovativeness, enterprises should engage in collaborative arrangements. So, one relevant finding generated by the study showed that 94% and 100% of firms surveyed in Campinas and Recife respectively considered interaction linkages of "high" or "medium" importance to innovation activities (see Table 1).

Table 1: Importance of Interactions for Innovation Activities

Degrees of importance	**Campinas No. of firms**	**Recife No. of firms**
High	10(59%)	09 (69%)
Medium	06 (35%)	04 (31%)
Low	01 (6%)	-
None	-	-
Total	17 (100%)	13(100 %)
No answer	0 2	-

Source: the current study

Regarding interaction partners, firms in both locations seemed to interact with different partners (see Figure 1) to develop their innovation projects. In Table 2, the study shows types of interaction partners which firms had experienced interaction linkages.

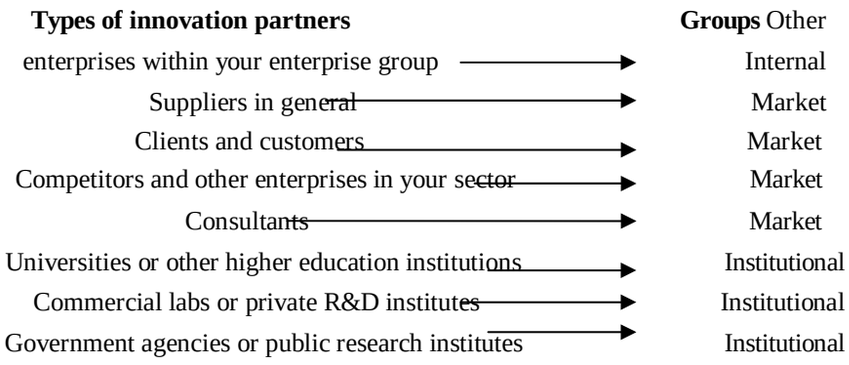

Figure 1: Classification of Types of Innovation Partners
Source: current study

Table 2: Classification of Types of Innovation Partners

Types of innovation partners	Group	Campinas No. of firms	Recife No. of firms
Other enterprises within your enterprise group	Internal	02 (14%)	04 (31%)
Suppliers in general	Market	05 (36%)	04 (31%)
Clients and customers	Market	06 (43%)	06 (46%)
Competitors and other enterprise in your sector	Market	07 (50%)	12 (92%)
Consultants	Market	08 (57%)	06 (46%)
Universities or other higher education institutions	Institutional	12 (86%)	05 (38%)
Commercial labs or private R&D institutes	Institutional	04(29%)	04 (31%)
Government agencies or public research institutes	Institutional	05(36%)	13 (100%)
No. of firms which answered this question	-	14 (100%)	13(100%)
No answer	-	05	-
Total of firms	-	19	13

Source: The current

The geographic extent of the network of relationships for the development of innovation projects is presented in Table 3. The findings showed that 57% of firms located in Campinas and 70% located in Recife had experienced interactions within and outside the cluster and 29% of firms located in Campinas and 15% in Recife reported interaction experienced within the cluster only.

Table 3: Locations of Innovation Partners

Locations / No. of firms	Campinas	Recife
Within the cluster only	4 (29%)	2 (15%)
Outside the cluster only	2 (14%)	2 (15%)
Both (within and outside the clusters)	8 (57%)	9 (70%)
Total of firms which answered this question	14 (100%)	13 (100%)
No answer	05	-

Source: the current study

5. Conclusions

Overall, the results of this study indicate that apparently, innovative firms are also very active as far as networking is concerned. Firms in both locations seem to confirm that their interaction behaviour determines the level of firms' innovativeness. According to the results of the empirical study, 100% of firms surveyed were engaged in innovation and interaction activities to develop their innovation projects.

Another finding revealed that firms interact with different partners in different locations; therefore we conclude that the level of interaction is not limited to geographic proximity.

Our findings are in line with Huxman (1996), Ahuja (2000) and Hunt et al. (2005), who advocated that firm's innovativeness depends on the increase of their interaction linkages, while interaction enables firms to achieve competitive advantages faster, cheaper and with fewer risks and these interaction linkages happen mainly because of the perception of mutual gains respectively.

The summary of our findings is as follows: i. the level of firm's innovativeness is strongly influenced by interaction linkages; ii. Interaction linkages are not restricted to geographically and iii. Although spatial agglomerations seemed not to be the main locus of innovation partners, they are still relevant to the development of innovation activities, especially for micro and small-sized firms. Therefore, innovation is not a solitaire phenomenon restricted to the firm itself that may be appropriately fostered.

