

# Virtual Factory: Miths and reality in the Brazilian context

## ELECTRONIC COMMERCE APPLICATION

### ABSTRACT

The concept of virtual organization ( involving *virtual enterprise* and *virtual factory*) can be understood as a kind of cooperative network enterprise and *dynamic cooperative network*, which, through the utilization of the new information technologies and the new infoways ( the Internet, for example) provides the acces to new markets of products and services without the traditional limits in terms of space and time and increases the competitiveness power of the partners belong to this virtual network. The aim of this paper is to investigate (based on the context of the global industry restructuring) the emergence of the *virtual enterprise* and *virtual factory* conceptions in the brazilian economy .

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### *Introduction*

The movement of globalization and the deep changes in the modern capitalism world, specifically the emergence of new technologies relating to the microelectronics and the infoways, have imposed deep changes in the organizational structure of the enterprises in order to get more competitive advantages. This movement has provoked, in particular terms, new kinds of inter-firms relationships, towards the increasing of the company competitive power, in general. Inter-firm networks have been created and got more and more importance not just in the developed countries but also in the newly industrialized countries as Mexico, Chile, Argentina and Brazil. Under this context, the companies are looking for a new paradigm of competition including some types of mutual cooperation with other companies ( suppliers and clients), public administration, universities, Research and Development centers, and so on. According to Filos (2000):

*“ Information is the fuel of the new economy and should be understood in its broadest sense, as knowledge, ideas and brainpower. Intangible goods such content and software represent an ever-growing share of the economy. The most successful organisations, not only commercial enterprises but also public admnistration, are those, which operate on the basis of collective intelligence. This means co-operating efficiently, sharing information, generating new ideas, and developing the capacity to exploit them. Co-operative competition amongst individuals is the core, providing driver for innovation and creativity”.*

The purpose of this paper is to investigate (based on the context of the global industry restructuring) the emergence of the virtual organization and virtual factory conceptions in the Brazilian economy and discuss some relevant aspects that are influencing the diffusion of this concept in the business process. Furthermore it is the intent of this work to question some existing myths about the extension of the virtual organization application.

## ***Methodology***

The research framework of the present article involves some special aspects as for instance:

- The influence and importance of the new types of Telecommunication and Information Technologies ( *Internet, Intranet, Extranet, etc.*) on the phenomenon of inter-firms networks and virtual organization);
- The conception of Virtual Organization (VO) or Virtual Enterprise (VE) and some possible utilization of this concepts.
- The inter-firms cooperation aspects;

Besides these points the investigation method will also prioritize the following aspects:

- The importance of an adequate social and cultural environment to stimulate the cooperation among companies;
- The institutional aspects involving the needs for reforms in Government Policies in Brazil.
- Physical Infrastructure: creation of an adequate telecommunication and information infrastructure

## ***Conceptualizing Virtual Organization***

During the recent years many different models have been proposed to investigate the inter-firm relationships, such as alliances, partnerships, consortia, networks, clusters, joint-ventures etc. Each model analyses and explains different and complementary aspects, focusing the attention on the nature and characteristics of inter-firm relationships.

The restructuring of the industrial organization in this new *digital* economy is heavily influenced by the change of strategies of the transnational corporations around the world., and also it is dependent on the capacity of firms in terms of creating the competitive strengths in the new forms of collective organization networks and chains which are characteristics of the new era.

The concept of virtual organization or virtual enterprise is especially pointed out as a strategic network among global companies that can create a lot of new opportunities for the partners belonging to a specific digital network. Operations related to production, marketing, logistics, product development, R&D, material supply, engineering, and so on can be highly improved through the intensive utilization of IT and new telecommunication channels.

Virtual organization is a special kind of enterprise cooperation network that creates “*dynamic cooperation networks*” by the intense utilization of the new information and telecommunication technologies (Internet, for instance) has the next goals:

- 1.) To make the access to new marketplaces possible, without the traditional space and time constraints.
- 2.) To improve the competitiveness potential of the partners of this virtual network;
- 3.) To make the innovation and exploitation new business opportunities in the global marketplace possible .

