Virtual Organization Models: Brazil and Mexico

Bremer, Carlos Frederico
Nucleus of Advanced Manufacturing, São Carlos School of Engineering, University of São Paulo – USP/EESC
Av. Trabalhador São-carlense, 400. São Carlos, São Paulo, Brazil. 13560-390
Tel:+55 16 273 9425
bremer@sc.usp.br

Molina, Arturo
Instituto Tecnologico e de Estudos Superiores de Monterrey – ITESM
Av. Eugênio Garza Sada 2501 Sur, Monterrey N.L., Mexico
Tel:++ (8) 358-2000, ext. 5115
armolina@campus.mty.itesm.mx

Ortega, Luciane Meneguin
Nucleus of Advanced Manufacturing, São Carlos School of Engineering, University of São Paulo – USP/EESC
Av. Trabalhador São-carlense, 400. São Carlos, São Paulo, Brazil. 13560-390
Tel:+55 16 273 9425
lmortega@sc.usp.br

Abstract

The application of organizational framework give to PMEs more flexibility and productivity from the formation of cooperation to cover its deficiencies in sources and knowledge. Tring to allow the action of PMEs in global environment a Framework for Global Virtual Business was developed by Bremer et al. (1999a), join concepts of virtual enterprises and organizations as well, describing the entities and the main coordination aspects of a virtual global business. Based in this framework, and seeking a new way to consolidate the PMEs in Brazil and Mexico, were developed two projects VIRTEC and VIRPLAS, respectively. The objective of both projects consists in structuring a common cooperation base where its members can find – in a environment of trust – the necessary infrastructure to exploit new business opportunities. This article describe the formation and operation of these frameworks, as well, their results.

Key words: Virtual Organization, Small and Medium Enterprise, Cluster

1. Introduction

The application of organizational frameworks represents an approach in direction to combine the PMEs with high flexibility and productivity together, with the fact that these need the formation of cooperation to cover its deficiency in terms of sources and knowledge. The adoption of this strategy allows the PMEs take advantage of the opportunity to globalize their business without lose its flexibility and economical independence in long and rigid associations with industrialized countries companies.

A specific type of framework is the Virtual Organization (VO) that is understood as a group of companies, prepared and qualified to cooperate and seek, in group, new opportunities to act in the market. This company framework concentrate its business and activities using partners to exploit business in a virtual way.

Virtuality can be defined as the ability to offer to clients a complete product or service that the company itself has only some of the abilities involved (Sieber, 1997). The other abilities
needed are get by cooperation. Concentrating its main abilities and, in as much as, join its strength in framework, these companies are able to produce more complex goods and also customized. Moreover, they can upgrade its competitive position in a notable way.

From this Virtual Organization can be created Virtual Companies (VCs), once it identify business opportunities that can be exploited by the integration of abilities, usually supported by information technology. As a cooperation, VCs allow the improvement of resource use of partner companies, the acquisition of new abilities and access to new markets. Moreover, the cooperation in VCs allow the offering of differentiated products and services in the market in reduced time and shared risks. With a opportunist characteristic, better succeeded a EV will be as faster it acts in exploit business.

These are concepts described in the Framework for Global Virtual Business, proposed by Bremer (1999a), presented in this article. This framework was created to allow the action of PMEs in global environment and shows the entities and main coordination aspects of a virtual global business. This framework is a result of a cooperation program between the Instituto Tecnologico y Estudios Superiores de Monterrey – Mexico; the University of Aachen-Germany and the University of São Paulo (BREMER et al., 1998), join different areas of study such as, marketing, management and manufacture.

Based in this framework, two VO were created: VIRTEC and VIRPLAS. VIRTEC is located in Brazil, in the city of São Carlos. It is a VO made by nine small and medium size manufacture and technological companies. In a year, a base to produce new business was created by the development and production of new products and adding value to the already offering products and services by the abilities of its members. VIRPLAS, Virtual Organization of Plastics, was created to explore how the concept of Virtual Industry Cluster could enhanced the regional development of plastic industrial sector of Monterrey, Mexico (Flores and Molina 2000). Both VO define their mains aspects of coordination and the description of these aspects constitute the objective of this article, that will also show the advantages and difficulties found.

