M@n@gement, Vol. 2, No. 3, 1999, 251-261
Special Issue: Organizational Downsizing

The Enabling Role of Information Technologies on the Emergence of New Organizational Forms

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During the last years, a consensus is emerging that to survive in the competitive turbulence that is engulfing a growing number of industries, firms will need to pinpoint innovative practices rapidly, to communicate them to their suppliers and to stimulate further innovation. In order to be competitive, companies are forced to adopt less hierarchical and more flexible structures, and to define strategies able to combine reduced costs, high quality, flexibility and a quick answer to customer requirements. Nowadays, there are very few companies with enough resources to form its value chain on their own. Therefore, some changes are taking place within individual companies and in their relations with other organizations, creating new structures in which relationships between customers and suppliers are suffering considerable changes. One of these changes is concerned with the formation of networks in which there is a division of labour that allows each company to exploit their distinctive advantages, and be more competitive globally. In a network model, a set of juridically independent companies establish cooperative long term links in order to achieve a higher level of competitiveness. The enterprises that belong to a network have not all the elements needed for manufacturing a product or providing a service under their absolute control. Therefore, the success of this kind of structures is conditioned by the coordination degree obtained along the realization of inter-organizational activities, which requires an efficient communication system among the partners. The Information Technology (IT) represents a supportive element that facilitates the transfer of information across organizational boundaries. In this paper we analyze the inclusion of the Interorganizational Information Systems (IOS) concept within the network model and discuss the role IT plays in enabling organizational transformation towards emergent forms of organization.

INTRODUCTION

Today companies act in a increasingly dynamic and complex environment; they have more difficulties making forecasts and in adapting themselves to the continuous changes in their environment. In order to be able to compete in this kind of world, it is necessary to innovate at an extraordinary speed, continuously improving the products, services and processes. Therefore, there is a need for a new and flexible model of enterprise which might be able to make full use of human creativeness and to adapt itself to the changing environmental conditions. In order to attain relatively low costs in the last two decades the enter-

prises followed strategies of backward-forward integration, based on the improvement of the effects of the experience curve and the scale economies. We consider that this internal growth may be inadequate to face the new situations appearing in the nineties and, no doubt, those that will appear in the next century.

The individual enterprise has less capability for foreseeing the consequences of the different business decisions; however, the need for competing in a more and more complex context requires the adoption of quick decisions, which facilitate the flexibility of the enterprise. New technologies, fast changing markets and global competitiveness are revolutionizing relationships both within and between organizations. Thus, the new environment requires from the enterprises a strategy able to agglutinate reduced costs, high quality, flexibility, and a quick response to the needs of the customer. Nowadays, the enterprises have to compete in a more and more turbulent scene, which obliges them to adopt less hierarchical and more flexible structures. During the last years, a major transformation in the strategy of many enterprises has been observed with a tendency to disintegration (Camisón, 1993). This is accompanied by a need for increasing the quality of the products or services offered, which requires more interdependency among the different corporate units. As a consequence of it, several transformations both inside the enterprises and in the relationships between them are taking place, which establishes new structures through which the relationships among competitors, customers and suppliers are changing substantially. One of these changes is the co-operation established among different enterprises, which allows them to develop their competitive capability. Companies are forming strategic alliances because there is an increasing acknowledgement that organizations operate in a relational context of environmental connectedness and that organizational survival and performance depend upon connections with other organizations.

The co-operation among enterprises allows their flexibility and their innovative capacity to be increased. Current products are based on so many critical technologies that most of the enterprises cannot keep constantly updated in all of them (Ohmae, 1989). In this sense, a study made by Costa Campí (1989) reveals a strong positive correlation between innovation and the co-operation agreements that do not limit the competitiveness, which questions the efficacy of the big corporation.

The diversity of co-operation agreements sometimes makes the establishment of precise limits among the enterprises more difficult; it is necessary to introduce new terminologies which include the new organizational structures (Ventura, 1994). Thus, the enterprises can configure a conglomeration or network where there are relationships of economical dependency between legally independent bodies. These relationships are directed towards a joint action, and every enterprise furnishes it with its specific competence. Several authors (Thorelli, 1986; Miles, 1989; Szarka, 1990; Larson, 1991; Easton, 1992; Hinterhuber and Levin, 1994) are convinced that the networks are the organizational structures of the future.

THE NETWORK STRUCTURE

The concept of the network's form of organization has been particularly popular with management writers for its potential to build the flexible organization with the ability to meet the challenges of a changing and global environment.

