INTERNET TECHNOLOGY: THE STRATEGIC IMPERATIVE

Charles H. Apigian
Middle Tennessee State University
capigian@mtsu.edu

Bhanu S. Ragu-Nathan
The University of Toledo
bhanu.ragu-nathan@utoledo.edu

T.S. Ragu-Nathan
The University of Toledo
traguna@utnet.utoledo.edu

Anand Kunnathur
The University of Toledo
akunnat@utnet.utoledo.edu

ABSTRACT

Organizations continue to struggle with identifying the appropriate drivers for Internet success. They must realize that investment alone will not lead to successful deployment of the Internet, but a strategic approach based on business principles is a sounder alternative. Organizations are also unclear on the appropriate way of measuring the tangible and intangible impact of the Internet on their business. This study develops measures for Internet Performance and Business Internet Use to help identify the necessary drivers for success and the correct dimensions for performance. Data from over 250 IT managers was collected to empirically test the validity and reliability of the derived constructs, and to validate the relationship between Business Internet Use and Internet Performance at the construct and dimension level. This study found that there is a significant relationship between Business Internet Use and Internet Performance, which further strengthens the argument that for proper implementation of Internet technology, a business-driven strategic approach is the optimal path for success.

Keywords: Internet, Strategy, Performance, Structural Equation Modeling, Electronic Commerce

1. Introduction

Many organizations ventured into the world of Internet technology to open up new channels of doing business to reap the "unparalleled" benefits and wealth creation that were promised [Amit and Zott, 2001]. The expected benefits include improvements in revenues, competitiveness, and profits. However, while there are some early success stories resulting from the use of Internet (e.g. Ebay, Dell, Cisco, and Amazon), there are also numerous stories of businesses that failed in their quest for success, such as Webvan, eToys, Boo, etc. [Straub et al., 2002, Frohlich, 2003]. Even for businesses that did not fail, there is still the question of whether there are any benefits from the use of Internet technology since it may be hard to determine whether the benefits of doing business via the Internet outweigh its costs. This inability to assess the impact of Internet technology stems from two basic issues that need to be addressed in order to facilitate a better understanding of the efficacy of the movement towards Internet technology. One, organizations need to identify the basic rationale for the applicability and use of Internet technology for their particular business needs. They need to have a strategic viewpoint for Internet deployment based on sound business principles. Two, organizations need to identify performance measures that will allow them to assess the effectiveness of the introduction of Internet technology.

The present study addresses these two issues through (1) the conceptual development of Business Internet Use and its measurement, (2) the development of a measure for Internet Performance, and (3) an analysis of the nature and strength of their relationship. The development of these measures should prove useful to both researchers and practitioners in understanding the impact of this technology. Existing Internet technology literature is still in its infancy and lacks such validated measures. The development of the empirical measures for this study was done using data collected from a large-scale survey questionnaire. Over 250 organizations responded to this survey, which was conducted through the Internet. These measures were then validated using structural equation modeling.

The remainder of this paper is organized as follows. The next section reviews the available literature to provide a rationale for the development of the constructs Business Internet Use and Internet Performance. This is followed by the research methodology section, which describes the processes of item generation for the questionnaire, the data collection, and the instrument assessment. The paper then discusses the implications of this approach and examines the relationship of the constructs at its dimension level, followed by limitations and a conclusion.

2. Business Internet Use and Internet Performance

2.1 The Need for a Strategic Perspective

Organizations traditionally take a technology-driven approach when introducing a new technology [Kalakota and Robinson, 2000]. That is, they typically examine and adopt currently available technologies and assume that their introduction of new technology alone will make them more competitive. This same technology-driven approach has guided the Internet technology introduction in many organizations. As Rangan and Adner [2001] point out, such introductions presume that any type of new technology will provide competitive advantage and that, in short, technology is a substitute for strategy. This is not unlike the approaches taken during the introduction of information technology (IT) in the 1980s and EDI technology in the 1990's [Galliers et al., 1995]. Almost a decade ago, Kettinger et al. [1994] stated, in the context of IT introduction, that "technological wizardry" and "innovating first" may not necessarily lead to IT success. The same can be said today with respect to Internet technology. Many organizations introduce Internet technology without a clear understanding of how the use of the Internet will enhance their financial and market position.

