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Global Value Chains and National Systems of Innovation: policy implications for developing countries¹

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Abstract

The debate about the impact of global value chains on technological learning and capability building processes in developing countries has important implications for both analytical and normative dimension. This paper presents a comparative analysis between the conceptual framework of NSI and the approach on Global Value Chain in order to explore the main complementarities and differences between them. The main objective is to compare the policy implications for developing countries of the two approaches. This discussion is addressed through an empirical analysis based on two case studies in Brazil, comprising the leather-footwear local productive system of the Sinos Valley in the South of the country and the experience of Foxconn in the state of São Paulo. The paper argues that the literature on GVCs provides important contributions for the understanding of the new division of labour within global productive chains resulting from the diffusion of information and communications technologies and trade liberalization worldwide. However, from the normative point of view, the policy recommendations that emerge from the GVCs approach present important limitations and neglect the systemic and national dimension of innovation processes, as this approach emphasizes the insertion in global value chains as the main, if not only, form of "upgrading" for developing countries.

¹ A preliminary version of this paper was presented in the 13th Globelics Conference in Havana, Cuba, 23rd – 25th September 2015

Introduction

Over the last decades, two parallel and interconnected phenomena have resulted in a new scenario in which to consider the issues of economic development and competitiveness in the context of developing countries. Firstly, the innovation process became a key source of economic change and growth. As stressed by the national system of innovation (NSI) approach, it is now widely recognised that the capacity to generate, diffuse and use knowledge is a key process that depends on continuous interaction and feedback within and between firms and others institutions, including public policies that constitute the system (Lundvall, 1992). Secondly, the increasing liberalisation of trade and financial markets and the important developments in transport and communication technologies have brought profound changes in the organisation of production and innovation activities across nations and localities.

The increasing globalization of production in commodity markets, especially during the 1990s, has posed new challenges for developing countries. The need to compete with a growing range of producers in foreign markets has forced local producers in developing countries to integrate into global value chains during the 1990s. In this context, the Global Value Chain (GVC) approach has emerged as an useful analytical tool to understand the consequences and implications of these changes in the international organization of the productive chains.

Authors working the Global Value Chain approach have argued that these global chains, which are not rooted in national or regional territories, have become the main sphere for the organisation of productive and innovative processes (Gereffi, 1999; Dolan, Humphrey and Harris-Pascal, 1999). From a normative perspective, one of the main consequences of this assumption is that the access to knowledge provided by the activities of large multinational conglomerates governing global value chains could make the role of national innovation systems powerless (Ostry & Nelson, 1995). More important, is that in the last few years the GVC analysis has become increasingly used by international organizations, like the World Bank, World Trade Organization and Organization for Economic Co-operation and Development, among others (Gereffi, 2014). Moreover, the GVCs framework turned out to be used as an analytical tool for sustaining a policy agenda of liberal economic reforms (Dalle et al., 2013).

This point can be seen as a contradiction with the NSI policy recommendations focused on the strengthening of the local productive and innovative capabilities. Scholars associated with the innovation systems approach, particularly in Latin American countries², have shown that the simple integration in global value chains is not at all sufficient to foster firms to increase their innovative activities and their competitiveness. On the contrary, empirical studies based in the experience of local productive systems in developing countries have reassured the crucial importance of national industrial and technological policies aiming at promoting the capacity of local firms to acquire and use knowledge and to innovate (Cassiolato et al, 2003).

This paper is part of the research agenda of RedeSist³ in Brazil that analyses and understand the dynamics of innovation systems in Brazil and Latin America. It attempts to connect RedeSist's effort with a broader Globelics attempt of analysing systems of innovation in connection with a perspective of production chains in a global scale. Based on a conceptual framework that connects the National Systems Innovation perspective and the Latin American Structuralist School, this paper aims at discussing the implications emerging from the debate about the role of global value chains in promoting economic development in developing countries through the process of integration of local firms within these chains or through the attraction of a subsidiary of a multinational corporation. This preliminary and exploratory analysis is carried out through a comparative analysis between the conceptual framework of NSI and the approach on Global Value Chain in order to explore the main complementarities and differences between them. The main objective is to compare policy implications for developing countries emerging from the two approaches. This discussion is addressed through an empirical analysis based in two case studies in Brazil. The first is concerned with the leather-footwear local productive system of the Sinos Valley in the South of Brazil and the second is related to the experience of Foxconn in the locality of Jundiaí in the state of São Paulo. These two sectors were chosen in order to illustrate the impact that the engagement in global value chains may create for both high-tech and low-tech sectors.

² For a comprehensive analysis on the specificities of the National Systems of Innovation in the South, see Cassiolato et al (2003), Arocena, and Sutz (2000).

³ RedeSist is a research network focusing on Local Productive and Innovative Systems. It was set up in 1997 at the Economics Institute of the Federal University of Rio de Janeiro (IE-UFRJ), Brazil

The paper is organized as follows. The next section presents a comparative analysis between the Global Value Chain approach and the innovation system literature. By doing so, the section explores the main analytical and normative impacts emerging from these two strands of literature and addresses some of limitations problems of the GVC approach. The third section, presents the case studies based on the leather-footwear local productive system and on the experience of Foxconn in Brazil. This section is focused on the impacts that the integration in GVC have brought to local producers in terms of the development of technological capabilities. The fourth section discusses the policy implications of both the NSI and the GVC approaches and brings the main conclusions of the paper.