References

- AHUJA, Collaboration Networks, Structural Holes and Innovation: a Longitudinal Study [J]. Administrative Science Quarterly, 2000, 45:425-455 Crossref
- BALESTRIN A., and VERSCHOORE J. Redes de Cooperação Empresarial [M]. Bookman, Porto Alegre, 2008
- CHESBROUGH H., Open Innovation: The New Imperative for Creating and Profiting from Technology [M].Harvard Business Press, USA, 2003
- COOKE , Networking for Competitive Advantage: Including Enterprise Support Policies in the European region [R]. Report Prepared for National Economic and Social Council, Dublin, 1996
- CORTRIGHTS J., Making Sense of clusters: Regional Competitiveness and Economic Development [C]. Discussion Paper Prepared for the Brookings Institution Metropolitan Policy Program, USA, 2006
- ETZKOWITZ H. and LEYDESDORFF L., The Dynamics of Innovation: From National Systems and 'Mode 2' to a Triple Helix of University-Industry-Government Relations[J].Research Policy, 2000, 29(2): 109-123 Crossref
- EUROPEAN COMMISSION, Innovation Management and the Knowledge-Driven Economy[M].European Commission, Brussels, 2004
- FREEMAN, C., The 'National System of Innovation' in Historical Perspective, Cambridge Journal of Economics[J].1995, 19(1)
- FREEMAN, C., Introduction. In: DOSI, Giovanni et al. (eds) Technical Change and Economic Theory[M].Pinter Publishers, London, 1988:1-8
- GRAY , Cross-Sectoral Partners: Collaborative Alliances Among Business, Government and Communities, In Chris Huxham (Ed.) (1996), Creating Collaborative Advantage[M].Sage Publications, London, 1996: 19-43
- HUNT M., DOYLE G., MCDERMOTT D. and MCCORMACK , Business Network on the Island of Ireland[A].Report Prepared for InterTradeIreland, Ireland, 2005
- HUXMAN C. (Ed), Creating Collaborative Advantage[M]. Sage Publications, London, 1996
- MELO, , Innovation and firm's Interaction Behaviour: Is Innovation Associated with Local or Non-Local Interactions? An Investigation of Clustered micro and Small Technology-Based Firms in Brazil [D]. Ireland: School of Business of the Waterford Institute of Technology (WIT), 2011.
- MOTTA, R., Gerencia de Idéias Novas: Como Despertar a Criatividade e Vencer a Impotência do Desejo Inovacional? [J].Revista Administração Publica, RJ, , 1989,23(4):71-86
- OLIVER, C., Determinants of Inter-Organizational Relationships: Integration and Future Directions[J]. Academy of Management Review, 1990, 15(2):241-265 Crossref

- OECD and EUROSTAT, Oslo Manual, 3rd edn[M].OECD/Eurostat, Paris, 2005
- PORTER, E. (1998), The Competitive Advantage of Nations[M].Macmillan Press Ltd., London, 1998 Crossref
- Porter, M. E. and Fuller, M .B., Coalitions and Global Strategy, : Competition in Global Industries Michael Porter (Ed.), [M]. Harvard Business School Press, Boston, 1996: 315-343
- POWELL, W., KENNETH, W. K. and LAUREL, S., "Interorganizational Collaboration and the Locus of Innovation: Networks of Learning in Biotechnology" [J].Administrative Science Quarterly, 1996, 41:116-45 Crossref
- ROTHWELL, R. Toward the fifth-generation innovation process [J].International Marketing Review, MCB University Press, England, 1994, 11(1):7-31 Crossref
- SCHUMPETER, , Capitalism, Socialism and Democracy, George Allen & Unwin, London, 1979
- TIDD, J., BESSANT, and PAVITT, K., Managing Innovation – Integrating Technological, Market and Organizational Change [M]. John Wiley & Sons Ltd., England, 2001
- UNIDO, Development of Clusters and Networks of SMEs, The United Nations Industrial Development Organization (UNIDO) [A]. The UNIDO Programme, Vienna, 2001
- Castell M. (1999), Materials for an Exploratory Theory of the Network Society[J/OL] (Available http://faculty.georgetown.edu/irvinem/theory/Castells-NetworkSociety.pdf) (Accessed on 20th July 2015)