Evaluation of the Performance of E-Commerce Using the Analytic Hierarchy Process (AHP): Business Perspectives on E-Commerce

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Abstract - The purpose of this study is to employ the Analytic Hierarchy Process (AHP) to evaluate electronic commerce (e- commerce) types. An important contribution of this study is the identification of business perspectives on e-commerce types. This study articulates distinctive characteristics of the types of e- commerce and management processes that extend the range of applicability across diverse business segments. The Analytic Hierarchy Process (AHP) helps the decision maker such as business executives to prioritize alternatives in B2B, B2C, and C2B as e- commerce types, so that the best one can be selected. As business innovation has relied increasingly on partnerships between business and supplier, there is a different perspective of how business executives view their business process and competitive advantage. Based on the findings from this study, one important way for business people to be heard is to devote their time to create competitive advantage and develop shared domain knowledge which appear as the most influential construct in the AHP model. Business executives need to understand the leverage points of the industry, the history and current issues of the e-commerce, and to learn to apply business- oriented objectives in the application of technology to gain competitive advantage. This change in view would help focus their attention on e-commerce technology and ideas that will produce the most benefit and create competitive advantage, rather than those that offer the most technical promise.

Keywords: Analytic Hierarchy Process (AHP), electronic commerce, - decision maker, business perspectives

I. Introduction

This research explores business-to-business (B2B), business-to-consumer (B2C), and consumer-to-consumer (C2C), types of e-commerce, identification of business perspectives on e- commerce types. A major factor involved in e-commerce technology issues is the use of the Internet as a major issue to modern organizations. The Internet has quickly become one of the most valuable assets in modern technology, and as such, is developing as an integral part of modern commerce. As with past technologies, the Internet will have future technological advances develop from its own growth. E-commerce has now become a key component of many organizations in the daily running of their business. The effective relationship between business and technology is a primary determinant of success in gaining business advantage through information technology (IT) (Gelinas, Sutton, & Fedorowicz, 2004). Consequently, business innovation relies even more strongly on IT and a different perspective of how business executives view their organizational contributions is needed for organizations to regain competitive advantages. For example, Fichman (2001) points out that IT people focus on information systems in organizations and concludes that IT people understand how organizational phenomena affect the development and use of technologies and how technologies shape organizations that are central to the

field's agenda, but tend to prefer IT centric interpretations of the business organization. According to West (2001), business people tend to pay greater attention to the benefits of IT such as improved customer service, enhanced product quality, increased market responsiveness, and better co-ordination of buyer and suppliers in business perspective.

In the literature reviewed, the evaluation of e-commerce technology role focused on the types of e-commerce effectiveness measures, for example systems usage, cost/benefit analysis, user satisfaction, information economics, and system capability. However, the IT function also includes convenience, speed, accuracy, global reach, low cost entry, and up-to-date status. According to Jarvenpaa and Ives (1993), organizations continue to question the benefits of information technology in conjunction with new corporate initiatives such as business process, e-commerce, and enterprise resource planning. Zehir and Keskin (2003) have noted that business today requires effective information system across a wider scope of variables than that of the traditional information system, and often linear, IT measurement, to achieve understanding of the factors that create the foundations of future success. It is important for this study to establish a comprehensive view of e-commerce measures that indicate the overall improvement of business productivity, which can then be more fully aligned with organization goals and business competitive advantages.

II. **Research Methodology**

Researcher investigative interests in research methods have led to the use of Analytic Hierarchy Process (AHP). The AHP helps the decision maker to prioritize alternatives so that the best one can be selected. The AHP is a mathematically based, multi-objective decision-making tool which was introduced by Saaty (1994). It uses the pair-wise comparison method to rank order alternatives of a problem that are formulated and solved in hierarchical structure. The technique has the advantage of being simple and thorough in handling difficult real-life problems. It provides greater utility in applications where information is either incomplete or not available. The AHP requires a problem to be decomposed into levels, each of which is comprised of elements or factors. The elements of a given level are mutually independent, but comparable to the elements of the same level. The structure presupposes that elements of any given level are influenced by elements at the level immediately above them.