1 Global Value Chains x National Systems of Innovation: from analytical frameworks to policy implications

For a long time it has been recognized that production is a collective process, comprised by different, connected economic and social activities and organized by different organizations (Reinert, 1999). In the Renaissance economics debate, Antonio Serra already pointed out that the importance of the presence or absence of diverse linked occupations and economic activities in the explanation of the difference between the wealth and poverty between cities of the period (Reinert, 1995).

A transnational dimension of this intrinsic collective nature of production came with capitalism: “in the real world of historical capitalism, almost all commodity chains of any importance have traversed these state frontiers.” (Wallerstein 1983, p. 31).

However, as recognized by scholars of different theoretical backgrounds and ideologies the present financial-dominated present globalization, brought new characteristics to such process with the emergence of a pattern of global production characterized by dispersion of production with functional integration of economic activities (Dicken 2003, p. 12). Arguably, the GVC has been the most influential among these.

Among the different conceptual approaches that analyse these trends one could single out the Global Value Chain (GVC) (Gereffi, 1994), international production networks (Borras, Ernst and Haggard, 2000), global production systems (Milberg, 2008), and the French concept of *filière* developed in the late 1970s by French economists (Raikes et al, 2000, p.12). At the same time the NSI perspective became one of the dominating frameworks to analyses how production are organized in capitalist societies correctly emphasizing the key role of innovation (Freeman 1987; Lundvall, 1992).

This section draws on the contributions emerging from the global value chain analysis and from the innovation system literature in order to explore both their analytical and policy implications for developing countries. The comparison between the two approaches offers useful elements to shed light on the debate concerning the role that the integration of firms in developing countries on GVCs plays in fostering economic and technology development processes.

1.1 Global Value Chain approach: the main analytical issues

Important breakthroughs in the realm of information and communications technologies – especially supply-chain and logistics automation, computer-aided product and component design tools, and computer-controlled production equipment – have made integrated production networks like GVCs possible and increasingly common (Gereffi et al., 2001). This set of changes enabled the creation of a new international division of work widely influenced by the strategies of firms, which distribute stages of production geographically according to the cost of relevant productivity factors (labour, capital, technology, etc).

According to Gereffi (1999: 3), these chains may be seen as a set of inter organizational networks clustered around one commodity or product, linking firms in different regions and countries. In this respect, the analysis brings together an explicit international dimension of productive chains and the perception of governance modes within the chain as a key source of competitive advantage. The author also proposes a distinction according to the nature of the division of labor and capital intensity within commodity chains. Two main categories are considered: producer-driven and buyer-driven commodity chains.

“Producer-driven commodity chains are those in which large, usually transnational, manufacturers play the central roles in coordinating production networks (including their backward and forward linkage) (...) Buyer-driven commodity chains refer to those industries in which large retailers, marketers, and branded manufacturers play the pivotal roles in setting up decentralized production networks in a variety of exporting countries, typically located in the third world. Production is generally carried out by tiered networks of third world contractors that make finished goods for foreign buyers. The specifications are supplied by the large retailers or marketers that order the goods” (Gereffi, 1999:41-43).

The analysis of upgrading processes is central in the GVC approach but, unlike the NSI approach, it assumes that the knowledge required for this outcome flows within value chains. Concerning upgrading processes, particular attention has been given in the GVC analysis to the concept of “governance”, under which the literature explains the role of global lead firms in determining the upgrading opportunities of local producers. In short,

the upgrading processes are conditioned to the flow of knowledge within value chains, which in turn is conditioned by governance structures, defined by Gereffi (1999) as authority and power relationships that determine how financial, material, and human resources are allocated within a chain. That being said, the literature on GVCs refers to three types of upgrading: product, process and functional upgrading. The product upgrading is associated with moving into product lines with increased unit values; the process upgrading is associated with a more efficient transformation of inputs into outputs due to a re-organization of the production system or an introduction of a superior technology; finally, the functional upgrading is associated with acquiring new functions to increase the overall skill content of activities (Humphrey and Schmitz, 2002).

During the early 2000s a group of scholars affiliated to the Institute of Development Studies (IDS) at Sussex University took a decisive step in the articulation of the literature on industrial clusters in developing countries with the CGV approach⁴. The studies of industrial cluster in developing countries by Schmitz (1995), Humphrey and Schmitz (1996) and Schmitz (1999b), have made a major contribution to the analysis of inter-firm linkages and deliberate cooperation between local actors as a mean to improve competitive performance⁵. As the cluster literature has become increasingly concerned with the effects of globalization of product markets for upgrading strategies and long-term competitiveness of clusters, a new research agenda was defined as to improve the former conceptual framework. According to Schmitz and Nadvi (1999: 1510-11), a new major concern in the research agenda would be the role of external linkages in the upgrading strategies of local producers once the former emphasis on local linkages in the

⁴ Although we consider the cluster concept significantly limited in the understanding of local productive and innovative development, the authors that established a link between GVCs and cluster shed lights on important limitations of the former approach. In the case study of Sinos Valley presented in section 3.1, the concept of local productive system is used instead of the cluster notion. We believe that the definition of local productive system is a better notion to discuss the local dimension of the productive and innovative development and the links between these agglomerations with the international environment. For more detailed discussion on this point see Lastres and Cassiolato (2008).

