Geographical Embeddedness of the firm. A Case Study based on the Knowledge-Based View .

F.Xavier Molina

Jaume I University of Castellón (SPAIN)
Department of Business Administration & Marketing
Campus Riu Sec
12080 Castellón (Spain)
Phone: (964) 281266
Fax: (964) 345733
E-mail: molina@emp.uji.es

ABSTRACT

Recently, collaborative advantage and geographical embeddedness of the firm has received growing attention in a dynamic vision of the attainment and sustainability of the firm competitive advantage. Concepts such as Industrial District and Regional Cluster have been used in these studies. However and in spite of this interest few efforts have been devoted to establish links between these competitive dimensions and theories of firm performance differences. This work has consisted on a multisource case study on the Spanish Ceramic Tile Industry. This empirical study has been focus on three major aspects: interfirm relationships, innovation process and social control. Findings have guided final discussion, linking these findings with dominant theories of the firm. The paper suggests that relational and geographical embedded strategies are related to both low transaction costs and strategic knowledge based resources.

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Researchers in the field of strategy are becoming more interested in the collaborative advantage and geographical embeddedness of the firm. The success and diffusion of entrepreneurial experiences (for example: Silicon Valley or Third Italy) has provided a rich source of empirical data. There has benn a recent trend to understand the Industrial District (Becattini 1979, 1990) and Regional Cluster (Porter, 1990).

In spite of this recent interest, this perspective has been traditionally absent in the strategic field (Scott 1989, Foss and Eriksen 1995: 49, Hagström and Chandler 1998: 7 Denoble and Galbraith, 1992). In fact, this phenomenon has never really been satisfactorily addressed or resolved (Pouder and St. John 1996). Most of the written material has been partially analyzed without outlining its relationship with competitive strategy literature (Enright, 1998). In particular, we know little about how knowledge actually flows across company boundaries and how institutions shape knowledge diffusion (Appleyard 1996).

This work has been based on the Spanish Ceramic Industry. The study describes factors such as: productive specialization, size, age and proximity of the firms as well as the importance of the social context. All of them are aspects of a collective model of creation and diffusion of the innovation.

The paper is organized as follows: In the first section, the theoretical framework is outlined, secondly, we have described the empirical work and our main findings and finally, we have discussed the implications regarding the innovation process.

THEORETICAL FRAMEWORK

The industrial district, a concept developed by A. Marshall (Marshall 1925), was later expanded by Becattini (1979, 1990) and a number of Italian economists and sociologists (Sforzi, 1990, Brusco 1982,). The concept of the industrial district combines three main elements (Becattini 1990): the community of people; the population of firms and the industrial atmosphere.

Industrial district assumes the existence of a community of people, where the participants share a feeling of belonging or common identity. Participants also share a system of values and beliefs which also act as a form of restraint on individual behavior (Becattini 1990).

High levels of individual interdependence justify the emergence of social control. As has been pointed out, by Russo (1997) and Paniccia (1998), the protagonism of a community of people is very similar to concepts like *embeddedness* (Granovetter 1985) or *Social Capital* (Burt 1992). According to these concepts, norms of reciprocity and trust emerge among individuals which facilitate local cooperation. This social embeddedness constitutes a key element of the development of the district (Dei Ottati 1994).

The Industrial District also assumes a population of firms. These firms are specialized firms. They are specialized in a specific phase of the production process. The industrial district is characterized as a group of firms working together, interfirm rather than an intrafirm division of labor. There are institutions, both public and private, offering what Brusco (1990) calls *real services*. These institutions include research centers, industrial policy agencies, academic institutions and trade and professional associations. These institutions -particularly those linked with research activities- identify the industrial district as a munificence environment as Decarolis and Deeds (1999) and McEvily and Zaheer (1999) have pointed out.

Finally, the Marshallian term *industrial atmosphere*, refers to the flows of experiences, information and knowledge circulating within the district with little or no constraints. This intangible asset can be translated as a district-specific tacit knowledge (Porter and Sölvell 1998).

The orthodox or canonical view of the concept of industrial district stems from a unique historical and social process. This restrictive version of the concept has been criticized by some authors (Paniccia 1998), arguing that only a few experiences of the Italian model could fulfill these requirements. Case studies by some authors have questioned its validity and potential, (Bianchi 1994; Harrison 1994) while other studies have postulated different origins and developments of the districts (Amin and Robins 1990, Spender 1998, Staber 1998). For instance, in a recent study, Lazerson and Lorenzoni (1999) revised the basic principles of the district, and were able to justify the presence of large firms in the Italian model. Along this vein, Zeitlin (1992) has proposed a more open model. He incorporates both spatial and institutional conditions to allow for the integration of different realities and historical, as well as social processes.

