

Horizontal Cooperative Arrangements and Telecommunications Networks: A Development Strategy for Traditional Industries

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Abstract

The following is a explorative study about the relationship between the use and development of telecommunications networks and a specific kind of strategic networks: horizontal cooperative arrangements. We explore both concepts and analyse possible relationships that may emerge between them. We use, as the main theoretical framework, the Strategic Networks approach. Finally, we present several propositions that provide a springboard for future research.

Keywords: Telecommunications networks, strategic networks, cooperative arrangements.

Introduction

Telecommunications networks have proved to be of fundamental importance in the economic and social transformation of the late 20th and early 21st Century (Blinder, 2001). Although the networks have impacted upon most economic agents, there is no doubt that the firm has experienced, and is leading, much of this change (Castells, 1998). In this sense, improvements in the means of communication between persons are accompanied by a number of positive social and economic effects. However, the real impact of the networks can be seen when the technological innovation can be translated into concrete business actions.

Strategic actions based on telecommunications networks have caused fundamental changes in the way we understand first business, and then the sector. Within a firm, the networks have lead to major changes in the availability, speed and reliability of internal communication, whether it is between systems or people. Outside the confines of the organization, networks have facilitated relations between the organization and elements within its competitive environment. These relations have diminished the dissuasive power of distance when an organization establishes or strengthens links with suppliers, clients, partners or public administration (Águila, 2000).

Perhaps one of the most interesting effects of the spread of telecommunications networks in the modern economy has been the creation and expansion of strategic networks. For now, we define strategic networks as structures that arise when two or more organizations seek to achieve common objectives by establishing stable relations between them. These relations must be founded on a previously established climate of mutual trust, and on a common framework of

objectives; and they presuppose a number of physical and technical resources that allow interaction between the firms.

The aim of this study is to explore the relationship arising between strategic alliances among cooperative firms and the implementation and development of strategic telecommunications networks. In other words, we will analyze whether the strategic alliances among cooperative firms are more effective in building strategic telecommunications networks than other types of strategic alliances. To address this research question we will use the Strategic Networks Approach and the literature on Strategic Arrangements among Cooperative firms as the main frameworks to support our theoretical propositions.

The study has three sections. In the first section we define the concept of telecommunications networks, and their implications for business management. In the second section we shall review the paradigm of Strategic Networks, as an area of management that has undergone enormous development in recent times. In the third and last section we present a model of analysis based on the strategic networks approach. In the latter section we define those business cooperative structures in which it is most likely that strategic networks based on telecommunications networks might arise or be strengthened.

Telecommunications Networks in the Business

The interconnection of the systems for the storage, processing and interchange of information has led to an unprecedented evolution in the management of organizational knowledge, from the external as well as the internal point of view. Internally, the networks have a direct influence on the product's value chain, in that they can significantly change the nature of the productive processes. This is especially so in companies that try to find economies of information management (distribution, logistics, consulting, information brokers, etc). From the external point of view, as we shall be able to appreciate in later sections, telecommunications networks are a revolutionary development that allow the organization to be connected with agents from its environment, especially customers, social groups, research centres, government agencies, the financial system and their own competitors. These changes are evident in the universal access to extensive networks based on TCP/IP (Internet) technologies.

In the present study we are interested in classifying the telecommunications networks that are available to the modern firm. There are various criteria for classifying networks. Among them, we might mention at least three. First, telecommunications networks can be classified in terms of their geographical scope, so that one can distinguish between networks of a limited scope, the LAN (Local Area Networks), those of more extensive scope, the MAN (Metropolitan Area Networks), and the still more extensive WAN (Wide Area Networks). Second, it is possible to distinguish the type of telecommunications network according to its internal configuration, or topology. One can find networks that are configured linearly or in bus, in the form of a ring, a star or a tree. Third, the networks may be characterized according to their relation with the organizational structure of the firm. We shall look more closely at this classification below, since it may serve to help us understand the strategic implications of the management of telecommunications networks in the firm.

