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TECHNOLOGY INNOVATION AND BUSINESS ORGANIZATION IN THE ITALIAN INDUSTRIAL DISTRICTS

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Abstract

The Industrial Districts – *Distretti Industriali* – play a relevant social and economic role in Italy's industrial organization. As is stated in the literature, industrial districts are networks of businesses, involving mainly small and medium-sized companies as well as other social and economic agents, organized in communities that are well-defined geographically, historically and culturally. Considering, on the other hand, the role of technology for the success of business, both individually for each economic agent, and collectively for the industrial district, the present study was planned to identify the characteristics of the dynamics of the business and the way in which they influence, or are influenced, by the management factors of the technological innovation process in that environment. It is an exploratory study of an empirical nature, with a research plan based on the review of the literature, an examination of institutional documents, and interviews with managers of organizations that are part of Italian industrial districts, as well as Italian researchers working on the subject of the present study. The guidelines for the research regarding the aspects of management of innovation, in the environment under investigation, were based on a management model that is appropriate for environments in which there is cooperative interaction between the constituent agents. The field research was concentrated on the Italian districts of Sassuolo, Modena Area, Emilia-Romagna Region (ceramics) and Lumezzane, Brescian Valley, Lombardy Region (metals-mechanics). The results obtained have allowed us to define several elements that are typical of the organization of business and of the process of technological innovation, in an industrial district. Among the management factors that were identified in the cooperative action for technological innovation, it was possible to identify the one directly associated with the cultural characteristics that are specific of the districts, i.e. the background of social and personal relationships.

Key words: Business networks, competitiveness, italian industrial district, small and medium firms, technology management.

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1 INTRODUCTION

This research was planned to enhance the knowledge about how managerial factors influence the technology innovation process in different phases - generation, development and diffusion - within a business network environment. The business environment chosen for this purpose, as the research body of analysis, is made up of the Italian industrial districts.

The **specific objectives** of this research are: a) to identify, compare and discuss the main characteristics of the technology innovation process and of the business organization, in the Italian industrial districts; b) to characterize the interactions practiced by the constituent organizations of the district and the role of some organizations of the third sector, in helping the cooperative activities (internal and external) needed by the productive enterprises; and, c) to assess the management issues, arising from the cooperation for technology innovation entered into by the productive enterprises, through the application of the analytical management model proposed by Bruno and Vasconcellos (2001, 2003).

According to the conclusions of a specific colloquium on networks and organizations (KANTER; ECCLES, 1992), more attention should be paid to how networks are constructed by their members and how these members are using these networks. The authors also argue that this kind of knowledge is complementary to that of the academic research agenda, regarding network characteristics and the network organization, and the best way to acquire this knowledge is to study individual managers who are engaged in it. Studies conducted by Yoshino and Rangan (1995), concerning the entrepreneurial approach to globalization, have led to a general conclusion summarized as follows, "The ability to build, develop, manage and maintain a global network will be the critical dimension that separates winners from losers, as the global environment evolves of the future" (YOSHINO; RANGAN, 1995, p. 206).

Particularly, the scope of this study has been limited to observe the phenomenon in the Italian industrial district, for two main reasons: a) the Italian industrial district is a business network predominantly made up of Small and Medium-sized Enterprises (SMEs), acting in a co-operative way, both internally and externally to the district; and, b) the relevant role of technology innovation (development and transfer), for the competitiveness of an individual firm and the whole district in the market, is very well recognized.

2 ITALIAN INDUSTRIAL DISTRICTS, BUSINESS NETWORKS AND TECHNOLOGY INNOVATION PROCESS. CONCEPTUAL APPROACH

Giacomo Becattini's definition is accepted in the economics literature, as the more appropriate one to express the present concept of an industrial district. This author started to coin his definition from the readings of Alfred Marshall's texts, who, for the first time, proposed a definition of **industrial district** while studying the industrial organization in England in the 1920's, as presented in a reference theoretical book named *Mercato e Forze Locali: Il Distretto Industriale* (BECATTINI, 1987). From that point on, Becattini designed his own research agenda applied to the Italian experience comprising the existing industrial districts at the time, all over the country: 58 in 1981 (SFORZI, 1987), - 199 in 1991 and 156 in 2001 (INSTITUTO NAZIONALE DI STATISTICA, 2006) - mainly located in Italy's northeastern and north-central regions. Becattini has defined an industrial district as a spatially and culturally identifiable area in which both employers and employees live and work. Other elements of Becattini's definition are described by Lazerson and Lorenzoni (1999) as follows:

> His [Becattini's one] ideal-type industrial district is comprised of numerous small firms engaged in activities related to a single industrial category and which are located in a community clearly identifiable in terms of geography, history and culture. Cultural homogeneity produces an atmosphere of cooperative and trusting behavior in which economic action is regulated by a series of implicit and explicit rules governed by both social conventions and public and private organisations (LAZERSON; LORENZONI, 1999, p. 238).

The contribution of the Italian industrial districts to the nation's economic activity is estimated as being 27% of total GDP, 38% of manufacturing GDP and 46% of manufacturing exports. Seventy five percent of these districts are specialised in: textiles and clothing, mechanics, furniture, and leather and shoes (GRANDO, 2005). Besides that, some economic activities led by the Italian districts, as luxury apparel, furniture, machine tools and ceramics allow the country to be placed in the top world ranking in the production of these items (LAZERSON; LORENZONI, 1999).

