

Amato Neto, J. ‘Development of regional clusters: The case of the ceramic cluster in Santa Gertrudes (State of São Paulo, Brazil)’, *Proceedings of the 19th. Annual Production and Operations Management Society (POMS) Conference*. POMS, La Jolla, California, USA.

**Abstract Number: 008-0229**

**Development of regional clusters: The case of the ceramic cluster in Santa Gertrudes (State of São Paulo, Brazil)**

**João Amato Neto, PhD**

University of São Paulo, Polytechnic School

Address: Avenida professor Almeida Prado, 531 – travessa 2

05508900 – Cidade Universitária, São Paulo-SP, Brazil.

[amato@usp.br](mailto:amato@usp.br)

Phone: 55 11 3091.5363 – ext. 409

Amato Neto, J. ‘Development of regional clusters: The case of the ceramic cluster in Santa Gertrudes (State of São Paulo, Brazil)’, *Proceedings of the 19th. Annual Production and Operations Management Society (POMS) Conference*. POMS, La Jolla, California, USA.

## **Abstract**

The purpose of this article is to analyze the main factors that influence competitiveness among the small and medium-sized companies belonging to the Santa Gertrudes ceramic cluster (located in the State of São Paulo, Brazil), stressing the main aspects such as the joint actions, the presence of main related industries, the importance of the accomplishment of fairs and events, and the presence of universities and R&D institutes. The methodology adopted is the single case study, composed of three stages: bibliographical revision on the themes regional cluster and productive cooperation networks among small and medium-sized companies; specific research on the ceramic tile sector, as well as on the cluster, complemented by technical visits to the companies and institutions belonging to the Santa Gertrudes ceramic cluster; and interviews for the effective collection of data.

**Keywords:** regional clusters, productive cooperation networks, joint actions.

## **Introduction**

The phenomenon concerning the industrial agglomerations or regional clusters has deserved special attention on the part of specialists, researchers and policy makers, mainly in emerging countries. On the other hand, the increase in competitiveness has forced companies to incessantly look for innovation in a broad sense, as proposed by Schumpeter (1984).

This article aims to analyze the main factors influencing competitiveness among the small and medium-sized companies belonging to the Santa Gertrudes ceramic cluster (located in the

Amato Neto, J. ‘Development of regional clusters: The case of the ceramic cluster in Santa Gertrudes (State of São Paulo, Brazil)’, *Proceedings of the 19th. Annual Production and Operations Management Society (POMS) Conference*. POMS, La Jolla, California, USA.

State of São Paulo, Brazil), pointing out the main aspects such as the joint actions, the presence of the main related industries, the importance of accomplishing fairs and events, and the presence of universities and R&D institutes.

### **Some main concepts**

The cluster definition is not as recent as some researchers believe. Several concepts, involved in those industrial aggregations, had already been pointed by Marshall in his study concerning the industrial districts of England, at the end of the 19<sup>th</sup> century (Iglioni, 2001).

Clusters are geographic concentrations of interconnected companies and institutions in a particular field and encompass an array of linked industries and other entities important to competition (Porter, 1998).

On the other hand, according to Meyer-Stamer (2001), the spatial concentration is not limited to the proximity of the main productive activity enterprises. It also involves the proximity of the capital goods industry, raw material sources, transportation net, manpower availability, or even the presence of a potential market.

The debate concerning the regional clusters of companies and local productive arrangements has gained special prominence in the literature due to the growing importance of this phenomenon relating to the experiences of socioeconomic development of several countries along the last decades. Besides, the largest interest regarding this theme is due to the intensification of the inter-regional competition and its implications, in particular for the situation of the emergent economies (ENRIGHT, 1998).

Amato Neto, J. ‘Development of regional clusters: The case of the ceramic cluster in Santa Gertrudes (State of São Paulo, Brazil)’, *Proceedings of the 19th. Annual Production and Operations Management Society (POMS) Conference*. POMS, La Jolla, California, USA.

### **Externalities (external economies)**

In fact, this discussion improves the classical analyses on the industrial districts of England in the late XIX century, revealed mainly by Alfred Marshall's works (1920), emphasizing the importance of the positive externalities as incentive factors to the geographical concentration of a group of producers. These analyses point out the externality concept as benefits gains for the productive units, which are formed due to the expansion of an industry or of an industrial section. Benefits are gained by an industry, when the area in which it has good infrastructure and highway nets, labor qualified in readiness, offer of raw materials and close location to the consuming markets. The existence of those resources decisively influences the reduction in production costs and provides industrial expansion in general. For example: The existence of a tannery in a given area stimulates the construction of footwear and leather goods factories in its surroundings.

According to Brito (2002), the externalities can be classified into 4 different categories:

Technical Externalities: from the technical point of view, the interdependence among the agents results in modifications in the characteristics of the respective production functions.

Pecuniary Externalities: changes in the relative prices of the factors and modifications of the cost structures of the companies.

Technological Externalities: the effects of the spillovers that result in changes in the adoption of a specific innovation and the rhythm of its diffusion in a certain market.