⁵The basic idea that emerges from the collective efficiency concept is that local external economies, in the traditional Marshallian sense, are not enough to explain the cluster's development. Competitive advantages are derived not only from local external economies but also by a deliberated force - joint action (Schmitz, 1995).

industrial cluster literature has neglected the role of external actors like international buyers and/or suppliers.

Overall, the empirical studies on local productive systems in developing countries have shown that competitive pressures emerging from the globalization of production markets have forced many local producers to be integrated into global production networks (Vargas, 2001). As emphasized by Gereffi (1999), the engagement of local producers into these chains could offer a possibility for firms in developing countries to embark on a path of progressive upgrading through learning processes and new knowledge acquired from external buyers. Therefore, in the GVC approach the access to the chain's lead firms is seen as a necessary step for industrial upgrading because it puts firms and economies on potentially dynamic learning curves (Gereffi, 1999)⁶.

The critical analysis about the GVC approach provided by Schmitz, Humphrey, Nadvi and others scholars from IDS have added some interesting insights in the debate. According to Humphrey and Oeter (1999: 12), the GVC approach is limited in the analysis of local governance structures and local producers' upgrading possibilities. Firstly, the strong focus on the governance modes within the chain underestimates the role of other forms of governance, such as cooperation at local level, government regulation and international regulation. Secondly, studies on industrial clusters in developing countries have shown that although working for global buyers may help local producers to upgrade in the sphere of production, the same is not true in which concern upgrading beyond production; global firms can make it difficult for local producers to progress into marketing (Schmitz and Knorrington, 1999; Schmitz, 1999a). In other words, conflicts arise in issues of functional upgrading when cluster firms seek to move into an activity which the focal organizations of the global chain regards as one of its core competences. Therefore, the question of whether the power to affect the development of the production system lies in the hands of local or global actors has become a critical issue

⁶ The commodity chain perspective defines two paths to upgrading. The first is related to shifts in market niches through the production of goods that require higher value added per employee within the same range of activities. The second path of upgrading is achieved by extending producers' activities beyond production to activities like marketing and design (Humphrey and Oeter, 1999:13)

in explaining the innovative and competitive strategies adopted by firms⁷ (Schmitz and Knorringa, 1999).

In recent years, the Organization for Economic Cooperation and Development (OECD) and the World Trade Organization (WTO) provided a number of papers on the subject and built a joint database in order to measure the importance of global value chains in the world trade (Dalle et al., 2013). Other institutions as the United Nations Conference on Trade and Development, the World Bank and the International Labour Organization followed this trend. In despite of the relevance of the provided database, the studies mentioned above came to normative implications that are questionable. They argue that, in order to ensure economic development, governments should reduce trade tariffs and other trade barriers. Thus, firms that wish to settle in a particular country would import inputs at low costs and become more competitive in the global market. Nevertheless, one must question if the same policies that seek to attract transnational companies to a particular country are the policies that will ultimately foster economic development in it. The efficacy of this kind of policy will be discussed in session 3.2, where the case of Foxconn in Brazil is addressed.

In this sense, the use of the GVCs literature by the international agencies helped to diffuse policy prescriptions associated with the “Washington Consensus”, according to which developing countries should open their economies and only implement a set of “horizontal” policies – such as education, infrastructure, and macroeconomic stability – in order to catch-up (Gereffi, 2014). Nevertheless, the literature of NSI in developing countries offer important insights that goes in a different direction of the GVCs approach.

1.2 The Systems of Innovation approach: bringing back the local dimension of policy-making

It is from the 1980s on, with the debates surrounding the interpretation of the innovation process, that the perspective of innovation as a systemic and interactive process appears in the academic literature and in OECD policy documents, highlighting the importance

⁷ This issue will be discussed in section 3.1, when presenting the Sinos Valley local productive system case.

of firms' both formal and informal networks, and giving rise to the concept of the innovation system.

The systemic approach to innovation, built on the Neo-Schumpeterian and evolutionary theoretical framework, was developed with basis on empirical studies conducted in the sixties and seventies, which analyzed, under different perspectives, the characteristics and sources of the innovation process (Cassiolato and Lastres, 2005). In general, this approach seeks to understand how the various activities (internal and external to firms) and institutions (universities, research centers, etc.) involved in the innovation process contribute to and affect this process⁸. This interpretation of the innovation process enabled a more accurate understanding about how innovations are effectively created and disseminated in the economic system.

The broad approach⁹ of innovation systems considers that innovation does not occur independently in the firms, but rather within a system in which direct and/or indirect, formal and/or informal relationships are established between several institutions and organizations, including educational and research institutions, government and other firms. The macroeconomic environment in which they operate also affects these relationships. It is noteworthy that the systemic approach recognizes that innovation goes beyond the formal research and development activities, being the outcome of collective processes that involve firms interacting with each other and with the various public and private institutions (Cassiolato and Lastres, 2005).