There is a prevalence of SMEs in the Italian industrial districts, but, in some of them, there may be a large firm acting as leading agent, as in the ceramic tile district located in the Sassuolo - Modena Area - (PAVAN, 1992), where the leading role is played by Ceramiche Marazzi. Conversely, a typical case without the presence of a large leading firm is in the chair district in the Manzano - Udine Area - (ALBERTINI; PILOTTI, 1996). Boari and Lipparini (1999) present a typology, from an economic standpoint, for the inter-firm relationships entered into by industrial district firms.

The significant presence of SMEs in the Italian industrial district is very representative of their predominance in the Italian manufacturing structure. As per data concerning national statistics, in 1991, 63% of Italy's manufacturing workforce was employed in firms with <99 employees and 39% in firms with <19 employees (LAZERSON; LORENZONI, 1999, p. 241). Aside those typical characteristics, three others could be taken as distinctive of an Italian industrial district: a) economies of time, defined as the ability to design, manufacture and deliver customized products quickly; b) the intense cooperative interaction among individuals (mainly on an informal basis) and firms in both the internal and external environment to the district, forming internal and external long term networks; and, c) the strong dependence on the innovation capacity to maintain the competitiveness of both individual firms and the whole district.

Generally speaking, the way SMEs belonging to an Italian industrial district operate is fairly close to the generic description proposed by Perrow (1992) for small-firm networks (SNF):

> They [small-firms] interact with one sharing information, equipment, personnel, and orders, even as they compete with one another. They are supplied by a smaller number of business service firms (business surveys, technical training, personnel administration, transport, research and development, etc.) and financial service firms. There are, of course, suppliers of equipment, energy, consumables, and so on, as well as raw material suppliers. Finally, while producers may do their own marketing and distribution, it is more common for there to be a fair number of quite small distributors, which is especially striking because SNFs typically export most of their output.(...) The small firms are surrounded by an infrastructure that

> is essential for their survival and for their economies of network scale: local and regional government provides roads, cheap land, educational services, and even financing; trade associations provide economic information, training, financing and marketing services; and both of these along with unions monitor unfair business and labor practices (PERROW, 1992, p. 455).

This description does not necessarily mean that the networks in the Italian industrial districts are restricted to their physical boundaries, as noted by Lazerson and Lorenzoni (1999). Studies carried out by these authors in four industrial districts – Prato, Tuscany (textile); Carpi (knitwear) and Bologna (machine-packing), both in the Emilia-Romagna Region; and Castel Goffredo (women's stockings), in the Lombardy Region - have shown the existence of both local and distant networks, with the latter as useful as the former, for the business competitiveness of the firms in the district.

3 METHODOLOGY

The two Italian industrial districts selected for this study are the Sassuolo District (ceramic tiles), in the Modena Area, Emilia-Romagna Region, and the Lumezzane District (metal-mechanics), in the Brescian Valley, Lombardy Region.

The **analytical model** applied in this study, regarding the management issues, has a dynamic characteristic, as evidenced by the mutual interaction of the four dimensions of the Bruno and Vasconcellos' model. This is because the stability and effectiveness of the business cooperation strategy (alliances or other forms of cooperation among organisations; formal or informal ones) are, by definition, susceptible to a constantly changing equilibrium, due to the tension between cooperation and competition. This situation corresponds quite well to the reality faced by firms in Italian industrial districts, even if the cooperation among firms takes place usually in an informal way. The dynamic nature of these interactions among dimensions ensures that the model provides a systemic approach for the analysis of the issues involved, as is appropriate when one anticipates possible problems that may jeopardize the stability and/or effectiveness of an alliance, and works pro-actively on solutions to these potential problems.

The key concepts in this model are the stability (also understood as durability) and the effectiveness of alliances. These concepts are analyzed in terms of four dimensions — **institutional** factors, **organisational** factors, **execution,** and **value creation** — each of which comprises a set of sixteen basic management rules or factors. The set of factors for each dimension is made up as follows: four factors in the **institutional** dimension - mutual respect and convergence of institutional objectives, history of relationships, identification of interlocutors, and excellence; five factors in the **organisational** dimension - tolerance of cultural differences, ability to engage in dialogue, communication, honesty and ethics, and transparency; four factors in the **execution** dimension - definition of agenda for interaction, definition of scope and commitment to execute projects, contract flexibility, compatible competencies; and three factors in the **value creation** dimension – knowledge, mastery and application, economic benefits, organisational / institutional benefits (BRUNO; VASCONCELLOS, 2003).

The study is of the **exploratory type,** based on the case study method which fits the purpose of the present research. According to Yin (1981), the case study method is appropriate when the research deals with a contemporary phenomenon, within a real context, and in order

to obtain knowledge (still scarce) of such reality. This research strategy, of an empirical nature, allows us to identify the variables that make up the analyzed phenomenon through direct observation and interviews. For this purpose, the research must be based on available theoretical proposals that are pertinent to the objective of such research, in order to guide the collection and analysis of the field data.

3.1 RESEARCH PLAN AND EXECUTION

The research has been planned and applied regarding both aspects: a) the academic side, on one hand, concerning the state-of-the-art of the strategic management and related disciplines, with special regard to cooperative strategies of business network; and on the other, the body of knowledge referring to industrial districts, with emphasis on the Italian model; and, b) the empirical side, carried out with a selected sample of managers working in the Italian industrial districts and with some engagement in the interorganisational strategic links, among the different agents involved in this kind of system.

In order to accomplish the first part of the proposed research plan, a series of interviews were carried out with scholars and researchers. Four of them were done with people from the Italian science and technology system: Vittorio Chiesa, professor at the Polytechnic School of Milan (Politecnico di Milano); Stefano Breschi, professor at Bocconi University, Milan; Sergio Albertini, professor at Brescia University; Lionello Negri, researcher at the National Research Council, Rome. A fifth person, José Albors Garrigós, professor at Valencia Polytechnic University, Valencia, Spain, was also interviewed.