Demand Externalities: situations in which the demand of goods offered by each unit is affected by modifications in the demand of other units or in which an individual consumer's demand is influenced by the joint demand of the same product.

Amato Neto, J. 'Development of regional clusters: The case of the ceramic cluster in Santa Gertrudes (State of São Paulo, Brazil)', *Proceedings of the 19th. Annual Production and Operations Management Society (POMS) Conference*. POMS, La Jolla, California, USA.

From this concept, it should be inquired what kind of collective efficiencies is sought by the companies of a certain cluster. In some cases, such efficiencies can be directly related to the incidental external economies (externalities already existing in the area, independently of any economic agents' actions), such as offer of specialized labor, access to the source of raw material or even for being close to the great buyers of the local products, as is the case of small and medium size vendors of parts and components to larger companies. In other cases, the economic agents deliberately look for means of cooperation and joint actions, in order to reinforce their competitive capacity, sharing costs and risks and establishing services of collective character. The concept of collective efficiency, in that sense, combines the spontaneous effects (or unplanned) to those that are sought (or planned), and it is defined as the competitive advantage derived of the local external economies and of the joint action.

In this sense, it is essential to focus not only on the effects of external economies, but also on the interactions between companies and the cooperation forms among them. However, as mentioned by Altenburg & Meyer-Stamer (1999: 1694), " given the complexity of interaction patterns in clusters, (...) it is impossible to formulate a precise definition of cluster or to establish a clear separation between pure agglomeration and complex clusters, with strong externalities ". In spite of that difficulty, the same authors formulate an operational definition of clusters based on measurable variables: "A cluster is a gathering of considerable size of firms in a geographic area defined with clear specialization profile and in which the trade and the specialization inter-firms are substantial ".

In synthesis, in a lot of situations, geographical proximity of producers belonging to the same productive chain can facilitate the generation and dissemination of important knowledge

Amato Neto, J. 'Development of regional clusters: The case of the ceramic cluster in Santa Gertrudes (State of São Paulo, Brazil)', *Proceedings of the 19th. Annual Production and Operations Management Society (POMS) Conference*. POMS, La Jolla, California, USA.

processes and for the occurrence of the collective efficiencies (SCHIMTZ, 1989) and not just the economic actors' individual efficiencies. The economic actors' proximity can also generate positive impacts in the process of sustained development of a specific region. Especially, the presence of universities, technical schools and research centers/institutes provides larger access to the differentiated knowledge of scientific and technological base. In this way, a lot of derived advantages can be observed in such agglomerations and inter-organizational interactions for the small and medium-size companies. These advantages concern mainly the possibility of diffusion of tacit knowledge due to the space proximity among the agents. Logically, these possibilities depend on the social context and the specificities of institutions in a given place. Such a tacit knowledge allows, as well observed by Alfred Marshall (1842-1924) almost one century before, that *"the secrets of the companies stop being secrets and end up hovering in the air, so that even children can learn without being aware of it"*. Marshall's classic sentence highlights the easiness of the process of circulation of information within a specific cluster of companies by means of their own channels of communication or specialized sources could cause a technology and knowledge overflow. In the literature, this phenomenon is known as a *technological spillover*.

### **Constituent elements of a cluster**

On the other hand, a series of constituent elements can be found within a cluster that reflects the economic agents' own potential competitive bus: social rules, traditions and habits that are singular to the local system (the "informal" institutions). The existence of an elaborated net of institutions facilitates knowledge diffusion and innovation, contributing to the increment of the competitive capacity of the producer agglomerations.

Amato Neto, J. 'Development of regional clusters: The case of the ceramic cluster in Santa Gertrudes (State of São Paulo, Brazil)', *Proceedings of the 19th. Annual Production and Operations Management Society (POMS) Conference*. POMS, La Jolla, California, USA.

Besides the presence of related local external economies, the market size, concentration of specialized labor, technological spillovers and other factors that favor local specialization, some characteristics are present in the clusters. The most important can be summarized as follows. The local companies usually interact sharing systems of production, trade and distribution. They also cooperate in marketing, promotion of exports, supply of essential inputs, P & D activities and others (Suzigan et al., 2001a).

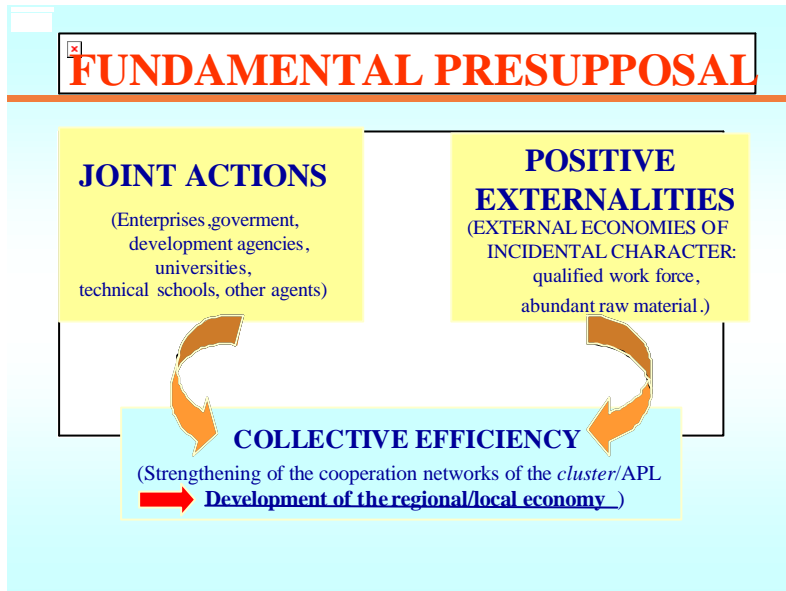
However, it is necessary to specify that types of joint actions or cooperation initiatives the local agents develop and their frequency. Among them, the following can be pointed out:

