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PRODUÇÃO

An evaluation of the dissemination of manufacturing process improvement among small firms in local production systems

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Abstract

There is a growing yield in the literature on the main determinants of the competitiveness of small and medium enterprises. One important contribution in this way is the assumption that the clustering of firms can bring them strong benefits, also in terms of productive improvement. Based on these assumptions, this paper aims to exam the main effects of the clustering firms on the manufacturing process upgrading of small firms, by the analysis of the dissemination of manufacturing practices and tools in local systems. To this end, a survey with 42 small footwear producers was carried out at the local system of Franca, Brazil. The study investigated the existence of manufacturing process improvement among these firms and the main sources of information for the dissemination of these tools. The main results show that the clustering firms can stimulate the adoption of new manufacturing management practices, through both deliberate channels of dissemination of new knowledge among firms and the spontaneous ways of information exchange, which are usual in these local production systems. In addition, it was possible to notice that the level of appropriability of these benefits depends on the existence of previous knowledge inside firms, that is, their absorption capacity.

Keywords

Small firms. Operations management. Industrial clusters. Productive improvement.

1. Introduction

In recent years, many studies have been dedicated to matters related to determinants of competitiveness of small and medium-sized enterprises and their inclusion in production chain. This importance is stressed when discussed in developing countries, mainly due to the recognition of small firms' role as a key element for the social and economic development of a country or region, principally because of their potential to generate income and employment (SOUZA, 1995; LA ROVERE, 2001; ORGANIZATION..., 1997).

However, in spite of this important role, small and medium-sized enterprises face problems of varied natures, especially concerning their own condition of small scale, lack of financial resources and difficult access to credit; and also problems related to their internal organization and structure, which affect their performance, with notorious weakness in terms of management capabilities. As a result, they often ignore new technologies and management practices or the necessary tools that enable their effective implementation (ORGANIZATION..., 1997). In addition, production improvement technologies are usually followed by changes in the production system and in the organization of work, demanding new labor technical skills. Even after the company learns the benefits associated with the implantation of a given technology, there are still doubts regarding the most suitable adoption method so that such technology can be integrated to the company's specific operational environment.

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This shows that the implementation of new technologies by enterprises depend on learning processes, which will determine the absorptive capacity and apply the newly acquired knowledge and information (COHEN; LEVINTHAL, 1990). As a consequence, several studies have pointed that the internal structures of production management represented relevant obstacles to the adoption of new technologies, arising from the existing organizational deficiencies in their management structures. Many of these obstacles used to arise at the firms' level, once they are linked to their absorptive capacity (ORGANIZATION..., 1997).

An important contribution in this sense is that the clustering of firms can contribute to the production and technology improvement of producers, due to the advantages accrued from the formation of local systems of production – more commonly named in Brazil as LPAs (local production arrangements). Local systems propitiate an environment where a set of benefits is generated, enabling companies to yield better results than if they had been operating singly (MARSHALL, 1920; PORTER, 2000).

Following these premises, this paper has the purpose to evaluate the contribution of the industrial clustering to the production improvement of small and medium-sized enterprises, focusing on the acquisition of new capabilities that occur within the firms. To do this, 42 micro and small-sized enterprises were visited, in the local system of Franca, State of Sao Paulo, with the purpose to identify the dissemination of production management practices – which, in turn, was used as an important indicator of the occurrence of knowledge spillovers in the local system.

This effort is based on two main reasons. First, because despite the advantages of the clustering firms being widely recognized in the literature, there are few studies that state more specifically which of these mechanisms can contribute to improve the competitive development of local producers, especially with respect to their production improvement. Secondly, but not least, because one of the salient characteristics of small and medium-sized enterprises is their deficiencies in terms of management and technical and technological updating, mainly in the sectors of intense labor. Nevertheless, there is little experimental evidence on the potential of local dissemination mechanisms in propitiating modernization and the process of production improvement in this universe of companies in Brazil. And thence, in many aspects, this theme is yet to be studied.