Any new organizational initiative which is intended to enhance competitive advantage can be effective only if that initiative is introduced within the context of the organization's overall strategy [Porter, 2001]. Porter [2001] further points out that instead of using a technology-driven approach, organizations should focus on sound business practices that incorporate the use of the Internet, i.e., the use of a business-driven approach to the introduction of Internet technology. The absence of a business-driven approach to the assimilation of the Internet has led many firms down a path of failed initiatives, with business models for Internet deployment focused on implementation rather than the strategic significance of deployment to the organization [Weill and Vitale, 2001, Robert and Racine, 2001, Tapscott et al., 2000]. The need to integrate sound business principles into the deployment of the Internet, i.e. the need to develop a business-driven Internet strategy, cannot be overstated. Such an approach demands that Internet technologies be implemented within the context of their usefulness in the achievement of the organization's strategic goals and objectives [Fruhling and Digman, 2000]. The existence of a well-developed strategic investment rationale enables organizations to guide their attention toward projects that could leverage the functionalities of Internet technologies in a firm [Chatterjee et al., 2002]. A business-driven Internet strategy model identifies the present strategic position of the organization in terms of its markets, customers, suppliers, etc. and then formulates an Internet strategy that can improve or change to a more favorable position.

While the need for a carefully formulated Internet strategy is apparent, the credibility of such organizational strategy-driven initiatives depends on how effective these initiatives are in helping the organization achieve its strategic goals and objectives. A measure of performance is a necessary tool in gauging such effectiveness; an understanding of what constitutes effective Internet performance is a necessary aspect of developing such a measure. Since the Internet technology research is relatively new, there is little research on Internet performance to draw upon. For the purpose of clarifying and defining the construct of Internet Performance, the present study draws upon the few recent studies that have addressed Internet performance and, to a greater extent, upon the existing literature on performance in the context of information technology. The following sections describe the development of the constructs of Business Internet Use and Internet Performance.

2.2 Internet Strategy and its Business Use

Internet strategy is defined as the policies and plans used to achieve business goals in which information exchange enables or facilitates execution of activities in and across value chains through technology, as well as supporting decision making that underlies those activities [Holsapple and Singh, 2000]. Although Internet strategy has been discussed in the literature at a conceptual level [Amit and Zott, 2001, Applegate et al., 2002, Bauer and Colgan, 2001, Earl and Khan, 2001, Lord, 2000, Plant, 2000, Wagner et al., 2003, Venkatraman, 2000], there is no extant literature that has attempted to develop a construct for Internet strategy or its business use that reflects the dimensionality of the construct and lends itself to operationalization for the purpose of empirical validation. Therefore, for the purposes of the present research, a twofold approach was used to identify and develop the key dimensions of this construct. First, a review of the Internet and IT literature provided the basis for generating a list of possible components for the Business Internet Use construct. Second, key executives responsible for the development and implementation of Internet strategies were interviewed to elicit their insights on the concept of Internet strategy and its use. Executives were from organizations that have successfully implemented Internet