1. Joint purchases of inputs.
2. Joint participation in fairs and exhibitions (national and international).
3. Shared strategies of commercialization, such as brand, advertising, distribution channels, forces of sales, among others.
4. Sharing of facilities, as manufacturing units and laboratories for essays and certification.
5. Accomplishment of services groups, such as market research, provision of information.
6. Participation in "export consortia"
7. Establishment of technical schools and research centers for forming and qualifying the workforce.

The illustration below presents a synthesis of these concepts:

Amato Neto, J. 'Development of regional clusters: The case of the ceramic cluster in Santa Gertrudes (State of São Paulo, Brazil)', *Proceedings of the 19th. Annual Production and Operations Management Society (POMS) Conference*. POMS, La Jolla, California, USA.

**FIGURE 1: Fundamental presupposal of a cluster**



Source: The author

Actually, it could be said that the balance between competition and cooperation is being sought. The local companies can benefit from the support of local institutions, many times commanded by local leaderships that usually coordinate private and public actions. Thus, the companies try to cooperate in areas in which they would have difficulties in acting separately, the so-called pre-competitive "areas". The producers share the costs and risks of those decisions and they benefit collectively from the access to those goods and services, that a lot of times can exercise a decisive role in the managerial competition process.

In an inclusive way, the concept of groupings (cluster) or local productive arrangements can be understood as the sectorial and geographical concentration of companies necessary to identify a series of inherent characteristics to the clusters, inter-dependent of their performance niche, of the product type or service provided. Among the several characteristics, the most important is the



Amato Neto, J. ‘Development of regional clusters: The case of the ceramic cluster in Santa Gertrudes (State of São Paulo, Brazil)’, *Proceedings of the 19th. Annual Production and Operations Management Society (POMS) Conference*. POMS, La Jolla, California, USA.

gain of collective efficiency, understood as the competitive advantage derived from the local external economies and from the joint action (ENRIGHT, 1994; HUMPHREY & SCHMITZ, 1995; PORTER, 1998; ALTEMBURG & MEYER-STAMER, 1999).

It is important to stress that clusters are only formed when both sectorial and geographical aspects are concentrated. Otherwise, they are just production organizations in disperse sections and geography, therefore not forming a cluster. In the latter case, the scope for work division and scale economy is small. In contrast, in the case of a cluster, there is a wide scope for division of tasks among companies, as well as for specialization and for innovation, essential elements for competition besides local markets. In this case, also, there is a significant space for the joint action of companies belonging to a cluster, which fails to happen in dispersed systems.

What is observed in practice, however, it is that there is great difficulty in characterizing a cluster, since the productive systems can not always be clearly separated into disperse or agglomerate (clustered) categories. The limits between these categories are not always clear, and, in some cases, there can be a mix of the two ways. It is important to highlight that this difficulty does not at all alter the essential fact that the gathering brings gains in collective efficiency that separate producers can rarely attain.

On the other hand, these gains in efficiency do not necessarily result from the existence of a cluster. A group of companies producing similar products in a same area constitutes a cluster; even so, these sectorial and geographical concentrations bring few benefits. The collective efficiency should be understood as the result of internal processes of the relationships inter-firms.

The clusters are not necessarily formed just by an industry type; however, they generally concentrate only an industrial sector, receiving, for this reason, critics related to its vulnerability

Amato Neto, J. 'Development of regional clusters: The case of the ceramic cluster in Santa Gertrudes (State of São Paulo, Brazil)', *Proceedings of the 19th. Annual Production and Operations Management Society (POMS) Conference*. POMS, La Jolla, California, USA.

in the regional economy, tends in view the challenge for the need of permanent modernization faced to the constant technological innovations, non characteristic phenomenon of diversified areas.

On the other hand, the clusters can respond to crises and opportunities in a more dynamic way, once its specialties can be reorganized in new processes.

In the vision of the Regional Economy School that it looks for entails between the economic geography and the industrial performance there is a strong tendency in the contemporary capitalism towards dense located clusters. *"Those clusters are constituted as intensive regional economies in transaction that, in turn, are connected by interdependent structures that are spread throughout the whole globe"* (SCOTT, 1998). Still under this focus, extra-market coordination and public policies are essential in the construction of located competitive advantages. Here also it is worth pointing out that this type of public policies is, road-of-rule, more wanted for the promotion of a local productive cluster: Fiscal incentives; investments in urban infrastructure and construction of public equipment (highways, airports, concession of lands, paving, connection to the energy grid, telephone lines, etc...).

