IMPROVING SMES COMPETITIVENESS REINFORCING INTERORGANISATIONAL NETWORKS IN INDUSTRIAL CLUSTERS

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Abstract

Drawing on a social network approach this paper proposes a methodology that helps with the empowerment and development of interorganisational networks in clusters. Paper emphasizes the necessity of establishing relationships with other firms and external agents in order to empower the creation and diffusion of knowledge, through factors such as innovation.

The aim of the proposed methodology is to know how required knowledge should be located and diffused to identify the opportunities motivating the creation of particular interorganisational networks. Similarly, it is also important to know how to determine which agents might to take advantage of these opportunities creating networks.

Keywords: clusters, interorganisational networks, competitiveness, knowledge, innovation

Introduction

For firms, cooperation with others; bigger or not firms, both in horizontal and vertical networks, becomes a strategic alternative and allows them to make the most of the competitive advantages of their associated firms. If a large number of firms are involved, relationships can be created among them so as to form a compact network. These interorganisational networks normally develop in a specific geographical location in the form of clusters.

Among the different types of existing networks, at first sight, one structure appears to be suitable for this situation; this is the "*virtual organisation*", so called for its special features of flexibility and adaptability to its surroundings. All the existing definitions in the literature on this type of organisation agree in defining them as cooperating organisations, each of whom contributes what it can do best to work for a specific market opportunity and operating as far as the client is concerned as if they were all in the same organisation.

A series of questions follow naturally from the foregoing definition: What are these opportunities? Who identifies them? How? Which organisations join together to take advantage of these opportunities? Who searches for them? What criteria are involved? What are the coordinating mechanisms established between firms? In this paper we propose a methodology that will try to answer these questions for the particular case of enterprises localised geographical clusters.

To achieve this, the most important factor will be to locate and share the information and knowledge necessary so as to be able to identify opportunities or key success factors, so that a virtual organisation can develop within a cluster, and to make possible the determination of the most appropriate members or components in order to achieve these success factors.

We have structured our paper as follows: first we have explained our theoretical framework, then we have described step by step the proposed methodology and we have applied to the case of the textile cluster in Valencia Region (Spain). Finally, conclusions and implications are discussed.

Theoretical Framework

Interorganisational Networks as Source of Knowledge and Innovation

Innovation varies significantly among firms (Cohen and Levinthal, 1990; Dosi, 1988) and it is probably the best indicator of the creation of value (Hitt et al., 1996). Innovation refers to the conversion of knowledge into new products, services or processes to be introduced on the market (or the introduction of significant changes into existing ones).

More specifically, innovation and firms' capacity to innovate can be associated with the capacity to combine and exchange knowledge resources (Kanter, 1988; Kogut and Zander, 1992). Resources in networks include information, products and personnel, as well as support for these resources. Moran and Ghoshal (1996) have argued that new sources of value are generated by means of new exploitations of resources, and more particularly through new ways of exchanging and combining resources. Either way, since the pieces of knowledge to be combined may reside in different parties, the exchange of information becomes a requisite for combination and thus for knowledge creation (Cabrera and Cabrera, 2002)

Undoubtedly, knowledge and innovation come both from internal and external sources, yet in the recent strategy and innovation literature a great deal of emphasis has been placed on determinants that are external to the firm. These factors refer to the positive externalities firms receive in terms of knowledge from the environment in

which they operate (Van Waarden, 2001). More specifically, interorganisational relationships create opportunities for knowledge acquisition and exploitation (Dyer and Singh, 1998; Lane and Lubatkin, 1998).

As the embeddedness perspective argued, access to external innovation sources is associated with the characteristics of the interactions of the firm with other actors in the social networks.

Territorial Interorganisational Networks

In our opinion, proximity can be expected to shape social networks by producing a dense structure and strong ties. Therefore, firms benefit from efficiency by *exploiting* existing opportunities through sharing high quality information and tacit knowledge as well as through cooperative exchange. If geographical dispersion prevents or hinders the generation of routines and redundancies of the interactions, face-to-face interactions between actors induce the frequency and redundancy of the ties (McEvily and Zaheer, 1999). In short, proximity provides frequent, repeated, non-marked, informal contacts, all of which facilitate strong ties and the density of the network of ties.

However, one of the primary concerns for researchers is how to generate the growth of cluster development within the context of dynamic innovation systems. *Lock-in* is part of the positive as well as the negative story of clusters because it is the capability to innovate within exclusive networks that provides the key that locks in learning capacity. Grabher (1993) referred to the risk of lock-in and group-thinking, particularly when the cluster has to cope with external changes. Only when that learning has been superseded and new knowledge is not absorbed does *lock-in* become a problem (Cooke, 2002).

As we understand it, cluster membership produces far more than a proximity effect for firms. Cluster firms enjoy a number of relations which are unavailable to external

firms. In terms of structural holes, we know about the existence of local institutions within the cluster that act as intermediary agents by providing contacts with external, otherwise unconnected, "actors" belonging to very different circles.

In the context of territorial networks we suggest that, rather than creating this portfolio of ties internally, firms can use external parties (but which are still within the cluster network) to connect themselves to disperse and weakly tied networks. Among possible third parties, we focus on local institutions.

We can conceptualize that as *bridging* social capital. Individual and organizations with geographical proximity forms groups that determine attitudes, beliefs, identities and values. At the same time to form part of a group determine access to resources, opportunities and power. It may have a high social capital within the group (*bonding* social capital) which helps members, but they may be excluded from other groups (they lack *bridging* social capital). It can be distinguished two types of social networks, *bonding social capital* as reinforcement of homogenous groups whereas *bridging social capital* as bonds of connectedness that are formed across diverse social groups (Putnam's, 2000).

In conclusion firms must participate in multilevel networks in order to be provided by knowledge and information required for innovation process. In the following sections we propose a methodology in order to identify and characterized different interorganisational networks.

The Case of the Valencia Textile Cluster (Spain)

In this section we are going to comment the economic indicators of the Valencia textile cluster in order to contextualize our research. What we like to underline here are

a few aspects to understand the economic position and dynamics of the Valencia Textile Cluster with respect to growth, labour cost or economic structures.

National Context

As it is well-known Spain lagging with respect to the rest European countries as a consequence of a close and autarchic economy during a long period of the twenty century. However, from the end of seventies and eighties Spanish economy was growing faster than European average and rapidly reducing the European gap.

Firm size distribution

Spain presents a predominance of the small size firms in their structure. According to the Observatory of European SMEs (2003) the weight of the micro firms was around 95%. On the contrary the large firms accounted for around 0.1 per cent. Regarding the number of employees for each firm category the numbers change but there remains the same structure. More than a haft of the workers belongs to micro firms, and less than 20% belong to large firms.

Existence of industrial clusters or districts

According to *The Observatory of European SMEs, 2003*, in Spain there were 142 clusters. Using other methodology Istat recently the Spanish Minister of Industry was built a map of industrial districts (at local level) and they applied Spain. . Findings were: 806 Local systems, 237 industrial districts 1.288.082 employment 14,9% on average DI / total industry (Boix and Galletto, 2006). Figure 1 shows the maps of the industrial districts in Spain.