Table 1. Literature Review Summary for Business Internet Use

Dimensions	Definition	Relevant Research
Internet-driven market channels	The capability to reach potential customers via the Internet. The use of the Internet can enhance an organization's market channels through its ability to reach new geographical locations, customers, and markets. This can be achieved through direct relationships, such as a website, or indirect channels (ex. portals, affiliations, etc.).	• Marketing/promotion [Steinfeld et al., 2002] • e-Marketing [Feeny, 2001] • Market orientation [Chang et al., 2003]
Internal Internet operations	The importance placed on the use of the Internet to improve the internal operations of an organization. Internet use pertains to the internal operations of an organization by enabling information to flow via a common platform. By establishing a common platform for information exchange, use of the Internet reduces time and costs to process orders, and reduces administrative costs, materials (search) costs, and order placement costs.	• Efficiency [Amit and Zott, 2001, Kudyba and Vitaliano, 2003] • e-Operations [Feeny, 2001] • Labor [Steinfeld et al., 2002]
Customer Internet interactions	The Internet use pertains to customer interactions to the extent to which avenues and applications of information and communication are enhanced, which will improve relationships and responsiveness with current customers. The Internet enables organizations to customize information dissemination to customers, offer complementary products, be the primary point of contact in their industry, facilitate direct communication through new avenues, and provide opportunities for their customers to clarify their needs and wants through an easy and non-obtrusive platform for information exchange. The use of the Internet can also facilitate timely response to customer needs and better interaction within the supply chain.	• Customer related process [Barua et al., 2001, Srikumar and Bhasker, 2004] • Customer orientation [Chang et al., 2003] • e-Services [Feeny, 2001] • Interaction [Zhu and Kraemer, 2002] • Customer Knowledge [Schoder and Madeja, 2004]
Supplier Internet interactions	The use of the Internet enables organizations new avenues for exchanging information with suppliers. This may occur when a company shares and integrates production processes and information, and improves communication through real time transmission of information from its suppliers, as well as aid in their search for new suppliers.	• Supplier related process [Barua et al., 2001] • Supply chain recognition [Feeny, 2001] • Supplier connection [Reinhardt and Levesque, 2004, Zhu and Kraemer, 2002]
Internet-enhanced distribution	The ability to provide and track products in an efficient and cost effective manner via the Internet. The Internet can facilitate the integration of distributors, intermediaries, and retailers with the organization. It can also facilitate tracking of product distribution in real-time, as well as improve the selection of distributors.	• Distributor selection [Zank and Vokura, 2003] • Distributor/Delivery [Steinfeld et al., 2002] • Distribution Channels [Chatterjee et al., 2002]

technology and the interviews were held at their facility. The interviews lasted approximately 4 to 5 hours and included tours of their operations. They were also asked to identify strategic aspects of their organization that could be enhanced or already have been enhanced by Internet technology. Further, they were asked to identify examples or scenarios to indicate specific items that encompass each area of Business Internet Use. The results of the interviews and literature review were brought together in developing a construct for Business Internet Use. To measure Internet strategy, it was deemed necessary to measure it through its use with respect to its business intentions. Business Internet Use is defined as the internal and external use of the Internet to support the activities and processes of an organization. Therefore, measures were developed that stress the importance of use within their organization, thus compiling a Business Internet Use construct. The derived dimensions of this construct are

Internet-driven market channels, internal Internet operations, customer Internet interactions, supplier Internet interactions, and Internet-enhanced distribution. This construct focuses on the internal aspect of Internet deployment by addressing the efficiency of operations, as well as placing significant emphasis on the external linkages that create the kinds of benefits that have become the hallmark of Internet deployment. External aspects such as customer and supplier interactions have made Internet technology the strategic resource that it has become for today's organizations. The dimensions of Business Internet Use are described in Table 1 along with a synopsis of research that helped identify specific items of each dimension.

2.3 Internet Performance

As with other areas of literature pertaining to the Internet, research on Internet performance is only now beginning to develop [Torkzadeh and Dhillon, 2002, Zhu and Kraemer, 2002]. Therefore, to better understand Internet performance, we reviewed the IT literature, which has a more comprehensive view of technology. Early in the development of IT performance literature, researchers were inconclusive of the level of significance that IT had on performance [Strassman, 1990, Mahmood and Mann, 1993, Loveman, 1994]. Brynjolfsson [1993] explained that this 'productivity paradox' was primarily due to mismeasurement. Mismeasurement can occur when the output measures are not correct, IT productivity is underestimated due to the intangible benefits or the antecedents to IT performance are not properly identified [Brynjolfsson, 1993].