III. **The Research Questions and Hypothesis**

The central focus of this research is electronic commerce (e-commerce) in business processing and the most obvious (visible) way to study electronic commerce is to identify a common artifact that is embedded within the IT and information systems contexts. The area of study consequently has two distinct domains knowledge: the computer IT knowledge, and business processing knowledge. A review of the literature (above) revealed that studies examining the association between e-commerce and business processing are divergent in how they conceptualize key constructs and their interrelationships. Previous research has shown that IT may indeed contribute to improving business process and information systems of the enterprise (Brynjolfsson and Hitt, 1998; Burnham, 1999). Moreover, the dimensions and extent of IT and business depend on a variety of factors, including the type of IT, management practices, and organizational structure, as well as the competitive and macro environment (Haughwout, 2000; Willcocks and Graeser, 2000). In the literature reviewed, the IT context is defined in relation to e-commerce and design, and the associated issues and problem areas.

The research question that brings together the matters discussed above is:

What is the best alternative for business enterprise of electronic commerce (e-commerce)?

This question provides a bridge between the worlds of e-commerce technology and business interests, and targets the possibility of identifying factors in e-commerce technology settlement. Critically the human and the interest factors are linked to the information technology.

Hence the working hypothesis is framed as:

H1: There is no significant difference between the types of e-commerce and business objectives.

Studies examining the objectives between the types of e-commerce and business people who use e-commerce as business processing for their convenience, speed, accuracy, global reach, low cost entry, and up-to-date status and other measures of performance may be at the functional level but the asserted consequences are strategic. This is to test if there is significant difference between the types of e-commerce and business objectives.

IV. **Evaluation Framework**

This study used AHP method, which helps business and IT staff of the organization structure their objectives in a hierarchic framework. Business and IT staff could make judgments about the importance of lower level objectives or alternatives where they have the knowledge of the subject matter. In this model, there are three main alternatives: Business-to-business (B2B), Business-to-consumer (B2C), and Consumer-to-business (C2B), as lower level objectives or alternatives.

In this research methodology, a group decision support system has to derive and synthesize priorities from these judgments. The model is set to determine how e-commerce types are performing. Additionally, business perspective and technical scenarios can be added to the model, just below the goal; then, business and IT can forecast the likely business perspective and technical scenario as well as the appropriate objectives and measures associated with each scenario.

The three main alternatives of e-commerce types that are available today are:
1. Business-to-business (B2B) describes commerce transactions between businesses, such as between a manufacturer and a wholesaler, or between a wholesaler and a retailer.
2. Business-to-consumer (B2C) commerce illustrates transactions when customers purchase products or services from a merchant, whether in an online or brick-and-mortar environment.
3. Consumer-to-business (C2B) is an electronic commerce business model in which consumers (individuals) offer products and services to companies and the companies pay them.

Table 1: Analytic Hierarchy Process Scale

Value	Preference	Explanation
1	Equally important	Two factors contribute equally to the objective
3	Moderately more important	Experience and judgment slightly favor one factor over the other
5	Strongly more important	Experience and judgment strongly favor one factor over another
7	Very strongly more important	A factor is strongly favored and its dominance is demonstrated in practice
9	Extremely more important	Reserved for situations where the difference between the items being compared is so great that they are on the verge of not being directly comparable
2,4,6,8	Intermediate values	To reflect compromise between two adjacent judgments

This study aims to identify which type of e-commerce is most efficient in organization practice. The following main determining attributes to influence the decision on the best alternative among the existing e-commerce types may be proposed as following:

Internet-based buying and selling marketplaces such as the stock market, where all of the sellers and buyers of a particular stock or of stocks of companies in a particular industry will find each other, financial information flows freely, current prices are posted, stocks bought are delivered efficiently and there exists settled ways of transacting business.

Maximize the value of the relationship is a process or methodology used to learn more about customers' needs and behaviors in order to develop stronger relationships with them.

Enterprise Resource Planning (ERP) system has modular hardware and software units and "services" that communicate on a local area network. The modular design allows a business to add or reconfigure modules

(perhaps from different vendors) while preserving data integrity in one shared database that may be centralized or distributed. Buying decision based on business value is the decision making processes undertaken by consumers in regard to a potential market transaction before, during, and after the purchase of a product or service including other forms of value such as employee value, customer value, supplier value, channel partner value, alliance partner value, managerial value, and societal value.