2. The approach and dynamics of local production systems

Given the various approaches and concepts about the phenomenon of industrial clusters, which are taken according to the objectives of the several studies in the area, this research makes use of the local production arrangement concept, as pointed by Suzigan (2006). Besides the characterization of the economic sphere and the presence of political and social agents that have productive and institutional links among themselves, the proposed concept also considers other elements

> [...] a complex system is set up, where several subsystems operate, such as: production, logistics and distribution, commercialization, technological development (R&D, research laboratories, technological service centers), and where economic, social and institutional factors are tightly interconnected. (SUZIGAN, 2006, p. 14).

The proposed definition offers a more comprehensive conception of the industrial clustering phenomenon, besides the physical and economical dimension (the existence of firms producing final goods and services, suppliers of equipment and other inputs, support and correlated institutions, among others) it also comprises production operations, emphasizing the interactions between the several elements that make up the production system as a whole.

The advantages noticed in local production arrangements were innovatively pointed by Marshall (1920), through studies and experiments carried out in the English industrial districts in the nineteenth century. Marshall pointed out three main forces that explain the formation of agglomerations: first, the existence of concentrated labor with skills specific to the sector; second, the presence of specialized suppliers that guarantee low costs and easy access to products and services; and third, the occurrence of the so-called knowledge spillovers, resulting from the proximity between agents (SCHMITZ, 1997).

According to Marshall (1920), the combination of these three factors, coupled with the specialized production process and the proximity among agents, propitiates the appearance of positive externalities. Positive externalities represent efficiency gains related to the type of organization of the firms that are not within them, but indeed, in the external environment that comprises the producers' agglomeration. On this view, producers benefit from the proximity with others from the same field and of correlated sectors and activities. In addition, the local system also holds support institutions such as research and service rendering institutions and work associations that can

contribute to the development of qualified labor as well as to the dissemination of new knowledge and information.

In local production systems, the intense specialization of the economic agents enables a dense division of labor among firms that, in turn, allows for frequent interaction between local agents through productive and commercial relations. These processes result in an increase in the productivity of enterprises and of the system as a whole, besides gains obtained in the organizational sphere. This way, external economies are generated and intensified.

Another important contribution of Marshall's studies was the introduction of the concept of knowledge spillover. The interaction between producers of final goods and their suppliers, the mobility of workers throughout different firms and the monitoring of competing companies make technical-productive knowledge and information about the market available in the local production system. Marshall represents this phenomenon through the metaphor that knowledge of industry "are in the air" and the secrets cannot be kept for too long (MARSHALL, 1920). The industrial atmosphere referred by Marshall is a specific social and economic environment where the proximity between firms increases the speed of information flow and propitiates the dissemination of innovations (PORTER, 2000). Confirming these premises, experimental evidences point to the existence of a tight relation between geographic proximity, knowledge spillovers and firms' innovation, which identifies the existence of important relations between geography and innovation (AUDRETSCH; FELDMAN, 1996).

Interaction and learning result from the process of division of labor, where each enterprise is responsible for one activity or phase of the production process. Thus, the so-called cognitive division of labor (LOMBARDI, 2003) is able to establish a dense channel of relationships along the production chain, which enables the dissemination of knowledge and learning processes among companies. This occurs because user-producer relationships (of vertical nature) propitiate the sharing of experiences and benefits obtained through the incorporation of improvements and new technologies in the internal environment of enterprises (BELUSSI, 2005).

It is important to emphasize that, besides the dissemination of new knowledge through vertical interaction, there is also a horizontal process of knowledge transference and absorption, because the geographic proximity facilitates the observation of competing companies and favors the imitation or adaptation of solutions and new techniques adopted. Horizontal learning occurs because firms can monitor, compare and imitate solutions developed by their near competitors. Thus, the configuration of local production systems helps the creation and maintenance of local learning mechanisms, which develop in both horizontal and vertical dimensions (MASKELL, 2001).