To clarify the mismeasurement of IT performance, Barua et al. [1995] identified three levels of economic impact: firm, function, and application. According to their analysis, firm level performance attempts to aggregate the impact of IT over many applications from all activities of an organization, and if activities are not as effective in each function of an organization, firm level analysis is diminished. Application level analysis encompasses a complex and wide array of analysis and is hard to define and collect reliable data. With the probability of many applications undertaken within an organization at the same time, it is not feasible to measure at this level. The more useful analysis is at the function level, since performance or effectiveness is different within each functional area of an organization. Therefore, based on their analysis they developed a generalized two-stage model that indicated that inputs (ie. investments) lead to intermediate variables (ie. capacity utilization, inventory turnover, etc.), which then result in output variables (ie. market growth, sales, etc.). It was found that there was a significant relationship between IT input variables and intermediate variables, but no direct relationship was found between input variables and output variables [Barua et al., 1995]. Dehning and Richardson [2002] also synthesized and developed a two stage model, which included information technology measures (input), process measures (intermediate), and firm performance (output). Therefore, understanding the appropriate level of analysis is essential to the development of an Internet performance measure, as well understanding the appropriate information technology measure (input).

Similar to the IT literature, Internet performance has been measured at different levels. Internet performance is defined as the value or enhancements that an organization may receive that are directly attributed to the use of the Internet. Torkzadeh and Dhillon [2002] identified factors that influence the success of Internet commerce such as shopping errors, online payment, and other factors that relate to the experience of the end-user. Other studies have used measures that focus on the characteristics of websites such as transaction throughput, video and sound quality & availability [Jutla et al., 1999], time spent on activities [Pinsonneault and Rivard, 1998], overall consistency [Ozok and Salvendy, 2000] and website usability and design [Palmer, 2002]. These studies measure the effectiveness of the use of the Internet in the context of the success of specific applications.

While such measures are useful in evaluating individual applications, the ultimate success of Internet technology is gauged in the context of its contribution to the organization as a whole. As Feeny [2001] indicated, an organization can have a great website and an excellent approach to commerce, but may fail to perform effectively if it has inadequate fulfillment capability or poorly run operations. Therefore, while the success of individual applications is laudable, the true impact of the Internet on overall organizational performance has to be evaluated at a broader level than the success of an individual application. In contrast to the focus on individual applications, there are other studies that have used broad measures of performance such as sales growth, market value [Kotha et al., 2001], sales per employee, gross margin [Zhu and Kraemer, 2002], and economic value added [Saeed et al., 2002]. While these broad metrics have traditionally represented the "ultimate" measure of organizational success, they have often been criticized for the reason that, as overall measures, their usefulness is blunted by a variety of organizational and environmental factors that affect them [Straub et al., 2002]. Also, for several organizations, Internet deployment has been recent enough that it is too early for its impact to translate into broad overall measures of success such as return on investment. Therefore, traditional broad based financial measure of performance may be inadequate and, to some extent, inappropriate, which was also the case in the early IT literature. The present research develops a measure of Internet Performance that can be positioned on the performance measurement continuum in between gauging the success of individual web-applications (application level) at one end and the improvement in overall financial measures (firm level) at the other end. An Internet Performance measure is developed that identifies how the use of the Internet has benefited the organization as described below.

Table 2. Literature Review Summary for Internet Performance

Dimensions[a]	Definition	Relevant Research
Relationship enhancement	The improvement of communication and relationships based on the use of the Internet. The use of Internet may develop customer and supplier lock-in and make it easier for customers, suppliers, employees, and the community to give feedback and communicate on a more frequent basis.	• Customer and supplier lock-in [Shapiro and Varian, 1999, Giaglis, 1999] • Improved customer service levels [Graham and Hardaker, 2000] • Impact on customer/supplier relationships [Zank and Vokura, 2003]
Revenue expansion	The increase in revenues or sales volume based on the use of the Internet. This can be achieved by increasing the customer base, reaching new demographics, and by becoming more visible and easily accessible to current and new customers.	• Increased customer base [Zank and Vokura, 2003] • Increased sales volume [Graham and Hardaker, 2000, Amit and Zott, 2001, Chang et al., 2003, Kotha et al., 2001, Zank and Vokura, 2003]
Cost reduction	The use of the Internet to reduce the transaction costs and information flow between customers and suppliers as it reduces the cost to communicate. The use of the Internet may also reduce internal costs since real time information becomes readily available throughout the organization.	• Reduction in purchasing / coordination costs [Boyer and McDermott, 1999, Garciano and Kaplan, 2001, Kettinger and Hackbarth, 2004] • Reduced Cost [Zank and Vokura, 2003, Giaglis, 1999, Graham and Hardaker, 2000, Amit and Zott, 2001]
Time reduction	The use of the Internet to reduce the time to place or receive orders as well as to reduce the time to process orders. This operational effect is a by-product of real-time transmission of data.	• Reduced cycle time [Graham and Hardaker, 2000, Zank and Vokura, 2003] • Order fulfillment reduction [Giaglis, 1999] • Transaction throughput [Jutla et al., 1999]
Note: [a] Internet Performance is based on the conceptual framework of Sawhney and Zabin [2001]		

