

Virtual Corporations

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INTRODUCTION

At the end of the 20th century, many authors tried to predict what new structures companies would be likely to adopt in the 21st century. Now, in the 21st century a clear tendency is emerging: the virtual organization (Agrawal & Hurriyet, 2004; Alsop, 2003; Bekkers, 2003; Camarinha-Matos & Afsarmanesh, 2005; Heneman & Greenberger, 2002; Lee, Cheung, Lau, & Choy, 2003; Talukder, 2003; Vakola & Wilson, 2004). This type of organization offers the most promising response to an increasingly complex business reality. In this respect, current organization theory is beginning to change its focus to new, flexible, and virtual organizational forms.

This article is organized as follows: The background section defines different concepts of virtual organization. The first model equates the virtual corporation to a temporary network of firms that quickly comes together to exploit temporary market opportunities. The second model focuses on the manufacture of virtual products by means of stable and trusting relationships with suppliers and customers. The third model of virtual corporation tries to turn the fixed workforce costs into variable costs. The third section points out the shared characteristics of this type of organization and the role of the manufacturing function, information and information technology, the network structure, and a new type of worker. The final sections discuss future trends and our conclusions.

BACKGROUND

The term *virtual corporation* was coined by Jan Hopland, an executive at Digital Equipment Corporation at the end of the 1980s, to describe firms that can marshal more resources than they actually possess by means of both internal and external collaborations (Fitzpatrick & Burke, 2001; Weisenfeld, Fisscher, Pearson, & Brockhoff, 2001). The term can be traced to the computing concept of *virtual memory*, which describes how a computer can behave as if it had much more processing power than it really has.

The expression virtual corporation has been used in the literature to refer to concepts ranging from simply using

teleworking and outsourcing intensively (Buhman, 2003; Coates, 2005; Matthews, 2004) to the wholesale restructuring of the firm. However, three approaches predominate in the literature: (1) virtual corporation as a temporary network of firms that rapidly forms to exploit temporary opportunities appearing in the market (Alsop, 2003; Beckett, 2003; Chalmeta & Grangel, 2003); (2) virtual corporation as a firm that produces virtual products, and which develops strong and stable links with its suppliers and customers (Biondi, Bonfatti, Monari, Giannini, & Monti, 2003; Lee et al., 2003; Mo & Zhou, 2003); and (3) a final model which considers that the virtual firm is an organization whose costs are essentially variable, only being generated when the firm is sure that it will recover them by selling the product or service (Matthews, 2004; Talukder, 2003).

The virtual corporation can also be defined by what it is not. The virtual corporation is not a takeover or merger between firms, nor is it a temporary employment agency, nor a “hollow” firm seeking to cut costs by closing down factories in one country and opening them up again in another one with lower labor costs.

CHARACTERISTICS OF VIRTUAL CORPORATIONS

As we mentioned in the previous section, there are three different perspectives of the concept of virtual corporation. Among the characteristics shared by these three models of virtual corporation, we would stress: excellence, technology, trust, opportunism, and absence of borders:

- **Excellence:** Since each member contributes its core competencies (Mo & Zhou, 2003), it is possible to create an organization with the best of each of them, so that every process of the virtual corporation can be the best in its class, something that no one firm could achieve on its own.
- **Technology:** Information technology—and more specifically, communications networks—will facilitate the transfer of knowledge and technologies between firms and will allow firms and workers to work together (Helling, Blim, & O'Regan, 2005; Heneman

- & Greenberger, 2002; Im, Yates, & Orlikowski, 2005; Kovacs & Paganelli, 2003).
- **Trust:** This type of relationship makes firms more dependent on others, and hence requires a much greater trust than would normally be the case between firms that are just partners (Camarinha-Matos & Afsarmanesh, 2003; Clases, Bachmann, & Wehner, 2003; Gallie & Guichard, 2005).
 - **Opportunism:** In the first and third model, firms will come together to exploit a very specific market opportunity, disbanding as soon as the opportunity disappears. In the second model, the opportunity to form a virtual corporation is brief. Once a firm adopts a virtual corporation structure, other firms have less chance of doing the same.
 - **Absence of Organizational Borders:** The close cooperative ties established between competitors, suppliers, and customers will make it difficult to see where one firm ends and another begins (Lee et al., 2003). This organizational structure shares the knowledge and resources needed to carry out the work to be done, regardless of which firm owns or manages them.