More important for the scope of this paper, is that the systemic approach of the innovation process enables a new understanding of the role and importance of the innovation policy. This approach emphasizes the role of policies that directly and indirectly affect innovation as a key factor that influences other subsystems, thus helping to determine the innovative performance and capacity of firms. The state appears as a crucial actor in this perspective

⁸ The basic references for this approach are the collection of articles on technological change and economic theory (Dosi *et al*, 1988), the classic work by Freeman (1987) on Japan and the books on National Innovation Systems edited by Nelson (1993) and Lundvall (2007).

⁹ For a discussion on the differences between the broad view and the limited view of the innovation systems, see Lundvall (2007) and Cassiolato et al (2013).

for it has the ability to change the competitive environment, providing favorable conditions for innovative strategies of firms (Gadelha, 2001).

Therefore, and given the importance of policies within the innovation system approach, it is imperative to highlight one of the most relevant (and interesting) aspects of this perspective. It regards to the fact that the development of the interpretation on the innovation process occurs jointly with the development of the discussion about the most appropriate innovation policy to foster the innovative capacity of countries, regions, industries etc. So, for the innovation system approach, innovation policy designed to strengthen innovation systems are fundamental to foster economic development of the countries and regions. Moreover, for the NSI perspective, there is not a general recipe for innovation policy recipe. Each country, region or locality should develop and implement an innovation policy appropriated for its specificities and constraints.

Concerning the role of systems of innovation in developing countries, it is worth mentioning that most of the original work concerned with the study of systems of innovation has focused on the experience of industrialised and developed countries. Notwithstanding their importance in providing new elements to the systemic and interactive approaches to innovation processes, many of their assumptions may be challenged when focusing a developing country context as emphasized by some Latin-American scholars (Arocena and Sutz 2000, Cassiolato et al 2003). In this context, beside the reduced investment in R&D activities and the significance of the external flows of knowledge on the technological upgrade of the productive sector¹⁰, two other important features may be highlighted concerning the specificities of developing countries innovative activities¹¹. The first is the great instability that underlines the macroeconomic environment in developing countries. Problems such as high interest rates, high external debt or high rates of inflation have proved to be important constraints to technological development in these countries (Cassiolato and Lastres, 1999). Some authors suggest that

¹⁰ As emphasized by Cassiolato and Lastres (1999:7-8) “ Across the majority of technology importing firms of the region and over four decades from the 1950s to the 1980s, the acquisition of foreign technology was not part of a broader process of technologically dynamic industrial development. (...) These ‘ex-post’ patterns of limited dynamism in assimilating what had been imported were typically associated with only limited ‘ex-ante’ efforts to create the technological capabilities required for effectively exploiting international sources of technology in the first place.

¹¹ For a more extensive discussion, see Cassiolato and Lastres (1998, 1999), Arocena and Sutz (1999).

in the 80s and 90s, most of the firm's technological strategies in developing countries have been more affected by macroeconomic policies (which is called by Latin Americans authors implicit policies) than by specific innovation policies (explicit policies)¹². Macroeconomic instability and vulnerability can hinder learning processes and the creation and diffusion of innovations. The implicit policies related to macroeconomic variables in developing countries are of much greater importance than innovation policies (Cassiolato and Lastres, 2005).

The second remark concerns the instability of institutional frameworks supporting the innovative activities in developing countries. Many of the innovative efforts in developing countries still sustain a lack of interaction between the different actors that comprise their systems of innovation at different levels (local, regional or national) (Arocena and Sutz, 1999).

Finally, Cassiolato et al. (2000) also suggested that one of the most important specificities of national systems of innovation in developing countries, as compared to those in advanced countries, is the different role played by subsidiaries of multinational corporations as compared to local firms. Especially in Brazil, where the subsidiaries of multinational have been playing an important role in the industrialization process since the 1950s, their activities usually do not involve technology development (Cassiolato et al., 2013b). In general, the adaptation of technology to local conditions is a dominant form of activity performed by subsidiaries in Latin America and Africa. According to the Latin American literature on innovation system, this happens because for the subsidiaries of multinational to decide to develop more value added activities related to innovation in the host country, this country must have developed innovation competences in well structures innovation system.

1.3 GVCs x NSI: is there a possible meeting point?

The analysis of the GVC and the NSI approaches suggest that there are some important analytical issues that need to be further explored in order to explore the complementarities between these approaches.

¹² For a comprehensive discussion on the concept of implicit and explicit policies see Herrera (1995).

One of the major analytical issues proposed by the systems of innovation literature points to the central role of innovation and interactive learning as key inputs to foster processes of economic growth and structural change at local, regional and national levels. The articulation between the concept of innovation and economic development process dates back to the pioneering contribution of Schumpeter. In this sense, the NSI approach offers a useful analytical model to deal with the issues of economic and social development processes in developing countries. The NSI approach emphasizes the importance of several social actors in fostering innovation processes; focuses not only in economic matters but also on political, social and cultural issues and carries a normative weight (Arocena and Sutz, 2005). Moreover, the Schumpeterian conception that articulates the idea of innovation processes of structural change has led many scholars to explore the connections between the IS perspective and the Latin American Structuralism school in an attempt to specify its analytical and normative corollaries.