In addition, the mobility of specialized labor among enterprises is also an important mechanism for the diffusion of technical and market knowledge. By virtue of the exploitation of collective synergies in local system environments, the benefits of innovation can be expanded to all producers, being difficult to be learned by external agents (BELUSSI, 2005). Technological changes are the easiest to be absorbed and, mainly, disseminated in internal environments of local systems. This occurs because technological knowledge is dispersed among a large number of different companies and institutions in the system and, at the same time, the new knowledge and information generated by each of these parts get disseminated through informal information mechanisms where low transaction costs are observed (ANTONELLI, 2000).

From the foregoing, it can be noticed that the literature on local production systems points out that a key element for the competitiveness and technological development of enterprises lies on the relations among them and, therefore, within the system. This perception becomes even more evident when the factors that formed the basis of these studies are analyzed, for example, social capital, mutual trust and confidence, division and specialization of labor between companies, and the concept of cooperation itself, which hold inter-organizational characteristics.

In addition to this systemic analysis, the incorporation of approaches on the development of capabilities within the companies become necessary, highlighting how this process can be driven by the agglomeration of enterprises in order to take advantages of the benefits therewith associated.

3. Methodological procedures

As noted before, the main purpose of this paper is to analyze the contribution of the clustering firm to the productive improvement of local small firms, through the assessment of the process of new knowledge dissemination in the environment of local production system and through the identification of similar production management practices among the local fims. To this end, between September and October 2008, 42 enterprises (20 micro and 22 small-sized) from the footwear local system of Franca were visited. These enterprises were chosen randomly according to a list of firms provided by local institutions. Visits

and interviews proceeded until the number of 42 enterprises was reached - amount considered enough for the accomplishment of the proposed objectives.

At the visited firms, interviews were conducted directly with the owners, who were queried on two main topics. The first topic was related to the adoption of new techniques and practices of production management in recent years, aiming to learn the existing processes and used tools in the firms. In this sense, the entrepreneurs were asked whether they had developed or adopted any new practice or tool in production management in the past 3 years. The second topic of the questionnaire involved questions about interaction with other firms or suppliers from the local system and also about cooperation activities and projects. Thus, the entrepreneurs were asked what the sources were for the development and implementation of this new practice or technique of production management – this enabled the identification of the main knowledge and information sources for production development.

The data collected in each firm were organized and compared in order to identify which practices were the most disseminated in the local system. The identified similar practices were more deeply investigated to characterize their dissemination process throughout the local firms. After that, the dissemination mechanisms of practices and spillovers were analyzed in order to identify the main modernization sources of the local firms.

According to Schmitz (1997), dissemination mechanisms were classified in two main types: i) voluntary/deliberate – when fims played an active role in the dissemination processes, through cooperation activities, participation in projects and contacts with other companies or institutions; or ii) involuntary/ incidental – when the dissemination process occurred without the active participation of the firms, that is, when the dissemination occurred with no effort of the company at all.

Thus, it was possible to understand more accurately through which mechanisms these enterprises acquired new capabilities and to what point they were related to the presence in the local production system. Such analytical procedure allowed for the understanding of the processes and mechanisms of knowledge transference acquired within the local system.

4. Analysis of the dissemination mechanisms in the local production arrangement of Franca

Interviews carried out in the firms indicated that, in general, they had quite similar production structures, as well as similar production management. Thus, it was observed that there were many production management practices in common, mainly in the past two years. These coincident practices, whose adoption was more frequent among the enterprises of the local system, were grouped in three main areas:

- Production control and planning practices;
- Financial administration and costs practices; and
- Improvement of productive flow and layout practices.

As noted before, the analysis of data for each of these groups was performed based on two main items: 1) description of the existing practices in the firms where the interviews were conducted; 2) identification of the mechanisms that enabled the dissemination of these practices.

4.1. *Production control and planning practices*

In this area, there was a high incidence of similar practices among the analyzed firms. The coincident practices ranged from the simplest, like the implementation of a manual system for the control of inputs and outputs of raw material inventory and the use of manual forms for the accompanying of production phases; until the more complex, such as the installation of a software for Production Control and Planning or the integration of an existing system with other management areas and the use of bar code system.