Insert Figure 1 about here

The Valencia Textile Cluster

Location and evolution

The Valencia Textile Cluster is located in the counties of l'Alcoià-Comtat including towns such: Alcoi, Ontinyent or Bocairent. In the region, in 2005 there were more than 35.000 employees in this industry. The workers distribution of workers was 73% of them in textile subsector and remaining in knitwear and apparel subsectors. Region cluster accounted for 19% of the total Spanish production only lower than Catalonia.

In recent years the production of the cluster dropped at -6% (2003) and -1.5% in 2002. Looking at the evolution from 2001 to 2004, only the first year was an increase of +9.7, the following years the value of the production dropped respectively at -4.7; -1.5 and -5,3 %. Total turnover value was 2,573 millions of €.

Structure of the cluster: firms' size, activities and specialization

The cluster size per firm on average was of 20 employees. Firms with more than 50 employees accounted for only 5 per cent of the total and there were 1,859 firms with more than 32,000 employees. The number of micro firms account of the 67% of the total. About the medium sized firma less than 50 employees, 34% and finally, large firms (more than 50 employees) accounted for 2%. So there was an unique specialization in home textiles.

The subsector partial workers employees were in 2003: yarns 2.833 (9%), fabrics 7,675 (24%), other textiles 9,506 (29%) and knitwear 12.208 (38%). The workers' distribution for subproducts was: 73% of workers in textile subsector and remaining in knitwear and apparel subsectors. Moreover, recently this cluster has move to the technical use of the textile. For instance in other industries like automobile, in last year the 40% of the firms were dedicated to this technical textile and the remains were divided between *dress* and *home* uses.

Insert Table 1 about here

Proposal for a Methodology

In order to be able to create interorganisational networks (as virtual organisations) in a cluster, the most important factor is to locate and share the necessary information and knowledge allowing us to identify opportunities or key success factors that would lead to their creation in a cluster. It is also important the decisions about the inclusion of the most suitable members to work together in order to achieve success.

For this we propose a methodology with three main phases. Figure 2 contents a graph of the proposed methodology that would illustrate the points dealt with in this paper. First is a general **territorial** phase, in which a structural analysis of the territory is carried out to identify the principal strategic segments and any microclusters existing in it. The second phase consists in studying a selected **microcluster**, which is analysed in order to locate and diffuse the information and knowledge necessary to create, build and promote the interorganisational networks existing in it. Finally, the third phase takes place, in which the key success factors (Z factors) of the microcluster are identified in order to make a specific virtual organisation for each identified key factor, the most suitable members are selected to be included and its main characteristics are determined.

Insert Figure 2 about here

In consequence, the methodology begins from a general situation and then becomes more and more specific, passing through the territorial aspect to the organisations in specific networks in the perfectly identified microclusters.

Now we will apply the proposed methodology to the Valencia Textile Cluster in particular, in order to describe its development and potential for analysis.

Phase 1. Territorial Stage. Identification and Analysis of the Industrial Sectors and Microclusters

IA. Structural analysis of the industrial sectors.

The first step in the proposed methodology is to carry out a structural analysis of the industrial sectors operating in the territory. Since our objective here is to demonstrate the validity and applicability of the proposed methodology, we will concentrate on the textile sector.

The methodology of Porter's five competitive forces (Porter, 1980) will be applied, with an analysis of the acquisitive power of the added value generated in the sector presented by each of the five forces that operate in it. The sub-sectors analysed are: preparation, spinning and weaving; textile finishing; carpets and other industrial textiles and woollen articles and manufacture of textile products.

IB. Identification and analysis of the most important microclusters.

When the textile sector is subjected to analysis, three large generic strategic segments appear: the production of clothing, household textiles and the so-called technical textiles. In this last group are contained many producers of different kinds of textiles; so that the term "technical textiles" has come to mean all those that are not included either in clothing or in household textiles.

From the interrelationships existing between these groups and their suppliers, nearby clients and associated firms and institutions, these groupings can be considered as specific microclusters, within the general cluster, with the capacity to generate their own strategic changes and able to influence the rest of the sectors and/or firms in a relationship with them.

In this paper the proposed methodology will be applied to the particular case of the Household Textile Microcluster; an analysis will be carried out on the decisive factors involved in its competitiveness in order to obtain a competitive diagnosis. Among the principal strategic variables detected in it, the most important are the diversity of its production, as well as its flexibility and different typologies of production.

Phase II. The Microcluster. Locating the Information and Knowledge necessary for the Creation, Structuring and Strengthening Interorganisational Networks

When the principal microclusters present have been identified, this is the moment to analyse the principal characteristics of the chosen microcluster. All this information will be essential for the preparatory stages of the creation of virtual organisations to deal with specific opportunities.

IIA. Obtaining the competitive diagnosis of the Household Textile microcluster.

With regard to the information about Valencia Textile Cluster analyzed before, it appears to possess the minimum resources necessary to sustain a competitive intra-sectorial strategy.

To sum up the analysis, the following table is obtained from the SWOT methodology, using qualitative data from a number of interviews based on a panel of experts and practitioners:

Insert Table 2 about here

II-B. Identification of the principal firms and institutions in the Household Textile Microcluster grouped in types.

The identification of firms and institutions present in the Household Textiles Microcluster will permit their structure and classification. They will be classified as **Institutions** present in or near the territory, that can be divided into vertical (or sectorial) and horizontal (or territorial) institutions; and **Firms,** where a second classification criterion can be applied based on Porter's diamond model (Porter, 1990), which produces leading firms, firms that supply goods and services to the first group, connected and/or related firms and nearby important clients.

To sum up, the principal firms and institutions are given in the following table:

Insert Table 3 about here

II-C. Design of map of the Microcluster.

From the foregoing relationships among the firms and institutions involved in the Household Textiles Microcluster, the map of the Microcluster can be drawn in which the different groups and sub-groups of identified firms and institutions are shown as inter-related blocks. Since there are participating businesses and institutions that are not located geographically in the territory but have a considerable influence on the value added by the firms in the microcluster these have been included in the Map of the Microcluster, but are shown to be outside the territory, with their relationships to the other members.

Insert Figure 3 about here

II-D. Definition of the present framework of relations among members.

The tool proposed in this methodology and used for the analysis of the relationships within the cluster, which is the objective of this section, is the "Structural Relations Matrix" (SRM). This is a squared matrix, or double-entry table, which defines the relationships among the principal firms and institutions located in a certain territory (Masiá et al., 2004). By means of this tool, the relations and connections among the elements involved are analysed so that the complete set of relationships among the group appears and the typology and quality of these relationships can be determined.

The group types of members and their corresponding code in the SRM are shown in the following table:

Insert Table 4 about here

Among these members the following diversity of types of relationship could be detected:

- **Indifference:** the members take no account whatsoever of the existence of the other member in the decision-making process.
- **Competition:** two members compete with each other, using different types of strategies to achieve their ends. According to the type of strategy and their attitudes to each other, the result of the competition for the microcluster may be:
    - **Negative:** The "I win-you lose" type relationship destroys value.
    - **Positive.** The "win-win" relationship creates value for the microcluster.

- **Collaboration: T**he two members adopt formal or informal attitudes that help each other to achieve their objectives while each is intent on achieving his own.

The two latter attitudes, competition and cooperation, are not mutually exclusive in a relationship between two members, unlike the first (indifference), which certainly excludes any other possibility. In the particular case of the relations between two competitors, the adoption of strong reciprocal competition in the market and positive cooperation in the rest of the activities, productive or not (contact with the administration, support for universities and research centres) is beneficial for the territorial system. This is called "co-opetition", for the concepts of competition and cooperation, and is considered the relationship most likely to generate value for the microcluster.