The rise of GVCs has created a new economic environment with uncertain consequences for developing countries. The literature on GVCs, however, faces difficulties in clarifying the implications of such productive paradigm for economic development. Frequently, the literature focuses on firm-level upgrading within value chains and leaves out further information about its contribution to development outcomes. In this sense, there is no way to establish an analytical link that explains the relationship between the upgrading process within individual firms and the economic development process within countries (Wood, 2001). So, without such analytical link, no causal relationship between these two events can be proven. This ‘fallacy of composition’, was previously emphasized by Lundvall et al (2015), and it is an important weak point in the global value chain analysis.

Similarly, in contrast to the innovation system approach, the GVC approach does not assign importance to the role of the State in helping firms with their upgrading strategies. On the contrary, one of the policy implications of this view is that the countries should implement free trade policies in order to get a better insertion on the global value chains. From the point of view of the GVCs approach, trade barriers tend to increase the costs of imported intermediary goods. So, to make part of those chains, the countries should reduce or even eliminate any kind of trade barrier in order to be more competitive in the world economy (Dalle et al., 2013). However, it is possible to say that this view, at least,

neglects of how local, regional or national institutions also affect and shape the upgrading opportunities for firms.

Local, regional and national features would condition different kinds of insertion of firms in the global value chains. As the studies about local productive systems has shown (Cassiolato et al., 2003), the local dynamics and characteristics inside different regions of Brazil may result in different types of insertion in the global economy. As stressed by the innovation system literature, the possibilities and forms of insertion of the local, regional or national systems on the global economy are completely different. Certainly, the GVC approach can benefit from such broad perspective.

The literature on GVCs as a whole equally fails to understand the process of upgrading as outcomes of processes of interactive learning. In the discussion of upgrading, the approach often emphasizes the importance of high-tech products and ignores the gains that arise from the learning processes that take place in low-tech sectors as well as in high-tech sectors (Peters, 2008). While the GVC approach focuses on upgrading processes that rely on mechanisms taking place inside value chains, the learning processes, which lead to technological upgrades, depend on a multitude of interfaces, and some of them are local.

Finally, as emphasized in the previous section, the GVC approach brings out questionable normative conclusions. By looking upon the insertion into value chains as the only way of providing technological learning and innovative capabilities for local productive agents in developing countries, the literature on GVCs significantly underestimates the fundamental role of industrial and technological policies in strengthening innovation systems at national, local and sectoral level. Moreover, in terms of policy implications, the GVCs framework suggests that reducing trade barriers and policies aimed at attracting subsidiaries of multinational firms become a better alternative to industrial policies focused on substituting imports and increasing local content (Sturgeon et al., 2013). The literature on innovation systems, on the other hand, provides important elements for the understanding of the capability building process within firms, industries and sectors in developing countries.

2 Case studies: upgrading restrains

This section presents two case studies, both located in Brazil, which aims at illustrating the policy implications of both the GVC and the SNI approaches. The case study on the leather footwear local productive system in the Sinos Valley describes the articulation of small and medium size shoe producers with global buyers and export markets. The analysis emphasizes the diverse strategies of local producers in improving their capabilities in strategic stages of the value chain and the role of global buyers in promoting or hampering learning and innovation processes at local level. The case of Foxconn in Brazil describes the effort on the Brazilian government to attract Foxconn operations to Jundiaí (in São Paulo state, and the impacts of such policies in promoting learning and innovation capabilities in the local electronic productive chain¹³.

2.1 The leather footwear local productive system in the Sinos Valley

The export-oriented footwear local productive system of Sinos Valley consists of an extensive set of actors that operate in different stages of the leather footwear value chain. The development trajectory of this system, since its origin in the second half of the 19th century until its entrance into the export market in the 1970s, has resulted in the setting up of a wide network of firms, business associations and other support organizations related to the footwear sector in the region of Sinos Valley. Nowadays, besides shoe producers, other firms operating at several stages of this productive chain such as subcontractors, tanneries, machinery and equipment suppliers, component producers, and export agents are located in the region. An impressive educational and technological infrastructure was also established. The relevance of this productive system in the local, regional and national socio-economic context is illustrated as much by its participation in the regional industrial product as by its insertion in the export market.

However, a significant stimulus for the consolidation of the footwear productive system in Sinos Valley happened during the 1970s. Between the late 1960s and the late 1980s this local productive system became one of the most important footwear export centers in the world as a result of the opening of new trading channels, especially those concerning

¹³ The analysis presented in this section builds on previous studies developed by the authors. For a discussion on the analytical and methodological issues concerning the case studies please see: Vargas and Alievi (2002), Vargas (2002), Szapiro et al (2014).

insertion in the US market. Over this period, the local footwear exports evolved from less than 20000 pairs to more than 150 million pairs per year (Vargas et al, 2003).

As emphasized by Schmitz (1999a), in addition to the exceptional conditions of demand in the international market and the ‘external agglomeration economies’ that allowed the improvement in competitiveness of the firms within the cluster, the ‘joint action’ efforts made by the local actors also constituted a crucial factor in making the subsequent trajectory of development of the cluster possible.