The network theory studies in depth the kind of relationships among the enterprises. Despite both the abundant available literature (Knoke and Kuklinski, 1983; Thorelli, 1986; Johanson and Mattsson, 1987; Jarillo, 1988; Powell, 1990; Charan, 1991; Larson, 1991; Easton, 1992; Gupta, 1992; Hakansson and Johanson, 1992; Miles and Snow, 1992; Yanagida, 1992; Gomes-Casseres, 1994; Hinterhuber and Levin, 1994; Webster, 1995) and the existence of a certain consensus on some aspects, there is still too much ambiguity in the concepts used in this area. Taking into account the formation of networks, which is an interesting field of recent development with strong repercussions on the inter-organizational relationships, it is necessary to clear the existing terminological confusions in order to formulate its theory and to improve its implementation.

Starting from the definition given by Knoke and Kuklinski (1983), a network is a specific kind of relationship joining a particular group of people, objects, or events. Two factors needed for constituting a network can be obtained from this definition; first, a network is formed by a group of elements; second, these elements establish specific relationships among them. In order to make the network concept operative within the business frame, most authors (Thorelli, 1986; Jarillo, 1988; Charan, 1991; Menguzzato, 1992; García Canal, 1993) try to identify the group of elements and the kind of relationships appearing within the network. If we base our concept on the definitions of these authors, we can consider the network as a way of co-operation by which a group of enterprises establish long-term bonds, without having subordinate relationships among them, in order to achieve a higher level of competitiveness. We must show that, as stated by Bueno and Morcillo (1993, p. 344), the establishment of a co-operative network is not a purpose itself but «it must be a dynamic structure that allows to consolidate the competitive position of its members».

By means of a network structure, the competitive position of the enterprises can be reinforced as these concentrate on what they do best, and on what maintains their success in the market. In this way, other enterprises make the activities left, in which they have distinctive competences too. The enterprises outsource those activities that are a ballast and bureaucratize them. This idea agrees with the theory of Quinn, Doorley and Paquette (1990), who sustain that an enterprise which internally provides a service that is either bought by others, or it is provided externally by other enterprises in a more efficient or more effective way, is sacrificing competitive advantages. The enterprises that belong to a network have not all the elements needed for manufacturing a product or providing a service under their absolute control. Within the networks, the involved elements belong to independent

enterprises and are placed along the value system of a product or service. All this drives to an organizational structure in which the enterprises generate more value in those areas where they have specific competencies.

The success of these emergent organizational forms seems to be based, on a great extent, on an effective co-ordination by means of the use of advanced information systems, which are based on the Information Technologies (IT). There is an increasing interest in the relationship between the emerging organizational ways and the function of the IT/IS insofar as the progresses in each field have influenced the others (Smithson, Baskerville and Ngwenyama, 1994).

INFORMATION TECHNOLOGY ON THE EMERGENCE OF NETWORKS

At the moment, the most spectacular and potentially powerful uses of the information systems technology go beyond the individual borders of the enterprises. In fact, Rockart and Short (1989) argue that the most important function of IT in the nineties is the better management of the interdependencies among the enterprises. One year later, Davenport and Short (1990, p. 12) state that «Information Technology has to be the most powerful instrument to reduce the co-ordination costs». While the traditional uses of IT tried to facilitate the internal processes of the enterprises, the Interorganizational Information Systems (IOS) are addressed towards the efficiency of a group of enterprises. Most of the studies about IOS have focused on the incidence of IT on the flows of information among the organizations, its capability of reducing the transaction costs, and its potential to achieve competitive advantages. Many authors have verified that:

– IT influences the nature, punctuality and detail level of the information shared by enterprises (Cash and Konsynski, 1985; Konsynski and McFarlan, 1990);

– IT reduces the transaction costs, while it provides a better management of the risks (Ciborra, 1983; Johnston and Lawrence, 1988; Bakos and Brynjolfsson, 1993; Clemons, Reddi and Row, 1993);

– IT reduces the co-ordination costs (Malone, 1987; Davenport and Short, 1990; Clemons and Row, 1993)

Hammer stated (1990, p. 108) that «the power of technology should be used for radically redesigning the business processes and achieving important improvements of the results». These studies seem to conclude that the technological infrastructure is first installed, and the advantages and organizational changes are obtained later. However, some studies (Kraut, Dumais and Koch, 1989; Bjørn-Andersen and Turner, 1994; Loveman, 1994; Mukhopadhyay, Kebre and Kalathur, 1995; Webster, 1995) on the incidence of the information technology question this view and state that the Information Technology is neutral with regard to the changes of the organizations; Yates and Benjamin (1991, p. 90) consider that, in order to benefit from the advantages of

