

## **ARE INTERACTION LINKAGES BASED ON GEOGRAPHIC PROXIMITY FOCUSED ON DEVELOPMENT OF FIRM'S INNOVATION ACTIVITIES STILL RELEVANT? EMPIRICAL STUDY OF THE ICT FIRMS LOCATED IN THE CITY OF SALVADOR, BAHIA, BRAZIL**

*São ligações de interação, com base na proximidade geográfica focada no desenvolvimento de atividades de inovação da firma, ainda relevantes? Estudo empírico das empresas de TIC localizadas na cidade de Salvador, Bahia, Brasil*

**Paulo Melo, Sérgio Maravilhas**

Universidade Salvador – UNIFACS, Salvador, Brazil

**E-mail:** pmmelo@yahoo.com, smaravilhas@gmail.com

**Abstract:** The current paper investigates the role of interactions based on geographic proximity for the development of firm's innovation activities. Many authors such as Porter (1998) argued that the formation of interactive linkages based on geographic proximity seem to facilitate the search for new knowledge, information and technologies able to impact the development of innovation activities inside the organization generating competitive advantages. To perform this research, the authors decided to investigate the interaction behavior of micro and small firms in the information, communication and technology (ICT) sector located inside and outside the technological park in the city of Salvador, State of Bahia, Brazil. The findings showed in general that firms which had innovation activities, also had some kind of interactions with other agents, confirming that innovation is not a solitaire phenomenon. However, the empirical evidences did not confirm that interactions based on geographic proximity were relevant for the development of firms' innovative activities. The study showed that, nowadays, firms use to interact with others regardless of whether they are geographically close or not. This may happen due to the fact that with the facilitation and the intensive use of new communication technologies have helped firms to reach partners wherever they are located at. Also, the study may suggest that arguments such as the role of geographic proximity and business agglomerations based on spatial proximity may need to be revised.

**Key words:** Geographic Proximity, Interaction Linkages, ICT sector

**RECEBIDO EM: 10/04/2017**

**ACEITO EM: 01/03/2019**

## **ARE INTERACTION LINKAGES BASED ON GEOGRAPHIC PROXIMITY FOCUSED ON DEVELOPMENT OF FIRM'S INNOVATION ACTIVITIES STILL RELEVANT? EMPIRICAL STUDY OF THE ICT FIRMS LOCATED IN THE CITY OF SALVADOR, BAHIA, BRAZIL**

*São ligações de interação, com base na proximidade geográfica focada no desenvolvimento de atividades de inovação da firma, ainda relevantes? Estudo empírico das empresas de TIC localizadas na cidade de Salvador, Bahia, Brasil*

**Paulo Melo, Sérgio Maravilhas**

Universidade Salvador – UNIFACS, Salvador, Brazil  
**E-mail:** pmmelo@yahoo.com, smaravilhas@gmail.com

**Resumo:** O presente artigo investiga o papel das interações baseadas na proximidade geográfica para o desenvolvimento das atividades de inovação da empresa. Muitos autores como Porter (1998) argumentam que a formação de interações interativas baseadas na proximidade geográfica parece facilitar a busca de novos conhecimentos, informações e tecnologias capazes de impactar o desenvolvimento de atividades de inovação dentro da organização gerando vantagens competitivas. Para realizar esta pesquisa, os autores decidiram investigar o comportamento de interação de micro e pequenas empresas no setor de informação, comunicação e tecnologia (TIC) localizado dentro e fora do parque tecnológico na cidade de Salvador, Estado da Bahia, Brasil. Os resultados mostraram, em geral, que as empresas que tinham atividades de inovação também tiveram algum tipo de interação com outros agentes, confirmando que a inovação não é um fenômeno solitário de paciência. No entanto, as evidências empíricas não confirmaram que as interações baseadas na proximidade geográfica foram relevantes para o desenvolvimento das atividades inovativas das empresas. O estudo mostrou que, hoje em dia, as empresas usam para interagir com os outros, independentemente de estarem geograficamente próximos ou não. Isso pode acontecer devido ao fato de que, com a facilitação e o uso intensivo de novas tecnologias de comunicação, as empresas têm ajudado a alcançar parceiros onde quer que estejam. Além disso, o estudo pode sugerir que argumentos como o papel da proximidade geográfica e aglomerações de negócios com base na proximidade espacial podem precisar ser revisados.