The combined analysis of both the firm as a complex and open entity (Scott, 1987) and of telecommunications networks allows us to make a fundamental distinction between endogenous and exogenous networks (Marino, 1995). Endogenous networks are those that form part of the endogenous relations of the firm, that is, those that are established within the business organization itself, independently of geographical distances. Exogenous networks, on the other hand, are those that are maintained with agents outside the firm, either from within the same sector or from different sectors, whether public or private.

Endogenous networks are established with three aims, each quite distinct from the others. First, the social aim: that is, for the network to form the basis of communication between the different social groups that interact within the firm, these being the owners, managers and workers. The first cases of the use of electronic mail within closed organizations had this aim: firms such as Bank of America, Boeing, Memorex and Manufacturer's Hannover Trust were the pioneers in the US in using computing networks for internal communication (Hellriegel and Slocum, 1998, p. 556).

The second aim of endogenous networks is the so-called operational aim: that is, for the network to be the basis for the internal operations of the firm, mainly in the area of administrative and productive management. At present telecommunications networks tend to connect the centers of decision-making with the operations area, thereby achieving the maximum efficiency in the use of the communication. The networks also provide a means of communication between the different modules of production planning and programming, such as Computer-Aided-Manufacturing (CAM), Flexible Manufacturing Systems (FMS), Artificial Intelligence (AI) systems, Automated Test Equipment (ATE) or Computer Integrated Manufacturing (CIM). In Spain, some pharmaceutical distribution firms, such as COFARES (Spanish Pharmaceutical Cooperative), or CECOFAR (Pharmaceutical Cooperative Centre) pioneered the introduction of telecommunications networks with supply, operations management or logistical aims (Bruque, 2002).

The third aim is the executive aim. The endogenous network can provide a source of information for decision-making, essentially with regards the planning and strategic management function of the firm. The network provides exhaustive information on all areas of the organization to which it has access, which allows managers to use an extensive database as a reference point in the decision-making process. There are two basic advantages to the endogenous network in the executive process: speed of access to the resources of the system, and reliability of the information that is contained within it. The speed of access is related to the network property of being able to access in real time those areas of the organization in which it is operating. The reliability of information is related to the storing of information at only one point, independently of its characteristics or where it comes from. That should assure that managers always have access to up-to-date information, and that there are no redundancies that may lead to errors.

Exogenous networks, on the other hand, provide firms with an interface with elements that are found in their environment, whether generic or specific environment. Relations with the factor or product markets, current or potential customers, or public institutions, can be channelled via an exogenous network. There are various reasons that might encourage a firm to set up an exogenous network. Following the model presented by Edwards, Ward and Bytheway (1997, pp. 17-21)

there are three main reasons, which, in turn, form an evolutionary model of the information systems based on telecommunications networks. The first reason for a firm to interconnect externally is for motives of efficiency. Telecommunications networks provide the possibility of managing communication processes with the outside world quicker and therefore more efficiently.

The second reason is that the needs of the organization evolve from motives of mere efficiency towards motives where effectiveness has more weight. It is now not enough to use the networks in order to achieve certain economies, but for the firm to engage in formulas of strategic cooperation based on inter-organizational information systems (Navas and Díaz, 1996).

The final reason, corresponding to the so-called external integration stage, is born of the idea that sharing information can lead to a change in the content of what the participants in industry do. The use of the networks transforms the rules of operation in the sector. For example, Edward, Ward and Bytheway (1997, p. 20) point out that (1) customers can carry out tasks that are the traditional preserve of the suppliers and (2) suppliers can carry out tasks that are the traditional preserve of their customers.

In the following section we shall concentrate on using telecommunications networks as exogenous networks, particularly as a means of creating and strengthening strategic networks between firms from the same or related sectors. Among these relations we shall analyse strategic networks that may arise downstream or upstream, depending on the position that other components of the network take up in the chain of production and supply. We shall do this within the theoretical framework of the Strategic Networks Approach.

The Strategic Networks Approach

Strategic networks can be defined as a collection of stable inter-organizational links that are important for participating firms (Freeman, 1979). In practice strategic networks can take the form of strategic alliances, joint ventures, or long-term associations between suppliers and their customers (Gulati, Nohria and Zaheer, 2000, p. 203). One of the main characteristics of strategic networks is they are voluntary. In this sense, a strategic network is any cooperative agreement between firms that supposes interchange, sharing or mutual development, including members' contributions of capital, technology or specific assets (Gulati, 1999, p. 397).