In general, it could be noticed that the adoption of practices related to the Production Control and Planning area followed a standard sequence, what reflected a gradual evolution of the used tools. In the firms that did not have software for Production Control and Planning, the first step was the formalization of data using manual or computerized spreadsheets. However, in firms that already had mixed systems, the second step was the purchase of simple software for Production Control and Planning for the storage and control of information regarding manufacturing activities. Over time, data were being collected more frequently and the enterprises started to look for systems that were more complex or sought the integration of the existing system with other areas of the firm, such as planning, sales and finance.

In enterprises that already had integrated Production Control and Planning systems, the next step was to feed the computerization aiming to quicken data collection on production and guarantee greater reliability of the data generated by the system. To do this, firms installed computers at shop floor level and reading systems of production sheets through bar code.

In this group of practices, two main dissemination mechanisms were identified, based on the classification proposed by Maskell (2001): 1) "horizontal" dissemination, through the informal contact with entrepreneurs and managers from other local footwear producers; and 2) "vertical" dissemination, through local specialized suppliers that sales and provide maintenance of Production Control and Planning software.

The data revealed that these two dissemination mechanisms were related to different phases of implementation of practices. In firms that adopted simpler practices, related to the initial phases of the development process in the Production Control and Planning area, the main motivation for the implantation was the observation of other neighbor enterprises or the reference of owner friends or employees from other companies, indicating the predominance of horizontal dissemination. In addition, in firms that already had stable relations with other footwear producers, the transference occurred in a more direct way, showing the presence of voluntary dissemination mechanisms. In one of the interviewed firm, for instance, the new computerized spreadsheet for inventory control was adapted from a version made available by a neighbor producer.

On the other hand, in the cases where there were no open relations with other companies, the transference occurred in a subtler way, for example, through informal contacts between the manager of the firms with employees and managers from other companies, indicating a predominance of involuntary dissemination mechanisms. In firms that adopted Production Control and Planning practices that were more advanced, the main dissemination mechanism was generated by the commercial contact with specialized suppliers in Production Control and Planning software. When questioned about the motivation for the improvement of the existing system, the interviewed entrepreneurs stated that it was a "natural evolution" resulting from the use of the software itself.

However, the interviews showed that all improvements were implemented with the help of software suppliers, who were also responsible for maintenance. This verification indicated that the main dissemination mechanism of these practices were voluntary. The explanation for this trend is that the implementation of more advanced Production Control and Planning practices demanded quite specific technical knowledge, what may have been interpreted as a barrier to horizontal dissemination. Moreover, there is the fact that the implementation of these practices represented a commercial goal for software suppliers, what increased the efforts to motivate their adoption by client companies.

4.2. *Financial administration and costs practices*

In the area of financial administration and cost control, the main practice identified regards formation of product cost, activity that was considered of great importance for competitiveness by the small enterprises surveyed.

In the past two years, the enterprises adopted improvements in this area through four main actions: 1) knowledge of all factors that must be calculated in the spreadsheet; 2) modification of the used method; 3) use of manual or electronic spreadsheet; and 4) updating of the spreadsheet contents. In all these cases, the dissemination happened through horizontal and voluntary mechanisms, represented by the contacts with other firms' entrepreneurs. It was observed that formation of product cost was a topic that the businesspersons from small enterprises worried about and often discussed.

The entrepreneurs pointed the practice of prospecting together with other footwear producers the most adequate spreadsheet for their internal procedures. Nevertheless, some enterprises have failed to use the spreadsheet granted by the other producer because they did not understand all the elements that comprised it and that were used in its elaboration. This case illustrates the importance of the firm's absorptive capacity in receiving knowledge made available by the existing dissemination mechanisms. In addition, as these practices are embedded in the routine of each enterprise, they are characterized by tacit and specific knowledge, which hampers their transference to other production structures, even being very similar.