When making the matrix, the first operation is to verify the existence or non-existence of a relationship between two members, of any type of tie, communication, commercial or competitive relationship, etc. If there is no relationship of any type, the corresponding element in the matrix is zero and the box remains empty. In a first stage, a cross is marked in the boxes whose elements present some kind of tie or relationship, which gives a first approximation to the density of the relationship network, according to the difference in the numbers of marked and empty boxes.

The next step is to determine the specific typology of the established relationship and its quality, according to its contribution, positive or negative, to the synergy of the system. For this, the following symbols will be used to correspond to the different types or possibilities of predetermined relationships.

Insert Table 5 about here

The aim of our empirical study is not to find a precise (or quantitative) impact of the existence of relationships between the cluster institutions and firms on performance cluster indicators. Our objective is to provide a better understanding of the mechanisms through which cluster relationships provide knowledge resources that are relevant to competitiveness of firms and how they can help firms to overcome certain limitations, in particular those referring to exploring activities.

So, in order to identify the type of attitude of one member to another, we have used two different approaches.

Firstly, objective quantitative data about the firms and institutions was obtained via reports and publications from institutions connected with the industry. In particular, we used data from annual reports and publications by ATEVAL (Association of Valencia Textile Manufacturers); AITEX (Technological Institute of Textile) and the ARDAN database by IMPIVA (Regional Government Industrial Policy Agency). This material was chiefly used for the descriptive part of the empirical section and to investigate attributes of the cluster institutions and firms.

Secondly, personal non-structured interviews with experts and representative people from these leading firms and other institutions in the microcluster helped us in designing the present framework of relationships among the leading members of the microcluster. The results of the surveys were complemented and compared in joint working sessions with a panel of experts and practitioners.

From all of this the SRM of the group types is obtained corresponding to the present framework of relationships within the Household Textile Microcluster (Figure 4). Each element of the matrix corresponds to an actual relationship among the members.

Insert Figure 4 about here

It must be emphasised that in this second stage only relationships that generate or destroy value for the microcluster have been taken into consideration, all others have been discarded. This is so because, by the defining characteristics of the microcluster (location, proximity), all the members have some kind of contact, which meant that the relationship network was relatively dense. Here, we have gone a little deeper, although the SRM that would really afford more specific information would be that in which the members were considered separately and not grouped in "types", making the analysis in a second level of desegregation, considering the cluster agents that are involved in a specific success factor.

It is also important to emphasise the fact that the Aij value of the matrix is not necessarily the same as the Aji, since the former represents what the member i gains from his relationship with member j. If both "win" something from the relationship, both values will be the same, but it could happen that agent i, in his relationship with j, increases his capacity to generate value for the microcluster, while j does not.

From this matrix several conclusions can be drawn, the most important of which is that the density of the network of relationships is as it should be, although there are significant deficiencies or vacuums, such as the need to establish better cooperation between those responsible for training and the business enterprises, or the need for closer relations between the leading firms and the final clients, and between the latter and the related and connected firms. In a later section, a greater analysis will be made of these deficiencies, which will help us to locate and identify possible Z factors or success opportunities.

The fact of performing the SRM with group types simplifies the analytical process (if the members of the microcluster were treated individually in the matrix the amount of data to handle would simply have been unmanageable), but also causes a certain loss of potential of the tool. For example, in the figure there is no competition relationship, since this relationship exists precisely among the members of the groups in the figure.

The SRM has really been used here as a descriptive support tool. Its usefulness at this stage of the methodology is to give a general idea of the relationships among the members of the microcluster, classified as large group types. The real potential of this tool will be seen at a later stage, when it will be applied to a specific case and to members much more clearly defined.

Nevertheless, we now have an efficient tool to plan the strategies for increasing the ties and relationships that could be developed with the objective of significantly improving the potential to generate external economies and competitive advantages of the network within the microcluster, both for the firms themselves and for the other small firms and institutions operating in the system.

II-E. Analysis of the Framework of the Value Chain of the Microcluster.

Porter's Value Chain was designed for a specific business company. In this paper we have proposed the concept of the Value Chain to include all the production processes of the whole microcluster, thus obtaining the Framework of the Value Chain of the Microcluster.

The specific Framework of the Value Chain of a Microcluster will be represented here as a flow diagram with the links in the form of blocks or boxes, where each square corresponds to a value-generating activity with its associated costs, according to the resources consumed in the activity.

The complete process involves a series of quite distinct operations: the spinning of the thread, the weaving of the cloth, finishing, making up and distribution of the products to the final customer. Each of the processes is carried out by different firms in the microcluster, or sometimes by firms outside it.

Using all the foregoing information, the Framework of the Value Chain of the Household Textiles Microcluster can now be shown in the following figure:

Insert Figure 5 about here

Phase III. The Virtual Organisation. Creation, structure and reinforcement of the interorganisational networks of the Household Textiles Microcluster

When the previous phases are complete the key success factors, can now be identified (business opportunities, technology, etc.) for the microcluster with the internal and external information obtained.

In this last phase these factors will be identified and the configuration of the most appropriate virtual organizations of the members will be decided from among those considered most likely to lead to success. For each factor or opportunity a specific virtual organization can be created, which will include the most suitable members for each opportunity according to the principles given in the previous phases.

III-A. Identification of the key success factors.

From the information and knowledge generated in the previous phase, specifically from the competitive analysis of the microcluster, from the framework of existing relations given by the SRM, and from the analysis of the Framework of the value Chain, strategic alternatives can be generated from which the directors of the members of the

microcluster can, with the help of a coordinator, choose the particular success factors necessary to initiate processes of strategic change.

From the competitive diagnosis of the Household Textiles Microcluster the conclusions can be drawn that, in order to be able to compete in the present and future markets, the firms in the microcluster must concentrate on their own skills and knowledge and try to strengthen them to compete in factors such as quality, uniqueness or innovation, since it is difficult to compete with the Asian countries in questions of market prices.

Also, the analysis of the framework of relationships among the members of the microcluster given by the SMR, shows two very significant gaps, which require greater analysis. These gaps have been tabled with the SRM, as can be seen in Figure 6.

Insert Figure 6 about here

Firstly, it will be observed that there are few relationships between the training organisations and the other members of the microcluster. This is a clear contradiction, since in the competitive analysis of the microcluster it was determined that one of the most important factors to increase competitiveness was the innovation should become a continuous process. If we remember that among the training organisations is the Polytechnic University of Valencia, which has a Department of Textile Engineering with enormous facilities for carrying out research in this field, as well as other R&D&I groups in the same university, experts in subjects as varied as new technologies, telecommunications, new materials, competitive and strategic analyses, etc. It is therefore absolutely necessary to strengthen the cooperation between these organisations and the firms of the microcluster. The situation would also be helped by

better communications with the institutions of business associations, both vertical and horizontal, and other territorial institutions.