Regional cluster (Porter 1990, 1991, Porter and Sölvell 1998, Enright 1995, 1998) can be considered as an equivalent or similar concept. The main difference lies in that regional cluster extends the application of the industrial district to the global firm

strategies, while the principles of the district assume an endogenous process. In the regional cluster concept drawn from the Activity-Based View of the firm, location is determined by local environment conditions (Dunning 1993, Enright 1998). Unlike the industrial district which is an outcome of the environment conditions, the institutional context of regional clusters can be created by deliberate action or strategic action.

These previous concepts describe concentrations of firms and institutions in a geographical space. This paper has focused particularly on the process of collective innovation. How companies and institutions generate and exploit innovations and how they are protected against external competitors.

EMPIRICAL RESEARCH

Research method. The aim of this case is collect and analyze data and facts to answer to the questions previously formulated. Observations were collected for a relatively long period of time and from multiple sources. We received support from a number of diverse institutions: ASCER (Association of Ceramic Tile Manufacturers of Spain), ITC (Institute of Ceramic Technology) and Jaume I University. In addition, we had access to internal reports and publications, we were able to conduct personal interviews with managers and owners of the firm in the district. The collection of quantitative data was obtained via reports and publications of the institutions of the industry, some of which were published by a number of external researcher institutions (Nomisma 1992 Costa 1993). In addition, we found it necessary to use a questionnaire to study on the ceramic tile manufacturers population.

Industrial district participants.

1. Firms. An interfirm rather than intrafirm division of labor is a result of emphasizing in the specialization inside the district. Different groups of activities have been ordered according their positions in the production process. The first group, the *final firms* following Brusco's terminology (Brusco 1990) are those that carry out pressing, glazing and firing phases. Together with this major activity of the district there are a number of auxiliary and related activities. The second group of firms carry out the *atomized clay process*. This process consists of grinding the raw material until a fine grain is obtained, after which they undergo granulation by subsequent atomization in order to obtain granules with defined characteristics.

The third group are *decoration firms* which usually carry out additional tile firing. In this process, design is incorporated to the tiles. This phase of the production process is not common to all pieces, it can be considered as a complementary phase.

The fourth group of activities are *ceramic machinery firms*. This group include manufacturing and commercialization of ceramic machinery and technological services. Ceramic machinery is presented in all phases of the tile production process, from the preparation and moulding, drying, firing, energy co-generation, transport, and storage etc. These firms include a number (25%) of Italian strategic alliances, joint ventures or direct investments (Company Listing 1999).

On the other hand, *frit and glaze manufacturers* is significant sector. These firms supply all components required for firing and glazing processes. Frits and ceramic glaze firms have had increased access to external markets (from 1990 up to 1997 export activities have increased 367%, reaching an export rate of 49,4% in 1998) (Cluster Competitiveness, 1999). As a result of this increasing access to external markets its dependence regarding the rest of participants of the district has reduced.

Components suppliers include a large number of firms. These firms supply components and materials for the production process such as electronic or mechanical components and equipment. On the other hand, *raw material suppliers* offer to firms such diverse materials as: abrasives, additives, clay, chemical products and refractory materials. Lastly, there are a number of companies offering *general services* to firms, including freight forwarders, engineering, consultancy, travel agencies, and etc.

Table 1 shows all groups of activities, where activities have been identified following SIC (Standard Industry Classification) at four-digit level.

Table 1. District participants. Source: Tile Guidebook (1999) Company Listing (1999).

ECONOMIC ACTIVITIES	4 digits S.I.C.	Number
Floor and wall ceramic tile manufacturers	32.53	149
Atomized clay manufacturers	14.59	8
Decoration of pieces firms	32.69	27
Ceramic machinery firms	35.59	74
Frits and ceramic glazes manufacturers	28.51	30
Components suppliers	50.85	58
Raw materials suppliers	Several	15

Firm services	Several	21
Total		382

2. Institutions

Here, we include regional institutions to complete the map of participants in the industrial district. These institutions offer services and support to the entire district. They are often non-profit organizations, both public and private. Their activities are focused on research, specific training for managers and technicians and marketing of ceramic products.