The Intermediary is the crucial element since it creates the connection between business which needs a service or a good and a mass of individuals. It promotes goods and services offered by individuals by proposing a distribution channel. It can offer such as large promotion, logistic and financial support, and technical expertise. It offers buyers a contact to a mass of individuals and takes care of money transactions and legal aspects. Electronic Data Interchange (EDI) Contact between companies exchanging orders via intra- or internet. A standard for that is EDIFACT (Electronic Data Interchange for Administration, Commerce, and Transport). This can be more secure using internet-tunneling, i.e. two partners use connections that can not be accessed by anybody else.
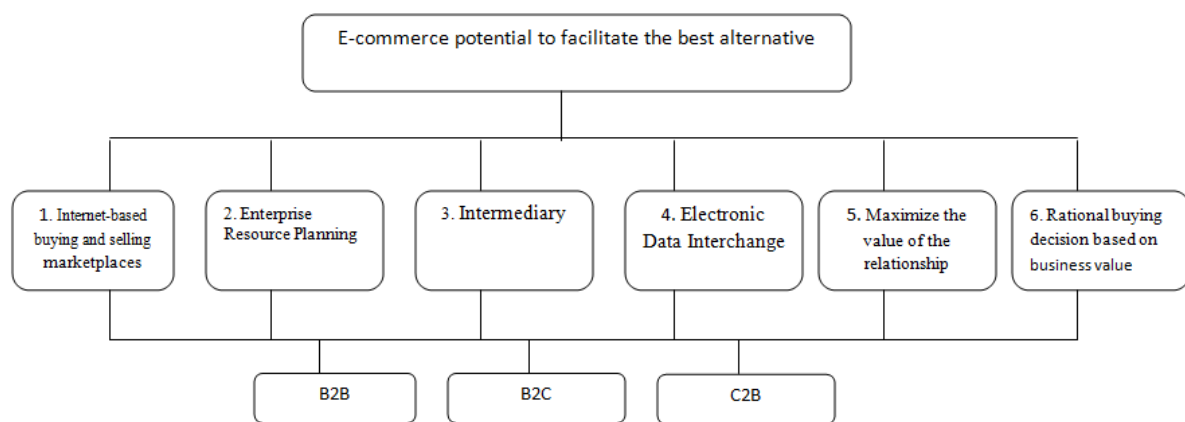

Fig 1 Commerce (e-commerce) Evaluation Processing

V. Research findings

In research findings, the model should structure the analysis process for decision-making, including important aspects, such as criteria grouping (respecting the independence between them), clarity, predictability and completion of the set of criteria. In addition, the implementation of the computational model would allow for the criteria voting to be done in an organized way, taking the inherent logic sequence of a decision into consideration. In this model, there were three main alternatives of e-commerce types: Business-to-business (B2B), Business-to-consumer (B2C), and Consumer-to-business (C2B), as lower level objectives or alternatives. There were 6 main determinant attributes of e-commerce features to influence the decision on the best alternative among the existing protocols may be proposed as following Internet-based buying and selling marketplaces, Maximize the value of the relationship, Enterprise Resource Planning (ERP) system, Buying decision based on business value, the Intermediary, Electronic Data Interchange (EDI). Business and IT professional could make judgments about the importance of lower level objectives or alternatives where they have the knowledge of the subject matter.

Table 1 shows comparing of the importance of e-commerce features between business and IT. Business people weighted more importance on "Enterprise Resource Planning (ERP) system" as first priority at 0.598 and "Electronic Data Interchange (EDI)" was last priority at 0.434. On other hand, IT people weighted importance on "Buying decision based on business value" as first priority at 0.603 and "Electronic Data Interchange (EDI)" was last priority at 0.414. IT and business people had weighted e-commerce types as the same result but there were different with respects of e-commerce features as different priority orders. Inconsistent expert judgment can be a factor when using the pairwise comparison method. The Evaluation and Choice module calculates and displays the inconsistency ratio (IR) of the AHP technique. The IR of 0.07 was obtained in this example. The IR provides a measure of the logical rationality of the pairwise comparisons. A value less than 0.10 is generally considered acceptable.

Table 1 Comparing the importance of E-Commerce features

	60 Business Respondents	60 IT Respondents
Internet-based buying and selling marketplaces	**0.537**	**0.507**
Maximize the value of the relationship	**0.584**	**0.547**
Enterprise Resource Planning (ERP) system	**0.598**	**0.452**
Buying decision based on business value	**0.502**	**0.603**
The Intermediary	**0.459**	**0.585**
Electronic Data Interchange (EDI)	**0.434**	**0.414**

Results are grouped by the construct being measured and tabulated by method of data collection.