Some recent literature has conceptualized performance from the perspective of how organizational effectiveness can be directly attributed to the use of the Internet, which is similar to function level performance. These studies are briefly described here and provide the basis for the comprehensive measure of Internet Performance developed in the present study. Garciano and Kaplan [2001] identified process/indirect improvements and marketplace benefits that are directly related to the Internet function. Frohlich [2003] measured the percentage of sales and procurement using the Internet. Zhu and Kraemer [2002] identified specific aspects of Internet performance such as profitability, cost reduction, and inventory efficiency. Graham and Hardaker [2000] identified Internet benefits such as reduced time-to-market, lower costs, reduced operating expenses, increased growth, and improved customer service levels. Chatterjee et al. [2002] suggested that the use of the Internet (e-commerce) can lead to new customers, new distribution channels, and help the offering of value-added customer services.

While the previously mentioned studies refer to the many benefits that can result from Internet use as seen from a variety of perspectives, the present study sought to develop a performance measure that could capture these different perspectives within one unifying construct. Research by Sawhney and Zabin [2001, pgs. 25-26] provides such a conceptual framework. While referring to the desired outcomes that e-business can enable, they stated that "building a business case in support of an initiative requires that one think in terms of the specific types of business impact." They further suggest that while impact can be defined and measured in many different ways, "in the final analysis, however, successful e-business initiatives will always result in one or more of four possible sets of outcomes: (1) Cost reduction, (2) Revenue expansion, (3) Time reduction, and (4) Relationship enhancement." The present study develops its measure of Internet Performance from this four-dimension view of the impact of Internet deployment as suggested by Sawhney and Zabin [2001]. These four aspects of Internet Performance are presented and described in Table 2.

The measure of Internet Performance indicates four aspects of how the Internet can enhance an organization. However, an organization cannot expand revenues, reduce costs and time, or enhance relationships by accident. There is a strategic driver that must be in place prior to success. Dehning and Richardson's [2002] synthesis of IT performance indicated three types of inputs: investment, strategy, and management. Most of the IT and Internet literature on performance has measured investment as an initial input or antecedent [Saeed et al., 2002, Zhu and Kraemer, 2002, Kotha et al., 2001]. Investment as an input is similar to a technology-driven approach to Internet strategy and is more applicable for mature technologies and not the introduction of new and innovative Internet technologies. Therefore, the best type of input for this research is a strategic view of input, which was measured through the Business Internet Use. Therefore, it is hypothesized that:

H1: Business Internet Use has a direct positive relationship with Internet Performance.

3. Research Methodology

The purpose of this research is to develop valid instruments to measure two key constructs within the realm of Internet deployment in organizations, i.e., Business Internet Use and Internet Performance, and subsequently test the nature of the relationship between the two constructs.

The development of the measures of Business Internet Use and Internet Performance consisted of four phases: (1) item generation, (2) pre-pilot study, (3) pilot study, and (4) large-scale data collection and analysis. The last phase involved rigorous statistical analysis using SPSS 12.0 to determine the validity and reliability of the instruments. Structural equation modeling was also used to further validate the results of the SPSS analysis and to test the relationship between the two constructs.