IT, the enterprises have to keep in mind that «IT cannot be isolated from its organizational context». We do not agree with the existence of causation between the implementation of IT and the organizational changes in the enterprise driving to an increase in the competitiveness of the enterprises. On the contrary, as stated by Webster (1995, p. 17), «the technological and organizational implementation are both sides of the same issue, since they depend on and determine each other». We think that, although IT might have the above mentioned positive effects on the organizations, the will and capabilities of the directors of the company are needed in order to make the most of those advantages.
In order to make the most of the whole potential of the IOS, it will be required that the managing directors get involved with the project, since they have a wider and more strategic view of the company. In this way, a system coherent with the objectives of the company would be implemented. This system would allow to take even more profit from IT, what would have positive repercussions on the enterprise and would facilitate the achievement of its objectives. The active participation of the Management Board in the planning of the IOS brings a problem related to the fact that IT is a relatively new resource that did not exist when most of the current managers were trained. Therefore, they usually do not feel comfortable with these new technologies. Nevertheless, we must say that there is a trend to change this situation insofar as we see the paradoxical situation of the use of computers: the more powerful they become, the easier they are to use. At the same time, directors are more convinced that IT plays a major role in the enterprise management, and it should be considered a resource to achieve the objectives of the business.
As a proof of this, we can mention the example of the McKesson Corporation[1], which was a dealer company of chemical products. This company knew that its success was linked to that of its customers, which were small stores, so it established a close relationship with them. By means of an appropriate use of Information Technologies, McKesson helped its customers to maximize their profits, since it gave them useful information for competing with the big pharmaceutical chains, which were getting a greater market share. The McKesson Corporation directors' idea of the of the was so successful that many other enterprises of the sector tried to imitate it, but they made a terrible mistake. They thought that the network created by McKesson was just a computerized system with terminals connected in other enterprises. The secret of the success of this company were not the computer links; information technology did not create the network. The network's success was due to the fact that the directors of McKesson were aware of both the relationships along the added value chain and the need to strengthen as much as possible every link within the chain, so cooperative behaviors could be established in order to provide the share of information and the quick response to the changes of the demand.
Another example, widely mentioned in the literature on Information Systems, is the one of the American Hospital Supply Company[2],

1. See Clemons and Row (1988) for further information.

2. See Main and Short (1989), and Short and Venkatraman (1992) for further information.

whose success has shown up the need to consider the network established not only as a mere system of electronic data exchange, but also as a better implementation of the technology found within a context of changes in the commercial relationships between the enterprise and its main customers.

In this sense, some other authors (Keen, 1991; Venkatraman, 1994) can be mentioned. They state that the implementation of this kind of technologies *per se* does not bring any competitive advantages; on the contrary, they must be accompanied by some particular elements, generally intangible, which facilitate the operation of the organization by means of a better distribution of the information and the experience. They also reflect a collaborative attitude among the enterprises. We can take the concluding comment of Hopper (1990, p. 119), vice-president on Information Systems of American Airlines: «Nowadays, it is more dangerous than ever to ignore the power of the Information Technology; it is even more dangerous, however, to believe that an information system can provide an enterprise with sustainable competitive advantages by itself».

A positive consequence of the revolution of communication and Information Technologies is that there are more available options for designing the labour now, because the technology can be used to increase the capacities of the workforce, and the information can be transferred to those places were the labour is carried out. Workers do not need to be located according to parameters of time and space to co-ordinate any more.

We consider that technology, although it is not the ground for the emergence of a new and innovative way of organizing the enterprises, plays an important role in its operation. Technology allows to do things in a different way, which provides the directors some organizational possibilities that would be unthinkable without its implementation. Thus, using a mathematical expression, we can state that Information Technologies are necessary but they are not enough to achieve a greater business competitiveness.

THE ROLE OF IOS WITHIN THE NETWORK STRUCTURE

For a long time, the communication among the organizations has been based on manual systems, even when the organizations had sophisticated internal information systems. Of course, some types of technical instruments (telephone, fax...) might have been used to make this communication easier, but a common feature of these manual systems is the constant need for reintroducing the information in the computerized systems of different organizations, having to type the data again and again.

The enterprises involved in an alliance must decide whether to use the manual management of all the exchanged data, or to complement that management with the interconnection of their respective computer