From the 1980s to the early 1990s, the competence emerging from low wage exporter countries in Asia allied to changes in product markets and the great instability underling the macroeconomic environment in Brazil have brought a major crisis to most of the footwear producers in the Sinos Valley region. This phase - described as the “tough phase” by Schmitz (1999a) - has required some drastic changes in the organization of productive process within and between firms. In addition, the challenges faced by local producers resulted in substantial changes in the relationships and co-operation schemes between shoe manufacturers and other actors in the local productive system.

Schmitz (1999a) emphasizes the impact of this gradual though continuous demise in the co-operative ties between different segments in the local productive system during the 1980s¹⁴. If in the 1970s the multilateral horizontal co-operation promoted by local support organizations was crucial to the opened up of external markets, from the 1980s the role of export agents – the main responsible for the linkages between local producers and global value chain - in the organization of productive and innovative activities had a considerable increase. As a result, the co-operative relationship between actors in the system has decreased substantially during the last decades. Even the professional trade fair for the shoe industry (FENAC), that use to play a major role in bringing together local producers and foreign buyers lost most of its strength to promote the interaction between actors within and outside the local productive system.

¹⁴ According to Schmitz (1999: 1642): “With the rise in shoe exports conflicts of interest became unavoidable: for example, shoe manufacturers wanted easier access to inputs and equipment from abroad while local suppliers fought against it; the needs of large shoe exporters differed from those producing from internal market”.

As emphasized by Vargas et al. (2002), the analysis of local producers' learning mechanisms revealed two different strategies used by the footwear firms and other productive segments for productive and technological upgrading. Such strategies also affected the position that different groups of local shoe manufacturers have reached in the export market. On the whole, local producers have shown a high degree of competence in activities related to the sphere of production. Nevertheless, Vargas et al (2002) also emphasizes difficulties faced by the firms in improving their capabilities in strategic stages of the productive chain, especially those related to marketing and design activities. Thus at one end of the scale there is a sizeable group of footwear firms with limited innovative capacity and a low tendency to develop interactive learning processes – either along the productive chain (involving suppliers, subcontractors, etc) or with other support organizations including the local technological and training infrastructure.

This manufacturers' group is engaged in Global Value Chains and competes on the external market in niches of low price shoes through strategies based on cost lowering and intensive use of subcontractors. Once these firms are subordinated to purchasing offices of large global buyers, they in fact reproduce the same sort of development strategy that allowed the consolidation of this productive system in the course of the 1970s, but which is now hindered by the new context of international competition.

At the other end, another set of shoe manufacturers have looked for a position in premium markets through strategies that involve design investment, productive improvement and opening up of new market niches. These firms have better innovative dynamics related to the implementation of learning mechanisms involving either local or external sources of knowledge. This second group of firms has reached a better insertion in the export marketplace through direct trading of shoes with own brands and designs. This phenomenon is not restricted to large firms, but involves also medium and small firms of the local productive system and reflects a shift in understanding by firms and other organizations within Sinos Valley of the new development path to be followed.

The gradual transformation in the competitive and innovative strategies of shoe manufacturers in Sinos Valley is also illustrated by the change in the export agents' profile and their role in the promotion of learning mechanisms in the production sphere. The significance of this group of actors –which has been crucial for local shoemakers to break into new markets during the 1970s and 1980s – has been gradually reduced as the

shoemakers adopted new strategies of insertion into that market. A relatively recent phenomenon regards the appearance of export agents working exclusively as purchasing offices of large global buyers such as Wal-Mart and Pay-Less. These offices are currently accountable for the greatest volume of individual orders placed in the local shoe firms – an average of 100000 pairs – and reflect a tendency regarding the predominance of large distribution nets in the international sphere.

Table 1 summarizes the main learning strategies undertaken by the actors making up the footwear productive segment. As can be seen from the table, such interactive learning strategies involve the use of internal and external information and knowledge sources. Assessment of the main learning mechanisms and major information and knowledge sources used by the actors allows exploration of the changing significance of local actors in the local productive system’s competitive and innovative capabilities.

Table 1: Interactive learning strategies in the leather-footwear productive system

Actor/sector	Information and knowledge internal source	Information and knowledge external sources	Type of learning strategies
Footwear firms working in niche market of higher quality and prices	Own capacity building in design and trading, local machinery and components manufacturers, national trade fairs	International competitors, foreign machinery manufacturers and international trade fairs	Active and based on both local and external information and knowledge sources
Footwear firms working in low-price markets	Large footwear firms of the local productive system	Export agents and purchasing offices of large global buyers	Passive and primarily based on external information and knowledge sources
Machinery and component suppliers	Local institutes of R&D and training, national trading fairs	International competitors, equipment at international fairs	Active and primarily based on external information and knowledge sources
Tanneries	Local institutes of R&D and training	Joint ventures with international competitors	Passive and based on local and external information and knowledge sources

Source: Vargas et al. (2002).

2.2 The case of Foxconn in Brazil

Foxconn is a subsidiary of Taiwan's multinational enterprise Hon Hai, which is the world's largest contract assembler, employing over one million people in total (Haslam, 2013). Foxconn is the assembler of choice of many information technology companies such as Nokia, Motorola and notably, Apple – it is reported that the company depends on Apple contracts for up to 50 percent of its revenues. Apple employs Foxconn to assemble the Apple iPhone and iPad range of products while Foxconn, in turn, is also located in a web of subcontractor relationships, sourcing components such as LCD displays from other suppliers including Sharp, LG and Japan Display.