Regarding the empirical data collection, four people were selected as respondents, two of them in each industrial district, Sassuolo and Lumezzane. The strategy for this empirical phase was to start the research with a service organisation of each district, which plays a role of coordination for many activities of common interest of the industrial district participants. By so doing, it was possible to have an overview of all activities and the interactions played by the district components among themselves, and among them and the agents from the external environment (individual ones – clients, suppliers, partners -, and institutional relationships – public or private organisations). Assopiastrelle and Lumetel represent this kind of organisation in the Sassuolo and Lumezzane districts respectively. The interviewees were Andrea Serri, manager in Assopiastrelle and Massimiliano Bergomi from the permanent staff of Lumetel.

In the second phase of the field data collection, interviews were conducted with people from the production units in each industrial district. The respondents for this activity had been selected as per recommendation made by the interviewees in the preceding phase, as follows: Giovanni Campomagnani, director for international business strategy and institutional relationships, Ceramiche Marazzi, Sassuolo District and Emilio Lena, partner-owner and the person responsible for process and product innovation, Greiner SpA, Lumezzane District.

For the interviews a set of open questions had been prepared, that were outlined on the basis of the concerned literature, collected through this research, and the model previously indicated in this methodology, concerning management issues in cooperative business strategies.

4 THE ITALIAN INDUSTRIAL DISTRICT ORGANISATION – CLUB DEI DISTRETTI ITALIANI

The Local Systems of Work (*Sistemi Locali del Lavoro-SLL*) – legally recognised in Italy by Law 317/91 - are characterised by a variety of sectors and organisational methods that differ widely from each another. The SLLs are census research tools of the social and economic structure of Italy, from a territorial perspective. Among the SLLs, the most easily distinguishable ones are the **industrial districts,** due to their strong identity associated with a few very characteristic elements: specialisation in a manufacturing sector, the division of work between companies, high entrepreneurial levels and permeation between social and economic life.

As per Law 317/91 an "(industrial district) is a territorial area characterised by high concentrations of small companies, industry specialised, with a specific relationship between proximity of firms and local population" (INSTITUTO NAZIONALE DI STATISTICA, 2006). This decision of the Italian Government was taken in order to facilitate the process of establishing industrial-specific policies concerning the improvement of competitiveness of an important portion of the national production system, i.e. the industrial districts. Each district is made up of **local units** classified as productive units (manufacturing and service companies) and non-productive units (public entities and non-profit organizations). In order to be in line with legislation in the European Community, in June 1993, the Italian legislation underwent a change and started using the Community's criterion by which the **small company** became an "SME (small and medium-sized company) with up to 250 employees" (INSTITUTO NAZIONALE DI STATISTICA, 2006).

Regarding the total number of SLLs (686), and according to the last census (2001), Italy has 156 industrial districts (out of the 240 SLLs working in the manufacturing sector), which absorb almost 2 million of the employees in the Italian manufacturing industry (almost 70% of the total in this type of industry). Within this total number of districts, there are 212,347 manufacturing companies, out of which 99.8% are SMEs (78.6% employ 1-9 people and 18.6% employ 10-49). There are 437 non-SME companies (>250 employees). The average number of employees per manufacturing enterprise in the district is 9.1 (INSTITUTO NAZIONALE DI STATISTICA, 2006).

The industrial districts in Italy are spread out in the whole country (see Figure 1). Also according to the 2001 census, the population living in the industrial districts represents 22.1% of Italy's total population, distributed among 27.3% of the country's municipalities. On the average, each industrial district is made up of 14 municipalities (12 in 1991), each one with an average of 80,715 people (68,943 in 1991) (INSTITUTO NAZIONALE DI STATISTICA, 2006).