From a strategic point of view, the Strategic Networks Approach posits that the behavior and performance of businesses can be better understood if it is examined the network in which they are integrated (Gnyawali and Madhavan, 2001). This comes from the fact that strategic networks can provide a firm with access to information, resources, markets or new technologies, generating, at least potentially, economies of learning, scale or scope. Additionally, the relations encouraged by the strategic network allow the firms that participate in it to better achieve some strategic objectives (Gulati, Nohria and Zaheer, 2000). Among these we might mention, first, the reduction of the risks inherent in new initiatives as a consequence of the combined use of the know-how provided by each member. Second, the strategic network can provide, for members of the network, the subcontracting of some of the links in the value chain. Third, networks may form the basis for implementing some strategic options. Thus for example the establishment of joint

ventures between multinationals and local firms has been a very common procedure for successfully achieving strategies of rapid penetration into strongly differentiated markets, or those with consistent entry barriers.

Perhaps one of the most interesting contributions of the Strategic Networks Approach is that it provides a new insight for how a firm obtains and maintains performance success, with this being measured in terms of better economic results. Previously, different paradigms have been used in Strategic Management for rationalizing success or failure. One of these paradigms is Industrial Organization (Porter, 1980). According to this approach, the differences in business performance can be explained in function of certain structural variables, whether of the firm or of the sector (for example size, similarity between products portfolio of rival firms, interdependence between their value chains, advertising expense, etc.) Subsequently, Transaction Cost Economics (Williamson, 1975) stressed the importance of transaction costs in improving business performance. Finally, the Resource Based View (Barney, 1991) described the characteristics that certain strategic resources must have in order to provide a firm with a stable competitive advantage. Nevertheless, none of these theories takes into account the effects, both positive and negative, that arise when an organization participates in a business network.

The Strategic Networks Approach no longer views the organization as an autonomous and independent entity, but instead puts it in a system of relations that will affect its ability to generate results. In this way, while Transaction Cost Economics emphasizes the possible benefits that may arise from reducing the costs that accompany one single transaction, the Strategic Networks Approach takes into account the strategic benefits that may result from optimizing not only one relation, but the entire network of business relations (Gulati, Nohria and Zaheer, 2000, p. 204). These authors mention five mechanisms by which the behaviour and performance of the firm can be modified via strategic networks: (1) changes in the structure of the sector; (2) changes in the position within a sector; (3) creation, transference or modification of pre-existing resources and capabilities; (4) reduction in the transaction costs; (5) modification of the course of events, or creation of path dependences favorable to the firms that form part of the network (for example, managing the relations that arise within the network to the firms' benefit).

The modifying capacity of these mechanisms can be affected, in turn, by various characteristics of the strategic network itself. In Figure 1 we present the strategic networks theoretical framework. The figure summarizes the influencing mechanisms that we have discussed above. The rectangles drawn with broken lines show the three characteristics of the strategic network that may explain the impact of the network on the influencing mechanisms, and therefore on the behavior and performance of the businesses in the network.

The characteristics that define the network have been grouped into three boxes. First, the structural characteristics of the network refer to those attributes that describe its structure, and following Gulati, Nohria and Zaheer (2000), correspond to the network density, the existence of "structural holes", the equivalence with other network structures and the position that firms occupy within the network (center or periphery). The density of a strategic network can be measured by the number of nodes and participants in the network, such that the greater the number of nodes and links between participants, the greater the density. A structural hole (Burt, 1992), on the other hand, occurs when two commercial partners (supplier-customer) are linked

solely via one intermediate sector. By way of example there is a structural hole in some food and agriculture chains, in which the agricultural producer is only linked with the retailers via a centralized system of wholesale distributors. In this case the firms that form part of the intermediate sector (structural hole) can benefit from the resources that flow within the network, such as knowledge, valuable information, or financial flows (Wenpin, 2001). Third, a network whose structure is similar to that of the sector may give rise to concentration phenomena. Finally, the position of a firm, or its partners, in the network may facilitate, or make it more difficult, for the firm to appropriate the intrinsic value generated by the network (Zaheer and Zaheer, 2001). A priori, firms that occupy positions further from the nucleus of the network may find that they do not benefit from the potential positive results produced by the network.