Also, the second great gap detected is the low level or lack of cooperation between the associated firms and the client firms with the rest of the members of the microcluster. If we remember that in the present state of the markets the consumer is the most important element, this situation in the microcluster is absurd. The relations with clients and related firms (in many cases these are also clients) must be strengthened so that they can become part of the value chain of the microcluster. The lack of relations with clients is often caused by the leading firms "losing" the last link in the chain (which is, to be exact, one of the links that generates most value), since they sell to intermediaries, which means a loss of contact with the final consumer. It must be remembered that it is in the last link in the chain (the last kilometre) where 80% of the product value is generated, since it is in this stage that the variable "design" is really shown.

The existence of the gap detected related to the low level of cooperation with clients means that, if the firms in the microcluster manage to include this last link into their production chain, they will be able to obtain for themselves a considerable amount of these sums and they will have a great advantage over their competitors. There is a group of potential key success factors in this area, based on the **incorporation** of a great part of the **final value** of the product into the microcluster itself, including the following:

- Internal production of upholstered furniture by the cloth manufacturers in order to achieve direct sales to distributors, eliminating intermediaries and thus obtaining the value added at this stage. Furniture components could be purchased from a supplier and assembled by the firms, or a cooperation agreement could be reached with a specialised company.

- Creation of **special distribution channels** by franchise or e-commerce to obtain direct access to final clients. The franchise project should allow the evolution from the most traditional commercial formats to the most up to date according to the market opportunities.
- Establishment of **cooperation agreements** among members of the microcluster to sell finished goods collectively (blankets. Sheets, towels, etc) to business groups (hotels, schools, prisons, hospitals, etc.).

As regards the gap for **communications between training organisations, vertical and horizontal institutions and the other members of the microcluster**, the following Z factors can be deduced from the analysis:

- The establishment of **joint lines of research and working** among the leading members of the microcluster, vertical and horizontal institutions and the training and research organisations.
- **Wider use of tools** for locating, managing and diffusing knowledge from both inside and outside the territory, specifically for each microcluster, with access for all members to provide and obtain information.
- Creation of **mechanisms for making known the services provided by research groups**, including the Superior Polytechnic of Alcoy, to the other members of the microcluster.

III-B. Identification of potential members to form a Virtual Organization for each key factor determined, from among the most suitable members of the microcluster.

The previous identification of potential key factors should be followed by the subsequent appropriate action. The key success factors should be converted into specific key processes to allow the firms in the microcluster to generate more value than their

competitors. For this, it is necessary to decide which members of the Household Textiles Microcluster should form a virtual network or organization and how they are going to be made to act in unison.

In order to find the most appropriate members to form a virtual organization for a specific key success factor the SRM tool will be used again, but this time concentrating more on the individual firms in order to discover more detailed information. This will allow us to identify the present system of relationships among the leading members of the microcluster with regard to each of the identified key success factors, as well as the optimum system required for the realization of their goals.

The factor chosen for the application of the proposed methodology was the strengthening of relations between the University and the leading members of the microcluster by means of developing joint working programmes. This factor was selected for its importance in providing added value to the group as a whole, as well as for the fact that the University could intervene in the role of Coordinator of the analysis. The other factors are also important but are more difficult to develop from the University, since not all the methodology application process can be observed from the Coordinator's vantage point.

The first stage in the process is to make the SRM corresponding to the existing relations among the leading members from the perspective of this factor, which can be seen in Figure 7.

Insert Figure 7 about here

It is worth noting the fact that the leading firms in the microcluster have not been treated individually. This is partly to simplify the process and partly because very little

information has been lost in this way, since for this key factor what is mainly needed are generic actions to strengthen relationships among all the leaders, the main institutions and the university.

From the analysis of the matrix several conclusions can be drawn:

- There is a certain amount of cooperation between the institutions and the leading firms but the relationship is not as strong as it should be.
- The university (as a whole and in all its departments such as research groups and the Textile Department itself) maintains medium level value-generating relations with the firms, but relations with the institutions are non-existent.
- In the particular case of the Textile Department (DITEX) and the Textile research Institute (IVIF) there is a value-destroying relationship for the microcluster, since there is not only no cooperation, but the IVIF sub-contracts or cooperates with the textile departments of other universities outside the territory.
- Something similar happens between IVIF and the EPSA, considered as a whole, as well as with their research groups. Although temporary cooperation takes place, there are also times when "negative" competition occurs between these members when they compete for markets or carry out the functions of other members.
- With regard to the different research groups in the university, both among themselves and with DITEX, there are no strong value-producing relationships.

It is not necessary to go into more detail to be able to conclude that his is not the ideal situation to generate value and to keep itself strong. The ideal situation among the members should be along the lines of the relations shown in Figure 8.

Insert Figure 8 about here

As can be seen, there ought not to exist any case of non-existent value-generating relations between any of the members. Evidently, the most desirable situation would be that in which all the relations scored +2 with competition and +1 without, although this is a difficult situation to achieve, at least during the first stage. Therefore the most important relationship as value-generating "entity" was considered to be cooperation with all the members involved, such as that of the EPSA group, or that of the leading members, who must take advantage of all that surrounds them. It is also essential to create synergies both within the groups of the university themselves and between them and the institutions, to generate co-opetition situations by cooperation and positive competition at one and the same time.

The following are some of the most important activities to be carried out:

- DITEX/Research Groups – DITEX/Research Groups:
    - Establish mechanisms so that each is aware of what the others are doing and also should try to create synergies.
    - Get rid of the idea of negative competition among the different groups and departments and should try to strengthen cooperation and positive competition in order to create the situation of maximum value (co-opetition).
- Research Groups/EPSA/DITEX – IVIF:
    - Get rid of the preconceived idea that they are in competition with each other (in the negative sense of the term) and look for joint synergy situations both in the training and research areas.
    - Inform each other of their lines of research and try to work together in joint projects.
    - Cooperate in joint projects of business analyses.

- EPSA – Leading firms:
    - EPSA should offer their services to the leading firms in a practical, attractive and absolutely
    - Try to create mechanisms or "entities" to act as interface between the university and the firms, providing the firms with whatever services they need.
- EPSA – Horizontal and vertical institutions:
    - Make people aware of the importance of having a university in the territory of the microcluster.
    - Make known the services offered by the university, its research groups and departments.

In conclusion, from the preceding analysis it can be deduced that mechanisms for communication should be established; also interchange of information and knowledge, cultural exchanges, and prejudices should be eliminated. All of these would contribute to generating a clearly value-generating situation for the microcluster. One of the options is to constitute a virtual organization among the members to coordinate their actions in order to have a certain guarantee of success. In the following section we will deal with how this has been carried out.

III-C. Determination of the basic characteristics of the Virtual Organisation by the generation of the framework of ideal relations drawn from the existing framework.

In this section we will focus on the chosen key factor, which was "the strengthening of relations among the university, the leading firms in the Household Textiles Microcluster and the principal institutions". In order to take action on this point, from the information generated in the previous section complementary and specific sessions

and meetings were held by the selected leading members to decide on the different strategies that could be applied.

An initial call was made for a joint working session in the premises of the EPSA to which representatives of all the leading members of the microcluster chosen in the previous stage were invited.

From the different conclusions arrived at the following were the most important:

- **The need for better cooperation between EPSA and the firms in the microcluster.** To achieve this, it was agreed to foster communications and access to the university for the firms by all possible means.
- **The need for greater cooperation between IVIF and EPSA.** The president of IVIF suggested the inclusion of a representative from EPSA in their board of governors and also the possibility of encouraging the creation of joint work projects.
- **The need for a better definition of what is or what can be considered as innovation in the textile sector.** This point provoked a productive debate and the conclusion was reached that the textile sector is a mature sector with distinguishing characteristics with regard to other sectors, so that it needs criteria to be applied other than those applied to the advanced technology sectors. It was concluded that a study was necessary on what could be considered as R&D&I in the sector.

