

THE NETWORK FIRM MODEL OF COOPERATION FOR SMEs IN THE BRAZILIAN ELECTRONIC SECTOR

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ABSTRACT

The interest in business networks and their importance for how business activities are carried about have increased significantly over the last few years. Through interactions with other firms, a firm can develop and expand its business. New types of arrangements inter organizations are appearing in several regions in the world. In Brazil, collaboration among small and medium sized enterprises (SMEs) is an emerging approach to industrial competitiveness, to achieve greater external economies of scale, market strength, or exploit new opportunities. The basic objective in this article is to scrutinize the nature of the relationships between competitors in business networks, and examine the elements that are coming inside of this new phenomenon organizational, through the composition of networks among small and medium firms proposing a network model to motivate the cooperation between the small and medium sized firms in the electronic sector in Brazil.

Keywords: Networks, Small and medium firms, Electronic sector

INTRODUCTION

One of the most rapidly emerging theories about the competitiveness of small and medium sized enterprises (SMEs) is that both can be accelerated through inter-firm collaboration. Small and medium sized firms as well as multinationals are building more and tighter relationships with other companies to achieve greater external economies of scale, market strength, or exploit new opportunities. Although there are a growing number of local, regional and state efforts to encourage inter firm collaboration.

Network organization is the most generic model of business organization. A network is loosely defined as three or more firms that cooperate in order to gain strength of members, solve problems, enter new markets, or develop and produce goods (Gelsing,1992).

The electronic sector is one of the best examples of the deep structural changes on Brazilian industry and economy. It is one the most dynamic sectors, with wide branching on the modern industry. Therefore, technological development is the core element to those industries that want to keep up with its evolution, remaining competitive.

Under a private aspect, the formation of networks between companies can be seen as a

solution for the small and medium sized firms (SMEs) that are in disadvantage front to the great companies to compete in global market. The solution can be in the formation of cooperation networks, where the network to dominate all the chain stages and each company carries out your function in agreement with your essential competence. The opportunities of business that appear starting from new forms inter organizations seem not to have precedents in the history of the economy world.

MAIN SUBJECT MATTER

It is well known that today we are witnesses to an enormous growth and increasing variety of ways to apply knowledge and technology in continuously changing industrial systems. The emergence of institutional or informal networks, formed by clusters, groups or vertical filières of firms, appears to be the major new feature of the contemporary industrial economy.

Network type organizations are fundamentally based on activity organized with the participation of many agents. The research tradition in economies on interfirm cooperation has as an important starting point in the pioneering contribution of Richardson. In his paper (Richardson, 1972), describes a continuum of interfirm relations in between the two extremes of pure transactions in organized markets, and full cooperation in complex clusters and alliances, close to integration. Richardson's paper can also be considered to be at the roots of contemporary and evolutionary approaches. It develops interesting observations which include in its core a capability or a cognitive approach to the theory of the firm. Particularly important is his characterization of the firm as a nexus of productive relationships. The focus is on the breadth of relations that exist amongst firms and across markets, links which constitute a relational base upon which each firm can build and develop its own network of relationships.

The existence of more than one alternative means of allocating resources between pure market forms and pure hierarchical models was also noted by (Coase,1937).

In the literature, one influential approach to the analysis of networks is that proposed by (Miles and Snow,1992) . The various authors provide their own analysis. For M. Porter the emergency in new ways of industrial organization gone back to larger cooperation between companies and the forms of gathering of companies, operating in a certain productive chain offers original elements for the elaboration of competitive strategies and more consistent industrial politics. Although there are many taxonomies of networks from which to choose, the most basic classification are: a) hard networks, which are three or more firms joining together to co-produce, co- market, co-purchase, or co-operate in product or market development and b) soft networks, which are three or more firms that joint together to solve common problems, share information, or acquire new skills. For (Grandori and Soda's,1995) classification focused on human resource issues and (Snow et al.,1992) investigated network roles in relation to product life cycle. (Grandori and Soda,1995) emphasized symmetric or parity-based networks versus asymmetric or centralized networks; this seems to have clear relevance for the way focal companies can manage their networks depending on their relative power. (Cravens et al.,1996) identify four types of network: flexible, hollow, virtual and value added, according to the dimensions of volatility of environmental change and the type of interorganizational relationship

involved. (Miles and Snow,1992) distinguish three types of networks: a) internal, b) stable, and c) dynamic. The first type of network relates to the internal coordination of the firm, the second relates to the external coordination, and the third represents a short-term network, built for developing single products or specific projects.