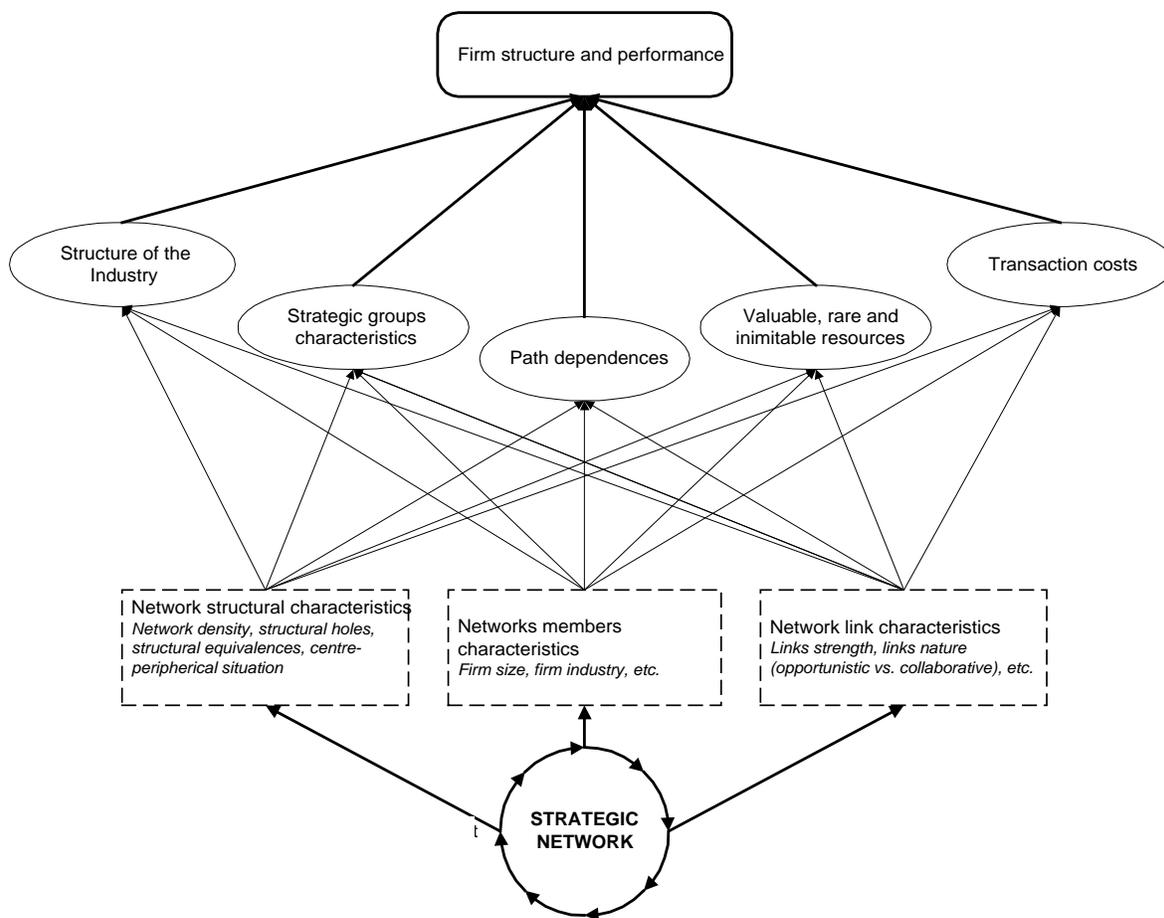


Figure 1. Strategic Networks. Conceptual framework.

The individual characteristics of the members of the network (Figure 1) may also have an important effect on the various action mechanisms. Thus the status of every participant (economic situation, growth, profitability) may affect every other member of the network (Gulati, Nohria and Zaheer, 2000). Businesses that choose to take part in the wrong association, with members that are technologically backward, or that, for instance, suffer market problems, may be dragged by their partners into a position of risk.