4.3. *Improvement of production flow and layout practices*

The practices implemented in the area of production flow and layout represent the efforts in incremental and continuous improvement by companies. Consequently, it was not possible to identify any adoption standards of these practices, since there was wide variation of actions and solutions used by the firms. Yet, the survey showed that the practices introduced in this area played a fundamental role in the production improvement process of small enterprises, once the changes undertaken caused an increase in productivity without, however, demanding considerable investment.

In general, these practices were related to four main actions: 1) changes of layout; 2) modification in the production sequence; 3) introduction or elimination of phases in the manufacturing process; and 4) improvement of the run mode of tasks.

The changes of layout were carried out based on the adaptation of machinery and equipment or on the simple change in the positioning of manufacturing phases. Such practices were even more important for the firms that manufactured a wide range of products, once the manufacturing demanded new configurations in the physical layout or even the purchase of new machinery, which involved constant layout changes and the reconfiguration of production flow. The modification actions of manufacturing phases involved the reassessment of production flow. Practices of this sort were related to the assembly phase, whose task sequence was modified in order to avoid waste of time and material. The same was true for practices intended to improve the run mode of production tasks. The interviews showed that most of production improvement resulted from the discovery of simpler ways to complete the same tasks – many times with significant gains of productivity.

In all these cases, the most significant dissemination processes happened through horizontal interaction, which occurred due to a combination of voluntary and involuntary mechanisms. In some firms, most of the practices were introduced by staff coming from other local companies - usually larger, which characterizes an incidental mechanism of dissemination of new knowledge, once the transference did not depend on deliberate integration actions between these enterprises. These employees brought important knowledge that began to be applied in the small firms. This phenomenon is convergent with the literature that points out that the mobility of workers is one of the ways that local knowledge spills over.

Besides the employees, these practices were also disseminated by the contact between firms' owners, who called upon their colleagues to get help for the solution of problems with production processes. In these situations, frequent visits to the shop floor level of other firms were paid, what, consequently, was restricted to the more welcoming companies of the local system that held frequent relations with the other producers, characterizing, though, a dissemination process by voluntary actions.

5. Main modernization sources of local system enterprises

Based on the analysis of the dissemination mechanisms of practices in the three previously presented areas, it was possible to identify the main improvement sources that enabled the adoption of new production management practices in the firmsand, therefore, contributed to their productive improvement. In general, the survey identified two main modernization sources in local production system of Franca, as follows: 1) technical learning and 2) interaction with specialized suppliers.

The first improvement source identified regards technical learning, provided by voluntary interaction among firms that searched to solve technical manufacturing problems. These interactions occurred: 1) among entrepreneurs; 2) between entrepreneurs and other firms' staff; or 3) among employees of different firms.

Technical learning was identified as an important source of improvement concerning manufacturing flow and layout practices. In the research, it was verified that the common basis of technical knowledge in local firms enabled the exchange of ideas and the joint search, which, in turn, generated new knowledge that resulted in the adoption of new practices. The surveys conducted in the local firms asked about their interaction with other local competing enterprises, concerning the exchange of ideas and information, and the solving of problems. For the affirmative answers, the interviewees were asked to identify which other firms they kept closer contact. These data allowed for the construction of an interaction network comprised by the local firms.

The results are displayed in Figure 1, where the large amount of isolated vertices represent firms that did not have any sort of voluntary interaction with other companies, with the specific purpose of exchanging ideas and resolving problems. These data are in agreement with the results verified in other studies, which demonstrated a small occurrence of cooperation and interactive relationships within the local system of Franca, where the climate of mistrust, created from several unsuccessful interaction experiences, curbs the development of more intense cooperative actions (SUZIGAN et al., 2001; GARCIA; MOTTA; AMATO NETO, 2004).