**Palavras-Chave:** Proximidades geográfica, interações das conexões, Setor de TIC

**RECEBIDO EM: 10/04/2017**

**ACEITO EM: 01/03/2019**

## INTRODUCTION

Innovation is a sophisticated, complex and multifaceted phenomenon which is studied from many perspectives: from economics to business management and from sociology to economic geographic with impact on firm's and country's competitiveness. So, in this sense, many authors from different schools of thoughts have tried to explain how it happens, what makes it to happen, what factors influence it positively and negatively as well as what are the impacts for companies, countries and for the society as a whole.

Overall, from the organizational perspective, innovation gives companies a first-mover advantage, opening new markets and allowing obtaining a market position before competitors can launch an alternative solution. Being first in the market gives companies good reputation and almost always the biggest market share (Trott, 2008). Then, to Best (1990), innovation gives companies the long-term capability to gain competitive advantage, production flexibility and adaptability of new organizational frontiers.

As definition, innovation also has many authors who have tried to define it from many perspectives and interpretations. To Schumpeter (1979), innovation may assume different dimensions: it may be a new product, service, process, production method, opening a new market, new source of raw materials and also the establishment of a new business or business model. In the following years, innovation has evolved to more complex interpretations which includes the use of knowledge and creativity to give solutions to problems detected (Motta, 1989) and to respond to unexpected changes in the marketplace such as new technologies and consumer's perceptions (Drucker, 1986). For Leonard-Barton (1995), Leonard and Swap (1999) and Kelley and Littman (2001 and 2007), innovation is the application of new knowledge, resulting in new products, processes or services or significant improvements in some of its attributes.

Moreover, to sociologists, innovation is a result of the exchange of knowledge, experience and technologies based on a networked environment which combines internal and external ideas and a landscape of abundant cooperation regardless of whether firms are geographically close or not. In this sense, innovation seems to be a complex process of acquisition of many inputs which may be originated from firms' internal sources or from external ones which may come from different origins. Considering external sources, Madhok and Tallman (1998) emphasizes that firms may acquire innovation inputs through cooperative arrangements with partners in different locations.

This paper then focuses on the assumption that innovation is not a solitaire phenomenon but depends on strong interaction and cooperation linkages. Despite it is generated inside the organization, firms are no longer the only locus of innovation, but the environment where they are embedded (Powell, Kenneth and Laurel, 1996). From this perspective, many other authors such as Granovetter, 1973, Lundvall, 1992, Rosenfeld, 1997, Porter, 1998, Ahuja (2000) and Svetina and Prodan (2008) use to defend that innovation depends on many factors. One of them is the formation of interactive linkages based on geographic proximity which seemed to facilitate and stimulate the exchange and sharing of many factors such as knowledge, technologies and information. They are able to impact the development of innovation activities inside the organization generating competitive advantages.

Despite of all these apparent gains of interactions based on geographic proximity to the development of innovation activities, the authors of this paper suspect that nowadays with the extraordinary development of new knowledge and information and the intensive use of communication technologies, these new knowledge and technologies are becoming available more rapidly on a worldwide scale accelerating the innovation activities (Melo, 2011). So, interactions focused on geographic proximity do not seem to have the same impact it had before.

The aim of this paper, therefore, is to understand whether these interactions on a geographic basis are still relevant for the development of firm's innovative activities. The start point is the argument that, nowadays (more than ever), innovation seems to be a result of interactions between firms and other agents, regardless of whether they are close geographically or not (Melo, 2011).

To investigate the current proposition, the authors decided to investigate innovative micro and small sized firms on the technology sector located in the city of Salvador, State of Bahia, Brazil. Five (5) firms researched are located inside the local technological park and three (3) others in different locations in the city. The reason of choosing companies inside and outside a local technological park is

to investigate firms' interaction behaviors in both conditions and the effectiveness of local interactions on geographic proximity.

To present the development of arguments, this paper is structured as follows: firstly, it is presented some conceptual aspects and considerations on innovation and networking with emphasis on interactions based on geographic proximity. Next, the authors present some methodological aspects adopted to perform this study and lastly, it is showed the main empirical evidences and conclusions.