Just as interesting are those effects related to the characteristics of the links in the network. Among these, two may become key elements. On the one hand, the strength of the links, and on the other, the nature of the links, whether they are opportunist or collaborative. A network set up with strong links may improve the possibility of collaboration or oligopolistic practices. This effect has been verified empirically in some recent studies (Galaskiewicz and Zaheer, 1999). Second, the existence of non-opportunistic relations between the members of the network may help the network to avoid problems that harm some members and benefit others, or in some cases harm the entire network. One of these problems is known as *learning races*, whereby some members try to appropriate as much information and implicit or explicit knowledge as possible in the shortest possible time. Once they have achieved this objective, the firms leave the network. This effect was studied in the case of alliances between Japanese and American firms in the 1980's (Hamel, Doz and Prahalad, 1989).

In short, the network characteristics which we have mentioned can influence some or all of the mechanisms that affect the behavior and performance of the firm (see the upper part of the Figure 1). Each of these mechanisms corresponds to theoretical approaches that have been amply discussed in the literature on Strategic Management in recent years. Thus, the first of these (structure of the sector) originated in Porter's Industrial Organization (1980). The second, the form and composition of the strategic groups, that can be identified with the existence of network structures, originated in studies by Caves and Porter (1977). The third, the mechanism known as path dependences, is related to the framework of the dynamic evolution of networks through time, which studies the evolution of this type of structure in time (Gulati and Gargiulo, 1999). The fourth affirms that strategic networks can affect the transference and generation of valuable and inimitable resources, such as is suggested by the Resource Based View (Barney, 1991). In the last case, the costs of Economic Transactions (Williamson, 1975) can be affected by the very existence of the network, and of its characteristics, an issue that we have already discussed.

The conceptual framework that we present here is not only useful for understanding the effects that networks may have on different organizational aspects from a theoretical point of view. It can also be useful to gain some strategic implications with regards the formation of networks and their relation to the use of telecommunications devices. These devices can be seen as facilitators of the new network structure, and can therefore promote the strategic effects that firms seek when they participate network structures. We shall analyse this issue in the following and final section.

Horizontal Cooperative Arrangements And Telecommunications Networks

Having looked at telecommunications networks and strategic networks separately, in this section we shall look at the interrelations that can arise between them. We shall study both concepts with the aim of obtaining a number of insights, which we present as research propositions.

The possibility that the strategic networks and the telecommunications networks are generated and developed in a coordinated way, and with the same objectives, was already expressed by Gulati, Nohria and Zaheer (2000, p. 213). Specifically they stressed that it was necessary to study the effect that new technologies have on the creation of business networks, and consequently on the competitive outlook of a specific sector. Owing to the novelty of both concepts (strategic networks and telecommunications networks) there are very few studies that analyse them jointly. One of the most widely known study (Gomes-Casseres, 1994) analyzed how, after the decline in the UNIX operating system, there followed the disintegration of most of the networks and strategic alliances that had sprung up in order to win the operating systems battle. More recently there have been studies on the electronic business models in the banking sector which are based on telecommunications networks, and these have focused on the effect of the location of customers and competitors on the structure and composition of the strategic networks (Zaheer and Zaheer, 1999).

We focus in this study on a specific kind of strategic agreement that can originate a strategic network: horizontal cooperative arrangements. Horizontal cooperative arrangements is a formula of business collaboration by which two or more cooperative societies become associated in order to promote, coordinate and develop the economic objectives of their members, and to reinforce and integrate their economic activity. The objective of the arrangement is to achieve an efficient cooperative development given the economies of scale that this associative process generates (Barea and Monzon, 1992). Among the advantages that this type of structure may provide are a concentration in the supply, the opening of markets, and the promotion of inter-cooperative relations (Bel, 1997, p. 483). In joining such alliances cooperative firms adapt their behaviour to that of their competitors, and manage to adapt to the dynamic imposed by the current globalized environment. Horizontal cooperative arrangements are, in fact, organizations that arise from the union of cooperative firms. In most legal systems, such as the Spanish, they have their own legal status and an organizational structure independent of the member firms. They are a form of business concentration that has become economically significant in some sectors of activity. Thus for example in the Spanish agricultural sector 50% of cooperative firms are integrated into a horizontal cooperative arrangement (Montero, 1999). The aim is for a unity of management in order to achieve synergies of information flow and synergies of decision. In other words, the objective of a horizontal cooperative arrangement is to plan and coordinate the long-term business development and strategies of the cooperative firms that form the group (Bel, 1997, p. 495).