*Firm size.*Evolution and distribution of firm's size in the district. Table 2, shows relative stability in the firm size during a period of two decades. Overall, we can say that increases in production and sales have been accompanied by parallel increases in employee productivity. The moderate increase in the number of employees in the 90's may be attributed to changes in the production processes (single firing) as well as to the internalization production phases of earlier technologies (double firing).

In this ceramic district the evolution of the firm size differs from the experience in other districts like Il Prato (Lorenzoni and Ornati 1988) or Modena (Lazerson 1995) where a process of desegregation from large to small sized firms has taken place.

Table 2. Evolution of the firm size. Source: ASCER (1999)

Year	Number of employees
1980	*77*
1985	*61*
1990	*66*
1998	*88*

Table 3 describes the distribution of the firm size in the district. Firm size is normally distributed and the majority of firms (59.2%) are between 25-100 employees.

Table 3. Distribution of firm sizes. Source: ASCER (1999).

Size (Employees)	Percentage
Less than 25	18%
25-50	35,40%
51-100	23,80%

101-200	13,50%
More than 200	9%

In recent years we have not seen any significant change in firm concentration. This shows that the structure of the district is stable. We can infer that a certain balance between cooperation and competition has been achieved. Becattini pointed out (1990) when the size of firms grows too much it "surpasses the scale" and hence the conventional form of the industrial district is abandoned.

Firm age. Starting in the 60's the inside district can be observed as a continuous process of creation of new firms. The start-up firms have arisen out of existing parent firms (spin-off firms). Table 4, represents the period of creation of the companies. Only companies that currently still exist have been considered and therefore they have not been considered as companies that have disappeared in the same periods.

Table 4. Age of the firms. Source: Tile Guidebook, 1999.

Period	Number of firms
Before 1950	7
1950-1960	12
1960-1970	30
1970-1980	30
1980-1990	33
1990-2000	37
Total	149

The rate of creation of companies has remained stable during the last four decades, with an average company age of 24 years.

Geographical proximity of the firms. Taking the city of Castellón as epicenter of the district, the average distance between final firms is 16,34 kilometers. While if we consider the rest of companies belonging to the auxiliary and related activities the average distance is 9,1 kilometers. This slight difference may be justified since auxiliary and related firms are focused on the internal market and they aim to locate around the epicenter.

The geographical distribution of the companies takes place around four local centers with an equivalent relative importance (see table 5).

Table 5. Firms distribution among local areas. Source: Tile Guidebook, 1999 and Company Listing, 1999.

Local centers	Final firms	Auxiliary and related firms	Total firms
Area L'Alcora	63	20	83
Area Onda	34	36	70
Area Vila-real	32	102	134
Area Castelló	20	74	94
Total	149	233	382

Social importance of the ceramic activity. A remarkable aspect of the district is the relative importance of activities related to the ceramic district in relation to total economic activities developed in these areas. Table 6 shows percentage for each of these local areas, the number of companies and employees directly linked with the activities of the district. Table 6 shows most of the local centers to be almost exclusively district based. Lower percentage for the case of Castellón may be justified by its larger dimension as an urban center and capital of the county concentrating the greatest number of unrelated activities.

Table 6. Relative importance of the district activities. Source: ARDAN'(1999).

Local centers	% Firms District	% Employees District
Zone L'Alcora (L'Alcora, Figueroles, Vilafamés, Sant Joan)	93,3	98,2
Zone Onda (Onda, Ribesalbes)	85,9	95,7
Zone Vila-real (Vila-real, Almassora, Nules, Betxi)	56,7	61.6
Zone Castelló (Castelló, Borriol)	24.4	43.5
Total	50,3	67.5

Technological overlaps. Inside this district the companies coincide in terms of same products and use of same technologies. This fact encourages a combination of competitive and cooperation interfirm relationships. In this context frequent exchanges exist both among companies and human resources.

Table 7. Product/Technology overlaps. Source: Tile Guidebook, 1999.

Product/Technology	Number of firms
Wall tile with white body	29
Wall tile with red body	113
Floor tile with white body	23
Floor tile with red body	97
Porcelain stoneware	10

Collective information. The existence of external institutions offering services and support to the companies generates important externalities. Two of them may highlighted: specific training by academic institutions and efforts in R & D carried out by the research institutions.