2. Framework for Global Virtual Business

The framework for Global Virtual Business was developed to explain how a Global Virtual Enterprise (GVE) is formed, run and dissolved (Bremer et al., 1999). The GVE can exploit the advantages of being global using local competencies.

This framework consists of three business entities: the Virtual Enterprise (VE), the Virtual Industry Cluster (VIC) and the Virtual Enterprise Broker (VEB). According to Byrne (1993), VEs are temporary networks of independent companies linked by information technology, which share competencies, infrastructure and business processes with the purpose of meeting a specific market requirement. According to (Eversheim et al., 1996), a VE may be formed within a VO, which then becomes a network of potential partners (enterprises). The VIC is an aggregation of companies from diverse industries with well-defined and focused competencies, whose purpose is to gain access to new markets and business opportunities by leveraging their resources. A VEB enables the creation of VEs using the services provided by VICs.

In this framework (Figure 1), a VE is created when a business opportunity can be exploited by a VEB through the selection of the appropriate competencies from members of a VIC. The VEB looks for business opportunities around the world or receives requests for specific products/services. In order to satisfy this demand, the VEB seeks partners in VICs for the best combination of the competencies, which, jointly, meet a customer’s product or service requirements. If an adequate competence cannot be found within the VIC, the VEB can also look for the required competence outside the VIC. The owner of that competence thus becomes a competence supplier for the VE. The success of the VE depends on the ability of the VEB to ensure the integration of competencies and cooperation among partners. Another important aspect is the establishment, within the VE, of an enterprise responsible for the mediation of possible conflicts. The role of this enterprise, called the leader enterprise, includes representing the VE to the customer. Among the VE partners, the consequences of a conflict are accepted by the enterprises
directly involved. If no member enterprise is directly responsible for the conflict, any possible losses deriving therefrom are proportionally distributed among the VE members.

The VEB also configures the appropriate infrastructure (physical, information, legal and social/cultural) to support the operation/dissolution of the VE. Once a member of a VIC is selected, it becomes a partner of the VE according to the framework.

![Figure 1 – Framework for Global Virtual Business](image)

Adapted from Bremer et al., 1998.

The members of the VIC, or the VE partners, are not required to contribute with a technical, shop floor or design competence. Business competencies such as export/import and infrastructural competencies such as videoconferencing are just as important as the physical competencies. Moreover, the VEB does not necessarily have to limit its search for the required competencies within a single VIC, but can involve other VICs. This, again, denotes flexibility and the capacity for quick response, which are primary requirements in virtual enterprising.

It is important to highlight that the Global Virtual Business Framework proposes to increase its members’ profits by leveraging resources, processes and knowledge (skills) rather than by dictating the direction to be followed.

Another interesting issue to be considered is that not all the VO or VIC members will join into a VE. Only the necessary competencies will take part on it, and the profit - or losses - distribution will not be equally divided, but they must follow the individual commitment and investment of each partner, towards the several interests involved, like profit gain, marketing, knowledge improvement and development.

Also worthy of note is the fact that, because multiple business opportunities may arise simultaneously, more than one VE can be configured at the same time. The simultaneous operation of these VEs will be possible and satisfactory only if the necessary coordination abilities are provided and if the enterprises involved have sufficient available capacity.

3. Experience in the creation of VIRTEC: Virtual Organization the Technology in Brazil

The VIRTEC project began in the Nucleus of Advanced Manufacturing (NUMA) located in the Engineering School of São Carlos, University of São Paulo, as one of the pioneer projects in the formation of Virtual Organization in Brazil.

