



Assessing E-Commerce Technology Enabled Business Value: An Exploratory Research

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INTRODUCTION

Despite the recent demise of a considerable number of dot-coms, many traditional brick-and-mortar companies have invested and continue to invest heavily in eCommerce technologies. These companies will spend by 2002, according to one source, over \$200 billion dollars on eCommerce business projects (Stuart 1999). While sizeable investments in eCommerce enabled initiatives are being made, it is extremely difficult to measure the benefits received from these initiatives mainly because of the difficulty involved in collecting data.

Anecdotal evidence in the information technology (IT) productivity and business value literature suggests that these firms have achieved enormous performance and productivity gains by integrating eCommerce channels with their existing brick-and-mortar channels and thereby transforming themselves into a click-and-mortar business. Cisco Systems, Dell Computers, and Boeing Corporation are examples of large click-and-mortar organizations that have achieved a significant economic benefit by using eCommerce technologies. Cisco claims it is the single largest user of eCommerce in the world, with 90% of its 2000 sales which amounts to about \$18.9 billion, coming online. It also says that 82% of its customer inquiries are handled online (McIlvaine, 2000). Cisco's revenues and net income have increased significantly since 1992 and its stock prices soared to the point that made Cisco a company with the highest market capitalization in the world in the early 2000 (Kramaer and Dedrick, 2002).

Dell Computer reported over 250% return on invested capital from its logistics and order fulfillment systems (dell.com, November 2000). It makes more than \$1 million dollars in PC sales online every day. Boeing's electronic intermediary, PART online, allowed it to process 20 percent more shipments per month in 1997 than in 1996 with the same number of data entry people and resulted in elimination of 600 phone calls per day to telephone service staff (Teasdale, 1997).

In spite of these anecdotes and others, there is no systematic empirical evidence in the IT productivity or business value literature regarding the payoffs from eCommerce business initiatives, especially for large click-and-mortar companies (Brynjolfsson and Kahim, 2000). The fundamental objective of the present research is to assess the eCommerce technology enabled business value. The research will investigate whether firms using eCommerce technology are successful in generating business value and, if they are, what eCommerce drivers determine such success and how best to use these drivers. An exploratory model of e-Commerce business value is proposed depicting the possible effect of management support for eCommerce enabled initiatives, efficient eCommerce support systems (e.g., automated data transmittal and retrieval system, automated order processing system, and online procurement system), and effective eCommerce presence on business operational efficiency and financial success. The model is fully grounded in IT business value and productivity literature (Kauffman and Kriebel 1988, Mahmood and Mann, 1995).

The contribution of the present research, once completed, will be an empirically validated eCommerce business value model that can function as a reference framework for strategic managers by offering guidelines for eCommerce based business initiatives. The constructs developed in the model

can serve as a foundation for further investigation of different eCommerce drivers and their relationships with business value measures. To the best of our knowledge, this is the first empirical study to address the business value of eCommerce enabled initiatives.

The paper proceeds as follows. The next section discusses the relevant prior literature to provide the background information and theoretical perspective for the present research study. This is followed by a presentation of the research model describing different drivers that affect the performance of a eCommerce initiative. The theoretical rationales for relationships among the drivers and relevant hypotheses are also presented in this section. The following sections, once the empirical study is completed, will present hypotheses testing results, discussion of relevant results, and conclusions and directions for future research.

LITERATURE REVIEW

While there are no empirical studies on the economic payoffs from eCommerce initiatives, a significant amount of research has been conducted in the IT business value area. We will review the relevant IT business value literature to provide background information and a concrete theoretical support for the present research. Please be advised that, at this stage of the research, the literature review is preliminary and incomplete.

Organizational Alignment

This driver measures the level to which the strategic managers support eCommerce initiatives by helping IT align its goals and strategies with organizational goals and strategies. The presence of an IT manager with executive authority goes a long way towards achieving this goal. Teo & King (1996, 1997) established that the business knowledge of the IT executive is important in completing this integration successfully. Reich and Benbasat (2000) found that communications between IT and business executives lead to better alignment of IT and business strategies. Teo & King (1996, 1997) found that integration of business planning and information systems planning results in IT being able to support business strategies more effectively.

eCommerce initiatives always involve additional learning on the part of a company. The presence of a training mechanism and top management's willingness to invest in employees' time for training are, therefore, very important. Teo & King (1996, 1997) established that top management support acts as a facilitator in the development of IT applications that have a strategic impact on the organization. Ginzberg (1981) identified management commitment as a key factor in the success of information systems.

Integration Factors

One way in which eCommerce adds value to an organization is by automating many low-skilled tasks. Measuring the extent to which eCommerce has helped integrate the systems and made workflow easier is an important indication of the value derived from eCommerce. Kauffman and Dai (2002) suggested that one way that firms can conduct successful B2B transactions is through the creation of inter-organizational systems. Barua, Konana, Whinston and Yin (2001) indicate that business partners and their readiness to imple-

ment eCommerce technologies is critical to achieve business excellence and operational efficiency.

Bakos (1991) found that electronic marketplaces reduce search costs for customers. The mechanisms that enable this value to the customer also strategically affect the company's performance by dramatically improving inter-organizational coordination. Benjamin and Scott Morton (1988) cite anecdotal evidence on how electronic integration provides significant cost advantages and how technology creates new integration possibilities.

Online Presence Factors

"The ability to market products and services through an eCommerce site directly to the customers worldwide on a 24/7 basis is a huge value-adding attribute of eCommerce. According to Moon and Kim (2001), measuring online presence effectiveness through the eCommerce site design and availability aspects is similar to the Technology Acceptance Model's (TAM) "perceived ease of use" component.