Because of this, it was unanimously decided to establish a work chain (virtual organization) to follow this last line. This organization would make a study of the type of investments in R&D&I of the textile firms, with a view to their effect on tax policies.

In this meeting it was therefore decided to form a specific virtual organization. From the initial analysis made at this meeting the principle basic characteristics of the Virtual Organization were decided.

III-D. The definitive search for members, negotiation and establishing relations.

From the leading members of the microcluster at first considered as the most suitable to form the Virtual Organization (Phase III-B), as well as from the principal characteristics which this organization should possess (Phase III-C), here we pass on to confirming the specific firms or institutions that will form part of the network. These members were decided on at the initial working session and at subsequent meetings by the CCTCV group, which acted as coordinator. The CCTCV sent all potential members an initial proposal giving the reasons for the situation as well as the proposed objectives, the work plan and the initial distribution of posts and responsibilities.

Conclusions

The proposed methodology begins at the territorial level and gradually becomes deeper detailed to deal with individual industries in the sector, the corresponding strategic segments, microclusters and, finally, specific virtual organisations within these groups.

For sake of simplicity, and since here we aimed to evaluate the applicability of the methodology, we have not included the analysis of all the possibilities, but we have rather chosen one of the possible options with each descent in level. Thus, from the Valencia Textile Cluster we have chosen the specific case of the Household Textiles Microcluster, and from the multiple options and opportunities available we have chosen a very special case of virtual organisation, created to encourage innovation within the

firms of the microcluster, with the intention of obtaining for them the advantages of administrative and tax benefits.

From the application of the methodology the general conclusion can be drawn that, in spite of its apparent simplicity, it is a powerful tool in that it systematizes the necessary previous analysis process before the taking of any strategic decisions, it does so at the specific territorial level for a specific industrial microcluster clearly defined in terms of product/market. Also, this process, unlike other existing methodologies, not only serves for the subsequent analysis of the causes of the success of certain policies, but its real potential lies in the fact that it can also make a previous analysis and provide the information required for making the right decisions.

The importance of the SRM tool is also noteworthy as it permits, among other things, the identification of the most suitable members of a microcluster to be used in obtaining a certain market opportunity or key success factor. This is something completely new in the field of virtual organisations or networks, since it has always been thought that the choice of partners is the fundamental step, but the way to achieve this or the criteria for particular cases are not always specified.

Previous research on social networks, provide useful ideas about how should design the portfolio of ties or links of the firms, in order to improve performance for example innovation. We have attempted to contribute to a better understanding of identification of the main actors the network, moreover this method propose a guide to choose the best partnership.

Finally, mention must be made of some of the limitations of our research. First, the case analysis although allows to know in detail some features of the firms and their networking relations also can suffer from bias of the specific and idiosyncratic characteristics of the analyzed case, restraining the generalisation capacity of our

findings. Second, we have used a perceptual approach, thus data and values can suffer a lack of objective or quantitative verification. Anyway, both limitations can be considered as goals for a future research.

References

Boix, R. & Galletto, V. (2006). Sistemas Locales de Trabajo y Distritos Industriales Marshallianos en España. *Revista de Economía Industrial, 359,* 165-184.

Cabrera, A. & Cabrera, E. (2002). Knowledge-sharing dilemmas. *Organization Studies, 23(5),* 687-710.

Cohen, W.S., & Levinthal, D.A. (1990). Absorptive capacity: A new perspective on learning and innovation. *Administrative Science Quarterly, 35,* 128-152.

Cooke, P. (2002). *Knowledge economies. Clusters, learning cooperative advantage***,** London: Routledge.

Dosi, G. (1988). Sources, procedures and microeconomic effects of innovation. *Journal of Economic Literature, 26,* 1120-1171.

Dyer J.H. & Singh, H. (1998). The relational view: Cooperative strategy sources of interorganisational competitive advantage. *Academy of Management Review, 23,* 660-679.

Grabher, G. (1993). The weakness of strong ties: the lock-in of regional development in the Ruhr area. In G. Grabher, (Ed.), *The embedded Firm: on the Socioeconomics of Industrial Networks* (pp.255-277). London: Routledge.

Hitt, M.A., Hoskisson, R.E., Johnson. R.A. & Moesel, D.D. (1996). The Market for Corporate Control Firm Innovation. *Academy of Management Journal, 36,* 1084-1119.

Kanter, R.M. (1988). When a thous flowers bloom: Structural, collective, social conditions for innovation in organizations. In B.M. Straw & L.L. Cummings (Eds), *Research in organizational behavior* (pp.169-211). Greenwich, CT: JAI Press.

Kogut, B. & Zander, U. (1992). Knowledge of the firm, combinative capabilities, the replication of technology. *Organization Science, 3,* 383-397.

Lane, P.J. & Lubatkin, M. (1998). Relative absorptive capacity interorganisational learning. *Strategic Management Journal, 19,* 461-477.

Masiá, E., Albors, J., Golf, E. & Capó, J. (2004). *Identifying key technology success factors in an industry by the application of an analysis model –STRELNET- to the links of the productive value chain among the main economic agents of a microcluster.* Paper IAMOT 2004. Washington D.C.

McEvily, B. & Zaheer, A. (1999). Bridging ties: A source of firm heterogeneity in competitive capabilities. *Strategic Management Journal, 20,* 1133-1156.

Moran, K. and Ghoshal, S. (1996). Value Creation by Firms. *Academy of Management Best Paper Proceedings,* 41-45.

OES (2003). Competente Development in SMEs. Observatory of European SMEs 2003, nº 1.

Porter, M.E. (1990). The competitive advantage of nations. *Harvard Business Review*, March-April 1990

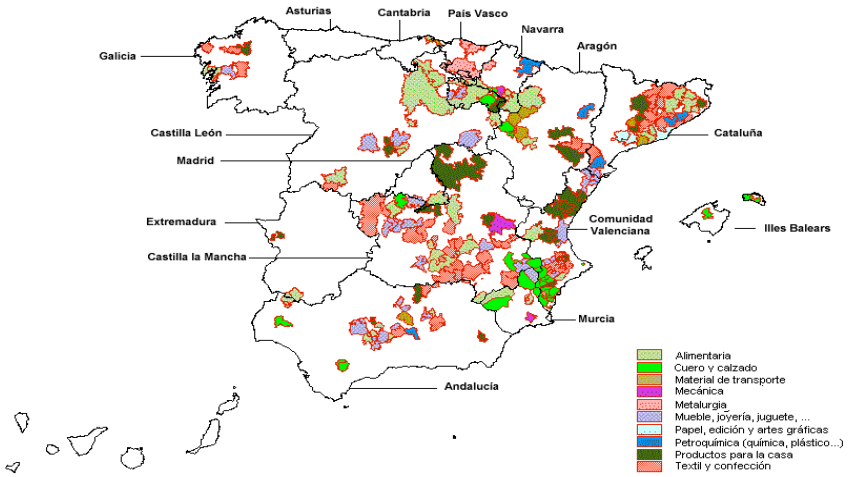
Porter, M.E. (1980). *Competitive Strategy: Techniques for Analysing Industries and Competitors*, New York: Free Press.