There are a number academic degrees tailored to the district needs: Chemical Engineering Degree (University Jaume I) for final firms and frits and ceramic glazes firms technicians; Industrial Technical Engineering Degree (University Jaume I) for final firms and ceramic machinery firms technicians; Industrial Design Engineering Degree (University Jaume I), for final firms technicians; Industrial Ceramic Specialization (Vocational training Institute), for final firms and frits and ceramic glazes medium technicians (ASCER 1999). A part from this official training there are numerous number specific training courses carried out by institutions of the district.

On the other hand, the activities of the research centers are diverse and include projects both with final firms and auxiliary and related companies. In short the Institute of Ceramic Technology (ITC) carries out the following activities: 1) *Technological transfer*. Applying and adapting to the ceramic sector technologies developed in other industrial sectors; 2) *R & D*. Development of new components, new compositions and optimization of the ceramic processes; 3) *Technological services*. Standardization of raw materials, controls of product system, installation of systems of quality and environmental control, and 4) *Training*. Specific courses, periodical publications and participation in congresses.

Research projects developed by ITC are distributed among the different activities in the sector. For the period 1985-1997 the distribution in percentage of the projects related to district activities was as follows: Frits and ceramic glazes firms (35%); Floor and wall

ceramic tile manufacturers (33%); raw material suppliers (18%); ceramic decoration firms (6%) ceramic machinery firms (1%), and others (7%) (ITC, 1998).

Specific technologies of the district. We understand specific technologies to be those that are not exclusive to any individual company as well as being untransferable to external companies. These technologies arise out of a combination of company and institution actions. Formal and informal communication channels are a hindrance to individual appropriation as well as to external district transfer.

Inside the ceramic district we can highlight, among others, the following specific technologies: Energy co-generation, big format floor tiles and the porous single firing wall tiles.

Energy co-generation, consists on the use of the thermal energy surpluses for the electric power generation. The development of this technology is a result of major public funding. The development of this technology has generated the specialization of a number of auxiliary firms, up to 14, including engineering, manufacturers, and components suppliers (Company listing 1999). This energy-saving infrastructure has been widely extended among major ceramic tile manufacturers.

Floor tiles big formats. We understand big format floor tiles as those bigger than 500cmsx500cms surface. Big formats arise from using comparative advantage in the quality of local raw materials. As a result of this advantage, firms develop specific technology in relation to mechanical, glazing and firing aspects.

This type of product allows results in reduction in unit cost of production as well as saving time at final floor installation. The difficulties of this particular production stem from flatness and caliber problems. Up to 21 companies producing big-size floor tiles n the ceramic district can be found of big dimensions, basically, formats such as: 500x500 and 600x600 (Guidebook 1999).

Porous single firing process. This is more important than previous technologies, in terms both of complexity and economic significance. Basically this technology consists of the application of single firing technology to wall tile pieces. This application presented difficulties as a result of more stringent demands on wall tiles than on floor tiles (design, shining, caliber, flatness, etc.). The district of Castellón had already specialized in the techniques of traditional wall tiles (in contrast with Sassuolo area that has specialized in floor tiles by developing a specific technology of porcelain stoneware). Currently, up to 142 companies are totally or partially concerned with floor

tile production and technology. An example of this specialization of the area ascertained through a product portfolio comparison between Italy and Spain.

Table 8. Products Portfolio Spain/Italy. Source: Cluster Competitiveness, 1999.

Product/Technology	Spain	Italy
Wall tile	46%	22%
Floor tile	51%	63%
Porcelain stoneware	3%	15%

Interactions between different levels of participants appear in the case of the porous single firing process involving firms, institutions and joint projects. Research institutions participate in projects with final and frits and glazes firms, and to a minor degree with the ceramic machinery sector. There, new products or combinations are developed. For instance, formats and designs are tailored to new technology and firms apply innovations individually or jointly with suppliers.

Findings of the questionnaire. Complementary to observations and interviews, we used a questionnaire in our study in order to find stronger support to conclusions. We took into account opinions by firms regarding a number of questions related to the innovation process at the district level. The survey consists of assessments by firm top management rated on a scale from 1 to 5. The result has been a total of 101 answered questionnaires that were filled in during personal interviews on a population of 149 firms (Appendix I). The survey was divided in two different parts. The first part covers five variables related to innovation process. In the second part, we aim to measure the importance of the legal protection of innovation in the district.