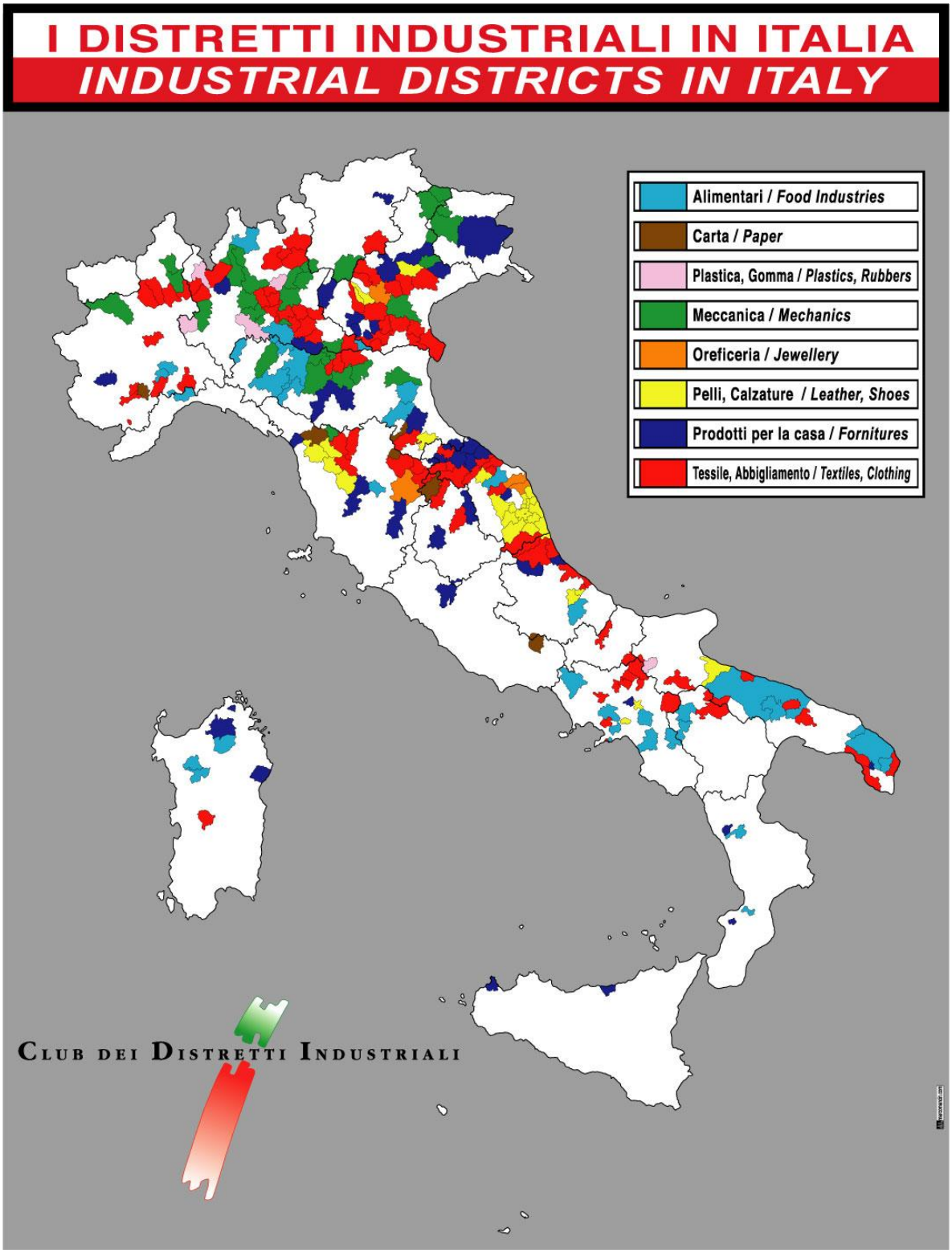

Figure 1 - Italian industrial districts. Geographical location
Souce: Clubdistretti, 2006

In 1994, for the purpose of reinforcing competitiveness in the Italian industrial districts, a collective organisation was founded and was named **Club dei Distretti Italiani**. Thirty-one of the Italian industrial districts are currently affiliated to this Club, totaling 55 thousand companies with over 450 thousand employees and generating a global turnover of approximately 45 billion Euros (almost 40% of the total turnover of the Italian districts) (CLUBDISTRETTI, 2006).

Among the Club's main objectives, two of them can be identified: a) to create a network among district operators to assist in the exchange of information and experiences regarding common problems; b) to promote studies and research in the field of economics and links with institutions, economic, cultural and scientific operators, also in order to encourage widespread awareness of the policies necessary for the development of local systems (CLUBDISTRETTI, 2006).

Club members may be industrial or craft associations representing a sector, unions, Chambers of Commerce, company service centres and other organisations that run their business at a local level and which are involved with local systems.

The sectors of Italian products represented in the Club are: wool textiles, taps and fittings, clothing, glasses, silk textiles, metalwork, furniture, materials and goods for civil construction and home furnishings, food and fruits, cork, ski boots and sports footwear, leather goods and footwear, goldsmith. Both the Sassuolo and Lumezzane districts are affiliated to the Club.

5 COMPARING TWO INDUSTRIAL DISTRICTS IN TERMS OF THEIR BUSINESS ORGANIZATION AND THE TECHNOLOGY INNOVATION PROCESS

This section presents the results corresponding to the part of the research which identifies the main characteristics of the business organization and the technology innovation process, that appear in the business network of the Italian industrial districts, as well as the role played by the technological innovation in the competitiveness of the district and of its members, individually. As was previously stated in the methodology, the research was undertaken in two industrial districts in Italy, i.e. Sassuolo and Lumezzane.

It is usual to find in the constitution of Italian industrial districts some organisations representative of social and cultural groups or communities, besides the producers. One of them plays a relevant role for the various dimensions related to the network effectiveness. In the two industrial districts focused in this study, they are Assopiastrelle and Lumetel in the Sassuolo and Lumezzane districts, respectively.

This kind of organisation acts as a steering agent for the network, having among its activities the following ones: to organise and promote the process for the diffusion of information (commercial and technical, including the innovation process); to encourage entrepreneurial activities; to supply services of business management (IT products, institutional marketing, exhibits and participation in fairs, etc.). Regarding the process of technological innovation, this type of agent in the district plays the role of institutional interlocutor, seeking to fulfill the demand or take advantage of technological opportunities with the entities in the scientific and technological areas, whether locally, domestically or internationally.

5.1 THE SASSUOLO DISTRICT. MAIN CHARACTERISTICS

The Sassuolo Ceramics District is a highly specialised area representing the productive and strategic heart of the Italian ceramics industry, a point of reference for the sector at world level, and the most important industry in the world for the production of sector-related machines and equipment.

The story of the ceramics District, situated between the Provinces of Modena and Reggio Emilia, began at the end of the 1950's thanks to the concurrence of different factors that enabled the ceramics industry to take off rapidly. These factors were: local availability of raw materials, opportunity of recruiting labour from the nearby agricultural areas and consequent birth of the plant engineering industry related to the sector.