Table 2 Comparing the results between business and IT

Attribution	Business		IT		Attribution	Business			IT
	Weight	Rank	Weight	Rank		Weight	Rank	Weight	Rank
1. Internet-based buying and selling marketplaces	0.537	3	0.507	4	4 Buying decision based on business value	0.502	4	0.603	1
2. Maximize the value of the relationship	0.584	2	0.547	3	5. The Intermediary	0.459	5	0.585	2
3. Enterprise Resource Planning (ERP) system	0.598	1	0.452	5	6. Electronic Data Interchange (EDI)	0.434	6	0.414	6

Table 2 shows result and compare the different perspectives between business and IT on each attribution as their objective on Electronic Commerce. These results indicate significant differences between business and IT objective (hypotheses 1).

VI. **Discussion**

An important contribution of this study is the identification of business and IT perspectives on e-commerce technology. By establishing the link between business and IT, the study focuses and evaluates e-commerce as the transacting of business electronically to find out if E Commerce can gain competitive advantage on the features of e-commerce by partisan business process and organization performance. This study articulates distinctive characteristics of e-commerce and business processes that extend the range of applicability across diverse business segments. It distinguishes between business and IT and explains why the exploitation of a complementary set of related information system artifacts across multiple functions create buying and selling online processing.

The most important direct predictor from this study was the high level of communication between business and IT. However, one cannot mandate meaningful communication between individuals. IT people have to earn the right to play a meaningful role in management forums. Based on findings from this study, one important way for an IT person to be heard is for him/her to devote the time necessary to understand business models and develop shared domain knowledge, the most influential construct in the research model. An IT person needs to understand the leverage points of the industry, the history and current issues of the business units, and to learn to apply business-oriented constructs in the application of technology to business problems. This change in view would help focus their attention on e-commerce types and ideas that could produce the most benefit and buying and selling online, rather than those that offer the most technical promise.

The purpose of this study was to draw on decision-making of business and IT professionals on e-commerce types while comparing to features. This study contributes to the growing body of literature linking business and IT which provides a framework for understanding how e-commerce technology may be appropriately viewed as a form of transacting business electronically. More importantly, it is one of the first studies to provide empirical tests of business and IT professional perspective on e-commerce technology. Viewed from business and IT perspective, the research findings indicate that e-commerce technology capability is a rent generating resource that is not easily imitated or substituted. Isolating mechanisms such as time compression diseconomies, connectedness of resources, and social complexity allow enterprises with high level of transacting business electronically, the capability to achieve and sustain superior performance.

It suggests that the inconsistent statistical findings about the relationship between business and IT which enterprise E Commerce may be attributed to management incomplete understanding of the nature of a enterprise's system resources and skills and to the fact that IT investment dollars serves as a poor surrogate for assessing a enterprise's IT intensiveness. It is rare for businesses to develop information technologies in-house. Instead, they rely on a suite of products (technologies) bought from e-commerce vendors. The result is that the vast majority of technological innovation and new product development in information system field is being driven by vendors. Given the complexity associated with creating an enterprise-wide business application capability, in any sample of IT spenders, only a small subset of the sample is likely to have the right IT resources in place for achieving competitive advantage. Other enterprises are more likely to have incurred the expenses of IT without comparative parity in IT capability.

VII. **Conclusion**

The research succeeded in identifying the difference in perceptions between business and IT professional in the evaluation of e-commerce types. This study holds importance for professionals tasked with evaluating for company wide the transacting of business electronically deployment. As the area of information system gains increased importance due to the strategic role of technology in organizations, and current events impact areas such as disaster recovery and enterprise continuity planning, a study of end-users to determine their perceptions about e-commerce attributes in organizations is critical for the transacting of business electronically. Evaluating e-commerce is complex and a dynamic process; therefore, bringing together the business and IT perspectives of e-commerce evaluation may facilitate the process of knowledge sharing in the organization.

Another implication of this study is for the complementarily theoretic perspective on the business value of IT. Studies using this perspective focus mainly on complementarities between business and IT professionals. This study uncovers those complementarities among e=commerce technology can create significant synergies and serve as a significant the transacting of business electronically and source of business value and competitive advantage on their own. This study empirically demonstrates that super-additive business and IT value arising from the complementarily of IT and IT management processes have significant positive effects on corporate performance. Finally, this study makes an important methodological contribution to information system research. This study developed the methodology of evaluation for capturing e-commerce technology such as

buying and selling online attribution arising from business and IT perspective. This study also adds to the literature on partnerships between IT and business people. With higher levels of business knowledge, IT professionals also have higher intentions of developing further or strengthening their partnerships with their clients.

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