Little empirical precedent was available to guide the development of the measures. Fieldwork helped refine the choice of constructs and identify the most relevant items. Item selection was also based on feedback obtained from a pilot questionnaire and constructs were further refined by using a data set. This research method is consistent with previous works (for instance: Szulanski 1996). For simplicity in scoring, a single balanced 5-point Likert-type scale was used almost exclusively. Cronbach's alpha was used as a measure of reliability because it is the most widely used measure (Nunnally 1978). Discriminant validity was evaluated for all variables pairs by examining the observed correlation matrix of the variables. Additionally, significance levels for all

means (above 3) were evaluated. Items forming all variables used in the study are described in Appendix II.

Variables: (1) Research institutions. Firm's perception of the role played by research institutions on firm R & D activities, particularly the role played by the Institute of Ceramic Technology (ITC). *(2) Similarity of the processes.* Firm's perception of the similarity of their models or patterns of firm-supplier relationships and make or buy decisions. Additionally, the importance of the local origin of the suppliers and of the human resources were assessed. *(3) Specific knowledge.* Firm's perception of the existence of knowledge-based resources at district-level, this knowledge is neither exclusive to the firm nor tradable to firms external to the district. *(4) District externalities.* Firm's of district location advantages. *(5) Common reputation.* Firm's assessment of the common internal perception held by markets.

The second part of the survey aims to value the importance of legal rights on the innovations. It was sought to value how much firms use legal mechanisms to protect innovations against competitors. *(1) Use of legal mechanism of innovation protection* This variable includes two groups of questions. First, firms evaluate the relative importance of the four groups of firm capabilities (regulatory, positional, functional, and cultural). The inclusion of this classification of capabilities were based on previous works Coyne (1986) and Hall (1992, 1993). We particularly focus on the assessment of regulatory capabilities (including: patents, copyrights, contracts and trade secrets). On the other hand we ask about the existence of legal rights shared with other district companies.

Results

Table 9. Descriptive statistics, means, standard deviation, Cronbach's alpha and Pearson's correlation (n=101).

Variables	Mean	S.D.	α	1	2	3	4	5
1.Research Institutions	3.61***	0.88	0.70	1.00				
2. Similarity of processes	3.99***	0.64	0.65	0.05n	1.00			
3.Specific knowledge	3.52***	0.47	0.62	0.11	0.11n	1.00		
4. District externalities	4.43***	0.57	0.61	0.21	0.01n	0.1n	1.00	
5 Common reputation	3.19***	0.70	0.70	0.29	0.01n	0.26	0.21	1.00

*** Mean significantly higher than 3 at p<0.01

α Cronbach's alpha.

Pearson correlations are significance at p<0.05 unless accompanied by 'n' indicating not significant.

Table 9 summarizes descriptive statistics. Cronbach's alpha score presented values ranging from 0.61 to 0.70, hence providing an adequate level of reliability for an exploratory study. Means are significantly above 3 at p<0.01, providing a positive assessment of the variables proposed.

Results confirm case description observations in the sense of underlining the importance of institutions on the innovation process, similarity in the processes, specific nature of the knowledge at level of the district, location externalities and finally as a result of this collective process, the common market perception of the reputation of district member firms.

Table 10 . The importance of legal protection.

Variables	Mean	S.D.
1. **Regulatory Capabilities**: Possession of legal rights such as patents, copyrights, trade secrets, etc.	8	7.3
2. **Positional Capabilities**: As a result of past decisions and actions, such as reputation, trust, loyalty, etc.	39	17.6
3. **Functional Capabilities**: The ability to do specific things. As a result of employees' knowledge and experience.	31	14
4. **Cultural capabilities**: Refer to organization habits, attitudes, beliefs, and values of individual and groups in the organization.	22	10

Table 11. Shared legal rights.

Firms (n=101)	YES	NO
Existence of shared patents with other district firms.	4	97
Existence of shared copyrights with other district firms	1	100
Existence of shared registered designs with other district firms	5	96
Existence of shared contracts with other district firms	14	87
Existence of shared trade secrets with other district firms	10	91

Tables 10 and 11, suggest a relatively poor relative assessment of the legal rights on innovations as regulatory capabilities (8%). And confirms the limited number of firms which share any type of legal rights with other district members. This finding may suggest both difficulties in identifying and attributing innovations because of their collective nature and the existence of non-contractual protection mechanisms based on the social embeddedness of the firms.