On the other hand, the technological-based clusters constituted another kind of studies regarding the agglomerates of companies. Under the focus of the Innovation Economy , the geographical proximity of a group of companies with universities, R & D centers, technical schools and other specialized agents constitute a strategic factor in knowledge generation and diffusion processes, greatly contributing to the business of the cluster. This phenomenon can also cause knowledge spillovers.

Amato Neto, J. ‘Development of regional clusters: The case of the ceramic cluster in Santa Gertrudes (State of São Paulo, Brazil)’, *Proceedings of the 19th. Annual Production and Operations Management Society (POMS) Conference*. POMS, La Jolla, California, USA.

### **Support Institutions**

Institutions are constituted as a set of common habits, routines, practices, rules and laws that regulate the interactions and relationships between individuals and groups. Authors such as Nelson and Winter (1982), North (1990 apud GARCIA, 2001), **Dosi (1984)**, Nadvi (1995) point out that support institutions can provide competitive advantages among producers. The institutions can be divided into two categories: The first one is composed by formal institutions, such as labor laws, patents laws, property rights and government regulations generally defined nationally, revealing aspects of the industrial and macroeconomic policies. The second category is composed by informal institutions, such as characteristic elements of society - habits, trust, disposition to cooperation, traditions, social rules, practices and norms of conduct - which, depending on their weight, can take to an intense socio-cultural identification among the local agents, stimulating interaction among them.

### **Related and supporting industries**

Related and supporting industries are important for developing a cluster competitive advantages. These occur when agents and companies share their activities in the value chain in terms of technological development, manufacturing, distribution, commercialization, logistics or technical support (MACHADO, 2003).

Porter (1990) attributes the concept of related and supporting industries to specialized agents and vendors of goods - machinery, equipment, replacement parts, components - and to specialized services – such as technical and market information, quality certification, technical, organizational, financial and accounting consulting assistance. This results in external economies

Amato Neto, J. ‘Development of regional clusters: The case of the ceramic cluster in Santa Gertrudes (State of São Paulo, Brazil)’, *Proceedings of the 19th. Annual Production and Operations Management Society (POMS) Conference*. POMS, La Jolla, California, USA.

for the producers that can obtain their products and services at reduced costs. According to the author, these industries can be linked to activities both upstream and downstream the productive chain, and consists one of the main factors to be observed in the identification of a cluster.

In Santa Gertrudes cluster the concentration of companies induced the localization of commercial representatives of related industries, such as equipment manufacturers, most of them from Italy, and that had a fundamental role in the initial phase of the cluster. In the beginning of this agglomeration, the machinery producers even took local raw material to the headquarters so as to adjust and to test the equipment. Nowadays, cooperation occurs in terms of information sharing, development of joint actions in order to get improvements, negotiation of deadlines and financing. However, even among manufacturers, no type of more intense or frequent cooperation is identified (MACHADO, 2003). Another related industry in this cluster is that of the colorant companies, producing chemical input for ceramic, most of which comes from Spain (leader in this segment) and Italy. Machado (2003) mentions that the cooperation with the ceramic companies happens mainly through the joint development of products, negotiations of payment deadlines and information sharing. As the chemical inputs are very close to commodities, those companies also supply added services such as technical support, design development and new products, privileging the local ceramic companies. According to the author, the colorant companies are the most important technology and design vendors of the area. Also observed is the cooperation among them; for example, actions for improving products and joint purchase of imported products.

Amato Neto, J. 'Development of regional clusters: The case of the ceramic cluster in Santa Gertrudes (State of São Paulo, Brazil)', *Proceedings of the 19th. Annual Production and Operations Management Society (POMS) Conference*. POMS, La Jolla, California, USA.

### **Main characteristic dimensions of a cluster**

The first is geographical. This involves the spatial concentration of the key stakeholders of the productive process. The proximity among the main production chain companies, promoting cooperation through their interaction, together with the presence of secondary production chain links in the region, represents an important feature for the competitiveness of a cluster. The infrastructure is also taken into consideration in this approach.

The second is economic issues, such as market structure and competitive dynamism, that can be grouped into three parts, as follows: the importance of the cluster industry, in terms of value added to the region; the production chain density, as well as the presence of enterprises hierarchy and vertical specialization; the industrial activity characterization, such as the enterprises informality degree.

The third is institutional. It comprehends all the aspects concerning 'enterprises external infrastructure'. This is constituted by regional organizations such as public institutions, class entities, promotion agencies and support associations that not only represent the different productive chain links companies, but also promote the occurrence of interaction that will further result in cooperation and consequent competitive advantage.