## **INNOVATION AND INTERACTION LINKAGES BASED ON GEOGRAPHIC PROXIMITY**

“The innovative process is not spaceless; on the contrary, innovation seems to be an intrinsically territorial and localized phenomenon....it is highly dependent on resources which are linked to specific places and impossible to reproduce elsewhere” (Longhi and Keeble, 2000, p. 27)

Historically, innovation is considered an economic phenomenon but at the same time it is equally conditioned to cultural, political, institutional and social factors, with strong impacts on the performance and competitiveness of firms, society and countries. Therefore, it depends on internal attitudes in searching for solutions for organizational, commercial and technical problems and these solutions may be inside or outside the organization.

Many authors also defended that the firm's innovativeness is strongly influenced by the location firms are embedded, therefore innovation phenomenon is not spaceless; on the contrary, location has a strong impact on the development of firm's innovation activities. These impacts come from many perspectives such as fiscal incentives, government benefits together with the facilitation of interactions due to geographic proximity of firms and other innovation agents. As far as locational factors are concerned, Cortrights (2006) argued that to succeed, firms must network and collaborate with others despite these interactions are local or non-local ones.

Some authors, such as Malmberg and Maskell (2002) and Malmberg and Power (2005), who study innovation use to defend that the search of external inputs is facilitated when firms are close geographically and spatially organized in business agglomerations of firms such as cluster and technological parks. This approach is relevant for the search for new solutions as geographic proximity seems to facilitate business interactions. They argue that because firms are geographically close, they tend to interact more often. This proximity facilitates the exchange of information and knowledge, transfer of technology and sharing of experience which stimulates the creation of new solutions for those problems as well as the continuous interaction process and search for new partners and new sources of innovation sustain gains in competitive advantages. To the European Commission (2004), this perspective uses to stress the relevance of external sources of information and knowledge to the increasing of innovativeness and competitiveness consequently.

To authors such as Unido (2001), Tidd, Bessant and Pavitt (2001), Contractor and Lorange (2002) and Hunt et al. (2005), the network approach is about fostering cooperation, allowing firms to overcome common problems and achieving collective efficiency beyond their individual reach. Also, it allows firms to share costs and risks, enhancing the learning process, opening new channels for opportunities and information as well as facilitating the transfer of tacit knowledge between firms.

Therefore, the network approach seems to emerge an important tool to promote innovation activities, leading to the general improvement of firm's competitiveness. To Ahuja (2000) and Cortrights (2006), the improvement of firms' innovativeness increases with the number of interactions linkages they maintain. Then, the capability of firms to innovate seems to be directly linked to their ability to interact with other innovation agents.

In essence, authors such as Lundvall, Johnson, Andersen and Dalum (2002), and Cooke and Leydesdorff (2006) have emphasized that localized interactions have served as an efficient strategy to increase the level of firms' innovativeness. These authors also agreed that firm's innovation activities are highly depended on the interactions between various actors within a system of innovation regardless of the geographic perspective or extent of this system are precise to determined. Undoubtly, a great part of the success of firm's innovation activities is directly related to set of interaction linkages they are involved with, able to provide new innovation resources such as knowledge, information and technologies (Cortrights, 2006).

The current review of literature seems to suggest that it may have a gap to be fulfilled: to search

for evidences whether with the intensive use of new communication technologies such as internet protocol firms may more easily interact with other actors despite these actors are geographically close or not; therefore, the role of geographic proximity may not be so relevant as it was in the past as well as the role of business agglomerations such as technological parks in promoting local interactions with direct impact on the development of firms' innovation activities. So, the access of external sources of innovation may be reached not only by those geographically close but also those located globally with the simple use of communication technologies.

## **METHODOLOGICAL PATH OF THE INVESTIGATION**

The authors of the current study decided to approach this investigation by analyzing the interaction linkages of selected firms localized in the city of Salvador, State of Bahia, Brazil. Firstly, it was selected the economic sector to be investigated. The main criterion was to select a certain sector supposedly more innovative than others. The choice was for information, communication and technological sector (ICT) which seems to be more innovative due to the fact that new technologies are coming up and spreading worldwide more rapidly.