CONCLUSIONS

As a summary of the observations we can say that productive specialization exists among the participants inside the industrial district. There are a number of institutions offering support and services to firms. These institutions carry out research, training and marketing activities. The age of the firms and the geographical proximity facilitate both formal and informal communication channels. Important technological and product overlaps occur. In fact, there is specific knowledge at district level. This knowledge is not exclusive of the individual companies neither it is available for the external firms of the same industry. The difficulties experienced for internal innovation protection and social embeddedness may explain internal diffusion of the innovations and protection against external competitors.

The collective innovation process is based on shared experiences where emulation and imitation play a significant role in a trial and error process. Formal and informal communications and the high internal mobility of human resources reinforce the system. There are interactions between explicit and tacit knowledge combining *learning by communicating* (often formal and codified) and shared experience based on *learning by doing*, as described by Spender (1998). Additionally this innovation process has the characteristics pointed out by Nonaka and Takeuchi (1995), meaning it is a continuous, incremental and spiral process. Innovations arise at each step of the process and they are incorporated to the next phase in a cumulative process. Overall, innovations do not have a radical character rather they are improvements on previously existing innovations. In fact, they are difficult to be identified and attributed to a particular firm or institution.

The existence of a country-brand competing against foreign ones reflects this shared district-specific technologies is. This brand implies quality standards shared by all products of the local area.

The existence of specific technologies at the district level have been proposed in previous works (Storper 1993, 1995). For example Tallman, *et. al.* (1999), in their study

of the English Sport Motor Valley found that the development of the mid-engine chassis, carbon composite chassis and aerodynamics technologies occurred in such a way that they were neither exclusive of any individual firm nor available for external firms.

Protecting knowledge assets is problematic. Patents, copyrights, and trade secrets and all property rights in knowledge are difficult to define as is to detect its expropriation or illegal imitation. Protection is extremely limited or nonexistent for knowledge that is only partially original, or is tacit, or is long-lived (Liebeskind 1996). In the case studied improvements are not only incremental in nature and based on tacit knowledge but are collective in nature; it is extremely difficult therefore to determine which firm or institution is responsible for the fundamental contribution to the innovation.

In conclusion, industrial districts give rise to appropriate conditions for the existence of strategic resources needed to attain competitive advantage and to generate rents. In the district, resources are generated under conditions of immobility. In this context, creation and accumulation of new resources, preserving them from time erosion, in a sense of dynamic capabilities (Teece and Pisano 1994). Lastly, the embeddedness of both formal and informal relationships, the importance of experience, emulation, and other factors are tacit in nature and form part of a continuous, incremental and spiral creation process.

REFERENCES

Amin, T.C. and Robins, K. 1990 The re-emergence of regional economies? The mythical geography of flexible accumulation, Environment and Planning, 8: 7-34.

Appleyard, M.M. 1996 How Does Knowledge Flow? Interfirm Patterns in the Semiconductor Industry Strategic Management Journal, *17: 137-154.*

ARDAN 1999 Data Base ARDAN Valencian Community Spain (Vigo: Consorcio Zona Franca).

ASCER 1999 Annual Report (Castellón: ASCER).

Becattini, G. 1979 Dal Settore Industriale al Distretto Industriale. Alcune considerazioni sull'unità di indagine in economia industriale. Revista di Economia e Politica Industriale, 1: 7-14.

Becattini, G. 1990 The Marshallian Industrial District as a Socio-economic Notion. In F. Pyke, G. Becattini and W. Sengenberger (Eds.), Industrial Districts and Local Economic Regeneration: 37-51 (Geneva: International Institute for Labor Studies).

Bianchi, G. 1994 Requiem for the third Italy?. 34th European Regional Science Congress, Groningen.

Brusco, S. 1982 The Emilian Model: productive decentralisation and social integration. Cambridge Journal of Economics, 6: 167-184.

Burt, R. 1992 Social Structure of Competition. In N. Nohria & R. Ccles (Eds.), Networks and Organizations: Structure, form, and action: 57-91. (Boston: Harvard Business School Press).

Company Listing 1999 Ceramic Technique. (Barcelona: Publicasa).

Costa, M.T. 1993 EXCEL. Cooperación entre empresas y Sistemas Productivos Locales (Madrid: IMPI. Ministerio de Industria, Comercio y Turismo).

Coyne, K.P. 1986 Sustainable Competitive Advantage. What it is and What it isn't? Business Horizons, 1: 54-61.

Cluster Competitiveness 1999 El Sector azulejero en Castellón. Iniciativa de refuerzo de la competitividad (Castellón: Fundació Bancaixa).