The city of São Carlos has a particular characteristic in the brazilian academical enviroment due to the presence of two technical universities (University of São Paulo and Federal Univesity of São Carlos) and one Agriculture Research Institute (EMBRAPA), recognized by their excellent level in research and instruction. This characteristic allows the creation of a large number of PMEs of high technology, becoming a good local to allow the creation of a VO.
The VIRTEC project began in July of 1998 by nine PMEs, all of them from São Carlos, capable to supply technological products and services with high added value according to the client needs. The customization of these products and services is get by the integration of different abilities of its members that cannot be competitive in the same final product to avoid the rising of internal conflicts in the VIRTEC. These competences are focalized in recycled materials, special steel foundry, automation, development of special polymers, hydraulic appliances, technical assistance and assembly, machining and mechatronic, instrumentation and software, dentistry equipment and special furnaces.

In the first years the project was financed by the members, who contributed with a small financial support, and personal expenses was supplied by different research agencies.

Due to the different areas of VIRTEC members, it is necessary to supply information to support the manage and operational processes of VIRTEC, and also to develop a common culture to GVI. These works were and still be done by different activities such as, getting the profile of each company of VIRTEC; benchmarking; evaluation of cooperative capabilities; identify the main abilities of each company and socio-culture aspects of them.

Once VIRTEC project was proposed and applied in its first year, to its continuity, different objectives have been improved and described. These objectives are:

1. Supply to VIRTEC members a better knowledge of the market and access to new clients.
2. Intensify the informal cooperation between VIRTEC members.
3. Promote integration between university and industry.
4. Allow a improved use of companies' abilities.
5. Improve knowledge acquisition rate by sharing ideas and concepts.
6. Allow the formation of VCs.

During the development of the project the socio-culture characteristics were analysed to identify and understand culture differences and change the environment of VO to a more propitious to success. In this analysis, among the aspects that help the success of VIRTEC is the different profile of the contractors; people who believe in industry-university partnership.

Other culture features of contractors were also important to good results of the project, such as: entrepreneurial culture, open to contact, absorption of the importance of making partners to grow the market of each company; agility and flexibility of the companies. However, it is possible to say that the great proponent to the good results achieved by the project is the fact that the members trust each other. This trust has been build by the time. Although one of the weaknesses of Brazil is, by Covey (2000), the mistrust, the members of VIRTEC have a great capacity to trust in the character and competence of its partners.

One of the decisions made by VIRTEC, that can be pointed as one of the main for the second year, is the allocation of trainee in the member companies. The integration of companies and the project has increased day by day and culture barriers are being reduced by partnership university and industry through its students.

From these points, extremely positive to good development of the project in the first year, some members have already made good use of some benefits in being part of VO.

The project is adapted to Brazilian PMEs profile. This can be observed by the success of two new products put on the market through VCs, a hammer with impact part made of biodegradable and a damper made of vegetable poliuretane. A third one is been developed (wheel chair). Moreover, a consequence that member companies can take advantage from VIRTEC project is a better visibility of the market, resulting in an increase in their profit (Bremer et al., 1999b).

Although VIRTEC activities are detailed planned, its schedule has been extended many times. This fact is attributed to the contractor working nature of members companies, usually, they concentrate to himself the creation and manage processes. Some difficulties are:

- Common schedule difficulties to all members;
- Confidence in judge an idea as difficult in the beginning, by the fact that the companies do not known each other. Until now there is a need for mediator, in this project in the university.
- There are few graduate students in the project.
• Some members do not make their part correctly.
• Difficulties in finish some initiated work.
• Difficulty to members understand the projects viabilities.
• Difficience information flux between NUMA and member companies.

The creation of the VIRTEC site is another benefit brought to the members, because it allows a greater opening of this companies to the global market.