The importance of a meticulous approach to the process of developing a valid measure cannot be overemphasized. As evidenced in the IT performance measurement literature [Strassman, 1990, Mahmood and Mann, 1993, Loveman, 1994], a repeat in inconclusiveness may occur with Internet performance if care is not taken in the development and validation of measures. Therefore, the more rigorous the measurement, "the better chance to detect the impact, if any, of a given technology" [Devarj and Kohli, 2003]. The present research follows these guidelines in developing measures for the constructs. The four-phase process specified earlier is described in detail in the following section.

3.1 Item Generation, Pre-Pilot Study, and Pilot Study

A basic requirement for a good measure is content validity, which ensures that the measurement items in an instrument cover the major content of a construct [Churchill, 1979]. Content validity is usually achieved through a comprehensive literature review and through interviews with practitioners and academicians. The items for Business Internet Use and Internet Performance were generated based on a review of the literature [Sawhney and Zabin, 2001, Shapiro and Varian, 1999, Steinfeld et al., 2002, Giaglis, 1999, Graham and Hardaker, 2000, Feeny, 2001, Amit and Zott, 2001]. All of the items were measured on a 5-point Likert scale, with 1 being "strongly disagree" and a 5 being "strongly agree". A "not applicable" choice was also given and was presented as NA. These items are listed in Appendix A.

In the pre-pilot study, the items were reviewed by three academicians. They were then re-evaluated based on structured interviews with two practitioners, one the president of an Internet strategy marketing firm, and the other the vice president of systems for an automobile company. They were asked to review and comment on the appropriateness of the constructs. Based on the feedback from the academicians and the practitioners, redundant and ambiguous items were either modified or eliminated and new items were added where necessary. The use of these experts helped to provide insights into potential problems arising from ambiguous or poorly defined constructs. This process was aimed at providing content validity for the instrument as suggested by Churchill [1979].

During the pilot study phase, the Q-sort method was used [Moore and Benbasat, 1991], which is a powerful method for confirming the underlying structure of complex variables and for establishing the convergent and discriminant validity of scales [Segars and Grover, 1998]. Similar to the procedure followed in other studies [Davis, 1986, Davis, 1989], three pairs of judges were used and three rounds of comparisons were made.

Each of the items for the dimensions of the Business Internet Use and Internet Performance was written on individual index cards. The cards were shuffled in random order and a complete set was given to each of the first pair of judges. Boxes labeled with the names of each of the dimensions were provided to the judges and they were requested to place each index card in the box that best categorized the item. Through each round of the Q-sort, modifications, additions, and deletions of items were made until agreement between judges was up to acceptable levels.

In the first round, an Internet marketing executive and a business systems and productivity consultant were asked to be judges. To assess the reliability of the sorting done by the judges, three different measures were used:

the Hit Ratio, item placement ratios, and Cohen's Kappa, [Nahm et al., 2002]. Moore and Benbasat's [1991] Hit Ratio was calculated by counting the number of items both judges placed in the same category. Item placement ratios were calculated by counting all the items that were correctly sorted into the target category by each of the judges and dividing them by twice the total number of items. Cohen's Kappa [Cohen, 1960] was used to evaluate the true agreement score between the two judges by eliminating chance agreements.

In the first round, the Hit Ratio averaged 0.812, the initial overall placement ratio of items within the target constructs was 0.850, and the Cohen's Kappa score averaged 0.769. For the Hit Ratio and the item placement ratio, a value above 0.80 is considered high [Nahm et al., 2002]. Landis and Koch [1977] indicated that a Cohen's Kappa score from 0.76 to 1.00 was excellent, from 0.40 to 0.75 was fair to good (moderate), and 0.39 or less was considered poor. On the basis of these guidelines for interpreting the Cohen's Kappa coefficient, the value of 0.769 was considered at the low end of the "excellent" level of agreement (beyond chance) for the judges in the first round (See Appendix B for details). In order to improve the Cohen's Kappa measure of agreement, an examination of the off-diagonal entries in the placement matrix was conducted. Items classified in a construct different from their target construct were identified and dropped or reworded. Also, feedback from both judges was obtained on each item and incorporated into the modification of the items.