Foxconn assumes a sub-contractor role in the referred global value chain and therefore, its position within the chain is highly subordinated to lead firms like Apple. While the latter controls design, purchasing, distribution and retail, Foxconn is uniquely responsible for the assembly. This division of work leaves the company in a vulnerable position. As a sub-contractor, Foxconn cannot lower the cost of external inputs or bypass the lead firm to reach retail, which narrows its power of maneuver in the production line and squeezes profit margins. Given that international competition is constantly forcing price erosion and given the dominance of lead technology firms, notably Apple, in terms of price setting, the pressure for cost reduction falls upon sub-contractor firms like Foxconn, which is induced to pass the burden of adjustment onto its workforce, which means reduce wage costs.

A study of Foxconn and Apple's accounting illustrates how international competition can have adverse effects on sub-contractor's profit margins and at the same time, spare lead firms from having their margins squeezed. Foxconn's operating margins — the proportion of revenues remaining after paying operating costs such as wages, raw materials and administrative expenses — declined from 3.7 percent in the first quarter of 2007 to a mere 1.5 percent in the third quarter of 2012, even as total revenues rose in the same period with the expansion of orders (Chan, 2013). By contrast, the study states that Apple's operating margins peaked at 39.3 percent in early 2012 from initial levels of 18.7 percent in 2007.

As mentioned before, in the face of international competition, power relationships within global value chains may create pressure points and compel sub-contractor firms to cut

wage costs, which leads to an important decline in labour conditions. As it has been portrayed by the media, labour conditions inside Foxconn is marked by harsh working conditions.

After a long period without implementing any industrial and innovation policy, from 2003 on we can observe the resumption of the industrial policy in Brazil, and innovation becomes a key variable for increasing the competitiveness of the economy. In this sense, incentives to innovation acquired growing relevance as a development strategy in the formulation of the industrial policy. Especially in the ICT industry, the Brazilian government adopted a set of instruments focused on some links in the electronic productive chain. One of the links that was contemplated in the industrial policy of the 2000s was the local production of LCD displays. It is important to note that the Brazilian Industrial Policy for the period from 2008 until 2011 (the Productive Development Policy - PDP) focused the information and communications sector, and targeted the local technological development and production of the displays and its components.

In this context, the Science, Technology and Innovation Ministry has played an important role in the articulation of efforts to attract the Taiwanese firm Foxconn to Brazil to produce the Apple equipment. Although Foxconn has been established in Brazil since 2005¹⁵, in 2011 the Ministry and the Brazilian's President started negotiating with the headquarters of Foxconn (Hon Hai) and offered important fiscal incentives to the company to start producing Apple equipment. More important than to produce Apple equipment, this initiative was inserted in the industrial policy (PDP) and the Brazilian government wanted Foxconn to establish a LCD display factory in Brazil which would be useful for the manufacture of tablets, cellphones and TVs. After a period of negotiation between the Brazilian government and the Taiwanese headquarters, Foxconn initiated its production of Apple equipments (iPhones, iPads) in Jundiaí (in São Paulo State).

During the process of negotiation, the Minister Aloizio Mercadante affirmed that Foxconn had plans to invest U\$ 12 billion in the construction of a production center of

¹⁵ Foxconn established its first subsidiary in Brazil in 2005 in the city of Manaus (Amazonas), which is responsible for the manufacture of cell phones and digital cameras. The assembly of cell phones was complemented by another subsidiary of Foxconn in Indaiatuba, in 2006. In 2007, the company opened its largest plant in the country in the city of Jundiaí, where began the manufacture of computers, laptops, netbooks and their motherboards.

LCD displays in Brazil. This promise wasn't fulfilled to the present moment and the odds are that it will not become a reality at least in the near future. It has been reported that negotiation talks were discontinued due to an impasse regarding the project funding model (Valor, October 11th, 2013).

Although the local production of the LCD display has not become a reality, one of the expected impacts of Foxconn production in Brazil was the reduction of the iPhone and iPad prices. In spite of the fact that the assembly of Apple's smartphones and tablets is currently taking place in Brazilian territory (among other countries), the prices of such products in the local market didn't change since Foxconn began its operations in Jundiaí. When the Brazilian government announced fiscal incentives for the local production of Apple equipments, it was estimated that this initiative would cheapen those products by 30%. However, to consumers' frustration, their values followed the price table of imported models. The comparison between the prices of iPhones and iPads sold in the Brazilian and in the North American markets show that the former are much higher (Valor, August 29th, 2012).

The efforts of the Brazilian Government to attract Foxconn operations to Brazil has been considered by Gereffi (2014) a successfully GVC-oriented industrial policy. The author believes that the effort to attract investment by firms like Foxconn provides a good insertion of the firm in the electronic global value chain headed by firms like Apple. Nevertheless, as has been discussed above, this policy initiative didn't generated any of the expected impacts: the local production didn't reduce the prices of the Apple equipment sold in Brazil and the desired local efforts to develop and produce LCD displays by Foxconn didn't happen. The main result of the implementation of the industrial policy based on the offer of a set of fiscal incentives and other facilities for the attraction of a subsidiary of a multinational corporation like Foxconn was the creation of 2.500 jobs, with low level of qualification.