![Figure 2. VIRTEC - Web Page (http://www.virtec.com.br)](image-url)

4. Experiences in the creation of VIRPLAS: A Virtual Industry Cluster in Mexico

VIRPLAS, which stands for VIRtual industry cluster for PLAStics, was created to explore how the concept of Virtual Industry Cluster could enhanced the regional development of the plastic industrial sector of Monterrey, Mexico (Flores and Molina 2000). VIRPLAS has six members with different competencies within the plastic industry. One company is focused on product and mold design, another has capabilities to design and manufacture injection molds components, two companies are on the business of injection molding, and one company is specialized in commercialization of plastic products and machinery. All these companies are Small and Medium Enterprises (SMEs) with high interest in being part of the new global businesses.

The six VIRPLAS members were SME’s who have previously carried out projects with the CSIM\(^1\), a research center at ITESM\(^2\). As the companies were visited, the concepts of Virtual Enterprise and Virtual Industry Clusters were explained as well as the main purpose of VIRPLAS. The project included the following phases:

- Design of an internet Web page for the cluster members
- Evaluation the cluster members to identify level of infrastructures development (physical, information, cultural/social, legal) using a modified IMMPAC methodology (Molina and Gonzalez 1998).
- Development of suitable infrastructures to carry out virtual business.
- Identification of new business opportunities for the cluster members.

---

\(^1\) CSIM- Centro de Sistemas Integrados de Manufactura
\(^2\) ITESM- Instituto Tecnológico y de Estudios Superiores de Monterrey
The companies accepted to participate and showed great interest of being part of VIRPLAS. Then, the companies were visited and a qualitative evaluation was carried out. For the qualitative evaluation a questionnaire was used, where information about the companies products, practices, technologies and infrastructures was obtained. Once the six companies were visited and evaluated, a company profile was created for each one of them and finally, a homepage was designed for VIRPLAS (http://tamayo.mty.itesm.mx/virplas) showing the companies profiles. The project is at stages 2 and 3, but there is already work being done in creating a portfolio for business opportunities.

Key learning points in the creation of VIRPLAS

One of the most important things to take in consideration when creating a new Virtual Industry Cluster is the interest and commitment of the members to be part of the cluster and participate in the activities needed. During the creation of VIRPLAS, a great interest was observed from the participating SME’s to be part of the cluster, to be published in the www and to be able to participate in international businesses. It can be said that in order to be successful, members must be willing to participate, they should co-operate when they are being evaluated and show a proactive attitude to obtain a win-win situation. In the case of VIRPLAS, the six members were eager to participate and gave all the needed information and time in order to create the cluster. By obtaining this, it was possible to create the cluster successfully.

For the creation of Virtual Enterprises, it was observed that a special effort should be performed to improve the information and physical infrastructures of the VIRPLAS members. This was noticed because some of the members do not count with state-of-the art equipment or with sufficient machines in order to manufacture high volumes-low mix or low volume-high mix of products. Also it will be important to perform a deeply evaluation of the cultural infrastructure of the VIRPLAS members, for example it was observed that although all the members have an internet connection, not all of them look at their e-mails at least once a day. Therefore is important to foster a new information technology culture in the companies.

An important issue to tackled in Virtual Industry Cluster formation, such as VIRPLAS, is to focus on developing and leveraging the members core competencies in order to participate in the creation of Global Virtual Enterprises (GVE’s). All of its members have to be thoroughly analyzed in order to identify their real core capabilities (human resources, practice and methods, and technological resources) in order that their core competencies can be deployed to create GVE’s.

The creation of VIRPLAS represents an enormous opportunity for SME’s in Monterrey, taking into consideration its closeness to the Unites States and the possibilities for this huge market. VIRPLAS can be seen as a starting point to promote the participation of Mexican SMEs in global business. The importance of developing virtual industry clusters should be recognized, where the academia, the government and the industry should work as a team, with one main objective: the creation of wealth in regions according to their competencies looking for a better and richer country to live.

5. Final Considerations

The framework proposed and adopted by these two Virtual Organizations is giving uncountable benefits to member companies and the regions where their are located. The information and experience change between these two universities has contributed to the improvement of the proposed framework model.

We hope that the integration of these two virtual organizations could be increased to allow the formation of new VC, consequently, financial return to member companies of each Virtual Organization.
6. References