The reworded items were then entered into a second sorting round. The judges were a general manager of an automotive distribution plant and a manager of information systems. In the second round, the Hit Ratio averaged 0.906, the initial overall placement ratio of items within the target constructs was 0.907, and the Cohen's Kappa score averaged 0.882. Since the second round achieved an excellent overall placement ratio of items within the target constructs, it was decided to keep all the items for the third sorting round.

The third sorting round was used to re-validate the constructs. The chief operating officer of an auto supplier and a vice president of operations were the judges in this round. The third round achieved a Hit Ratio of 0.922, an item placement ratio of 0.944, and a Cohen's Kappa of 0.902. These numbers indicate a high degree of consistency with the results of the second sorting round and a high level of agreement and placement between the judges. Appendix B shows the agreement levels between rounds as well as the Hit Ratios and item placement ratios for dimensions of each construct.

4. Large Scale Data Analysis

4.1 Data Collection

The response rates in more recent mail surveys have been less than desirable [Colombo, 2000, Baruch, 1999]. Therefore, alternate modes of data collection were carefully examined. Given the relevance of Internet technology to this study, it was decided that a web-based survey would be used as the means for data collection. Klassen and Jacobs [2001] have suggested that web-based surveys lower costs, broaden distribution, improve the accuracy of data, and reduce survey turnaround times.

This study sought to choose respondents that are knowledgeable about the business use of the Internet and its implications in their organizations. Based on the literature and recommendations from practitioners, IT managers and professionals were chosen as the respondents and were contacted through e-mail. Through a careful analysis of e-mail lists and list management services, opt-in e-mail lists were identified as most appropriate for this study. An opt-in or permission list includes the names of only those individuals that have given the list service permission to use their e-mail addresses [Krishnamurthy, 2001]. These individuals are generally part of a specific group or industry that share common interests, which includes a willingness to participate in such studies. To be included in an opt-in email list, an individual is asked to participate. This is usually in conjunction with other offers, such as subscribing to newsletters or identifying a specific topic as an interest. These lists are generally current since they are continually updated (at least once a month); respondents can remove themselves from the list at anytime, thereby improving the integrity of the respondent base. An added feature is the opportunity provided by list management services for individuals to fill out a small survey on why they did not respond to the e-mail. This helps to identify key problems with the survey before sending out any reminders. The IT professionals and managers contacted for this study represent a broad range of companies and industries.

The initial mailing was sent to about 5200 IT professionals and managers in the United States. The e-mail that the respondent received gave a brief description of the study; it also provided a link to the website where the survey instrument was hosted.

Possible respondents for an e-mail survey can be counted in two ways: (1) those who were contacted by e-mail and (2) those who visited the survey site after reading the e-mail (referred to as click-through). The click-through response was calculated by using an internal counter on the webpage of the survey. If the click-through response rate appears to be low it may indicate that the e-mail did not triggered enough interest in the respondents. This could call for some modifications in the contact information. Since this type of survey research is relatively new, no standard has been established regarding high/low click-through rates.

For the first mailing there were 258 click-through responses. Of these, 97 were submitted as completed surveys. After the first mailing, the list management service provided a non-response report. Among the reasons for not responding were time constraint and suspicion that the purpose of the e-mail was to collect e-mail addresses for miscellaneous undisclosed marketing purposes.

A second e-mail was sent to the recipients of the initial mailing. Based on the feedback indicating concerns about possible misuse of their e-mail addresses, this second e-mail included a further assurance that the study was for academic research purposes only and that respondent information, including e-mail addresses, will not be used for purposes outside of this research. The total of the second click-through response was 338 resulting in 119 actual responses. A reminder e-mail was sent out again. This had a click-through response of 93 leading to an actual response of 49. This significant decrease in click-through response indicated that future reminders would not lead to substantial additional responses.

There were a total of 689 click-through respondents (13.2%) and an actual response of 265. Of the 265 responses, 8 were not used due to incomplete information. This resulted in 257 usable responses, which is a response rate of 4.9% based on those who were initially contacted for the survey. The response rate based on click-through respondents was 37.3%, which is considered normal for e-mail surveys [Marinova et al., 2002, Dillman, 2000].