A survey of 661 webmasters selected from Fortune 1000 companies by Liu, Arnett, and Litecky (2000) pointed towards the attractiveness, the quality of design, and information available on the eCommerce site as being the most important factors that influence the ultimate purchase decision of a customer. Keeney (1999) stresses the importance of identifying value propositions that concern customers and developing a value model for the customer.

Operational Efficiency

Setting up uniform operating mechanisms through eCommerce technologies normally results in better operational efficiency ultimately ensuing in crucial cost savings. Setting up online customer service in terms of FAQ's, chat rooms, and a link to the call centers indicates a higher operational efficiency level. Barua, Konana, Whinston, and Yin (2001) show that business partners and their readiness to implement eCommerce technologies is critical to achieve business excellence and operational efficiency. Banker, Kauffman, and Morey (1990) emphasize the importance of distinguishing between impacts of IT investment on competitive efficiency (e.g., ROI and STA) and operational efficiency (e.g., impact on value chain components).

eCommerce Business Success

Continuing support for eCommerce strategy is key to success with eCommerce initiatives as initial costs are high. This happens only when an e-commerce implementation is producing viable financial returns. This is similar to measuring the impact of information technology (Brynjolfsson and xxx 199, Mahmood et al, 1993, 2000, 2001).

RESEARCH MODEL

An eCommerce enabled business value model for understanding the drivers that determine the success of an eCommerce initiative is proposed in Figure 1. The model suggests that organizational alignment, integrations factors, and online presence variables interact together and affect operational efficiency and ultimately financial performance of a business involved in eCommerce business. In this section, we discuss the independent and dependent constructs and suggest some research hypotheses that will be tested, once the data is collected. Each construct is operationalized using a number of items asking the respondents to rate the extent of agreement or disagreement with each statement on a seven point Likert scale, with anchors ranging from 1 (Strongly Disagree) to 7 (Strongly Agree).

Organizational alignment refers to the alignment of information technology strategies, goals, and objectives to organizational goals, objectives, and strategies. This construct is operationalized using five items about IT strategies being aligned with top management strategies, IT being a part of long-term organizational strategies, IT executives having decision making roles, IT structure, and overall organizational learning environment (see Appendix 1).

Integration factors refer to the extent to which eCommerce has helped integrate the different systems and made workflow easier. This is an important indication of the value derived from eCommerce. This driver is operationalized using six items The questions related to whether an Internet-enabled system exists for information sharing, order changing, transmitting and processing of data, inventory and purchase tracking, and online procurement system.

The Online presence construct point to online presence effectiveness through the eCommerce site design and availability aspects. It is operationalized

using five items about the security, attractiveness, navigationability, flexibility, and availability of the eCommerce site.

Operational efficiency refers to setting up uniform operating mechanisms using eCommerce technologies. The construct is operationalized using three items about online business, customer service, and highly automated order tracking system availability; and two items about whether customer requests can be resolved online, and whether continuous monitoring of orders is available.

eCommerce business success refers to the business value gained by a brick-and-mortar company through its eCommerce initiatives. This construct is measured by performance, productivity, and perceptual measures. The performance criterion is best measured by gain in four financial performance measures: return on investment (ROI), return on sales (ROS), growth in revenue (GINR), and net income over invested capital (NIC). Cron and Sobol (1983) and Dos Santos, Peffers, and Mauer (1993) employed ROI while NIC was utilized by Barua, Kriebel, and Mukhopadhyay (1995) and Hitt and Brynjolfsson (1994). ROS was used by Hitt and Brynjolfsson (1994) and Mahmood and Mann (1993). Woo and Willard (2000) used GINR in their research. Two ratios were used to indicate an organization's level of productivity: sales by total assets (STA) and sales by employee (SE). A variable similar to STA, total sales, was used by Brynjolfsson and Hitt (1993) while SE\$ was used by Strassman (1990). The perceptual criterion is measured using four customer loyalty related measures in terms of company's image, customer satisfaction, product service innovation, and number of return customers. First three items contribute to customer loyalty. Customer loyalty is one of the most significant contributors to business profitability (Turban, King, Lee, Warkentin, and Chung, 2002). Customer loyalty can also reduce costs. It costs five to eight times more to acquire a new customer than to keep an existing one

Research Hypotheses

In summary of eCommerce business success model, we propose the following hypotheses:

- H1: *Businesses with higher level of organizational alignment will achieve operational efficiency.*
- H2: *Businesses with higher level of integrated online systems will achieve better operational efficiency.*
- H3: *Businesses that have a better online presence will have a better chance of achieving operational efficiency.*
- H4: *Businesses with higher operational efficiency will be more successful in achieving eCommerce business success.*

METHODOLOGY

An instrument for gathering relevant information was designed based on the existing academic and practitioners literature. It consists of a total of 31 items. A seven-point Likert scale was used with anchors ranging from 1 (Strongly Disagree) to 7 (Strongly Agree). The respondents were asked whether they agreed or disagreed with each statement. The items were developed on the basis of prior work.

A copy of the instrument has been mailed to 250 click-and-mortar companies within the United States of America. These firms were selected from those published in Informationweek.Com. The respondents were told, to minimize potential biases, that their identity and responses will remain confidential and that only aggregate information will be published.

The responses, once received, will be analyzed using the LISREL software tool. The results will be used to empirically validate the model and critically test its reliability.

RESULTS

The results of our research will either support or refute the belief that business operational efficiency and value are generated by eCommerce initiatives. Our study will provide insights into whether eCommerce technologies are likely to be effective and how these technologies can be used efficiently to derive most businesses value.

REFERENCES

References will be provided upon request.

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