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# Knowledge transfer among the small businesses of a Brazilian cluster

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ABSTRACT

This study verifies how knowledge is transferred among small businesses operating in industrial clusters, how this competitive resource circulates and is accessed within the cluster. Interfirm cooperation, industrial support institutions, workforce mobility and social ties, concepts highlighted in the literature as dimensions of the knowledge transfer process, were used to structure the survey instrument, which was applied in the cluster that leads Brazilian furniture exports. Questionnaire responses were received from 198 firms and submitted to factor analysis. Conclusions and theoretical contributions of the study are that: (i) the knowledge transfer process is multi-dimensional; (ii) knowledge transfer can occur in clusters even in the absence of interfirm cooperation; (iii) the dimensions of the process can be combined in various ways to facilitate knowledge transfer; (iv) this combination may differ from cluster to cluster; and (v) producers are more likely than suppliers to perceive and access knowledge available in the cluster.



## 1. Introduction

When Marshall (1925–1985) highlighted the existence of clusters in firms and defended their importance as a means to increase the productive efficiency of companies, he initiated a debate about the advantages accruing to a firm established in a region surrounded by its competitors. Such efficiency, in the view of Krugman and Obstfeld (2001), results from the economic externalities to be obtained from the existence of specialized suppliers, access to a common labor market, and access to information.

In the discussion of industrial agglomerations, the use of a variety of different terms can be observed in the literature consulted, including 'poles', 'clusters' and 'networks', each of which has a slightly different meaning. In this study, we use the term cluster—a notion introduced by Marshall (1925–1985)— meaning a number of firms located within a given, delimited geographical region that are complementary in terms of their production processes.

The specific focus of this study is on how knowledge is transferred within clusters. For the purposes of the study, it is assumed that knowledge is an economic externality in clusters, as postulated in the economic literature (see, for example, Krugman & Obstfeld, 2001), and an essential resource for obtaining competitive advantage, as postulated in the strategic management literature (see, for example, Conner & Prahalad, 1996).

When Marshall (1925–1985), in perhaps the first mention of within-cluster knowledge, wrote that in a cluster knowledge hovers in the air, he was referring to the fact that people who work in firms located in a cluster possess knowledge that facilitates opening new businesses related to those already existing in the cluster. More recent authors, such as Asheim and Isaksen (2002) and Malmberg and Power (2005), also write about within-cluster knowledge, but in broader sense that includes technological knowledge, the knowledge embedded in products and processes. This suggests the existence of a variety of within-cluster knowledges.

In addition, it has been argued that cluster arrangements present characteristics that generate advantages for agglomerated firms other than knowledge, such as cooperation and trust (Dei Ottati, 1994; Digiovanna, 1996; Lazerson & Lorenzoni, 1999), and knowledge transfer (Asheim & Isaksen, 2002); and Zeng (2006) suggests that the cooperation and trust developed within clusters are related to within-cluster knowledge transfer.

In general, research on the process of within-cluster knowledge transfer suggests that it involves four dimensions: cooperative relationships among the agglomerated firms; relations with local support institutions, workforce mobility, and relationships external to the cluster (Asheim & Isaksen, 2002; Benton, 1993; Brusco, 1993; Malmberg & Power, 2005; Meyer-Stamer, 1998; Schmitz, 1993; Zeng, 2006). More recently, Hoffmann, Bandeira-de-Mello, and Molina-Morales (2011) modeled the associations between interfirm relationships, workforce mobility, and the existence of support institutions, concluding that these three elements constitute dimensions of the within-cluster knowledge transfer process. Of the dimensions identified in these previous studies, that of extra-cluster relationships was not considered to be of direct relevance to within-cluster knowledge transfer and was excluded from our study.

Although these previous studies have pointed to knowledge as a competitive resource available to firms installed in clusters (Asheim &

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Isaksen, 2002; Malmberg & Power, 2005), they do not deal with whether it is equally accessed by all firms. A study by Molina-Morales (1999), in Spain, addressing this question, found that producers and suppliers enjoy equal access to this resource and, as a consequence, experience similar levels of performance. However, unlike our study, none of this previous research, including that of Molina-Morales (1999), specifically examines how knowledge is transferred among different types of small businesses, *e.g.* producers and suppliers, operating in industrial agglomerations. With the objective of verifying, in a different context than previously studied, how this economic externality/competitive resource circulates and is accessed within a cluster by different types of firms, we chose to study the furniture-manufacturing cluster located in São Bento do Sul, in the state of Santa Catarina in the south of Brazil.

The Brazilian furniture industry has industrial parks in all units of the Brazilian federation, although there is greater concentration in the southern region of the country and in the southeastern states of São Paulo and Minas Gerais. The furniture industry of the state of Santa Catarina employs the third largest labor force of this type in the country, and the firms, in general, are small enterprises having little vertical integration. The furniture industry of São Bento do Sul responds for more than 40% of the local economy, and its output represents the major share of Brazilian furniture exports (ABDI, UNICAMP, 2008), permitting the inference that this industrial agglomeration is internationally competitive.

