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PREVIEW

**E-ENGINEERING AND INTER-ORGANIZATIONAL RELATIONSHIPS:  
AN EMPIRICAL STUDY**

by

Silvana Trimi

A DISSERTATION

Presented to the Faculty of

The Graduate College at the University of Nebraska

In Partial Fulfillment of Requirements

For the Degree of Doctor of Philosophy

Major: Interdepartmental Area of Business

(Management)

Under the Supervision of Professor Sang M. Lee

Lincoln, Nebraska

August, 2001

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AN EMPIRICAL STUDY

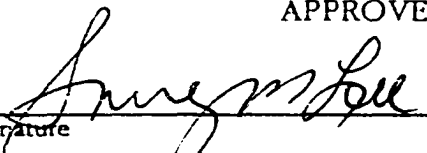
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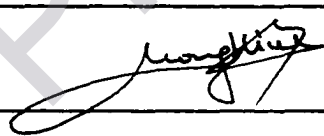
  
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GRADUATE COLLEGE  
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# **E-ENGINEERING AND INTER-ORGANIZATIONAL RELATIONSHIPS:**

## **AN EMPIRICAL STUDY**

Silvana Trimi, Ph. D.

University of Nebraska, 2001

Adviser: Sang M. Lee

This is an empirical study of E-engineering based inter-organizational relationships and their impact on organizational performance. The rapid digitalization and globalization that is going on today have necessitated a new and revolutionary organizational innovation. This organizational innovation seeks drastic improvements much like BPR (business process reengineering) did in the 1990s, except to a much greater in degree in both scope and speed. Referred to as E-engineering, it requires that the organizations reinvent the way they do business such that they fully incorporate the advantages of the Internet. E-engineering involves significant changes in three areas: interpersonal relations (internal, external, vertical, and horizontal); interfunctional processes; and interorganizational relationships. While all three areas offer benefits to the organization, I believe that interorganizational collaborations that encompass and take advantage of the Internet offer the greatest potential and the greatest challenge. Many anecdotal stories relating the benefits and changes in the ways in which organizations enter into relationships and cooperate with each other are available. However, an empirical study supporting these anecdotal stories has not yet been conducted.

Several hypotheses were developed to determine the impact of the Internet on: the frequency and opportunity to engage in interorganizational relationships; the importance and obtainability of selection criteria used by organizations to select their partners; the quality of relationships with partners, customers and professional communities; and the effect on overall organizational performance. To test these hypotheses, data were collected from a cooperative effort of the Gallup Organization and UNL.

Results indicate the Internet has increased: the frequency of interorganizational activities and provided more opportunities for finding partners regardless of the type of interorganizational relationship sought; and the overall importance of the selection criteria used to find partners and made it easier to achieve them. The Internet has intensified the qualitative aspects of relationships with partners, customers, and professional communities. These changes have played a major role in increasing overall organizational performance.

In-depth discussions regarding these results were conducted and the implications for academicians and practitioners were presented.

## ACKNOWLEDGMENTS

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PREVIEW

## **CHAPTER 1**

### **INTRODUCTION**

#### **THE NEW BUSINESS ENVIRONMENT**

Today we live in a networked, borderless global economy. The dynamic new environment became reality due to the three forces emerging almost simultaneously – digitalization, globalization, and privatization. Advances in information and telecommunication technologies are enabling organizations to be agile, resilient, and fluid. These organizations seek to create new competencies to gain and sustain competitive advantages in evolving new markets. The highly adaptive net-based enterprises rely on knowledge and creativity of their human resources to create such competencies. As Drucker (1997) and Nonaka (1991) assert, we live in the knowledge age where the only real organizational resource is knowledge, the result of creative leveraging of human expertise and enabling technologies. Thus, intellectual assets have now replaced natural resources as the foundation of competitive advantage.

While globalization has been on-going during the past several decades, the physical borders of nations began to crumble only after collapse of the cold war in 1989. Global tension and conflicts based on ideological differences gradually disappeared as market economies prevailed throughout the world (Lee, et al., 1994). Today, global competition is based on the forces of the market economies rather than military power. Globalization has brought tremendous improvement in the quality of life around the globe through free



trade of goods and services. International mergers and acquisitions are growing because of many countries are easing the restrictions on foreign investments. As Ohmae (1996) pointed out the importance of nation state and physical borders of countries has no significant meaning in the networked global economy.

The traditional competitive strategies emphasized the transaction costs (Tapsott et al., 2000) and product quality (Deming, 1982; Juran, 1988). However, these key competitive strategies of the past century are just requirements for market entry and no longer are sufficient competitive strategies in the new environment. The hyper global competition and the emergence of the Internet-based business demand a new strategy – speed. The time-based competition has revealed the weaknesses of many large so-called “dinosaur” public enterprises. These public enterprises are not limited to the notoriously inefficient state-owned enterprises (SOEs) of the former communist/socialist countries, but they also include large public organizations in the west, including the United States. The privatization movement is a necessary evolutionary step to introduce the new competitive strategies of speed and mass-customization to infrastructure industries -- communication, transportation, public utilities, financial services, healthcare, etc.