Based on Bremer (1996b.) apud Goldman (1995) the adoption of the virtual organization structure under the competitiveness analysis can point out the next strategic reasons:

1. To share resources, facilities and core competencies in order to expand the geographical range or the apparent potential that a rival company can offer a client;
- 2.) To share the risk and the infrastructure costs to be a competitor.

According to Zimmermann (1997), the term *virtual* is used in a common sense to explain something that apparently exists, like virtual reality or virtual product/virtual object; so these do not have any physical structure. They only exist on the computers. To the observer *they only exist in the mind, as a product of imagination.*

Otherwise the concept of virtual enterprise can be easily understood through the architecture of memory of a computerized system. The core memory resources should not be used to all the program demand. The logic solution found was the virtual memory which involves a logical memory. This one uses a set of core memory and a secondary memory with unlimited extension.

A virtual enterprise can be understood through two point of views: a functional one and an institutional one. Concerning the institutional point of view a virtual enterprise is an arrangement of the best core competencies of independent companies which cooperate with each other. They are connected through the utilization of the new information and telecommunication technologies during a certain period of time. This period corresponds to the achievement of a specific business purpose without considering the companies boundaries or their original countries. It is necessary to emphasize that a lot of difficulties in terms of governmental regulation have happened.

In this enterprise network configuration each member has the access to the existing resources in all network. The risk of each entrepreneur is shared among the partners of this network, specially in the large projects.

Nevertheless, concerning the final client there is the expectancy of getting low cost and better quality products. Besides they can have many more choice possibilities of getting better services, although this final client can see only one supplier.

Concerning the functional point of view, one main characteristic of a virtual enterprise is the concentration on core competencies, which are coordinated by a dynamic way and guided to the problem solving, through a superior base of IT. According to this approach a virtual enterprise is not referred as an additional organizational form only. It is a quality that can be applied to an existing organization.

## ***The diffusion of Virtual organization and the E-Business in Brazil: Some myths and the reality***

In this new scenery companies and institutions are changing their traditional structures deeply and reorienting their strategies. The concept of virtual organization -VO or virtual enterprise-VE have become broadly used by these companies. However there have been a lot of myths and mistakes about this issue. Lets try to present and discuss some of them.

First of all many people think that only large companies, especially the Transnational Companies-TNC's can apply this concept in their operations. In fact several opportunities for VE in Brazil will occur for all types of companies (large, small and medium enterprises – SME's, and high-tech micro-companies), if adequate conditions are set up for the creation of these new business opportunities. The sectors that are more suitable for the formation of VE are manufacturing and services, especially tourism, software, communication, education and information. Furthermore it can be possible to think that other kind of social organization as cooperatives and non-governmental-organizations could benefit of this type of *digital cooperation networks* . Just to illustrate this perspective it can be said that more than 15 incubators of popular cooperatives , spread throughout Brazil, are working together. They are using the potentialities of the Internet tools to communicate with each other and create new job opportunities and better income to the poorest people.

In general Latin America has been recognized to be a growing market, especially countries such as Brazil and Mexico. In these countries opportunities have emerged not only for large multinational corporations, in sectors like automotive, electronics and communication, but also for the national suppliers of these companies which have been pushed to fulfill the required standards (e.g. ISO 9000, QS and ISO 14000). The best example is the automotive industry. Companies such as Chrysler, Ford, Mercedes Benz and VW have tried to develop complete supply chains with national manufacturers. So cars are already been manufactured by national firms such as: *Stratus* from Chrysler in Mexico. Another example is the new concept developed by VW in Brazil where suppliers are allocated within the assembly factory in the concept known as "*The Modular Factory*" ( Bremer *et alli*, 1997).

In these scenarios of economical growth, the concept of Virtual Organization (VO) is appealing. Analyzing the situation of e-business and e-commerce in Latin America it is possible to identify the leadership of Brazil in many aspects, comparing it to other countries like Mexico, Argentina, Chile and Colombia. Brazil has the largest size of user base; major presence of retailers and content providers. It has one of the lowest costs of Internet access and fulfillment players (being left behind only to Mexico, in these latest two aspects). Anyway, Brazil has been showing a strong potential for rapid development in the next years.