applications. This interconnection may bring, however, compatibility problems in the integration of the data from the different enterprises, since those applications would have possibly been designed without taking into account any requirement of integration among enterprises.
The establishment of co-operation networks implies the need for wider communication in the organizational field, as well as the requirement of capability to integrate the information systems from different enterprises. The enterprises inside a network cannot operate properly if they have not the possibility to communicate quickly, accurately, and over long distances. Within a network, it does not make any sense to restrict the application of modern computer technologies to the individual borders of each enterprise. The Management Board of the enterprises in the network must, on the contrary, consider the possibilities of co-ordinating the processing of data outside the limits of their own organizations by means of an IOS.
The application of the IT which provides the electronic integration among the shareholders of an industry may make easier the outsourcing of activities, as well as be a basic part of the proper operation of the reticular structures. An IOS may play an important role in the co-ordination of interdependent activities, which would be carried out by distant organizational units. Thus, the enterprises can reduce their dependency on strategies of backward-forward integration in order to ensure the control over the production process (Kanter, 1989).
The concept of network emphasizes the interdependency among enterprises, which is provoked by the presence and the sharing of the following key attributes: objectives, experience, labour, taking of decisions, responsibility, trust, and acknowledgement or reward. The enterprises within a network will adopt a common objective, namely to provide a quicker and better service to the final customer. With this aim in view, independent organizations will have to establish close interrelationships, in which Information Technologies have a vital role to play. In this way, the aim of optimizing the flow of profits along the supply chain could be achieved too. IOSs are, basically, new means to facilitate the relationships among organizations; they are, therefore, a strategic instrument. However, an IOS allows to obtain operative advantages too, such as (Suomi, 1991):
– reducing paper-work and manual operations;
– reducing the stock levels;
– accelerating the product and material flow;
– standardizing of procedures;
– accelerating the flow of information about changes on the demand;
– reducing telecommunication costs.
The IT is a basic support that facilitates the co-ordination of different enterprises through EDI systems, shared databases, e-mail, videoconferences, which will allow them to work together. They will be able to share information on the markets, on the needs for materials, on stock levels, production schedules, and delivery programs.
A key factor in an efficient exchange of information within a network is the computer connection of its members. The computer links accele-

rate the transference of information, since it provides the automatic transmission of data between physically distant computers. These links can be used as a strategic instrument to increase the competitiveness of the enterprise, binding it electronically with its customers and suppliers through inter-organizational systems. The electronic connection facilitates the approaching of the linked enterprises, which means that the companies may provide the customers direct access to the internal databases, as well as just-in-time stock control.

An IOS allows independent enterprises to maintain close links and substitute the communications of a hierarchical co-ordination (Clarke, 1992). However, the application of such technologies makes sense only if it is used inside the framework of the new organizational structure philosophy. These technologies must facilitate the complementarity of the resources and activities developed by the network members. The proper operation of a network relies on the attitude of the managers of the participating enterprises. Computers just make the communication, the sharing of data, and the capability of responding quickly to changes on demand, more simple. The Information Technologies may facilitate the proper operation of the networks, but they do not create them. As Johnston and Lawrence state (1988), “cables and processors” do not determine the success of this kind of organizations; it is the people who configure them and their capability to understand the relationships along their value chain who will attain it.

We have illustrated in the bibliographic revision that most authors show up that the creation of trustworthy climate is needed for the proper operation of the networks, which may allow directors to share data and improve the quality of their decisions. There is a variable that can contribute to the development of mutual trust among the enterprises in the network, which is the good predisposition of the enterprises towards the making of investments in order to adapt to their partners. Once an enterprise has made this kind of investments, it will show a greater interest in improving the relationships with the other enterprises in the network, it will show a greater flexibility in its demands, and it will use the dialogue option to solve the differences between them too. The computer links through an IOS of the member enterprises would belong to these adapting investments, and it could be an incentive to make the co-operative relationships among the enterprises in the network closer.

CONCLUSION

This decade has brought companies around the world a tremendous increase in competitive pressures. In order to survive, organizations need to be highly flexible and responsive to the rapid twists and turns of markets and technologies. Management theorists rushed to offer alternative organizational models. The transformation in organizational structure may be facilitated by advances in Information Technology. But, IT is not effective if it is not accompanied by an innovation in the

human and organizational parts simultaneously. The connection of information systems of distant organizations requires organizational changes in order to improve a wider share of data among them. In our opinion, a co-operative network is the perfect frame in which a major improvement of the potential advantages of an IOS can be obtained.
The network pursues to integrate the distinctive capabilities of different enterprises in it, by means of collaborative agreements which involve closer relationships among them. The network structure allows an enterprise to specialize and to reduce costs in those activities from the value chain that are basic for its competitive advantage, leaving its partners to realize the activities particular to their respective speciality areas.
In order to obtain a major improvement of the advantages that a network can provide, a good communication system among the partners is required, so as to be able to communicate quickly and accurately. A key factor to attain a proper exchange of information within a network is the computer connection of its members. These computer links accelerate the transference of data, since they provide the automatic transmission of the data among geographically distant computers.
The implementation of a SIO may be a key factor in the improving of the communication of the enterprises in a network, as well as play a vital role of co-ordinating the interdependent activities realized by independent organizational units. Furthermore, one of the basic requirements for the good operation of a network is the creation of a trustworthy climate among the partners, so as to allow directors to share information that can improve the business decisions. Thus, the connection of the enterprises through a SIO will be useful, not only for processing data and co-ordinating the activities of geographically distant enterprises, but also for stimulating the maintenance of the co-operative links among the enterprises in the network.

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