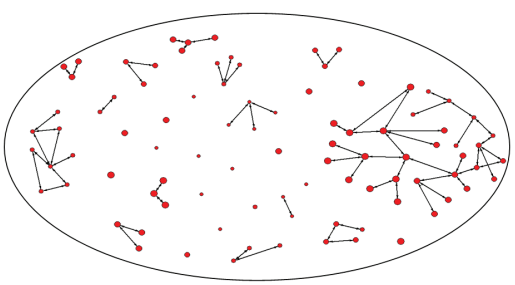

Figure 1. Graph showing the interaction network of enterprises in the local system. Source: Elaborated based on data collected in the field research.

In general, Figure 1 shows a highly concentrated interaction standard, which points to the existence of small groups of firms that interact with each other. Consequently, the voluntary interactions among local firms used to occur in a very selective way and were restricted to small groups.

In addition, Figure 1 also identifies two main groups of firms that frequently interacted with each other. The first group, located on the extreme right of the figure, corresponds to a group predominantly constituted of small enterprises, which were quite dynamic and participative within the local system. One common point among these firms is that they all took part in a joint initiative coordinated by SEBRAE's office in Franca or had already taken part in some support program offered by local institutions.

It was found, thereby, that those firms that were more welcoming and active and that were involved in a growth path, tended to approximate the local training programs more easily, what enriched their in-house learning processes. At the same time, it was noticed that, due to the existence of the positive feedbacks, the frequent contact with other firms enhanced the new acquired knowledge through technical learning, which in turn, enabled the absorption of new capabilities.

The second group of interactive enterprises, which can be seen on the far left of Figure 1, was predominantly formed by small-sized companies that had in common the fact of being engaged in internal projects of production improvement and development of new products. These enterprises frequently exchanged information in these areas through visits and informal conversation. Nevertheless, the interviews demonstrated that, in this second group, the interactions were more valorized by the smaller firms, for which the contact with the larger and more advanced companies was of great importance for the implementation of new practices and manufacturing management techniques in recent years. In both cases, it was observed that ties of friendship, socio-cultural factors, geographic proximity and, sometimes, kinship between the owners were determining factors to the formation of the interaction groups. In addition to the solution of technical manufacturing problems, firms from both groups also exchanged ideas on market trends.

On the other hand, it is important to notice that, despite the fact that technical learning be restricted to small groups of firms, the study identified the presence of very similar practices both in the isolated companies and in the firms belonging to different groups. This apparent contradiction can be explained by the existence of horizontal dissemination mechanisms that hindered the action of the firms and, therefore, were involuntary. As already mentioned, these involuntary mechanisms were manifested mainly in two ways: 1) mobility of staff and 2) observation and imitation of competing firms, not necessarily having direct contact with them.

These involuntary dissemination mechanisms enabled practices resulting from the technical learning process, arising from the interaction among the clustered firms, to be disseminated in a more homogeneous way, reaching the other local enterprises. In these cases, it is important to emphasize that this type of dissemination was made possible due to the proximity of the practices compared to the knowledge basis in the local system. This result is convergent with the existence of a local knowledge system, which was referred by Maskell (2001). This knowledge system, which constitutes one of the competitiveness bases of clustered firms, superimposes what the author called production system.

Suppliers were another important source of improvement; they contributed to the implementation of advanced manufacturing management practices, especially in the quality control area. Two main practices introduced in firms as a result of the interaction with suppliers were identified: 1) control of defects in the process and 2) use of water-based glue. In these cases, it was verified that the practice of service provision by suppliers, associated with products sales, was an important element to boost the adoption of these new practices. However, the knowledge complexity involved demanded commitment and active participation of the enterprises so that the implementation of the practices introduced by suppliers was successful. That was necessary because those practices involved inedited knowledge to the enterprises that were not directly related to the existing knowledge basis of the local system. This is the specific case of the water-based glue usage, once the technical superiority of this kind of adhesive compared to the solvent-based glue, made it imperative to adopt this new technology. However, to this end, the enterprises had to promote changes in their production processes, activity where the participation of suppliers was fundamental.