Following the definition of Gulati, Nohria and Zaheer (2000), these structures fulfil the conditions of strategic networks of being voluntary, stable and strategic in character. Horizontal cooperative arrangements are voluntary agreements, given that by definition cooperative societies join the agreement voluntarily. Although occasionally the public authorities, clients or suppliers may encourage structures of this type, the final decision falls exclusively on each organization.

Horizontal cooperative arrangements are stable. This type of agreement results immediately in the birth of a new organization whose members are the member firms. Some of the strategic decisions, which affect the long-term management of the organization, become the sole preserve of the new organization. Horizontal cooperative arrangements are born therefore with the intention of long-term permanence, which means member organizations have the explicit desire to join a stable strategic alliance.

The stability in time of horizontal cooperative arrangements means that they are clearly strategic in nature. The firms that join the agreement must alter their mission and their fundamental strategic lines in order to adapt them to those of the alliance. In general the arrangements affect the strategy of at least one fundamental area of the organization (human resources, production, marketing, finances, etc). (Costa, 1989; Bel, 1997). In view of this, we can make the first of our propositions.

Proposition 1: *The structures formed by horizontal cooperative arrangements fulfil the conditions of a strategic network.*

The firms that form the horizontal cooperative arrangement, as members of the strategic network, could benefit from the telecommunications networks in order to achieve two principal objectives. The first objective is to increase their capacity for distributing, store and codify the dispersed knowledge among the various geographical areas and departments of the organization. The second objective is to construct a robust framework of intangible capital in the organization, largely a consequence of the potential for the access and extension of knowledge that telecommunications networks provide. Telecommunications networks can impact very positively on firms with a democratic participation (such as in the case of horizontal cooperative arrangements). Vargas (2002), referring to the Internet network, affirms that the Internet has given rise to a new economy and a new way of doing business, but that it is above all a powerful instrument for participation and for the management of organizational knowledge. The positive effects generated by the use of telecommunications networks can be even stronger in firms in which the participation of members (first-level cooperatives, workers, customer, supplier) is deeply ingrained.

In fact, a horizontal cooperative arrangement is also a cooperative firm. As a cooperative firm, the horizontal cooperative arrangement is a type of company in which the active and effective participation in the production and/or commercialisation process is what legitimises the capacity to take democratically decisions (García-Gutiérrez, 1988-1989). The only way to participate in this process is if the member is either a client or a supplier. The double role of member-client or member-supplier, which arises in cooperative companies could imply an increase in commitment by the cooperative firms involved in the building of the horizontal cooperative arrangement (the new company).

What is more, taking into account that horizontal cooperative arrangements are forced to sustain the relationship of loyalty with the member, it is to be expected that it gets highly involved in the introduction of technological and human resources which are necessary to increase the degree of the member client satisfaction. There is in fact evidence showing that active support on the upper management and the firm ownership towards the acquisition of

Information Technology (IT) constitutes a key point in the achievement of a higher organizational efficiency (Powell and Dent-Micallef, 1997).

The positive effect of IT in general and in telecommunications networks in particular has been widely documented. If we consider the most widely used diffusion tools over the last few years (computing, robotics and telecommunications) (Freeman and Soete, 1996), the effective use of this kind of technology may affect the conditions in which products are produced and supplied, creating a positive effect on production economies (McLean and Soden, 1977; Cash and Konsynski, 1985), increasing the efficiency in the management of the value chain (Porter and Millar, 1985). These positive effects have been backed up by recent studies in which, in the long term, an increase of the business performance after the introduction and development of new technology has been highlighted (McAfee, 2001).