In the nine Municipalities that make up the Modena Area (Sassuolo, Scandiano, Rubiera, Casalgrande, Castellarano, Formigine, Fiorano, Maranello and Castelvetro di Modena) all the main sections related to the ceramics cycle have been developed: enamel and paints, glue, packaging, specialised technical consultancy service providers, graphics and design, marketing, storage and transport, legal and insurance services. Eighty percent of Italy's tile production comes from the District of Sassuolo, of which four fifths is devoted to flooring and the remainder is utilised as coverings. The District comprises 114 production companies (99.8% SMEs), 20,400 workforce involved and a turnover of 4.3 billion Euros (CLUBDISTRETTI, 2006).

Tiles from Sassuolo and the surrounding area are well-known all over the world for their high quality and special beauty. The products' strong resistance to wear and tear, their wide range, sizes, colors and decorations, styles and design are the District' strong points, together with the capacity to innovate and to embrace cutting edge production technology. Another distinctive characteristic is the high level of integration within the District itself, which generates considerable advantages for the companies located in or around the area. Ceramic tiles and machines and equipment for the ceramic industry are exported. The main market outlet for the District's production of tiles (around 70%) is Western Europe (mainly Germany and France), followed by the United States and Eastern Europe (PAVAN, 1992).

The companies in the district are strongly geared towards exporting. The characteristic of an **Italian style** product is a relevant factor for the competitiveness of these companies in the international market. For this specific market, the option in the company's strategy is the area of high quality products, seeking the consumer with high purchasing power. The competition, especially Brazil and Spain, works with the low and middle-income sectors of the market. New players are entering the international market, coming mainly from Thailand, South Korea and Taiwan.

Therefore, the service offered to the market by the Italian producer (both before and after the sale) became relevant for its competitiveness. This capacity is more widely developed among the few large companies in the district (>250 employees), among them Marazzi who was interviewed for the field study in this work. These companies have the necessary conditions to work within a **market-oriented** strategy. The large group of SMEs in the district has a **product-oriented** strategy.

According to the people interviewed in the Sassuolo district, in order to show the relevance of services for the competitive capacity of the companies – particularly in the international market – the statement was 'we no longer sell square meters of flooring or tile, instead we sell architectural projects, of which such products are a component'. In other

words, ‘we sell a solution for a particular area and not an isolated product’. Thus, there is a greater need for integration among the players in the district’s production chain as well as for the development of products with high technological content, which is confirmed by the research conducted by Pavan (1992).

The internationalisation of the district’s activities was achieved particularly by the large companies, who have even set up production facilities in some countries. This was the case of Marazzi, who owns production units in Spain (in the ceramics district of Castellon), France (Le Blanc-Mesnil) and the US (in Dallas), and has commercial representatives and its own distribution centers in those countries, as well as in France, Germany and the UK. The SMEs, on the other hand, have only internationalized their commercial activities.

Due to the role played by the companies’ dynamics as well as to the positive results achieved to face the widening of the internationalisation of the economy in the eighties, the Sassuolo district became part of the research conducted by Michael Porter, on the competitiveness of nations, which led to the concept of ‘cluster’ as proposed by said author (PORTER, 1992).

According to the interviewee from Marazzi, the company belongs to the group of companies in Porter’s research. The Marazzi group has a turnover of 80 million Euros (2005), corresponding to the production of 8 million square meters of flooring and tiles; it employs over 8,000 people in all of the Group’s activities, in Italy and overseas (MARAZZI, 2006).

Assopiastrelle, the association of Italian ceramic tile and refractory material manufacturers, is responsible for representing, supporting, informing and liaising among member companies. The organisation also includes allied companies, i.e. Italian companies that perform industrial activities complementary to the production of ceramic tiles or refractory materials, as well as sales companies (CONFINDUSTRIA CERAMICA, 2006).

For almost forty years, Assopiastrelle has been striving to meet the needs of member companies, by supporting their activities and representing their interests, role and corporate image. It is supported in its efforts by its affiliation to Confindustria (Italian Employers' Association). Through an extensive network of national and international relationships, Assopiastrelle is capable of pursuing strategies to support its member companies. Assopiastrelle also sits on the management boards and committees of various Italian and international organisations and bodies.

Assopiastrelle coordinates relations with the organisations responsible for drawing up technical standards on ceramic tile production and with the bodies that certify the quality of ceramic tiles. It maintains contacts with universities throughout Italy and with research centres to assure constant innovation of ceramic products and production processes. In regional terms, the Association leads relationships of common interest with the University of Bologna and the Italian Ceramic Center – *Centro Ceramico* - a technology research center associated to that university, and it is also in charge of organising continuous training and specialisation activities for graduates and for newly employed personnel through courses held by the University of Modena and Reggio Emilia. The Centro Ceramico was founded in 1976 and is managed by a consortium led by the University of Bologna, with a branch inside the Sassuolo District (CENTRO CERAMICO BOLOGNA, 2006).

5.2 THE SASSUOLO DISTRICT - MANAGEMENT OF THE TECHNOLOGY INNOVATION PROCESS AND THE COMPETITIVENESS

The Italian ceramic industry's leadership role is based, amongst other things, on the efficiency and competitiveness of its constituent companies. In turn, these factors are the result of a closely-knit network of relationships, shareholding and strategic agreements with national and international organisations and companies, all of them aiming to improve the competitiveness of industrial factors.

The main challenge for the competitiveness of the companies within the district is associated with the need to reinforce factors and competencies that cannot be easily imitated or copied. Among these, the capacity of innovation can be mentioned, both in the area of technology as well as in the service added to the products. For the district as a whole, technology is the relevant factor for the competitiveness of companies.

In this district, two types of management behavior that are typical in the management of technology can be observed. One of them, which occurs in most SMEs, shows companies dedicated almost exclusively to product innovation, with flexibility and agility for a reactive response to demand. The other type of behavior is that of large companies (>250 employees) that work in the development of technology, processes and products.