The view of Brazilian electroelectrical sector

The great surge of liberalization, commercial opening and supervised exchange in the 1990s brought- about changes and structural retrogressions in the Brazilian business industrial configuration with significant denationalizing in many sectors.

Nowadays, the worldwide market of electronics sets in motion US\$ 3,5 trillions with a rising tendency and the oil worldwide market sets in notion US\$ 2,8 trillions with a decreasing tendency. In the competitive forum of the productive chain of the Brazilian electrical complex (2000) many countries set the electronics sector as an economical priority: China, Korea, Taiwan, USA, Japan and others.

The electronics industry demands heavy investments in capital goods and in research and development, highly qualified labor force in all levels, long term industrial policy, and also appropriate infrastructure of the international trade. In the past, Brazil was competent to carry out research and development in some segments of the electrical complex and the country had a significant number of qualified professionals and technicians. However, during the last two decades, with the increased worldwide growing of the electrical industry, the country could not keep a long term industrial policy for the several sectors of the electronic complex favoring the aggregation of local value in the production. Other factors, such as high inflation and low index of economical growing during the 80s, sudden commercial opening and currency supervalorization, that went on until very recently, were also crucial factors to prevent the consolidation of the electrical industry in Brazil. The electrical complex is consisted of sectors that are in charge of projects and manufacturing systems and of many sectors that supply inputs, pieces and equipment. Some electrical systems are final goods (audio and video, photographic equipment, watches, etc). Others are investment goods used in the industry, agriculture and in services (processing data, offices, telecommunications and accuracy instruments for scientific, medical and industrial use (Leitão, 2001). The peculiarities of the electrical complex point to the need of steps that aim the transformation of the high current deficit into surplus and search for the reduction of its negative impact on the Brazilian trade balance and also help to consolidate the electrical industry in Brazil. In other countries, the adopted policy aimed at these purposes encourage both the local production of intermediary goods and of electrical components. In Brazil, the implantation of industrial policies intended to set up a national industry of electrical components is being contemplated. So that it would be possible to aggregate more value to final Brazilian products, to change the technological profile of exportations, and to decrease the expenses with importation of electrical components. In the end of 2002 the Brazilian electrical sector presented a turnover of R\$ 56 billions, 4% less than the one of the preceding year (2001). This was a bad result given the importance of the electro-electrical industry for the development of modern economies and because of Brazil condition that still lacks a competitive productive park and also electrical energy infrastructure and telecommunications that can serve broadly all the community. The main reason for the turnover decreasing was found in the

telecommunication area: its turnover fell 48% from R\$ 11.431 millions in 2001 to R\$ 5.994 millions in 2002. Besides telecommunications only the computing area presented a negative growing of 3% with a reduction in sales: R\$ 14.732 millions in 2001 and R\$ 14.290 millions in 2002.

The weak performance of the telecommunication sector reflects the reduction in the number of service supplier orders that made heavy infrastructure investments in preceding years. The moderate performance of the computing area is the result of a combination of factors: devaluation of the Brazilian currency (real), which burdened the cost of products and contributed to the market shrinkage of personal computers, “grey” market competition and low level of activities in Argentinean economy which resulted in 94% decreasing in exportations for that country. The generation, transmission and distribution area of electrical energy presents a 9% expansion in turnover. The automation and industrial equipment area, whose performance is related to productive investments, prevented a growing of 21% in turnover. The electro-electronical component area had its sales cranked out by segments of consuming goods and on the other hand suffered the consequences of decreasing in computing and telecommunications.