Another myth refers to the idea that one of the most common applications of VO concept is related to *supply chain management* of the companies. But this is not true. In this sense it is interesting to observe the conclusions of a recent research involving 54 big companies in Brazil (KPMG Consulting – dez./2000). This research revealed the increasing interest on the Internet

utilization in their operations ( *e-commerce* or *business-to-business* ones). Based on a questionnaire of multiple choice the companies pointed out the *Relationship with their customers* (93%) as the main reason for using Internet resources. After this, *Marketing* was mentioned as a second reason ( 70%). The next reasons were: *Selling Channels* (61%); *Logistics* (50%); *Production* (37%); *Human Resources* (35%) and *others* ( 7%).

On the other hand there is still a common sense that it is very easy for a company ( even those small or medium size ones) to enter in the *digital era* and work with this new concept of virtual enterprise or e-business. But this idea could be considered another existing myth. Actually the successful development of VO depends on a lot of requirements and on the existence of appropriate infrastructures. Since a generalization of infrastructures in Latin American (LA) countries is difficult to be done, this paper focuses on a more specific analysis of the infrastructure in Mexico and Brazil. The necessary conditions for the risen of VE in such countries will be discussed within the *AVE Case Framework* (Goranson, 1995).

- Social/Cultural Infrastructure: development of an Entrepreneur Culture in Latin American (LA), especially in the case of Small and Medium Enterprises (SMEs).
- Legal Infrastructure: the needs for reforms in Government Policies in Latin American Countries
- Physical Infrastructure: creation of adequate telecommunication and information highways
- Information Infrastructure: development of reliable and accurate industrial databases.

Next we are going to focus of such of this point:

In terms of *legal infrastructure* it can be said that the new economical agreements NAFTA (Canada, USA and Mexico) or Mercosur (South America countries) seems to satisfy the requirements for the development of enterprise's cooperation networks, but they don't mention anything about virtual organization. Certainly this is a very important subject to be researched in the next years.

Nevertheless *physical infrastructure* is one of the critical barriers for the implementation of cooperation networks in LA, since it depends on a large investment in communication technologies. In Brazil the situation has become better after the privatization process of the telecommunication companies in the last years. The increase of competition among telephone companies, last year, made the launching of products like cable modems (@*jato* of TVA and *Virtua* of *GloboCabo*), ADSL and ISDN possible. On one hand, cable modem offers a solution to free the telephone line and on other hand, ADSL (called *Speedy* in São Paulo and traded by *Telefônica*) and ISDN (traded by *Telefônica* and *Telemar*) are technologies that search the best exploitation on the existing telephonic plants. This situation is excellent for the telephone companies, which can supply an additional line without extending the capacity of the telephonic central. The main difference between the ISDN and the ADSL is that the ISDN is charged by time of use, while the monthly fee of the ADSL is always the same one, independently on the use (León *et alli*, 2000).

Regarding the *information infrastructure*, there is no reliable information about the state of industry in most of the LA countries, some studies have been carried out to identify industrial clusters in Mexico and Brazil, but the information is not widespread, and sometimes is kept for government policies. A first effort in Mexico for the creation of an industrial information site is called SIEM (Acronym in Spanish for Information System for the Mexican Industry) which is a Web site where all the Mexican companies are supposed to subscribe. Nevertheless this effort has failed as there is no trust in Mexican government programs. On the other hand, standards for exchange of data are not wide spread as well. Electronic Data Interchange (EDI) protocols are already used, yet the exchange of product model data using standards like IGES, VDA-FS or STEP is very rare, sometimes unknown.