In the case of the SMEs, access to technology occurs mostly through third parties, especially equipment manufacturers and input suppliers. Some companies have developed their own innovative competencies by acquiring and applying IT to manufacturing and product technology (CAM, CAD). The strategy of cooperation practiced by the SMEs regarding technological innovation issues occurs at a lower level than that of trading in the international market (for example selling the product under a single brand) (PAVAN, 1992). According to this author as well as to Onida (1992), the reduced practice of cooperation involving technology, almost always done informally, is one of the factors affecting the competitive capacity of the SMEs.

However, in the case of the large companies in the district, the strategy of cooperation - in its broad sense and for several objects - is practiced in a formal way both inside and outside the district. In terms of technological cooperation, the authors observed the existence of several agreements between Marazzi and universities in Italy (Modena) and in Spain (Valencia) as well as collaborative research with the **Experimental Center for Glass** (Murano, Italy). Marazzi is a leader within the district in the process of business internationalization.

In line with its company strategy of being the leader in the technology of ceramic processes for flooring and tiles, Marazzi holds strategic alliances with manufacturers of equipment and input suppliers. This is the case of the alliance with Sacmi (former Siti), which led to the patenting and international commercialization of the tunnel kiln and mono-burning technologies as well as to the development of a new enamel for the finishing of the product with Bayer Italy.

From the point of view of the district, the presence of internationally leading companies, such as Marazzi and others (Iris, Cisa), produces cooperation effects that spread to many SMEs (in the areas of manufacturing and technical services) as well as to other organizations, as for example, the center for technology and the one for services.

5.3 THE LUMEZZANE DISTRICT. MAIN CHARACTERISTICS

The Lumezzane District is part of a whole district named The Iron District – District 10 of 20 districts in the Lombardy Region - from the Brescian Valley (Valle Trompia and Valle

Sabbia) that covers an area of 800 sq. km. in the Province of Brescia and is made up of forty-nine municipalities, among them Lumezzane, with a population of 292,920 inhabitants. The district dates back to the last part of the 19th century and the beginning of the 20th (Austro-Hungarian Empire). Nowadays a typical feature of the Brescian Valley region is the substantial presence of artisan enterprises. The area specialises in the manufacturing and working of metal products. In addition, there is an important presence of enterprises producing machines and mechanical equipment and metallurgical products.

The coordination of The Iron District is held by both local governments of Valle Trompia and Valle Sabbia that share the Board Committee with the Chamber of Commerce of Brescia, Craft Workers Association of Brescia (Associazione Artigiani di Brescia), Regional Craft Union (Unione Provinciale Artigianato), representatives from Brescia's branch of national workers unions (Confederazione Generale Italiana del Lavoro (CGIL), Confederazione Italiana Sindacati Lavorotori (CISL) and Unione Italiana del Lavoro (UIL), and also Lumetel. The whole District 10 comprises around 3,300 entreprises, and it has a turnover of 94 million Euros (Clubdistretti, 2006).

The territorial distribution of the different specialisations in the district shows the way in which the mechanical industry is more heavily concentrated (almost double in terms of number of companies and workers) in the area of the Trompia Valley – particularly in Lumezzane – as compared with the other specialisations in the area of the Sabbia Valley (steel metallurgy and metallurgy). The production structure of the Iron District is made up mainly of SMEs as well as of artisan production enterprises. Lumezzane concentrates 2,021 production companies (2,017 SMEs with an average of 9.5 employees per company) and make up 31.2% of the total workforce in the whole District 10 (INSTITUTO NAZIONALE DI STATISTICA, 2006; LUMETEL, 2006a).

The strong points of the district are: a) a business culture strongly geared towards production; b) a strong capacity to coordinate the company's internal activities, together with agility and operational flexibility; and c) conditions of the social and economic environment that encourage business entrepreneurship. Among the weak points, the ones that mainly affect the competitiveness of companies are related with the innovation of the product, a rather reactive business attitude without a policy for self-motivated differentiation and with poor competencies for the phases of promotion and sales (LUMETEL, 2006b).

Greiner S.p.A. has been present in national and international markets since the end of the 40s, when it was specialised in the production of bronze gate valves and stop valves. The company has been trying since then to meet the continuous requirements, coming from different situations of technological innovations and of new materials, in order to give the market the most efficient and proper solutions. In that way the company has also created an open and easily-adaptable way of working, including design by means of the latest CAD systems (GREINER S.P.A., 2006).

Greiner is a family-owned company managed by two members of the family. One of them is in charge of the technical area (technology, engineering and production) and the other one runs the marketing side. This company is an SME whose technical capacity is above average for the district, as it counts on a team of engineers able to develop patents for its products. Eighty percent of its production is sold in the domestic market and twenty percent is exported to Europe, mainly to Spain. The company has few activities in the area of cooperation; it acts only sporadically together with equipment manufacturers.

The Lumetel Agency was founded in 1991 as a non-profit organization acting in the Iron District. Its mission is to offer services to the companies in the district contribute to the diffusion of technological innovation and, overall, act as an entity to promote and encourage innovative activities in the areas of technology and management, aimed at local development. The services offered by the Agency – about one thousand per year - are mostly used by the SMEs in the district (LUMETEL, 2006a). Lumetel was set up with an almost identical share of capital from public and private entities. The municipality of Lumezzane and the province of Brescia are two of these public entities and, on the private side, more than 160 companies take part in the organization.