In São Bento do Sul, the production process is organized in a complementary manner. In other words, each small firm carries out one or a few stages of the production activities that are part of the cluster's total production process. This way of organizing production is similar to models observed in the regions of Modena and Reggio in Italy (Brusco, 1993), and in the region of Baden-Württemberg in Germany (Schmitz, 1993), where small firms also divide the stages of production within the context of the cluster, each one specializing in a reduced number of procedures. In view of these characteristics, including the international competitiveness mentioned, we considered the São Bento do Sul cluster to be an appropriate venue for investigating the questions of interest.

This article is structured as follows: in the next section, we discuss the theoretical framework of the study. We then present the methods used for collecting and analyzing the data, the results, discussion and conclusions of the study.

## 2. Theoretical framework

The principal concepts informing the theoretical framework of the study are those related to the process of knowledge transfer. In this study, as previously mentioned, knowledge is considered as an externality and as a strategic resource available within clusters.

### *2.1. Relationships among firms*

As mentioned above, literature on the subject of knowledge transfer points to a number of possible dimensions to the process of within-cluster knowledge transfer. The discussion that follows is centered on the dimensions that served as the basis for elaboration of the survey instrument used in our study and on possible supplier/producer differences with respect to the knowledge transfer process.

Benton (1993) study of industrial agglomerations in Spain points to the importance of cooperation for knowledge transfer among agglomerated firms. Such cooperation, according to the author, has to do with the complementarity of production processes and is favorable to the exchange of technical, production and market information. In addition to this benefit, cooperation facilitates joint efforts by firms for participation in national and international fairs and for pooling resources to invest in research and development.

Another example is found in the study of Negrini, Wittmann, and Battistella (2007) that examined a furniture-manufacturing cluster located in Pelotas, located in the Brazilian state of Rio Grande do Sul. This study found a satisfactory level of cooperation among competitors, who engaged in joint purchase of material and components, thus obtaining lower prices and better conditions of payment than possible with individual negotiations. In addition to joint purchases, the firms of the Pelotas cluster were found to cooperate in the exchange of technical and managerial know-how, enabling them to improve their production processes and to modernize their industrial park. This finding, which points to the probable relevance of horizontal cooperation to within-cluster knowledge transfer, was utilized in the study of Hoffmann et al. (2011) that modeled the dimensions of knowledge transfer in clusters.

Asheim and Isaksen (2002) investigated knowledge exchange and innovation in three clusters—Hortren, Jaeren e Sunnmore—located in Norway. In the latter region, known as the country's largest naval construction center, they observed that knowledge exchange went beyond a relationship of cooperation between existing firms to include the participation of clients (navigation companies) and users (fishermen and sailors) as sources of innovation. According to the authors, conversations with sea captains, engineers and other members of the naval crews provide valuable feedback for improvements. These conversations are pursued during periodic, informal visits by product development professionals and production line workers to discuss the performance of company products. Another type of knowledge transfer observed in that region was the active participation in and commitment to incremental innovation on the factory floor of those working there. According to Asheim and Isaksen (2002), the local culture has a tradition of collective endeavor that favors this type of practice. Whether similar results might occur in countries or regions where there is no such cultural tradition is a question of considerable relevance.

In his study analyzing the growth of industrial agglomerations in Africa, Zeng (2006) also points out the importance of cooperative relationships within a cluster. Based on the case of a firm in the Kenyan flower industry that used subcontracting to increase production to volumes permitting participation in the export market, he concludes that cooperation of this sort is fundamental for small firms, in that it facilitates access to opportunities impossible for them on their own and increases the competitiveness of the cluster as a whole.

Vertical cooperation within the production chain was also looked at by Molina-Morales (1999) in a Spanish cluster producing decorative ceramic tiles. In this cluster, firms cooperate in accessing tangible competitive resources, such as raw materials, and also intangible resources, such as knowledge. No significant differences in accessing these resources or in firm performance were observed between suppliers and producers, permitting the inference that cooperative vertical exchanges are facilitated in clusters.

In another study Molina-Morales (2001), in his discussion of cooperative interfirm relations, provides evidence that the non-professional relationships or social ties that develop among actors within a geographically delimited community around shared community activities unrelated to the work environment can contribute to the development of cooperation in the work sphere, as well. These non-work relationships reinforce the ties between actors, facilitating communication among them, including with respect to work matters, given the fact that a common matter of interest to all is their professional activity.

But in a cluster, not all is cooperation. A paper written by Brusco (1993), based on Marshall (1925–1985), suggests that relationships among the firms of industrial districts are influenced by both competition and cooperation. He compares an industrial district to a market in which firms conduct the buying and selling of raw materials and supplies and contract for labor. On the one hand, they compete with each other; on the other, a variety of opportunities for collaboration exists, ranging from the purchase and sale of specialized services to setting up consortia of various types (purchase of raw materials, obtaining financial credit), joint participation in industrial fairs (thereby lowering individual costs), and so on. Cooperation leads to