To sum up, efficacy in the service and efficiency in operations may be clearly affected by the use of new IT (Blinder, 2001). So, it is foreseeable that organizations which are more committed to keep a high loyalty level with their members (horizontal cooperative firms) are going to offer a higher degree of effective use of these tools in relation with other types of strategic alliances. This affirmation forms the basis for proposition 2:

Proposition 2: *The strategic networks that correspond to horizontal cooperative arrangements use telecommunications networks more intensively than any other type of strategic network structure.*

One of the fundamental features of strategic networks is related to the nature of their links. According to the literature (e. g. Galaskiewicz and Zaheer, 1999), the strength or weakness of the links, on the one hand and on the other hand the opportunistic or cooperative nature of these same links, can have a significant influence on the structure and behaviour of the strategic network. As a general rule, the stronger the links, the more probable it is that the members of the network take strategic decisions oriented to satisfy group objectives, as opposed to individual objectives.

The opportunistic behaviour of the network members can have the opposite effect, since it erodes the trust needed for members to participate in long-term projects. Finding opportunistic behaviour in network members can lead to an increase, rather than a decrease, in rivalry between members. It is presumably for this reason that non-opportunistic, collaborative behaviour facilitates and promotes the development of technical structures (for example telecommunications networks) that can have positive effects on the whole structure. As a coda to the two previous ideas, we now propose a third proposition.

Proposition 3: *Strategic networks corresponding to horizontal cooperative arrangements use telecommunications networks more intensively when their links are stronger and more collaborative.*

The size and density of the network have been defined as fundamental attributes of the strategic network. These characteristics define the structure of the strategic network, determining most of its potential for influencing the performance and behaviour of the individual firms that participate in it (Gulati, Nohria and Zaheer, 2000). In this way, it could be predicted that those networks consisting of a large number of organizations and with a large number of links (high density

network) between them will be able to participate in technological projects that require the use of financial and human resources. If in addition the organizations that make up the network are large, the availability of human capital, training and technological resources could be even greater.

From the point of view of the dynamic capabilities approach (Teece, Pisano and Shuen, 1997) a strong interaction in a high density network can mobilize some dormant capabilities related to information technology. In the case of the Spanish Olive Oil Production Industry, many of the firms in the sector implemented networks facilities after the creation of strategic networks (horizontal cooperative arrangements) that brought together, in 1999, a total number of 193 firms (Bruque and Moyano, 2002). The advent of larger and denser strategic networks enabled, in mid 2000, the building of a telecommunications network based on the Internet for interchanging commercial orders with clients. This network is now used for further tasks such as the management of the relationships between the firms in the network and the Spanish tax administration.

The implementation of larger and denser strategic networks in this sector after 1999 made it possible for the firms not only to have access to new IT facilities, but also to obtain the complementary human or managerial resources that leverage the effect of IT. Only the largest and densest strategic networks were able to organise a labour force skilled in IT management. Moreover, the managers and members of the firms attended periodic meetings and courses on IT management in their organizations. Both training efforts and a skilled labour force were much more difficult to achieve for the firms not integrated in large, dense strategic networks. This reasoning is reflected in proposition four:

Proposition 4: *Strategic networks corresponding to horizontal cooperative arrangements use telecommunications networks more intensively when the network is denser, and the size of the participating cooperative firms is larger.*

Conclusions

In developing the theory in the above sections, we have tried to deepen our understanding of the role of horizontal cooperative arrangements on the development of strategic networks and subsequently on the development of telecommunications networks. This study is a first step in interconnecting the paradigm of the Strategic Networks with the part of Strategic Management that is concerned with the management of information systems and technologies. Following from this integration, and after reviewing the theoretical bases of both conceptions, we put forward a number of propositions that may prove useful for structuring future research.

This paper has several applications. Firstly, this study can provide a springboard for future research. Secondly, It may serve as a call to attention for managers in the sectors in which cooperative firms have an important role. The creation of associative structures, or their strengthening, combined with technological renovation, may create a synergy-effect. Managers may understand these positive effects better if they understand the advantages of creating networked business structures, such as in the case of horizontal cooperative arrangements. This

application can be more effective in traditional or even rural sectors, in which the creation of networks is perhaps the only way of improving technological and organizational status.

Finally, the study may prove useful for public administrations responsible for the sectors in which cooperative firms are relevant (such as many agricultural or agri-food industries). Promoting networked associative structures could be a natural means of technological renovation. These efforts could help members of the industry to abandon its traditional conformity with regards the new technologies, and to welcome a new proactive vision of the technology, one that seeks a synergy between business structures and technological structures.

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