Lumetel has conceived and operates two technology incubators to encourage the entrepreneurial activities in the district. The agency operates on the national and international levels: in 1998 it became a BIC (Business Innovation Centre) of the European Business and Innovation Centre Network – EBN network -, and it also opened its own office in China (Shanghai).

5.4 THE LUMEZZANE DISTRICT - MANAGEMENT OF THE TECHNOLOGY INNOVATION PROCESS AND THE COMPETITIVENESS

Technological innovation in the district originates mainly from equipment suppliers and technology fairs. The main innovation occurs in the area of manufacturing; product innovation mostly of incremental nature, is more reactive than proactive and the main source of demand for this type of innovation originates from the customer itself. A strong characteristic of the district is the attitude, on the part of the competitor, to imitate the product, and this occurs within a short period. Therefore, each company will include this factor to calculate the time for the launching of products. This behavior also explains the great interest on the part of the companies regarding process innovation, in order to reduce costs and improve quality.

Cooperation, in a broad sense, both internal and external, as practiced by the agents in the district is limited and was not encouraged until the end of the 1990's and beginning of the present decade. The fierce competition caused by the appearance of similar imported products (mainly from China, in the case of this particular district) has modified such behavior. Having to meet the demand of large orders has stirred collaboration among competitors, in order to guarantee the supply in amounts that one single company would not be able to offer. There has also been a self-motivated initiative to work closer with the university, through projects that include students, as was the case of an international competition of industrial design sponsored by the Polytechnic School of Milan (*Politecnico di Milano*).

From the point of view of external cooperation and due to problems of cost and logistics, some companies are delocating part of their manufacturing to eastern European countries. For this purpose, they enter into collaborative actions with internal as well as external agents, to work out issues in the area of logistics and production.

The Lumetel agency plays a catalytic role in this process of approximating and setting up partnerships that became necessary because of the latest market conditions.

Due to the background of cultural characteristics, the diffusion of knowledge associated with innovation occurs by means of an informal process, mostly through social or leisure activities. More recently and as a result of the information technology, e-mail has become another means for the diffusion of knowledge among people. For the companies, IT

has also created an alternative for cooperation, with the creation, on the part of Lumetel, of an electronic portal of multiple agents within the district (companies, financial institutions, telecommunications suppliers, etc.), in order to encourage collective purchases and the creation of a market for the exchange of used machines and equipment.

6 BUSINESS NETWORK ORGANISATION VERSUS TECHNOLOGY INNOVATION PROCESS: MANAGEMENT OF COOPERATION INFLUENCING COMPETITIVENESS

The results obtained by means of this research allow us to summarise (Chart 1) the typical characteristics in terms of business organisation and the technology innovation process, within the Italian industrial district. The set of literature and documents that have contributed mostly for this characterization originate from: Becattini (1987); Bugatti and Bugatti (1992); Clubdistretti (2006); Confindustria Ceramica (2006); Corvi (1995); Grando (1995, 2005); Lazerson and Lorenzoni (1999); Lumetel (2006b); Pavan (1992); Viesti (1992). Otherwise, the field research outputs also aggregate some important elements to complete and confirm some of the characteristics of the role of the management of technology innovation for the competitiveness of a single agent or for the whole network, which congregates hundreds or thousands of SMEs.

BUSINESS	INNOVATION
✓ Economic interactions among firms founded on history of trustful social relationships ✓ Entrepreneurship stimulation and reinforcement ✓ Synergy potentialisation ✓ Individual business strategy ✓ Strong dependence on innovation capacity (process innovation is more critical in Sassuolo) ✓ Product design differentiation ✓ Flexible tailor-made production structure ✓ Readiness to match changes on consumer needs ✓ Increasing participation in international market ✓ High level of investment in capital goods ✓ Infrastructure sharing: commercialisation; training; R&D ✓ Joint institutional relationships: technical entities for standardisation; regulatory agencies; funding entities; policy making organisations	✓ Tacit knowledge accumulation (cognitive process without planning/coordination; based on network of personal relationships) ✓ Extensive technical interaction (on informal person-to-person basis; mainly between producer and local supplier) ✓ Fast diffusion of innovation ✓ Main access through equipment/devices from suppliers (local and external ones) ✓ Investment from individual firm's resources (very small amount of money from external funding) ✓ Supply diversification on international basis ✓ Incremental process innovation by producer in continuous basis

Chart 1 - Italian Industrial Districts - *Distretti Industriali Italiani* - Business organisation and technology innovation process: current main characteristics
Source: Developed by the authors

From the point of view of technological innovation, the two analyzed districts, working in mature areas of the economy, show that there are no specific actions on the part of the public research system, coordinated by the *Consiglio Nazionale delle Ricerche* (CNR). Thus, these districts have neither financial resources nor infrastructure from the Italian public system to meet their technological demand (ISTITUTO MOBILIARE ITALIANO, 2000; NEGRI, 1993). The investment in innovation, production or services must be made with the companies' own resources.

The collective demand of the district is met by organizations such as Assopiastrelle and Lumetel, in the case of the Sassuolo and Lumezzane districts. One of the important roles of these organizations is the one played by their catalyzing actions, geared towards the development and strengthening of the cooperation practiced by the various agents involved in the system of the industrial district, even for the development of the competencies required for the process of innovation within the companies.

One of the characteristic aspects of the business network of the Italian industrial district type is that the environment favours **the adding of value through concentrated knowledge** rather than through other material factors, typical of geographic concentration. The generation and diffusion of knowledge, particularly in the area of the SMEs, occurs by a non-formal process, based on a person to person communication. The corporate dynamics encourage the accumulation of knowledge within the district. It is fairly common for someone to leave a specific company and remain in the district to set up his/her own firm, normally in the area of services. Several cases were reported by the people interviewed in the two analyzed districts.