Putnam, R. (2000). *Bowling alone: the collapse and revival of American community,* New York: Simon and Shuster.

Van Waarden, F. (2001) Institutions innovation: the legal environment of innovating firms. *Organization Studies 22 (5),* 765-795.

Figure 1

Map of industrial district in Spain



Source: Boix and Galletto (2006)

Figure 2

Scheme of proposed methodology

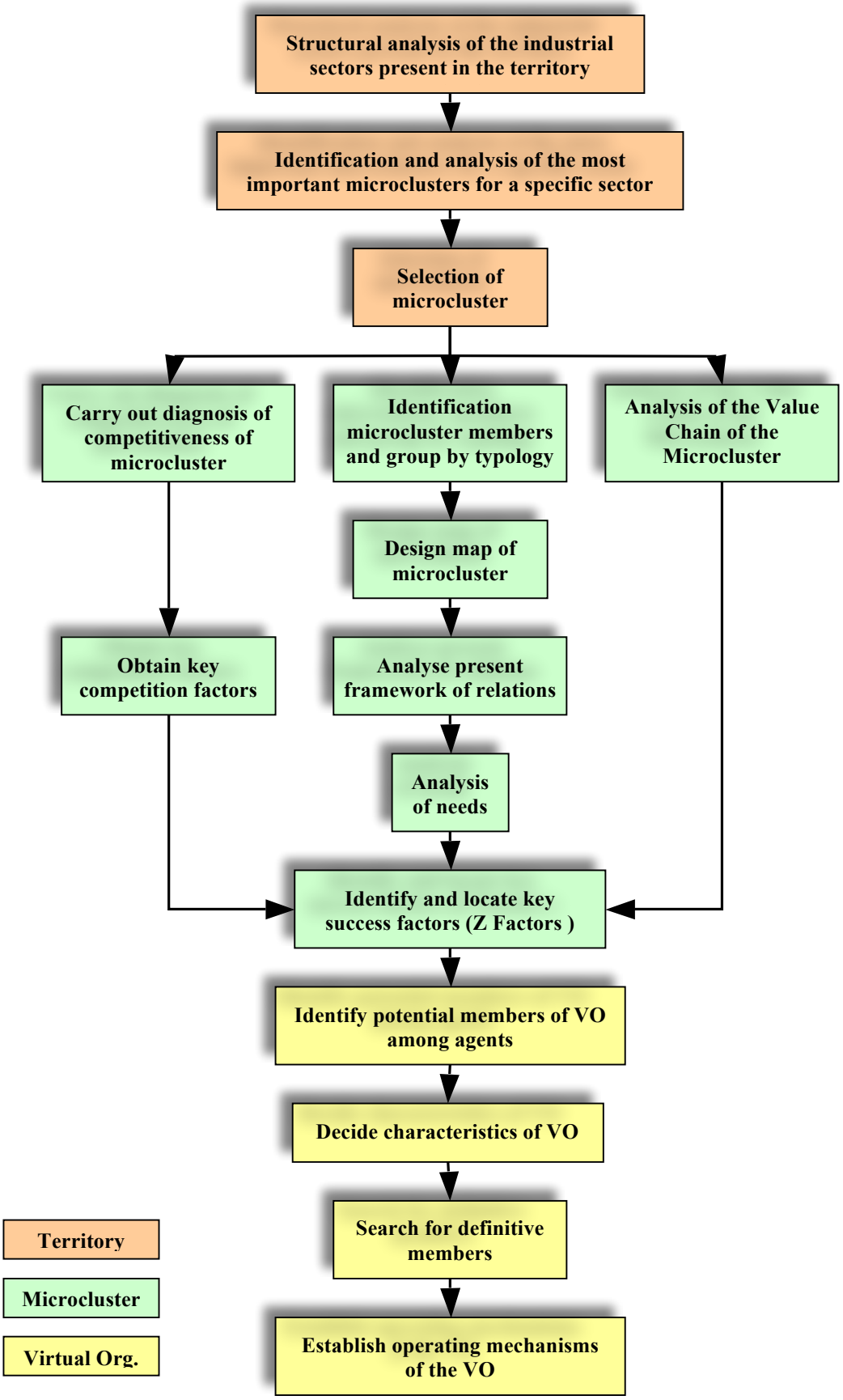


Figure 3

Map of the Valencia Household Textiles Microcluster (Compiled by the authors)