The Brazilian electro-electronical complex is consisted of the following areas:

- 1) Industrial automation
- 2) Electrical and electronic components
- 3) Industrial equipment
- 4) Generation, transmission and distribution of electrical energy
- 5) Computing
- 6) Electrical material for installation
- 7) Telecommunications
- 8) Electrical appliances

The companies that took part in this research are typically small and average sized ones (SMEs) that are mainly related to the engineering area. There is a smaller number of companies in the manufacturing area of products and equipment. These SMEs are suppliers or sub-suppliers of several productive chains in many industrial sectors: automotive, electro-electronical, petrochemical, paper and cellulose, etc. In the engineering area there are small and average sized companies and big national companies; in the manufacturing area there are big companies (mainly foreign ones) and few national small and average sized companies.

METHODOLOGY

In relation to used methodology it can be said that the approach of survey was the most appropriate, because one the subjects identifies the key elements that constitute the model of cooperation network for SMEs in the electronic sector. This research, used questionnaires type survey with closed subjects. They were applied two types of questionnaires: the first applied questionnaire in the small and medium sized firms of the electronic sector and the second applied questionnaire in class entities, type associations.

Taking into account the methodological aspects the present study had two stages. In the first stage it was conducted a survey that used an auto-administered questionnaire aiming to analyze some aspects of the small and average sized companies of the electro-electronical sector, and the ideal cooperation model for the sector. In a second stage, qualitative studies were conducted in small and average sized companies and in class corporations associated with the studied sector by means of semi-structured interviews.

Questionnaire 1, which was administered to companies, was consisted of four parts. The first stage deals with the general aspects of the company, the second one is related to the company profile and includes details such as: manufactured products, industrial sectors in which it takes part, clients, level of turnover, concurrent, production level, market share, etc. The third stage deals with the relationship profile and with the net model among companies. The fourth one is related to informative technological aspects.

Questionnaire 2, which was auto-administered to class corporations, includes 10 questions related to the perspectives for the electro-electronical sector.

Some of the questions use nominal scales while others involve ordinal scales (Likert, 1932) of five points in order to outline behavior, and such techniques are typically related to non-parametric statistics.

Construct validity, internal and external validity and reliability

Following the survey carried out in small and in average sized companies and in class corporations, the businessmen of the sector were interviewed (managers, production chiefs, engineers, etc). The interviews carried out in the companies and in the class corporations present a regional approach, considering some cities in Sao Paulo State, Brazil. According to Siegel (1975), in the hypothesis of one sample, or of two independent samples, as in the present study, the most appropriate statistics for the nominal scale is the frequency, while the central tendency indication in an ordinal scale is the average one.

According to Bryman (1989): “There seems to be an agreement among the organizational researchers that the used samples in surveys are rarely based in probable sample, prevailing most often the terms “convenient sample” and “intentional sample”.

The sample used in this paper has an intentional nature and covers two samplings: one of small and average sized companies and the other of class corporations and associations with regional features. The sample was mostly conducted through companies associated to “ABINEE” (Associação Brasileira da Indústria Elétrica e eletrônica) using an internet site. Three hundred sixty five questionnaires were sent to small and average sized companies and 20 questionnaires were sent to class corporations resulting in a return answer of 44 from the companies and 11 from the corporations. The utilization of 12% for the companies and 55% for the corporations is reasonable when compared to the ones practiced in this field.

FINDINGS

Among the results obtained in this research we can mention as important elements for the formation of cooperation networks: a formalized legal structure, trust among the partners, a central agents’s presence. Among the expected benefits with the formation of those networks were mentioned: the increase of negotiation power on the part of the companies,

to share technology, and to gain market. Though the competitors cooperate it does not mean that they do not compete, and perhaps they even distrust each other. Formal agreements are present if the competitors have formed strategic alliances or partnerships. This research allowed to identify three aspects that allow the birth, and survival of the networks of SMEs (small and medium sized firms) in the electronic sector : the culture of the trust, the culture of the competence and the culture of information technology. The conclusions of this research allow to through cooperation a company can gain competence, market knowledge, reputation, access to the other products, and other resources of importance for its business.