In virtual corporations the role of the manufacturing function also changes (Martinez, Fouletier, Park, & Favrel, 2001). This type of organizational structure seeks to generate high-quality products and services rapidly in response to the demand (Offodile & Abdel-Malek, 2002; Weisenfeld et al., 2001). Generating virtual products, also known as mass-customized products (Biondi et al., 2003), requires both the customers' participation in their conception and design and the firms' implementation of time-based strategies. This implies combining the customers and suppliers in a type of highly efficient network (Lee et al., 2003), which will require information systems that support relationships at all levels (Hsieh, Lin, & Chiu 2002). Companies will focus on one, maybe two, or three core competencies, all else will be outsourced (Buhman, 2003; Erickson, 2004; Mo & Zhou, 2003; Porter, 2000). Time is regarded as a component that, like any other, can be improved by means of intelligent planning and the use of technology (Hao, Shen, & Wang, 2005; Lee et al., 2003).

Mass customization of products combines the effects of lean manufacturing processes (Guisinger & Ghorashi, 2004), zero-inventory production methods, or just-in-time, and total quality management processes. These management processes make it possible to produce the great variety of products that could once only be made by craft manufacturing, but often at a lower cost than mass production, and with excellent quality.

Moreover, incorporating the new information technology into the manufacturing processes has given rise to *flexible manufacturing systems* (FMS) and *computer-integrated manufacturing* (CIM) (Presley, Sarkis, Barnett, & Liles,

2001). Such systems help manufacturers to achieve many of the objectives of the virtual corporation, such as shorter production cycles, a smaller and more qualified labor force, smaller batches, flexibility, a better short-term response, and long-term adaptability.

In virtual corporations, the role of information and information technology is also important (Aerts, Szirbik, & Goossenaerts, 2002; Alsop, 2003; Gallie & Guichard, 2005; Heneman & Greenberger, 2002; Joukhadar & Binstock, 2000; Khalil & Wang, 2002; Kovacs & Paganelli, 2003; Stowell, 2005; Xu, Wei, & Fan, 2002). This role becomes clear in the three models described previously. The virtual corporation understood as a network of firms is also an information system where there is an exchange of the data generated by the activities or processes (internal and external) that it carries out. The success of the virtual corporation will depend on its capacity to acquire, distribute, store, analyze, and integrate this massive flow of information through its organizational elements, supported by information technology.

The model of virtual corporation defined as a generator of virtual products is characterized by the customers' intense participation in the creation of the products, and by the high information component of the latter. This growing information component of products is evident in the mass customization of products that the virtual corporation is applying.

On the other hand, the virtual corporation is organized as a *network organization structure*. Firms have gone from competing against each other to cooperating. This cooperation was initially based on more or less temporary alliances, and subsequently on connections of variable geometry. This new organizational structure of variable geometry, or dynamic network structure, considers that the main components of firms can be assembled and reassembled again and again to adapt to the changing environmental conditions (Aerts et al., 2002; Huang, Gou, Liu, Li, & Xie, 2002). This network structure is accepted by all of the authors (Camarinha-Matos & Afsarmanesh, 2003, 2005; Weisenfeld et al., 2001), although they refer to it using different analogies and names. Where there is consensus is in the idea that the dynamic network is the most flexible organizational form known. Its main characteristics are: (1) disaggregation of the firm's functions (design and development, manufacturing, marketing, and distribution), now carried out by independent organizations in a network; (2) existence of internal and external agents, responsible for linking the business functions of different firms (Aerts et al., 2002; Zarour, Boufaida, Seinturier, & Estraillier, 2005); (3) existence of market mechanisms for coordinating the functions, rather than plans and controls (Biggs, 2000); and (4) existence of freely accessible information systems for verifying each member's contribution (Zarour et al., 2005), rather than the slow processes of mutual trust building.

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