The second step was to search for firms in the ICT sector. Considering the argument of Svetina and Prodan (2008) who argue that the way firms search for new sources of innovation is not linear for all companies, but depends on the size of firms, the current researchers decided to approach micro and small sized firms. Small sized firms tend to invest in interaction linkages with external sources because they seem to be more limited in internal resources. Large companies, on the contrary, seem to invest more in functional interactions within the organization or among firm's department as they seem to have more internal resources such as talented employees, technology and financial resources (Svetina and Prodan, 2008). Despite of the size of firms, small, medium or large companies are directly impacted by the pressure from the environment for innovation and the solution seems to be always the networking approach which competitive gains are higher than those obtained by individual efforts alone (Balestrin and Verschoore, 2008).

Thirdly, the researchers decided to investigate five (5) ICT micro and small sized firms inside the local technological park. These firms tend to be supposedly more innovative and tend to interact more due to the logic of the geographic proximity facilitating interactions among actors within a local business agglomeration. Next, the researchers also decided to investigate three (3) firms outside the local technological part, but in the same city; therefore, in the same local system of innovation.

So, the authors decided to investigate eight (8) innovative micro and small sized firms on the ICT sector located in the city of Salvador, State of Bahia, Brazil. Five (5) firms researched are located inside the local technological park and three (3) others in different locations in the city. The reason of choosing companies inside and outside a local technological park is to investigate firms' interaction behaviors in both conditions and the effectiveness of local interactions on geographic proximity. In this case, the only variable was the fact that some firms belonged to a business agglomeration (local technological park), supposedly more affected by geographic proximity and others not so exposed to influences of spatial proximity.

From the methodological point of view, to approach this investigation, the researchers considered to use the strategy of semi structured interviews with the application of a questionnaire in order to capture and identify innovation activities and interaction linkages of the eight (8) selected firms. The construction of the questionnaire, including the set of questions, was based on the recognized innovation survey: the Community Innovation Survey (CSI) and the Oslo Manual, version 2005. The researchers, in this particular context, decided to approach the research problem by analysing the firm's innovation activities and interaction network in order to trace the route able to confirm or not the applicability and validity of the proposition.

## **FINDINGS**

This section shows empirical evidences related to this investigation. It comprises: firms' interaction network and identification and location of their partners. It is relevant at this time to clarify that the firm's interaction networks investigated in this study was only those focused on the development of

innovation activities. Other interaction linkages (e.g. social, technical or economic interactions), which did not aimed to contribute to the development of firms' innovation activities, were not considered in the present study. Also, the findings are shown in two different dimensions: i) firms located inside the local technological park (LTP) and ii) firms located outside the local technological park.

Firstly, Table 1 shows a general overview of firms' main characteristics comprising: Year started the operation, no. of employees, main economic activity (Product / Service) and some aspects on innovation and interaction behaviors. Overall, firms are mature: on average, they are almost ten years old; considering the number of employees, they may be classified as small firms (below 50 employees); 100% of firms are from the ICT sector; mostly engaged in innovation activities, but with a relative low level of engagement on interaction, despite all of them considered interactions as of "high or medium" importance to innovation activities.

**Table 1 Firms' main characteristics**

<b>General Topics</b>	<b>Inside the LTP</b>	<b>Outside the LTP</b>
Years of operations (average)	9.4 years	9.7 years
Nr. of employees (average)	26	16
Main economic activity (sector)	ICT Sector	ICT Sector
% of firms were engaged in innovation activities	80%	100%
% of firms reported innovation interactions	40%	33%
% of firms perceived networking as of "high or medium" importance to innovation activities	100%	100%

Source: current research

Regarding interaction behaviors, not surprisingly, the findings presented that most of firms surveyed agreed that interactions are of "high" or "medium" importance to innovation activities. In fact, taking into account firms inside the LTP, 80% of them are considered interactions of high importance to the development of innovation activities and those outside of the LTP, 67%. This evidence comes in line with some authors such as Cortrights (2006), who argued that there is a gain in competitive advantage when firms are involved in interaction networks.

Moreover, according to Table 2, those firms inside LTP, which have reported interaction activities, named government agencies or other public institutions, such as research institutes, as the main interaction partners. The main reason for this level of interactions with public agents is the fact that most of firms are financed, have some kind of public incentive or fiscal benefit to develop innovation activities. On the other hand, firms outside the LTP have a more diversified picture of interaction partners: general enterprises such as suppliers, clients, competitors and third level institutions.