The fourth is the social, in which the Social Capital of the region community will be evaluated. It covers the innovative, entrepreneur, participative and associative characteristic of the community in addition to its educational level. Moreover, this field also involves the cluster impact on the inhabitants, in terms of awareness and the increase in employment. Putman, 1993b apud ALBAGLI; MACIEL, 2003, p.7, defines social capital as "lines of social life - nets, norms

Amato Neto, J. ‘Development of regional clusters: The case of the ceramic cluster in Santa Gertrudes (State of São Paulo, Brazil)’, *Proceedings of the 19th. Annual Production and Operations Management Society (POMS) Conference*. POMS, La Jolla, California, USA.

and trust - that facilitate action and cooperation in the pursuit of common goals”. These authors mention as the main sources of social capital the family, the communities, the firms, society, institutions and organizations, the civil society and the government. Its main advantage is the establishment of a system of common values that contributes to uniting the region towards a common goal. The social capital can provide the reduction in conflict potential, to contribute for communication, for cooperation and for building a trust relationship.

### **Methodology approach**

The chosen methodology was based on a qualitative approach which has been supported by a documental analysis and an extensive bibliography research. The research strategy has considered a single case study, accomplished by a mix of data collection techniques which has combined these following collecting data methods:

- a) Non-structured interviews guided by an initial script applied to leaderships of the support institutions, to experts and researches of this specific cluster (Santa Gertrudes).
- b) Quali-quantitative applied questionnaires for technical professionals and some entrepreneurs of this cluster.
- c) Documental analysis gather from secondary sources combined with bibliographical and historical research

### **The Santa Gertrudes cluster: fundamental characteristics**

The Santa Gertrudes cluster is located in the center of the State of São Paulo – Brazil - involving 7 municipalities: Santa Gertrudes, Cordeirópolis, Rio Claro, Limeira, Iracemópolis, Piracicaba

Amato Neto, J. 'Development of regional clusters: The case of the ceramic cluster in Santa Gertrudes (State of São Paulo, Brazil)', *Proceedings of the 19th. Annual Production and Operations Management Society (POMS) Conference*. POMS, La Jolla, California, USA.

and Ipeúna, totaling a 2,989 Km<sup>2</sup> area. From the 1950s until the 1980s, this regional cluster only produced some kind of tiles and low quality ceramics. Nowadays, the cluster is composed of 37 small and medium-sized companies (80% of the total) producing ceramic tiles. Its products, predominantly made by dry pressing, are sold to all Brazilian regions. The main destination of the production and a source of revenues is the Southeast region (more than 40% of the cluster income). The cluster is characterized by small companies (producing less than 300 thousand m<sup>2</sup>/month) and medium-sized companies (between 300 and 500 thousand m<sup>2</sup>/month). This production confirms the remarkable growth in the last 10 years, mainly for the availability of raw material, technology and growth of the consumer market. It should be stressed that the Santa Gertrudes and the Criciúma clusters (in the state of Santa Catarina) are the main ceramic tile producers in Brazil. Santa Gertrudes responds for approximately 43% of the production and 22.33% of the Brazilian ceramic export, respectively (MACHADO, 2003).

The most evident advantages of the Santa Gertrudes region are related to the fact of being located in a great consumer center (the State of São Paulo), possessing great amounts of raw material (it counts on approximately 20 mines for clay extraction) and presenting easy access to highways. These last two factors allowed the companies to use price as the main competitive factor (MACHADO, 2003).

It is possible to identify significant changes in strategy in some the companies of the Santa Gertrudes cluster along the last 5 years. Traditionally, this cluster was known for competing for price and for focusing on the low-income consumer market . During the last few years, the companies are seeking differentiation of products, privileging efforts for improving the quality, for meeting deadlines and for exporting. Other characteristics point to an improvement in quality,

Amato Neto, J. ‘Development of regional clusters: The case of the ceramic cluster in Santa Gertrudes (State of São Paulo, Brazil)’, *Proceedings of the 19th. Annual Production and Operations Management Society (POMS) Conference*. POMS, La Jolla, California, USA.

such as the efforts to obtain quality certifications (mainly ISO 13006 or NBR 13818), and the significant growth in exports.

Specifically concerning the issue of Basic Industrial Technology, the main gaps identified refer to the quality certification issue, since in general the companies, mainly the medium-sized ones, already overcame the basic problems of normalization of processes and of industrial metrology (equipment and instruments gauging).

In terms of the links of the cluster productive chain in which there are greater gaps and, at the same time, better opportunities for new investments in this cluster, the following stand out: design and equipment/ machinery manufacturers.

Therefore, a certain cooperation degree can be observed, predominantly in an informal way, among the main agents involved: ceramic manufacturing companies, colorant companies, machinery and equipment manufacturers and technological research center, specially the Brazilian Ceramic Center of Brazil - CCB. Therefore, the cooperation often happens among companies of different links of the productive chain. Such cooperation level, however, still does not allow establishing a system of common values (social capital) that can significantly contribute for greater cohesion among the local producers around a brand name for the cluster, for example.

Conversely, a significant increase in the joint participation of companies is observed in fairs and events of the civil construction industry, which contributes to increase the visibility of the companies and of the cluster in general, both in the internal and the external market.