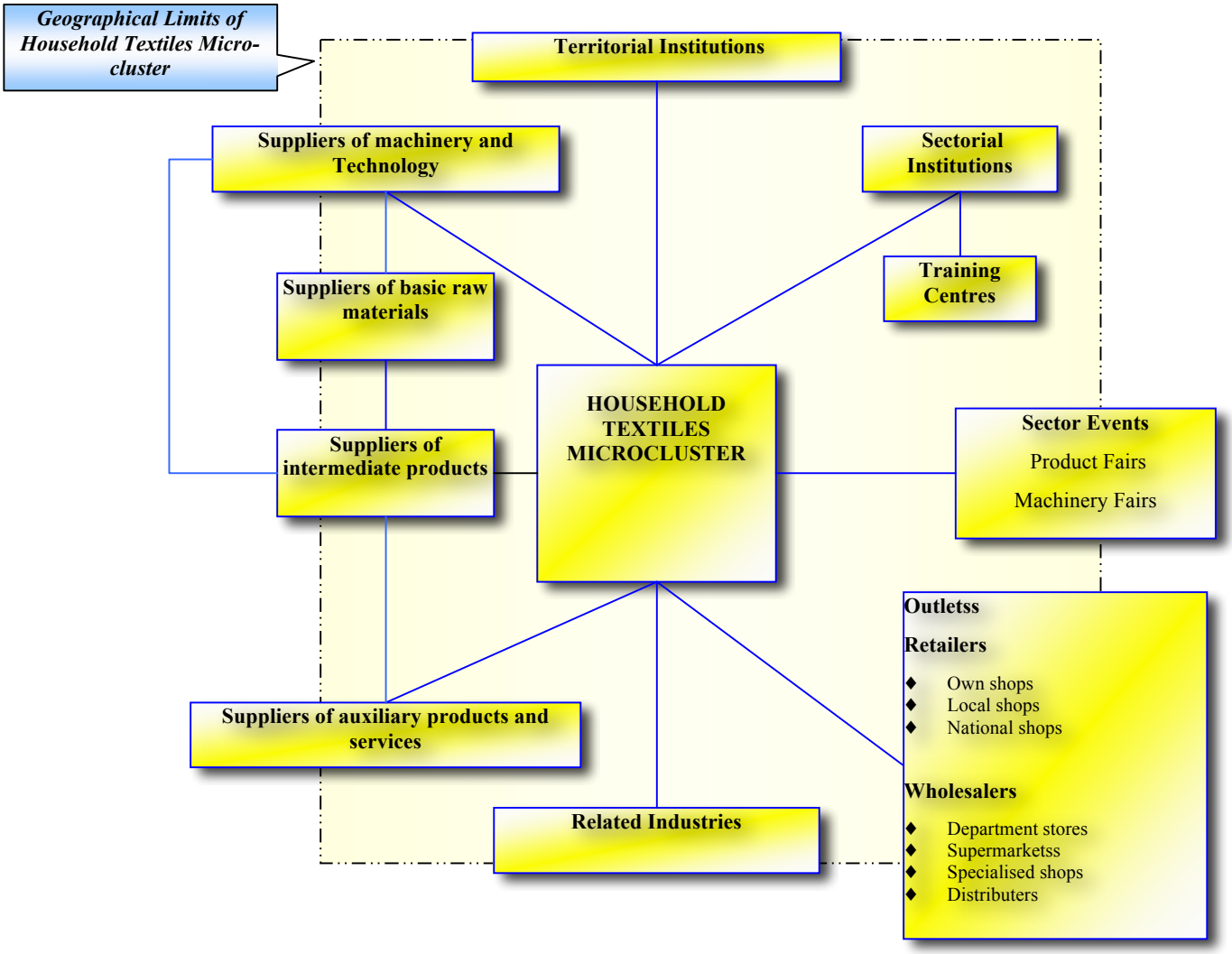


Figure 4

SRM of Type Groups in the Household Textiles Microcluster

	IVFP	IVFM	IVIF	IVAE	IHIF	IHAE	ELTH	EPMF	EPMQ	EPMT	EPPC	EPPD	EPPA	ERCS	ECLS
IVFP		0,5	0,5	1	0	0	1	0	0	0	0,5	0	0	0,5	1
IVFM	0,5		0,5	1	0	0	1	0,5	0,5	1	1	1	0	0	0
IVIF	0,5	0,5		0,5	0,5	0,5	1	0,5	0,5	0,5	0,5	0,5	0,5	0,5	0
IVAE	1	0,5	0,5		0,5	1	1	0,5	0	0	1	1	0	0	0
IHIF	0	0	0,5	0,5		0,5	0,5	0	0	0	0	0	0	0	0
IHAE	0	0	0,5	1	0,5		0,5	0	0	0	0	0	0,5	0,5	0
ELTH	1	1	1	1	0,5	0,5		0,5	1	1	1	0,5	0,5	1	0,5
EPMF	0	0,5	0,5	0,5	0	0	0,5		0	0,5	0	0,5	0	0	0
EPMQ	0	0,5	0,5	0	0	0	1	0		0,5	1	0,5	0	0	0
EPMT	0	1	0,5	0	0	0	1	0,5	0,5		1	1	0,5	0	0
EPPC	0	1	0,5	1	0	0	1	0	1	1		0	0	0	0
EPPD	0	1	0,5	1	0	0	1	1	0,5	1	0		0	0	0
EPPA	0	0	0	0	0	0,5	0,5	0	0	0,5	0	0		0,5	0
ERCS	0,5	0	0,5	0	0	0,5	1	0	0	0,5	0	0	0		0,5
ECLS	1	0	0	0	0	0	0,5	0	0	0	0	0	0	0,5	