In the backdrop of these new developments, it is easy to understand the emergence of a new economy in which organizations must compete. As Tapscott et al. (2000) pointed out, the new economy of abundance is where widely available goods (like PCs, fax machines, data, etc.) are more valuable than scarce resources. Also, new technologies brought separation of economics of physical things (goods and services) and economies of information (image of goods and services). This unraveling of the two value chains

has created an explosion of new business opportunities and simultaneously made traditional business models extremely vulnerable (Evans and Wurster, 2000).

## **THE INTERNET-BASED BUSINESS MODELS**

While organizations are struggling to search for new competitive advantages, another salvo has been thrown at them. The usually passive customers have suddenly become extremely vocal. The Internet savvy customers are very knowledgeable about the market, product specifications, and prices. Also, customers are no longer isolated individuals. They are forming various customer communities (for books, Harley Davidson, music, sports, etc.) and share their experiences (Venkatraman and Henderson, 1998). The emergence of the e-customer based economy is turning the traditional supply chain upside down. The push system (suppliers → producers → intermediaries → customers) is suddenly becoming a pull system (customer → producer → suppliers) (Tapscott, et al., 2000). The e-customer based economy demands a simultaneous implementation of the four competitive strategies – cost, quality, speed, and mass-customization. Today, organizations must find ways to meet the particular demands of highly intelligent e-customers but also provide new values that would surprise and delight this new breed of customers.

One of the most important forces that have brought the dramatic change to the business environment is the Internet technology. The changes that the Internet brings to the global economy are more pervasive and varied than anything has gone before (Tapscott et al., 2000). At the foundation of the changes is dramatic decrease in the cost of transmitting information as proven by Moore's Law (Vanscoy, 2000). As information

handling cost falls rapidly (as much as 75 percent every 18 months as Moore's Law suggests) rapidly, this cheap resource should replace other costly productive inputs as quickly as possible. That is how organizations create real values and profits. Another meaning of this law for web-based companies is that anticipating rapid changes in technology will be their core business challenge for the decades to come. Thus, the Internet and information technology are changing the rules and models of doing business.

As the Internet becomes a critical importance in doing business, organizations strive to maximize the value of their net-based business through navigation. Metcalfee's Law (the value of a network is proportional to the square of the number of nodes of that network, which means that more businesses are connected to the network, greater its value becomes) dictates that enterprises should utilize the Internet internally and externally throughout their value chains (Evans and Wurster, 2000). Personal working relationships (vertically, horizontally, and externally), business processes innovation (cross-functional work processes), and external working relationships (collaborations, partnerships, alliances, etc.) should all leverage the Internet technology to realize Metcalfe's Law.

During the Industrial Age, organizations utilized vertical integration to gain competitive advantage as proposed by Coase's Law (a firm will tend to expand until the costs of organizing an extra transaction within the firm become equal to the costs of carrying out the same transaction in the open market). However, in the networked e-global age, the reverse of Coase's Law applies (Tapscott et al., 2000; Vanscoy, 2000). That is, a firm will continue to downsize until doing a transaction inside the firm becomes cheaper than doing so externally. Today, the virtual organization is reality with

companies outsourcing design, manufacturing, distribution, and other functions so they can focus on their core competencies (Sholler, 2000). Consequently, interorganizational working relationships are of critical importance for gaining and sustaining competitive advantage.

This dissertation deals with this increasingly important new aspect of the Internet-based business. We shall call this E-engineering. *E-engineering refers to the Internet-based organizational innovation to radically improve the effectiveness of the organization.* Through E-engineering an organization attempts to reinvent the way it does business by fully incorporating the advantages of the Internet technologies such as teleconferencing, e-business, EDI virtual networks, etc. It is a new business paradigm that creates new business models that directly connect all key players for the organization (Ham and Stepanek, 1999). Although there have been some studies in the general area of E-engineering at the personal working relationships and process innovation, there has been no empirical study in the interorganizational collaborations based on E-engineering. This research is an empirical study investigating the current state of E-engineering applications for interorganizational working relationships and their effectiveness.