Amato Neto, J. ‘Development of regional clusters: The case of the ceramic cluster in Santa Gertrudes (State of São Paulo, Brazil)’”, *Proceedings of the 19th. Annual Production and Operations Management Society (POMS) Conference*. POMS, La Jolla, California, USA.

The main educational and research institutions operating in the Santa Gertrudes cluster are: The State of São Paulo University Júlio of Mesquita Filho (UNESP), campus of Rio Claro ; Federal University of São Carlos (UFSCar) and University of São Paulo (USP), campus of São Carlos. However, most of the small companies do not to consider the partnerships with significant higher education establishments.

### **Main deficiencies of the cluster**

One of the main deficiencies observed in the cluster refers to labor capacitation. According to Machado (2003), only 2.5% of the companies employees completed upper level courses and little more than 70% have completed their fundamental education. These data result in the companies difficulty in using qualified labor, a generalized fact in the cluster.

Also noticed is that the horizontal cooperation conducted among the ceramic companies is incipient. This fact is highlighted by the estimate that more than 90% consider that the main competitors are in the region itself, which may characterize the existence of a predatory competition. This fact is reflected in the competition for price, still present in the region, as already mentioned. The cooperation among the ceramic manufacturing companies, such as exchange of information, experiences, parts and employees, for example, only occurs, most of the time, among companies of the same family group. However, even in these companies, strong competition is observed, consequently hindering a more intense cooperation.

Amato Neto, J. ‘Development of regional clusters: The case of the ceramic cluster in Santa Gertrudes (State of São Paulo, Brazil)’, *Proceedings of the 19th. Annual Production and Operations Management Society (POMS) Conference*. POMS, La Jolla, California, USA.

The São Paulo Association of Ceramic Tile (ASPACER) and the Brazilian Ceramic Center (CCB) are the main institutions to foster of this type of cooperation, supplying support both in technical and political aspects.

Another problem identified through visits made to the companies of the cluster and interviews with the leadership of the institutions aforementioned is the lack of experience of the companies in activities related to marketing and logistics.

Concerning quality and aesthetics (design) of the products of the region, it is observed that there are still some gaps. The main cause of the problem is the competition for prices practiced by the manufacturers in the region. The companies end up not trying to develop products with greater added value, which could develop new markets, as well as increase the current export level. Another important observation is the lack of Research & Development laboratories in the companies of the cluster. Nowadays, the CCB develops pioneer activities aiming to overcome that deficiency in design,

### **Initiatives for the development of the cluster**

The Ceramic Center of Brazil (CCB) plays an important role in the development of activities aiming to propel the Santa Gertrudes cluster. The main actuation of this institution is the quality certification of floor and wall tiles, the accreditation of which, by the National Institute of Metrology, Normalization and Industrial Quality (INMETRO) was obtained in 1996. Now, besides those activities, CCB is quite active with the companies of the cluster, with actions aimed at the improvement in technological training and of quality. Those measures are translated into the companies awareness as to the compliance with norms and the importance of quality;

Amato Neto, J. ‘Development of regional clusters: The case of the ceramic cluster in Santa Gertrudes (State of São Paulo, Brazil)’, *Proceedings of the 19th. Annual Production and Operations Management Society (POMS) Conference*. POMS, La Jolla, California, USA.

dissemination of certification results in the sector and among consumers; elaboration and updating of technical norms in the ceramic sector; organization of open trainings or in the company itself; organization of lectures for manufacturers; technical assistance service and development of partnerships with teaching and research institutions, government and managerial entities for the technical and technological growth in the sector (CCB, 2004). Among the most recent initiatives, the inauguration of the Center for Technological Innovation in Ceramics (CITEC/CCB) in a partnership with ASPACER, identified as the main agent of the companies governance in the region, besides the Santa Gertrudes Municipal Government. In this center, it is possible to conduct tests and essays related to the ceramic tile stages of production, which allows, among other things, the development of innovative designs. This fact is observed in the "Cara Brazil" project, in which product lines with design valuing daily Brazilian scenes are made aiming at developing new markets, to increase export and, above all, to add value to the product. One of the most recent joint actions initiatives conducted, that is, with the participation of CCB, a colorant company and a ceramic manufacturer, was the launching of the line of products “Fazenda Santa Gertrudes” (2004), trying to picture the characteristics of the main tourist spot of the region through product design.

Amato Neto, J. 'Development of regional clusters: The case of the ceramic cluster in Santa Gertrudes (State of São Paulo, Brazil)', *Proceedings of the 19th. Annual Production and Operations Management Society (POMS) Conference*. POMS, La Jolla, California, USA.