Figure 5

Value Chain framework of the home textile microcluster

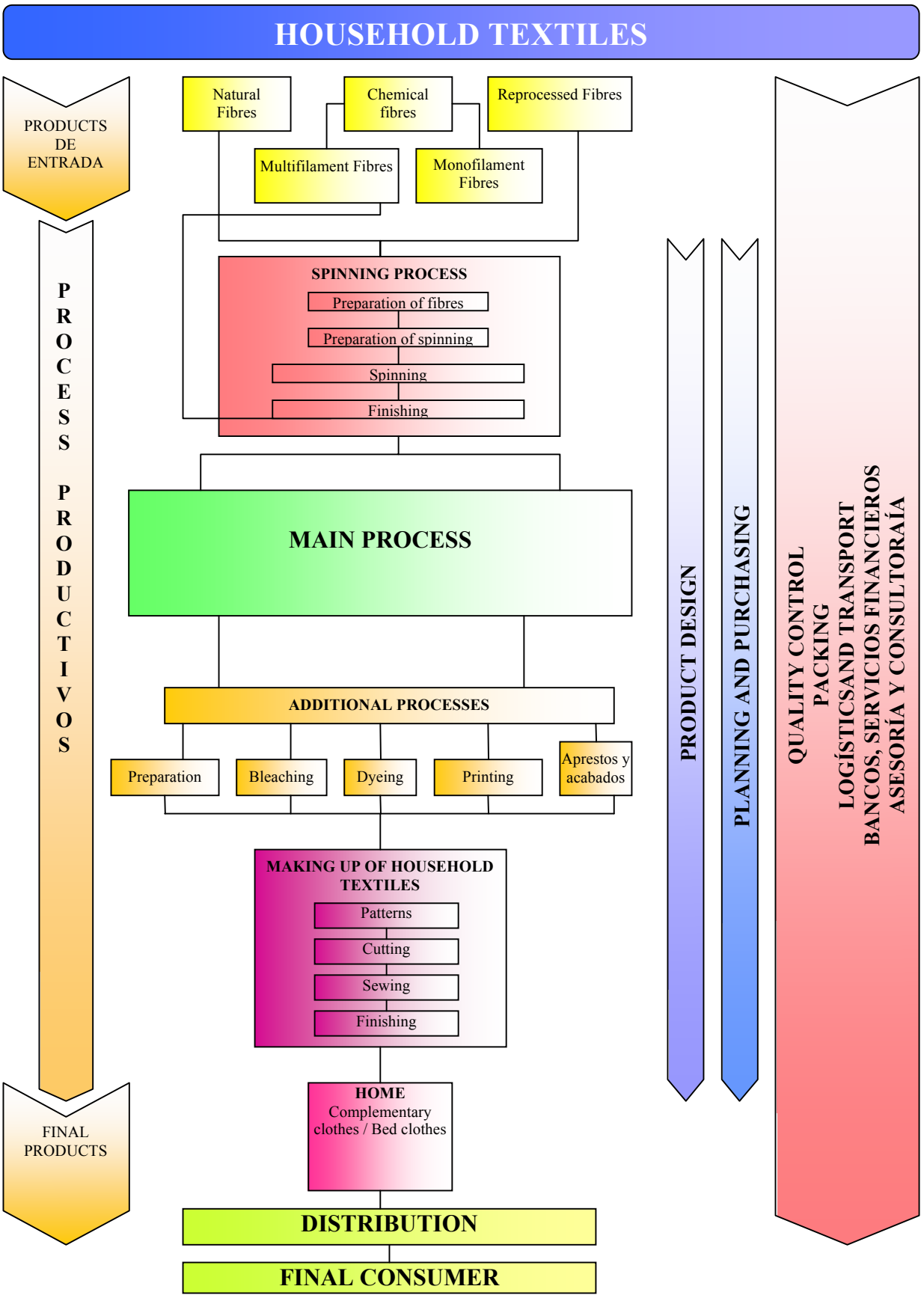


Figure 6

Analysis of the most significant gaps existing in the SMR

	IVFP	IVFM	IVII	IVAE	IHCF	IHAE	ELTH	EPMF	EPMQ	EPMT	EPPC	EPPD	EPPA	ERCS	ECLS
IVFP		0,5	0,5	1	0	0	1	0	0	0	0,5	0	0	0,5	1
IVFM	0,5		1	1	0	0	1	0,5	0,5	1	1	1	0	0	0
IVII	0,5	1		1	0,5	0,5	1	1	1	0,5	1	1	0,5	0,5	0
IVAE	1	0,5	1		0,5	1	1	0,5	0	0	1	1	0	0	0
IHCF	0	0	0,5	0,5		0,5	0,5	0	0	0	0	0	0	0	0
IHAE	0	0	0,5	1	0,5		0,5	0	0	0	0	0	0,5	0,5	0
ELTH	1	1	1	1	0,5	0,5		0,5	1	1	1	0,5	0,5	1	0,5
EPMF	0	0,5	1	0,5	0	0	0,5		0	0,5	0	0,5	0	0	0
EPMQ	0	0,5	1	0	0	0	1	0		0,5	1	0,5	0	0	0
EPMT	0	1	1	0	0	0	1	0,5	0,5		1	1	0,5	0	0
EPPC	0	1	1	1	0	0	1	0	1	1		0	0	0	0
EPPD	0	1	1	1	0	0	1	1	0,5	1	0		0	0	0
EPPA	0	0	0	0	0	0,5	0,5	0	0	0,5	0	0		0,5	0
ERCS	0,5	0	0,5	0	0	0,5	1	0	0	0,5	0	0	0		0,5
ECLS	1	0	0	0	0	0	0,5	0	0	0	0	0	0	0,5	

Figure 7

Real SRM corresponding to the key success factor "strengthening of relations between university, firms and institutions"

	IVAE	IVIF	DITEX	EPSA	GIAE	GINT	IHAE	ELTH
IVAE		1	0	0	0	0	0,5	0,5
IVIF	1		-2	-1	-1	-1	1	1
DITEX	0	-2		0,5	0	0	0	0,5
EPSA	0	-1	0,5		0,5	0,5	0	0,5
GIAE	0	-1	0	0,5		0	0,5	0,5
GINT	0	-1	0	0,5	0		0,5	0,5
IHAE	0,5	1	0	0	0,5	0,5		0,5
ELTH	0,5	1	0,5	0,5	0,5	0,5	0,5	

Figure 8

Optimum SRM corresponding to the key success factor "strengthening of relationships among university, firms and institutions

	IVAE	IVIF	DITEX	EPSA	GIAE	GINT	IHAE	ELTH
IVAE		1	0,5	1	0,5	0,5	1	1
IVIF	1		+1,5	+1,5	+1,5	+1,5	1	1
DITEX	0,5	+1,5		1	1	1	0,5	1
EPSA	1	+1,5	1		1	1	1	1
GIAE	0,5	+1,5	1	1		0,5	0,5	1
GINT	0,5	+1,5	1	1	0,5		0,5	1
IHAE	1	1	0,5	1	0,5	0,5		1
ELTH	1	1	1	1	1	1	1	

Table 1

Principal characteristics of the Valencia Textile Cluster

Turnover (millions €)	**2,573**
Employees	**32,000**
Other activities	**Textile subsector and remaining in knitwear and apparel subsectors. The 40% of the firms were dedicated to this technical textile and the remains were divided between *dress* and *home* uses**
Exporting rate	**34**
2004 Growth	**-5.3**
Number of firms	**1,859**
Average firm size	**17.2**
Product specialization	**Moving to technical textile**
Institutional setting	**AITEX, arket and technology observatories. Te Business and Innovation Centre (BIC), trade associations (AETA); (ATEVAL); *Caixa Ontinyent* as risk capital organization; *Feria Valencia* holding TEXTILHOGAR exhibition fair; Vocational schools with a Higher Polytechnic School of Alcoi (EPSA) as a part of the Polytechnic University of Valencia.**
Relocalization	Commercialization of the foreigner products inside district. The press to go down salaries of immigration.

Table 2

Summary of SWOT analysis of the Household textiles Microcluster in the Valencia Textile Cluster

WEAKNESSES	**STRENGTHS**
• Lack of firms in the zone to perform certain services. • Great importance of the existing commercial network. Difficult to create new ones due to age of those at present in operation. • Great influence of labour costs due to reduction in cost of raw materials. • Little innovation in present installations.	• Clearly client oriented. Diversification of firms in various strategic segments. • Disintegration of vertical enterprises towards production units of certain value and lower costs. • Flexible and multi-skilled workers. • Establishment of different specific strategies to counter market uncertainty.
THREATS	**OPPORTUNITIES**
• Strong price competition: manufacture of medium range products. • Dependence on and influence of wholesalers and large distribution networks. • Existence in nearby territories of high geographic concentration of firms specialised in sector. • Influence in purchases of external factors such as fashion, samples available, construction, etc. • Entry of large quantities of uncontrolled textile products providing unfair competition.	• Development and use of textile technology. • Presence of foreign market due to being popular tourist region. • Growth and evolution of specialised shop chains. • Rise in R+D+I activity.

Table 3

Summary of principal firms and institutions in the Household Textiles Microcluster grouped according to type

Business/administrative horizontal institutions: • 3 generic business associations • 1 Chamber of Commerce and Industry. • 1 Innovation Agency • 10 Town Councils	**Vertical research/training/business institutions:** • 3 textile business associations • 1 Institute of Textile Research • 1 Department of Textile Engineering of the Polytechnic University of Valencia
Training and Research horizontal institutions: • 9 local training centres (Including the campus of the Polytechnic University of Valencia)	**Vertical sectorial event institutions:** • 4 product fairs (Valencia, Barcelona, Frankfurt and Paris) • 4 Machinery fairs (Barcelona and Valencia)
Leading Household Textile firms CCV: • 11 leading local firms	**Suppliers of basic raw materials:** • 3 multinationals of virgin fibres • 2 local and 2 national firms of reprocessed fibres • 2 multinationals of dyes and chemical products
Suppliers of Machinery and Technology: • 3 local businesses and 2 from Barcelona	**Auxiliary products:** • 6 local transport firms • 2 local packing firms
Intermediate processes: • 3 local design firms • 5 local dyeing, processing, finishing and printing firms	**Suppliers of intermediate products:** • 5 local spinning firms • 5 local weaving firms
Related and connected industries: • Furniture, toys, shoes, cars, sanitation, health	**Clients:** • Distributors, warehouses, department stores, final clients

Table 4

Grouping and coding of member types in the Household Textiles Microcluster

TYPE	SUB-TYPE (number of members considered)	CODE
Vertical/Sectorial Institutions	Product fairs (4)	IVFP
	Machinery fairs (4)	IVFM
	Research/Training centres (2)	IVIF
	Sector business associations (3)	IVAE
Horizontal/Territorial Institutions	Research/Training Centres (9)	IHIF
	Territorial business institutions (15)	IHAE
Firms	Household Textile leaders (11)	ELTH
	Basic raw material suppliers (fibres) (7)	EPMF
	Basic raw material suppliers (chemical products) (2)	EPMQ
	Machinery and technology suppliers (5)	EPMT
	Suppliers of intermediate processes (8)	EPPC
	Suppliers of intermediate products (10)	EPPD
	Suppliers of auxiliary products (8)	EPPA
	Related and connected industries	ERCS
	Clients	ECLS

Table 5

Type of relationships among members in the SRM

		COMPETITION		
		Negative	Non-existent	Positive
COLLABORATION	Non-existent	**-2**	**0**	**+1**
	Medium	**-1**	**+0,5**	**+1,5**
	Strong	**-0,5**	**+1**	**+2**