**Table 2 Firm's interaction behavior (type and location)**

<b>Interaction Indicators</b>	<b>Inside the LTP</b>	<b>Outside the LTP</b>
Main interaction partners	Mainly government agencies or public institutions	Mainly enterprises (e.g. suppliers, clients, competitors) and third level institutions
Locations of interaction partners	Mainly elsewhere in the city, same State, in another State and in another country	Mainly elsewhere in the city, in the same State and in another State

Source: current research

Regarding the locations of interaction partners, the questionnaire suggested five (5) locations as follow: in the LTP, elsewhere in the city, in another part of the State, in another State (same country) and in another country. The evidences showed that firms inside and outside LTP have had the capability to interact with partners wherever they are geographically located. One fact that called the authors' attention is that firms located inside the LTP did not mention any interaction activities with other firms inside the business agglomeration.

## CONCLUSIONS

In conclusion, the findings suggest that interactions are very important to the development of innovation activities. Both groups of firms (inside and outside LTP) have had the same interaction behaviour: in general, they are very interactive sensitive. This evidence is in line with Rothwell (1994) who use to argue that innovation is a result of a strategic networking approach.

However, evidences also presented that firms which use to interact for the development of innovation activities are not limited by geographic distance; on the contrary, in both groups, firms use to interact more with partners relatively distant to their main offices. This may be consequence of the facilitation and the intensive use of new communication technologies to reach partners wherever they are located.

This fact suggests that authors such as Porter (1998) who strongly argued that interactive linkages based on geographic proximity facilitates innovation activities generating competitive advantage may need to be reviewed. Also, it suggests that the argument of geographic proximity and the role of business agglomerations based on spatial proximity also need to be revised. Finally types of business agglomerations such as LTPs may have to rethink their role in promoting, increasing and improving the intensification and quality of interactions among their members, unless they may lose importance in near future.

## REFERENCES

- Balestrin, A. and Verschoore, J. Redes de cooperação empresarial [M], Bookman, 2008
- Drucker, P. F. Innovation and Entrepreneurship: practice and principles [M]. Heinemann, 1986
- Chesbrough, H. Open Innovation: The new imperative for creating and profiting from technology [M]. Harvard Business Press, 2003
- Cortrights, J. Making Sense of clusters: Regional competitiveness and economic development, discussion paper prepared for the Brookings Institution Metropolitan Policy Program[M], USA,2006
- Kelley, T. and Littman, J. . As Dez Faces da Inovação: o Poder da Criatividade e da Inovação na Empresa[M]. Presença, 2007
- Leonard, D. Wellsprings of Knowledge: Building and Sustaining the Sources of Innovation [M]. Harvard Business School Press, 1995
- Leonard, D. and Swap, W. When sparks fly: igniting creativity in groups [M]. Harvard Business School Press , 1999
- Madhok, A. and Tallman, S. B. Resources, Transactions and Rents: managing value through interfirm collaborative relationships[J]. Organization Science, 1998,(3)
- Malmberg, A. and Maskell, P. The Elusive Concept of Localization Economies– Towards a Knowledge-based Theory of Spatial Clustering [J], Environment and Planning A. 2002,(3):429-449
- Malmberg, A. and Power, D. (How) do (firms in) clusters create knowledge [J]. Industry and Innovation.2005,(4):409–431
- Melo, P. Innovation and firm’s interaction behavior: 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, P. Gerencia de idéias novas: como despertar a criatividade e vencer a impotência do desejo inovacional[J]. Revista Administração Pública. 1989, (4):71-86
- Oecd/Eurostat, Oslo Manual 3rd ed[M].Paris, 2005
- Porter, M. E. (c). Clusters and the new economics of competition [J], Harvard Business Review, 1998,(11-12):77–90.
- Schumpeter, J. Capitalism, Socialism and Democracy. London: George Allen & Unwin, 1979
- Svetina, A.C. and Prodan, I. How internal and external sources of knowledge contribute to firm’s innovation performance[M] . Managing Global Transitions. 2008,(6):277-299.
- Tidd, J.; Bessant, J.; Pavitt, K. Managing Innovation-Integrating Technological [M], Market and Organizational Change. England: John Wiley & Sons Ltd, 2001
- Trott, P. Innovation Management and New Product Development (4<sup>a</sup> ed.)[M]. Essex: Prentice Hall Financial Times, 2008