The analysis of the interaction of the firms with their suppliers indicated that the vertical interaction was an important source of improvement for the local producers. In the interviews, the enterprises were asked to point out the main suppliers (including all types of materials and services) that they kept frequent contact for the exchanging of ideas and searching of technical solutions. The results can be seen in Figure 2.

Figure 2 shows that suppliers would interact with a large amount of enterprises, which had the effect to boost the dissemination mechanisms of the

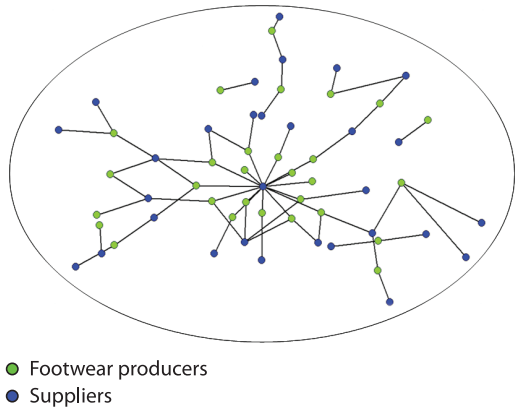

Figure 2. Graph of the the interaction network between local enterprises and suppliers. Source: Elaborated based on data collected in the field research.

improvements introduced in the client firms. In most cases, the same technical solutions were offered to different enterprises. Figure 2 also shows that the majority of relations was concentrated in a single supplier, represented by the adhesive and sealant (glue) supplying company of the 'Amazonas' group, holding that controls several local enterprises that operate in several input segments for footwear producers and it is an important supplier of components for the local producers.

These results confirmed the analysis of the dissemination standard of management practices in the local system, once the practices most disseminated by suppliers were those related to footwear gluing process. Thus, it was observed that the "Amazonas" firm acted as an important source of improvement for the small local companies, which contributed to the dissemination of new production management practices. On this point, it could be verified that , for the company belonging to the 'Amazonas' group, the provision of services was used as an important tool in the competitive process, once it linked the services with the selling of its products. Actually, the interviews confirmed that this market operation strategy had positive effects, once the firms kept long and stable relations with most of its users.

In general, the analyses of the improvement sources of the local system and the local knowledge spillovers, which enabled the dissemination of these improvements through new production management practices, demonstrated the existence of different dissemination standards. These differences will be discussed in the next section, with the purpose of emphasizing their role as one of the main contributions to the production arrangement for the production improvement process of the local small enterprises.

6. Assessment of the arrangement contribution to the production improvement of the local small enterprises

The analysis of the data collected in the field research showed an important occurrence of local knowledge spillovers, which were identified through similar production management practices among the local firms. As previously mentioned, these spillovers occurred through different dissemination mechanisms and were related to practice groups or 'families'.

The study of the internal knowledge process, which enabled the adoption of new practices by the producers, allowed to detect the origin of knowledge that motivated the firms' manufacturing improvement, resulting in the identification of the main improvement sources of the local system. The data revealed the existence of a tight relationship between (1) the improvement sources of the local system; (2) the practices adopted by the firms; and (3) the predominant dissemination mechanisms. These correlations are displayed in Chart 1.

Chart 1 shows that the nature of the dissemination processes in the local system was determined by the knowledge (practices) characteristics transferred: the more the practices transferred were close to the knowledge basis of the local firms the simpler were the dissemination processes (use of horizontal and involuntary mechanisms). The opposite is also true: the more the knowledge transferred held off the knowledge basis of the local companies the more complex were the dissemination mechanisms used.

Consequently, the technical learning was responsible for improvements related to incremental nature practices. These practices involved technical aspects that approached the local knowledge basis and, hence, were easier to be disseminated. This explains the predominance of involuntary dissemination mechanisms in this group. On the other hand, more advanced practices introduced in the enterprises, mainly through suppliers, had high technical content that was not part of the knowledge common basis of the local system. As a result, most of the enterprises proved to have limited absorptive capacity for this group of more advanced practices.