## **Conclusions**

In sum, it can be stated that Santa Gertrudes ceramic cluster is facing a growth stage, evidenced by some aspects, such as the accelerated growth in exports and also for the beginning of competition not only among the companies located in the same region, but also with the Criciúma (SC) cluster - region mentioned by half of the companies that answered the questionnaire. The latter cluster, for making its products by wet pressing (technique also used in most of Italy), manages to obtain a final product with better quality and design. However, it is observed that the technological progresses are making this difference decrease steadily. Some authors such as Maggi; Seibel; Meyer-Stamer (2001) mention that some medium-sized companies of the ceramic tile cluster of Santa Catarina already feel threatened by the companies in the Santa Gertrudes area. The authors also state that the Brazilian production of ceramic tile after the 1990/91 crisis was largely due to the expansion of the Santa Gertrudes cluster, whereas the Santa Catarina cluster kept stagnant in the internal market, concentrating its efforts on exports.

From the point of view of the **main threats** for the companies in this cluster, the following were detected: 1.) environmental problems related to the need of licensing of raw materials natural deposits; 2.) concentration of the production volume in a few companies, which can imply the disappearance of small and medium-sized companies. 3.) sensitivity of the sector towards the economic atmosphere of the country; 4.) overproduction (supply) has caused a reduction in prices.

As the main opportunities identified through research, the following can be identified: 1.) new production technologies will require qualified labor; 2) There is an incipient export process; 3.)

Amato Neto, J. ‘Development of regional clusters: The case of the ceramic cluster in Santa Gertrudes (State of São Paulo, Brazil)’, *Proceedings of the 19th. Annual Production and Operations Management Society (POMS) Conference*. POMS, La Jolla, California, USA.

Also noticed is the beginning of the establishment of related industries and of a market of supporting services in the transport, legislation, packing, training, maintenance and project areas.

In the long run, the main actions that should be elaborated to maintain a cluster competitive and in expansion are: 1.) to guarantee the supply of the energy matrix (gas, electricity); 2.) to improve the conditions of ports for export; 3.) to simplify environmental licenses; 4.) to improve labor formation.

### **Referências bibliográficas**

ALBAGLI, S.; MACIEL, M. L. **Capital Social e empreendedorismo local**. Disponível em: <<http://www.ie.ufrj.br/redesist/NTF2/NT%20SaritaMLucia.PDF>>. Acesso em: 25 de nov. 2003.

ALTENBURG, T.; MEYER-STAMER, J. **How to promote clusters: experiences from Latin America**. *World development*, v. 27, n.9, 1999.

AMATO NETO, J. **Redes de cooperação produtiva e clusters regionais**: oportunidades para as pequenas e médias empresas. São Paulo: Editora Atlas, 2000. 163p.

ASPACER (Associação Paulista das Cerâmicas de Revestimento). Estatísticas. Disponível em: <<http://www.aspacer.com.br/estatisticas.html>>. Acesso em: 21 de nov. 2003.

BRITO, J. **Cooperação Interindustrial e Redes de Empresas**, In. KUPFER, D; HASENCLEVER, L., *Economia Industrial*, UFRJ, Rio de Janeiro, 2002.

Amato Neto, J. ‘Development of regional clusters: The case of the ceramic cluster in Santa Gertrudes (State of São Paulo, Brazil)’, *Proceedings of the 19th. Annual Production and Operations Management Society (POMS) Conference*. POMS, La Jolla, California, USA.

CAMPOS, R. R. et al. **Aprendizagem por interação: pequenas empresas em sistemas produtivos e inovativos locais.** Disponível em: <<http://www.ie.ufrj.br/redesist/P3/NTF2/NT%20Renato.PDF>>. Acesso em: 10 de dez. 2003.

CASSIOLATO, J. E.; SZAPIRO, M. **Arranjos e sistemas produtivos e inovativos locais no Brasil.** Disponível em: <<http://www.ie.ufrj.br/redesist/P3/NTF2/Cassiolato%20e%20Szapiro.pdf>>. Acesso em: 02 de dez. 2003.

DOSI, G. **Technical change and industrial transformation – the theory and an application to the semiconductor industry**, Londres. Macmillan, 1984.

ENRIGHT, M. **Regional clusters and firms strategy.** In CHANDLER, A; HAGSTRON, P.; SOLVELL, O, orgs. *The dynamic firm: the role of technology, strategy, organization, and regions.* Oxford University Press. 1998.

GARCIA, R. **Vantagens Competitivas de empresas em aglomerações industriais: Um estudo aplicado à indústria brasileira de calçados e sua inserção nas cadeias produtivas globais.** 2001. 203p. Tese (Doutorado) - Instituto de Economia, Universidade Estadual de Campinas. Campinas, 2001.

HUMPHREY, J. **Opportunities for SME’s in developing countries to upgrade in a global economy.** Geneva: International Labour Office, 2003 (Working Paper 43)

Amato Neto, J. ‘Development of regional clusters: The case of the ceramic cluster in Santa Gertrudes (State of São Paulo, Brazil)’, *Proceedings of the 19th. Annual Production and Operations Management Society (POMS) Conference*. POMS, La Jolla, California, USA.

HUMPHREY, J.; SCHMITZ, H., **Governance and upgrading: linking industrial cluster and global value chain research**, IDS Working Paper 120, Institute of Development Studies, University of Sussex, 2000.

HUMPHREY, J.; SCHMITZ, H. **Principles for promoting clusters & networks of SMEs**. Disponível em: <<http://www.unido.org/userfiles/PuffK/humphrey.pdf>>. Acesso em: 15 de dez. 2003.