This is one of the ways for people to remain in the area of the district. This fact sets a cultural environment favorable to the accumulation and diffusion of knowledge.

Cooperation through a structured process and in line with corporate strategy is practiced by the larger companies (>250 employees) in both districts. On the other hand, in the group of SMEs, no evidence was observed regarding the higher relevance of the concept and awareness of the **strategic role of cooperation for competitiveness**. Some improvement was seen in this regard as a result of the rise in the internationalisation of business requiring cooperative action on the part of the SMEs in the area of production and commercialization. This management aspect is one of the factors in the **institutional dimension** of the conceptual model of cooperation management of the strategic alliance type, applied in the present work (BRUNO; VASCONCELLOS, 2003).

In the area of the Sassuolo District, where some companies practice planned cooperation as a strategic option, another factor of institutional nature in the Bruno and Vasconcellos (2003) management model is **the mutual respect for the nature of the mission and the objectives of each one of the partners.** The respect for the cultures, the partners and the social environment in the area of each one of the companies, is part of the cultural values of Marazzi. In 2005, the company set up a code of ethics (MARAZZI, 2006). The ethical behavior is one of the factors in the **organizational dimension** of this management model.

In the environment of the Italian industrial districts, due to the fact that the diffusion of knowledge is done mostly through a person to person relationship, the people interviewed highlight the importance of two factors in the Bruno and Vasconcellos management model: **the background of relationships** – in the institutional dimension- and **the quality of communication** – in the organizational dimension. It was also recognized that the cultural environment in the districts plays an important role, which is vital for the development of trust

among people. The latter is of utmost importance for the quality of communication required for an efficient diffusion of knowledge. Trust is also the basis for the strengthening of relationships between institutions and the people who participate in the cooperation processes among companies (ROBERTS, 2004, p. 76; TURATI, 1990, p. 221).

Regarding the **management competency** for the cooperation process, it was observed that there are no programs for the training of managers in this area, in the two analyzed districts. Several authors mention the importance of such competency to generate a competitive edge for the companies that take part in such cooperation. Among them, the work of Lorange e Roos shows that **the competency of learning** the practice of management is one of the seven key factors for the success of partnerships (LORANGE; ROOS, 1993, p. 213). The process of learning is the basis for recognizing the added value of intangible aspects achieved through a partnership, as for example **the organizational development and the mastering and application** of new types of knowledge. These intangible aspects, besides their economic benefits, are the key dimension in the Bruno and Vasconcellos model (2001), i.e. the dimension of **creation of values** to be achieved through a cooperation process with business characteristics.

7 FINAL COMMENTS: PERSPECTIVE RESEARCH

Two areas of research emerge as a result of this study of exploratory nature. These would be, on one hand, to continue working on the phenomenon hereby analyzed, extending the study to specific cooperation cases of companies in the area of the Italian districts. On the other hand, work could be done in the area of comparative studies between the **Italian industrial district** and **local Brazilian production setups**, which is one of the reasons for the research in which the present work is included. This experience in Brazil is inspired in the Italian model and is being applied in some regions of the country, as can be seen from several papers already published (for a broader overview of this movement in Brazil) (TIRONI, 2001).

For the development of future research applied to the Italian industrial districts, the movement to which this type of business network is being submitted should also be considered. Among the different studies that have been published (BECATTINI; RULLANI, 1993; BRESCHI; LISSONI, 2001), the conceptual leadership of this movement is summarized by Albertini (1991) as going from the production of goods to that of knowledge (in order to produce goods competitively). In practice, this movement is already ongoing in Italy, by means of the **technological district** concept, which gave rise to the conception and implementation of ten such Italian districts. (BALESTRI, 2005).

From the point of view of competencies in the management of cooperation strategy, for the purpose of technological innovation, the **technological district** in Italy has introduced some huge challenges. As an example of the magnitude of these challenges, in the first three years of existence of the Technological District in the Emilia-Romagna District – specialized in state-of-the-art mechanical technology – 77 million Euros were invested, for a total of 188 projects. At the same time, 234 cooperation agreements of the university-enterprise type were signed and 155 other similar ones were also signed with state-owned Italian laboratories (GRANDO, 2005).

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INOVAÇÃO E TECNOLOGIA NA ORGANIZAÇÃO EMPRESARIAL DOS DISTRITOS INDUSTRIAIS ITALIANOS

Resumo

Os distritos industriais têm um relevante papel social e econômico na organização industrial italiana. Distritos industriais são redes de negócios envolvendo principalmente pequenas e médias empresas e outros agentes sociais e econômicos, organizados em comunidades que são bem definidas dos pontos de vista geográfico, histórico e cultural. O presente estudo visa identificar a dinâmica de negócios e a maneira na qual ele infuencia, ou é influenciado, pela gestão da inovação tecnológica. Trata-se de um estudo exploratório com um plano de pesquisa baseado na revisão da literatura, um levantamento de documentos e entrevistas com gestores de organizações que fazem parte de distritos industriais italianos e pesquisadores que atuam na área. O estudo de campo foi desenvolvido nos distritos italianos de Sassuolo, Modena Area, Emilia-Romagna Region (ceramica) and Lumezzane, Brescian Valley, Lombardy com Region (metal-mechanica). Os resultados identificam vários elementos que são típicos das inovações tecnológicas nos distritos industriais, particularmente as características culturais e os fundamentos das relações sociais e pessoais.

Palavras-chave: Competitividade. Distritos industriais italianos. Gestão da tecnologia. Pequenas e médias empresas. Redes de negócios.

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