In these cases, the dissemination processes demanded, necessarily, the creation of deliberate mechanisms of new knowledge dissemination among producers, what, for this reason, demanded a longer period of construction and interaction of relations among agents. On the other hand, these interactions lasted longer and were characterized by more complex contents, which brought results that were more expressive for the implementation process of these

Chart 1. Classification of modernization sources of the local system.

Modernization source	Characteristics of the practices introduced in the enterprises	Predominant dissemination mechanism
Technical learning	Simpler, of incremental nature	Involuntary horizontal dissemination
Suppliers	More complex, involving significant changes in the enterprises	Voluntary vertical dissemination

Source: Elaborated based on data collected in the field research.

practices in firms. This is the typical case of interactions between producers and their suppliers, especially in the case of adhesive suppliers. Interestingly, unlike the results obtained in the research by Silva (2007), who identified the importance of the user-producer relation to the footwear machinery industry, no relevant role played by equipment and machinery suppliers was identified. The main reason for that may be in the profile of the enterprises that made up the research sampling that originated this study - basically formed by small-sized firms. These enterprises, in general, acquire only secondhand-refurbished machinery and, therefore, cannot benefit from more expressive interactions with machinery suppliers.

These findings indicate the existence of barriers to complex knowledge dissemination related to more advanced production management practices. Such statement is convergent with the results found by Giuliani and Bell (2005), who demonstrated that the knowledge dissemination process in local production systems occurs in a selective and non-homogeneous way, according to the firms' absorptive capacity. The authors pointed that the practices that demanded more complex knowledge and were not part of the knowledge common basis of the local system were disseminated only among a selective group of enterprises with greater absorptive capacity.

These results helped to explain the differences between the dissemination standards of the main improvement sources shown in Chart 1, since the variation of the dissemination mechanisms was determined by the knowledge basis existing in the local firms. Such considerations enhance the important role of enterprises' internal capabilities on the process of benefit appropriation provided by the agglomeration of producers.

7. Final considerations

One of the most important theoretical conceptual assumptions for the analysis of local production systems is that localized firms, especially the small and medium-sized enterprises, are able to acquire new capabilities through the access to local external sources of information and knowledge. From this premise, this paper analyzed the influence of new knowledge dissemination mechanisms in small firms located in local production systems. In this way, an information survey was carried out with a group of small footwear producers in the local system of Franca, where two main questions were asked: whether the enterprises had adopted any improvement in their processes of production and production management and which had been the sources of these improvements.

In convergence with conceptual assumptions, the study was able to verify that, in general, the firms' in-house learning processes were enhanced by local mechanisms of information and new knowledge dissemination, so that this new knowledge necessary for the implementation of new production management practices was more exploited among the local companies. Among the main mechanisms, there were some of purely incidental nature, related with ways of interaction typically seen in local production systems, and other deliberate mechanisms, created through the establishment and maintenance of expressive and frequent interaction between agents.

At the same time, it was found that the benefits of clustering firms, which are expressed through local external economies generated in these industrial structures, can be better exploited by the enterprises, the greater their absorption capacities to this new knowledge. The presence of strong capabilities among local firms is able to motivate the maintenance of more substantive interactions between the agents, with positive effects for the accumulation of new knowledge.

In general, it was observed that the knowledge dissemination processes that developed within the local production systems held great importance for the learning and transference of new capabilities. In this environment, the new practices introduced in some firms could be quickly disseminated to the group of producers, boosting the improvement process of the local system as a whole. On the other hand, the enterprises that had greater capabilities presented greater absorptive capacity, what makes the benefits of clustering be unevenly appropriated, demonstrating that these advantages can be better exploited by companies with greater absorption capacity.

This has important implications on public policies for local production systems, and especially on small enterprises, which are typically found in these local productive structures. Support programs focused on the competitive development of small enterprises in local production arrangements must necessarily involve creation and reinforcement mechanisms of the internal capabilities of producers, once that they can boost the appropriation of the benefits generated by the clustering of firms.

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