DeCarolis, D.M. and Deeds, D.L. 1999 The Impact of Stocks and Flows of Organizational Knowledge on Firm Performance: An Empirical Investigation of the Biotechnology Industry, Strategic Management Journal, 20: 953-968.

Dei Ottati, G. 1994 Co-operation and Competition in the Industrial district as an Organizational Model, European Planning Studies, 2: 463-485.

Denoble, A. and Galbraith, C. 1992 Competitive Strategy and High Technology Regional Site Location Decisions: A Cross-country study of Mexican and U.S. Electronic Component Firms. Journal of High Technology Management Research, 3: 19-37.

Dunning, J.H. 1993 Multinational Enterprises and the Global Economy (Reading MA: Addison Wesley).

Enright, M.J. 1995 Organization and Coordination in Geographically Concentrated Industries. In N. Lamoreaux and D. Raff (eds.) Coordination and Information: Historical Perspectives on the Organization of Enterprise (Chicago: Chicago University Press).

Enright, M.J. 1998 Regional Clusters and Firm Strategy. In A.D. Chandler, JR.; P. Hagström and Ö. Sölvell, The Dynamic Firm. The role of Technology, Strategy, Organization, and Regions: 315-342. (New York: Oxford University Press).

Foss, N.J. and Eriksen, B. 1995 Competitive Advantage and Industry Capabilities. In C.A. Montgomery (Eds.), Resource-Based and Evolutionary Theories of the Firm: Toward a Synthesis: 43-70. (Boston: Kluwer Academic Pub.).

George, T.A. and Mallery, P. 1995 SPSS/PC + Step by Step: A Simple Guide and Reference. (New York: Wadsworth Publishing Company).

Granovetter, M. 1985 Economic Action and Social Structure: The problem of Embeddedness, American Journal of Sociology, 91: 481-510.

Hagström, P. and Chandler, AD. 1998 Perspectives on Firm Dynamics. In A.D. Chandler, JR., P. Hagström and Ö. Sölvell, The Dynamic Firm. The role of Technology, Strategy, Organization, and Regions: 1-12. (New York: Oxford University Press).

Hall, R. 1992 The Strategic Analysis of Intangible Resources. Strategic Management Journal, 13: 135-144.

Hall, R. 1993 A Framework Linking Intangible Resources and Capabilities to Sustainable Competitive Advantage. Strategic Management Journal, 14: 607-618.

Harrison. B. 1992 Industrial Districts: Old Wine in New Bottles?. Regional Studies, 26: 469-483.

ITC 1998 Annual Activities Report (Castellón: ITC).

Lazerson, M. 1995 A New Phoenix?: Modern Putting-out in Modena Knitwear Industry. Administrative Science Quarterly, 40: 34-59.

Liebeskind, J.P. 1996 Knowledge, Strategy, and Theory of the Firm. Strategic Management Journal. 17: 93-107.

Lorenzoni, G. and Ornati, O. 1988 Constellations of Firms and New Ventures. Journal of Business Venturing, 3: 41-57.

Marshall, A. 1925 Principles of economics (London: 8th ed. Macmillan).

McEvily, B. and Zaheer, A. 1999 Bridging Ties: A Source of Firm Heterogeneity in Competitive Capabilities. Strategic Management Journal, 20: 1133-1156.

Nomisma 1992 Competitivita e concorrenza nell'industria delle piastrelle. I productori italiani e spangoli nell'evoluzione del settore (Bologna: Laboratorio di Politica Industriale. Assopiastrelle Eds.).

Nonaka, I. and Takeuchi, H. 1995 The Knowledge-Creating Company. A Theory of the Firm's Knowledge-Creation Dynamics (New York: Oxford University Press).

Nunnally, J.C. 1978 Psychometic Theory (New York: McGraw-Hill).

Paniccia, I. 1998 One, a Hundred, Thousands Industrial Districts. Organizational Variety of Local Networks of SMEs, Organizational Studies, 19: 667-700.

Porter, M and Sölvell, P. 1998 The Role of Geography in the Process of Innovation and the Sustainable Competitive Advantage of Firms. In A.D. Chandler, JR., P. Hagström and Ö. Sölvell, The Dynamic Firm. The role of technology, strategy, organization, and regions: 440-457. (New York: Oxford University Press).

Porter, M. 1990 The Competitive Advantage of the Nations (New York: The Free Press).