IGLIORI, D. C. **Economia dos clusters industriais e desenvolvimento**. São Paulo : FAPESP, 2001. 147 p.

LASTRES, H. M. M.; CASSIOLATO, J. E. (Org.) **Glossário de arranjos e sistemas produtivos e inovativos locais**. Disponível em: <<http://www.ie.ufrj.br/redesist/P4/textos/Glossario.pdf>>. Acesso em: 20 de nov. 2003.

LASTRES, H. M. M.; CASSIOLATO, J. E; SZAPIRO, M. **Arranjos e sistemas produtivos locais e proposições de políticas de desenvolvimento industrial e tecnológico**. Disponível em: <<http://www.ie.ufrj.br/redesist/P2/textos/NT27.PDF>>. Acesso em: 05 de dez. 2003.

MACHADO, S. A. **Dinâmica dos arranjos produtivos locais**: um estudo de caso em Santa Gertrudes, a nova capital da cerâmica brasileira. 2003. 123p. Tese (Doutorado) – Escola Politécnica, Universidade de São Paulo. São Paulo, 2003.

Amato Neto, J. ‘Development of regional clusters: The case of the ceramic cluster in Santa Gertrudes (State of São Paulo, Brazil)’”, *Proceedings of the 19th. Annual Production and Operations Management Society (POMS) Conference*. POMS, La Jolla, California, USA.

MAGGI, C.; Seibel, S.; MEYER-STAMER, J. **Improving upon nature**: creating competitive advantage in ceramic tile clusters in Italy, Spain and Brazil. Disponível em: < <http://www.meyer-stamer.de/2001/Tiles.pdf>>. Acesso em: 20 de jun. 2004.

MARSHALL, A. **Principles of Economics**. New York: The Macmillan Company, 1952. 871p.

MAYER-STAMER, J., **Estratégias de desenvolvimento local e regional: Clusters, políticas de localização e competitividade sistêmica**, Friedrich Ebert Stiftung, 28/9/2002.

NADVI, K. **Industrial clusters and networks: case studies of SME growth and innovation** UNIDO, Vienna, 1995.

NELSON, R.; WINTER, S. **An evolutionary theory of economic change**. Cambridge, Mass., Harvard U.P., 1982.

PORTER, M. E. **Cluster and the new economics of competition**. Harvard Business Review, Boston, v.76, n.6, p.77-99, 1998.

PYKE, F. **Industrial development through small-firm cooperation**: theory and practice. Geneva : International Labour Office, 1992. 69p.

PYKE, F.; BECATTINI, G.; SENGENBERGER, W. (Ed.) **Industrial districts and interfirm co-operation in Italy**. Geneva : International Institute for Labour Studies, 1990. 237p



Amato Neto, J. ‘Development of regional clusters: The case of the ceramic cluster in Santa Gertrudes (State of São Paulo, Brazil)’, *Proceedings of the 19th. Annual Production and Operations Management Society (POMS) Conference*. POMS, La Jolla, California, USA.

PYKE, F.; SENGENBERGER, W. (Ed.) **Industrial districts and local economic regeneration**. Geneva : International Institute for Labour Studies, 1992. 294p.

SEBRAE (Serviço Brasileiro de Apoio às Micro e Pequenas Empresas). **Outras estatísticas sobre MPE**. Disponível em: <[http://www.sebrae.com.br/br/ued/estat\\_outras.htm](http://www.sebrae.com.br/br/ued/estat_outras.htm)>. Acesso em: 21 de nov. 2003.

SCHMITZ, H., **Collective Efficiency: Growth Path for Small-Scale Industry**, The Journal of Development Studies, vol.31, No. 4, april 1995

\_\_\_\_\_. **Small firms and flexible specialisation in LDC's**. Sussex, England, Institute of Development Studies, 1989.

SCOTT, A. **The geographic foundations of industrial performance**. In: CHANDLER, A.; HAGSTRON, P.; SOLVELL, O. (Orgs.). *The dynamic firm: the role of technology, strategy, organization, and regions*. Oxford: Oxford University Press, 1998.

SUZIGAN, W. (2001). **Aglomeraciones industriais como focos de políticas**. *Revista de Economia Política*, v. 21, n. 3.

Amato Neto, J. ‘Development of regional clusters: The case of the ceramic cluster in Santa Gertrudes (State of São Paulo, Brazil)’, *Proceedings of the 19th. Annual Production and Operations Management Society (POMS) Conference*. POMS, La Jolla, California, USA.

SUZIGAN, W.; GARCIA, R.; FURTADO, J. **Governança de sistemas de MPME em clusters industriais**. Disponível em: <<http://www.ie.ufrj.br/redesist/NTF2/NT%20Suzigan.PDF>>. Acesso em: 05 de nov. 2003.

WORLD BANK. **What is social capital?** Disponível em:

<<http://www.worldbank.org/poverty/scapital/whatsc.htm>>. Acesso em: 21 de nov. 2003.