The following conditions were mentioned as necessary for the cooperation among small and average sized companies of the electro-electronical sector in Brazil:

- Establishment of exchange of ideas
- Jointly analysis of problems and solutions
- Definition of the contributions of each partner
- Definitions of performance areas
- Development of an strategic view
- Information exchange among partners

Other important points for the cooperation are:

- To avoid individualism, to know how to accept, union of people by means of leadership, synchronized action and synchronized group action, lack of conflicts among partners, denying of divergent interests

In order to arrange a cooperation net among small and average sized electro-electronical companies the following minimal conditions were mentioned by most of the interviewees:

- Mutual interests: the agents have particular and different interests which can be complementary when in the search for a common purpose.
- Hierarchy of participants: particular interests of all the agents must be
- Define allocation of resources
- Determination of the net purposes: when and how to eliminate conflicts and in which cases to cease the cooperation
- Duration and carry out time of specific projects
- Mechanisms to determine new purposes and priorities
- Definition of a central agent
- Define the relationships with big companies, class associations, universities, banks, research centers and other local companies.

The companies that took part in the research consider that the net integration presents the following benefits:

- Allows the definition of common strategies
- Preserves the individuality and protects the company data
- Reduces the production costs and the investment risks
- Intensifies the communication and the access to information
- Broadens e market dimensions

- Facilitates the credit access
 - The companies in net adopt similar instruments in business management
- The main difficulties for the creation of SMEs (small and medium sized firms) nets were:

- Brazil lacks cooperation spirit
- Brazilian culture is based on individualism and it forgets the collective
- Brazilians find it difficult to accept cultural changes (the population, the businessmen politicians, and the rulers)
- There is a lack of knowledge on specific opportunities for the creation of SMEs nets.

Following the tabulation of the results and the analysis of the interviews it was determined that the model of cooperation net for the small and average sized electro-electronical companies in Sao Paulo state (view figure 1) should count on the participation of the small and average sized companies and also of the following agents:

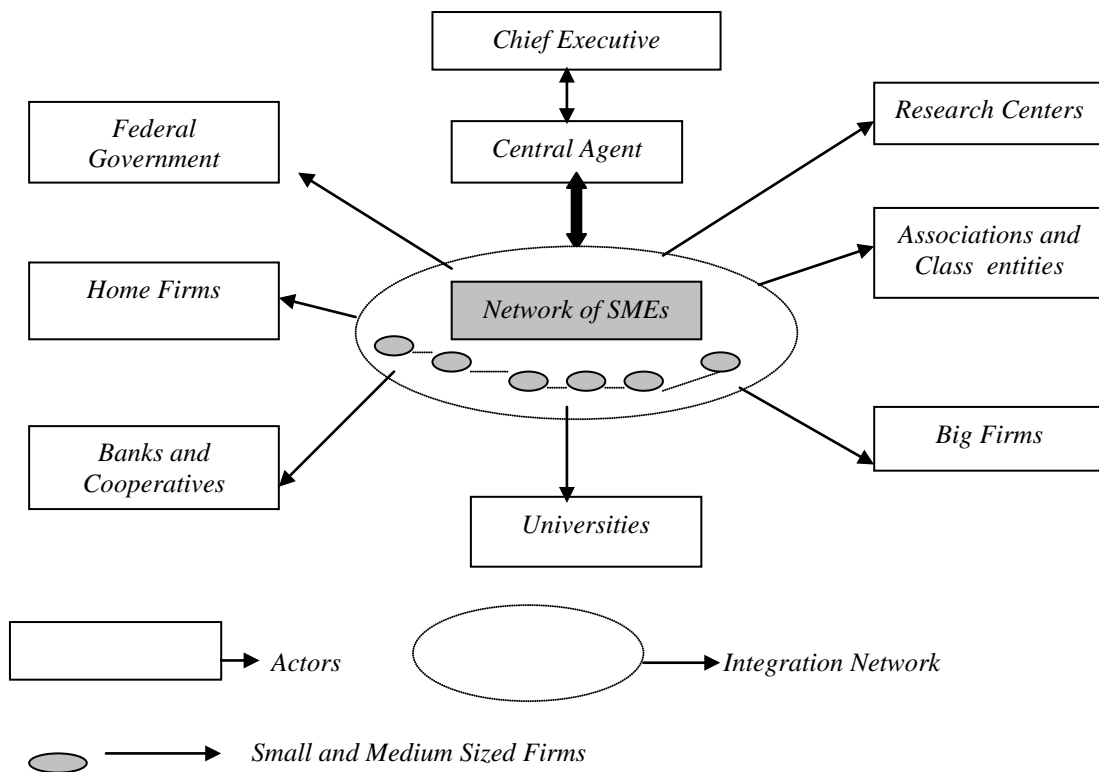


Figure 1. Conceptual Model of Network Cooperation in SMEs in the Electronical Sector

- Regional Government: Favoring the social conditions.
- The class associations interested in keeping economical survival and in increasing the income of associates
- The universities and the research centers which are aimed to spread knowledge and to form human resources.

- Other service institutions that can offer specialized technical assistance: Sebrae, Anprotect, Fiesp, etc.
- Banks, cooperatives, credit institutions which must drive the economy and offer resources to the local economy.
- A central agent that canalizes information and conducts the net.
- Other regional companies: bigger companies or companies of other sectors.

A point that was highlighted in the survey is related for the type of support structures that could create the net organized companies, such as:

- A center of net business that allows more advantageous conditions. A higher business volume would attract new markets, quality of the acquired products reducing the costs of raw materials, and negotiating the payment time. It would offer better prices and better products.
- Shared marketing: a marketing center makes it possible to develop advertising campaigns for the net, strengthening the products and improving the communication with the external market.
- A center to strengthen alliances: it is possible to set up partnerships with suppliers, distributors, service suppliers, etc. Therefore, the companies get qualified and can compete more eagerly in the market.

According to all the interviewed people guided policies are necessary for the formation of nets to consolidate mechanisms of integration and also to make possible the evolution of a productive system based on collective actions and on mutual knowledge.

These local policies can be considered as strategies of industrial policies formed by actions that allow the admission of new agents, favor the research access and development an industrial cooperation.

A net of companies must provide a number of general services as benefits to the associated companies which would provide:

- Information systems: secure and reliable, that generates fast responses in order to detect and to take advantages of the opportunities that are offered by the national and international market. The net needs detectors to follow the technological development of the electronic market in the world and in Brazil, and it is necessary to transmit the information to the companies.
- Innovation with quality: the business management must take part continually into the productivity increment and into the quality of the products in order to ensure the market and the engagement in new markets. The technological innovation and its application in products and processes must be performed by the net of companies, but also by means of external relationships with universities, research centers and organizations into and outside the country.
- Financial support: a net of companies must give directions related to forms and sources of financing, use of available financing instruments and their techniques.

- Promotions of an integrated net of companies through the use of images. When the net presents the products or services it is promoting the other companies that are parts of the net, providing a competitive image.
- To attract new partners and/or investments. New partners that can be willing to complement the technological competence of the net and they can be attracted by the economical information on the region, by the fiscal incentives that it provides, by the potential partnerships with other companies, etc.

The role of the government (state) before the creation of a net of companies should allow:

- Homogenized incentives for the business development, avoiding non-coordinated policies and encouraging cooperation.
- Favoring the education and training of experts who can make up for the lacking competence in a regional level.
- Investments in collective goods in a long term: education, health, life quality, infrastructure in general
- Development of nets (infra-structure) to increase the internal integration among regions

CONCLUSIONS

This paper has dealt with an emergent form of firm organization, related to the constitution of networks. The contribution of Richardson concerning the extent of cooperation among firms, have been utilized in an attempt to explain the main subject in the paper. This conceptual development, extending the scope of applicability of the cooperation networks model, opens up new chances for empirical studies the network approach.

Clearly the successful development of cooperation networks among small and medium size companies depends on a lot of specific conditions, first of all it relies on the existence of appropriate infrastructures in developing countries with Brazil.

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