Porter, M. 1991 Towards a Dynamic Theory of Strategy. Strategic Management Journal, 12: 95-117.

Pouder, R. and St. John, C. 1996 Hot Spots and Blind Spots: Geographic Clusters of Firms and Innovation. Academy of Management Review, 21: 1192-1225.

Russo, M. 1997 Relazioni tra imprese e svolupo locale, Economia e Politica Industriale, 93: 105-137.

Scott, A. 1989 New Industrial Spaces: Flexible Production organization and Regional Development in Noth America and Western Europe (London: Pion, Td.).

Sforzi, F.1990 The Quantitative Importance of Marshallian Industrial Districts in the Italian Economy. In F. Pyke, G. Becattini and W. Sengenberger (Eds.), Industrial Districts and Local Economic Regeneration: 75-107. (Geneva: International Institute for Labor Studies).

Spender. J.C. 1996 Making Knowledge the Basis of a dynamic Theory of the firm. Strategic Management Journal, 17: 45-62.

Spender, J.C. 1998 The Geographies of Strategic Competence: Borrowing from Social and Educational Psychology to Sketch and Activity and Knowledge-Based Theory of the Firm. In A.D. Chandler, JR., P. Hagström and Ö. Sölvell, The Dynamic Firm. The role of technology, strategy, organization, and region:, 417-439.(New York: Oxford University Press).

Staber, U. 1998 Inter-firm Co-operation and Competition in Industrial Districts. Organization Science, 19: 701-724.

Storper, M. 1993 Regional Worlds of Production: Learning and Innovation in Technology Districts of France, Italy and the USA. Regional Studies, 27: 433-456.

Storper, M. 1995 The Resurgence of Regional Economies, Ten Years Later: The Region as a Nexus of Untraded Interdependencies. Journal of European Urban and Regional Studies, 2: 191-221.

Szulanski, G. 1996 Exploring Internal Stickiness: Impediments to the Transfer of Best Practice within the Firm. Strategic Management Journal, 17: 27-43.

Tallman, S.; Jenkins, M.; Henry, N. and Pinch, S. 1999 Knowledge Clusters and Competitive Advantage in Global Industries. 19th Annual International Conference. (Berlin:Strategic Management Society).

Teece, D.J. and Pisano, G. 1994 The Dynamic Capabilities of firms: An Introduction. Industrial and Corporate Change, 3: 537-556.

The Guidebook 1999 Spanish Wall and Floor Tile Manufacturers (Barcelona: Publicasa).

Utili, G.; Sarti, M. and Gobbo, F. 1983 L'industria delle piastrelle di ceramica nel mondo. I principali paese produttor*i* (Modena: Nomisma-Edi.).

Zeitlin, J. 1992 Industrial Districts and Local Economic Regeneration: Overview and Comment. In F. Pyke and W, Sengenberger (Eds.). Industrial Districts and Local Economic Regeneration: 279-294. (Geneva: International Institute for Labor Studies).

APPENDIX I: Variables and items.

Variable	Item
Research Institutions	1. Degree of Importance of institutions in R&D activities
	2. Availability of services and support to firm's R&D activities
	3. Using ITC services.
	4. Valuation of the services of the ITC
Similarity of the processes	1. Similarity of the pattern of relationships with the suppliers
	2. Similarity of make-buy decisions
	3. Local origin of suppliers
	4. Previous local experience for managers and technicians
Specific Knowledge	1. Non exclusive knowledge of the employees
	2. Using knowledge and technologies developed by local competitors
	3. Knowledge district-specific regarding external firms
	4. Previous experience in district firms for employees.
	5. District internal human resources mobility
	6. Shared information on products and technologies for district firms.
	7. Shared information on markets and customers for district firms.
	8. Existence of institutional information on products and markets
	9. Valuation of the institutional information
	10. Ease of informal transmission of knowledge and innovation.
District externalities	1. Valuation global of the institutional services
	2. Quality, effectiveness and efficiency of the auxiliary industry
	3. Degree to which your firm reaches subcontracting agreements
	4. Degree to which your firm reaches non-productive cooperation agreements
	5. Privileged access to resources
	6. Permeability of the social structure
	7. Access to informal communication channels.

Common Reputation	1. Common perception of the district firms 2. Common fame of the district products 3. Common esteem of the district products 4. Positive effect of other individual firm reputation 5. Negative effect of other individual firm reputation.