## **PURPOSE OF THE STUDY**

Organizations always have to enter in some type of working relationships with others. The reasons and the types of the interorganizational relationships have been studied extensively by management scholars (Gulati, 1995, 1998, 1999; Dickson and Weaver, 1997; Saxton, 1997; Park, 1997; Nooteboom and Noorderhaven, 1997; Singh, 1997; Human and Provan, 1997; Osborn and Hagedoorn, 1997; Combs and Ketchen,

1999; Chung, et al., 2000; Kaufman, et al., 2000; Hitt, et al., 2000; Afuah, 2000; Baum, et al., 2000; Steensma and Corley, 2000). However, most of these studies are based on the traditional concepts of the firm that the firm's structure and mission are geared toward production of goods. Today organizations are replacing expensive private networks with cheaper ones based on the Internet. With the wide-open opportunities to explore more efficient business models through the Internet, the basic organizational structure is a business-web (b-web) connecting various internal and external entities (Tapscott et al., 2000). Also, the primary mission of the organization is no longer production to push the product to the customer. Now the mission is fulfillment of the customer needs for values. Thus, the business-web model must be so designed that the organizations can be close to the customer and be effective in creating new values for the customer.

Organizations have already made a great deal of investments in IT and changes in their business processes. IT expenditures were the highest among the others for almost every organization during the last five years. Based on a report from Stamford, Conn.-based Meta Group (March, 2001) IT spending grew 8.7 percent in 2000, and is expected to increase 10 percent in 2001 (although the economic downturn may have some impact). At this relatively early stage of the Internet based business models, there is general paucity of empirical studies that have investigated advantages the Internet brings to business organizations. Many articles deal with anecdotal stories or case studies concerning the success or failure of the Internet based business. The general consensus is that the Internet based organizational innovations are much bigger, in both scope and depth, than the revolutionary concept of business process reengineering (BPR) of the

1990s (Hammer and Champy, 1992; Davenport, 2000). BPR deals primarily with inter-functional processes that are internal to the organization. However, E-engineering encompasses not only processes across functions but also external of organizational boundaries.

This dissertation focuses on only one segment of E-engineering. It investigates the impact of the Internet on interorganizational relationships in the following aspects:

- The frequency of engagement in different types of interorganizational relationships.
- The availability of interorganizational relationship opportunities.
- The importance of various selection criteria for partners in interorganizational relationships.
- The obtainability of various selection criteria for partners in interorganizational relationships.
- Ability to obtain information about the characteristics of potential partner organizations.
- The organization's relationship with partners on various cooperative ventures.
- The organization's relationships with customers on various aspects.
- The organization's relationship with professional organizations on various cooperative partnerships.
- The organization's performance outcomes.
- The impact of the organization's technology infrastructure, industry standing in terms of competitiveness, and prior partnership experience on IORs.

- The impact of the various organizational characteristics such as type of industry, size, etc. on IORs.

## **RESEARCH METHODOLOGY**

This research is an empirical study of new interorganizational relationships that leverage information technology (IT), especially the Internet. Since this is the first empirical study of E-engineering, it is necessarily exploratory in nature. Thus, this study utilizes a structured questionnaire for data collection. A preliminary questionnaire was designed based on the literature review of previous studies dealing with interorganizational relationships and the Internet-based new business models. Then several faculty, doctoral students, and IT specialists at the Gallup Organization reviewed the questionnaire. The copies of refined questionnaire were then distributed to two primary target groups: (1) management consulting firms for IT related services (300 firms); (2) the Gallup Organization client firms that are known to have interorganizational relationships (2,000 firms).

The questionnaires were distributed to the targeted firms via US mail with a cover letter, signed by CIO (Chief Information Officer) of Gallup and Chair of the MIS Program at the University of Nebraska – Lincoln (UNL) and a stamped return envelope. The first group of target firms returned the questionnaires to UNL while the second group returned them to the Gallup Organization.

A set of hypotheses is developed along the lines of research questions outlined in the previous section. These hypotheses deal with different types, frequency of use, availability of opportunities of interorganizational relationships; importance and

obtainability of partner selection criteria; and purposes of interorganizational relationships. The hypotheses, once supported or rejected by statistical analysis of the collected data, would answer the research questions. The statistical techniques based on SPSS software (version 10) were used to analyze the data.

## **ORGANIZATION OF THE DISSERTATION**

This dissertation is organized as follows:

Chapter 1 has presented the general introduction to the new business environment characterized by digitalization, globalization, and privatization. Then, the paradigm of E-engineering as a new drastic organizational innovation approach leveraging the Internet technology was introduced. The discussion of research purpose and methodology utilized completes this chapter.

Chapter 2 presents a thorough review of literature related to this dissertation research. More specifically, it will review all major studies dealing with the following topics: organizational learning and innovation including evolutionary innovation for learning and quality management, revolutionary innovation including BPR, and the Internet based innovations; IT based enterprise innovations; E-engineering including its concept, scope, and challenges; interorganizational relationships and the types; theories related to IT and interorganizational environment; and interorganizational relationships in the Internet era.

Chapter 3 presents research methodology employed in this research including: the research hypotheses; the questionnaire development and distribution; data and sample description; and statistical methods used to analyze the data.