Considering the model of functioning of the GVCs in which Foxconn is involved, it is difficult to believe that the local production of Apple equipment would mean more value-added in Brazil or even a clever insertion in the chain. As was mentioned in the beginning of this section, the relationship between Apple and Foxconn is evolving in the direction of reducing Foxconn's profit margin and increasing Apple's profit margin.

The discussion of this case and the interpretation given by Gereffi (2014) as if it was an example of an industrial policy focusing on increasing value-adding position in dynamic segments of GVCs is radically diverse from the interpretation that could be done by the NSI perspective. Considering the analytical tools and concepts of the latter approach, the case of Foxconn would show how limited and inefficient is this kind of policy strategy, which is based on the attraction of a multinational subsidiary, as this would automatically generate an internal virtuous cycle. The simple assembly of modern electronic equipment in the Brazilian territory doesn't mean that we have a better insertion in the correspondent CGV.

3 Final Remarks and Policy Implications

The debate on the impact of global value chains on technological learning and capability building processes within firms in developing countries brings out important implications for both conceptual and analytical points of view as well as for its normative dimension.

From the conceptual and analytical point of view, the literature on GVCs provides important contributions for the understanding of the nature of the division of labor and capital intensity within commodity chains. However, from the normative point of view, the policy recommendations that emerge from the GVC approach present important limitations and neglect the systemic and national dimension of innovation processes. In particular, the normative implications of this model point to the insertion in global value chains as the main, if not only, form of "upgrading" for developing countries. This insertion in the GVC can be done either through competitive domestic firms focused on the export market seeking to integrate GVCs in its noblest stages or through the attraction of local operations of subsidiaries of multinationals.

In fact, recent contributions about the policy recommendations emerging from the GVC framework have stressed the importance of the engaging of local producers in developing countries vis-à-vis the avoiding of protectionism practices by national or local governments. As it has been discussed in this paper, this approach is widely endorsed within organizations like the World Bank, WTO, OECD, among others. It also puts in opposite sides the power of multinational conglomerates in organizing and controlling productive and knowledge systems within the global value chains, and the role of innovation policies in promoting different paths of technological learning and capacity building in developing countries that host firms inserted in these chains.

The case studies presented in this paper provide some interesting insights concerning the dichotomy between the learning and capability building strategies emerging from the GVC and the systems of innovation approaches.

In the Sinos Valley local productive system, the analysis of footwear producers' learning trajectories revealed two different paths. One group of producers is mainly engaged in a Global Value Chain and competes on the external market in niches of low price shoes through strategies based on cost lowering and intensive use of subcontractors. These producers are subordinated to purchasing offices of large global buyers in USA and

Europe and have limited innovative capacity in design and marketing. This group of producer presents passive learning strategies and low tendency to develop interactive learning processes – either along the productive chain (involving suppliers, subcontractors, etc) or with other support organizations including the local technological and training infrastructure. Although this kind of competitive and innovative strategy have allowed local producers to access external markets in the past, it was hindered by the new context of international competition from China and other Asian countries. The other group of producers have target premium markets through strategies of building innovative capabilities in design and marketing, and opening up of new market niches. This group of firms have reached a better position insertion in the export marketplace through direct trading of shoes with own brands and designs. Governmental programs and local supporting agencies have played a major role in providing financial and technical support to local producers engaged in this second group.

In the case of Foxconn, the Brazilian government initiative was to attract a contract assembler to set facilities in Brazil and engage in the local technology development and production of displays. The case briefly presented in this paper showed that this kind of strategy doesn't work in developing countries. Contrary to the interpretation of authors linked to GVCs approach (Gereffi, 2014), this industrial and innovation policy didn't resulted in a better insertion on the electronic GVCs.

In both empirical cases presented, being the low technology Sinos Valley or the high technology Foxconn cases, the GVC approach gives a limited interpretation. It ignores the systemic dimension of innovation that puts strong emphasis on institutional, political and economic contexts as key elements in the analysis of the trajectories of capability building in companies, sectors and regions.

In this context, innovation policies should not only focus in better insertion on GVCs but, on the contrary, policy makers must take into account that to get a better place in the GVCs (which means upgrading in the value chain to more noble stages with increased domestically value added and more qualified jobs) implies on designing innovation policies focused on developing strong innovation systems and capabilities. This policy implication goes in the opposite direction of the one diffused by the international organizations that make use of the GVCs approach.

Finally, it is important to note the cases of developing countries known by the improvement of their position in the global division of labor related to technology development (Korea, Taiwan, China, for example). In the case of these countries that have been presenting virtuous insertion on GVCs, their success resulted from the adoption of structured industrial and innovation policies, aimed at strengthening their national innovation systems (Hiratuka, 2005). Local learning and innovative capabilities were the reasons that stimulated the setting up of production and technology development facilities of multinational firms in those countries. As we understand and the NSI perspective confirm, only when national innovation policies aimed at developing innovative and productive capabilities are adopted, the multinational firms develop more value added activities inside the country, which results in better insertion on GVCs. In the same direction, with strong innovation systems, national firms can develop local networks and capabilities that make possible for them to search for better opportunities of insertion on GVCs and even give the opportunity of establishing their own GVCs.

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