In terms of the *social and cultural requirements* for creating cooperation networks among companies, a set of problems or barriers can be identified, for instance:

1. Lack of real commitment and confidence among the partners of this kind of network:
2. Lack of resources in terms of information technology (IT). Concerning SME's they do not used to deal with IT as the same way that the big companies used to do.
3. Brazilian companies in general and SME's especially do not used to cooperate with each other. Very often the companies owners ( "*the self-made men*") are satisfied with their real situation and they are not worried about any kind of new business opportunities.
4. The precarious organizational structure and the specific organizational culture of a large number of Brazilian companies are very often the main reason of a lot of problems involving the relationship with another companies or partners .The forms of cooperation are not always formalized in the sense of an official collaboration.

Specifically talking, the application and diffusion of the concept of virtual organization or another kind of cooperation networks among companies can be seen as a promising approach, since these companies from Brazil have the opportunity to achieve global markets without losing their economic independence. Moreover SMEs have their own identity and want to remain in such a way. *Cultural infrastructure* related to cooperation among partners have been a common practice in companies where the lack of resources has forced them to project and manufacture products in an outstanding creative and innovative manner, sometimes subcontracting, leasing or borrowing resources from other companies to achieve the desired results. These forms of cooperation are not always formalized in the sense of an official collaboration, instead they have been more seen as support among colleagues. Therefore, a must for cooperation is an already frequent practice of Brazilian companies. However a major problem for the cooperation among SMEs in Brazil is the lack of entrepreneur culture, companies owners are usually happy with their current success and they are not looking for new business opportunities, some companies are just concentrated in performing everyday operations and there is no vision for the long run. The fact is that SMEs usually are family business where one persons makes all the decisions and there is no strategic plan for business or technology.

### *Some Conclusive Remarks*

The development of Virtual organization or virtual enterprise in emerging economies like the Brazilian one is not so easy, nor it is a rapid process. It must be considered in a medium long term perspective. The VO strategy and therefore the creation of VE are a reasonable alternatives to traditional cooperation in Brazilian companies, since it offers an opportunity to maintain their traditionally high structural flexibility by achieving a positioning of economics of scale. As it was showed the requirements to develop VE in Brazil depends on how well the barriers regarding enterprise culture, legal policies, technological infrastructures and information technologies are jointly tackled between government, academics and industrialists.

This work has shown that firms with well-defined strategic postures can benefit from collaboration in order to compete. The share of the resources with competitors, suppliers, trade association, and the community provides a better outcome for the partners. Generally, larger firms are at a higher level of competitiveness both on the domestic market and internationally as well. The clear differences in terms of the evaluation of competitiveness in the favor of larger firms appears through the emphasis on determining factors as production technology, the quality of the management staff, financial possibilities, effective marketing, research and development. Such discrepancies between large firms and SMEs suggest that there exist big disproportion in competitiveness as between the SME sector and large companies. One potential way of overcoming the lack of competitiveness of small and medium size enterprises is co-operation.

Nowadays it is evident the great number of commercial transactions that are made throughout Internet. You can buy books, CDs, and a lot of other products utilizing just a “click” in your personal computer. Nowadays there is a great number of virtual companies such as supermarkets, bookstores, shopping centers, etc.. All of these are called *business to consumer* (“*B to C*”). But there are other kinds of commercial transactions among companies called *business-to-business* (“*B to B*”). In this last case companies sell and buy each other raw materials, parts components, packages and so on. Besides it is possible to sell and buy whatever you want through the virtual auctions, this is the *consumer to consumer* (“*C to C*”). In synthesis you can buy or sell everything you want using the Internet tools. Besides these it is possible to listen to music, read newspapers, magazines and make a lot of things with the Internet support.

However, the applications of the Internet are not exclusively related to the business world. In terms of education there are a lot of possibilities to exploit. Virtual schools and virtual universities are being spread around the world too. In this sense it is important to understand that this type of Internet use could be an important educational framework mainly to people who live far from the big cities.

Concluding, as a new technology like others (as biotechnology, robotics, genetic engineering, etc.) the Internet must be used for the social benefits of all the citizens instead of the benefits of a small part of the society. The correct use of this electronic tool as well as all kind of technology should be decided in a democratic environment for the actual development of the humanity.

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