A concern that typically arises with such surveys is non-response bias. To check for non-response bias, a time-trend test technique was used [Armstrong and Overton, 1977]. This technique assumes that nonrespondents resemble late respondents more than early respondents [Zhuang and Lederer, 2003]. Chi-square tests were calculated for corporate position, industry type, and company sales. Respondents from the first e-mailing were considered early respondents and respondents from the second and third e-mailing were considered the late respondents, which is similar to past studies [Tu et al., 2001, Zhuang and Lederer, 2003]. Corporate position had a chi-square value of 3.63 (p-value = 0.457 with df = 4), industry type had a chi-square value of 11.527 (p-value = 0.247 with df = 9), and company sales had a chi-square value of 2.785 (p-value = 0.733 with df = 5). Each demographic did not show a significant difference between samples, which indicates a lack of non-response bias (See Appendix C for details).

To further ensure non-response bias, we tested for differences between early and late respondents based on the means of the aggregated construct items. For each of the 5 dimensions of Business Internet Use and the 4 dimensions of Internet Performance, t-tests were conducted. In every instance, the results did not show a significant difference, which again indicates the lack of non-response bias (See Appendix D for details).

4.2 Instrument Assessment

This section describes the procedures performed to assess the measurement properties of the Business Internet Use and Internet Performance measures. For purposes of clarity of this narrative, Business Internet Use and Internet Performance (the second order constructs) will hereinafter be referred to, simply, as constructs. The components of these constructs, which are the first order constructs, will hereinafter be referred to as dimensions. Thus the components of the second-order Business Internet Use construct comprises market channels, distribution, internal operations, customer and supplier interaction dimensions and the second-order Internet Performance construct comprises the revenue expansion, relationship enhancement, and cost and time reduction dimensions. Each of these dimensions, in turn, consists of the actual items that were used in the questionnaire survey. As conceptualized in this research, the Business Internet Use construct is represented by 5 dimensions with 34 items and the Internet Performance construct is represented by 4 dimensions with 20 items.

The measurement properties of the constructs were evaluated by assessing key components of construct validity, namely: (1) content validity, (2) internal consistency of operationalization (unidimensionality and reliability), (3) convergent validity, (4) discriminant validity, and (5) predictive validity. An instrument has content validity if there is general agreement among the subjects and researchers that survey items cover all important aspects of the variable being measured. Unidimensionality indicates that all the items are measuring a single theoretical construct. Reliability values indicate the degree to which operational measures are free from random error and measure the construct in a consistent manner. Convergent validity is about the extent to which there is consistency in measurements across multiple operationalizations [Campbell and Fiske, 1959]. Discriminant validity refers to the independence of the dimensions [Bagozzi et al., 1991], i.e. the extent to which measures of the dimensions are distinctively different from each other. Predictive validity seeks to find support for the validity of the construct by investigating whether it exhibits relationships with other constructs that are in accordance with theory.

4.3 Unidimensionality, Convergent and Discriminant Validity, and Reliability

Following the approach predominantly used in many measurement studies [Sethi and King, 1994, Segars and Grover, 1998], the measurement properties of the two constructs, Business Internet Use and Internet Performance, were assessed by testing for various types of validity as well as reliability. Tests for unidimensionality, convergent validity, discriminant validity, and reliability were performed through the corrected item-total correlation analysis (CITC), factor analysis, and the calculation of Cronbach's alpha by using SPSS 12.0. Structural equation modeling was used (using LISREL 8.54 software) to further test the convergent and discriminant validity and also predictive validity. A final composite reliability measure was also calculated using the Werts, Linn, and Joreskog [1974] measure on internal consistency.

Table 3. Instrument Assessment for Business Internet Use

Items	CITC Scores	CITC Alpha if Deleted	Dimension Level Factor Analysis	Cronbach Alpha
		Internal Internet operations		
IIP1	.895	.969	.921	
IIP 2	.917	.968	.938	
IIP 3	.899	.969	.924	
IIP 4	.913	.968	.936	α = .973
IIP 5	.896	.969	.921	
IIP 6	.919	.968	.940	
IIP 7	.861	.971	.894	
IIP 8	.828	.972	.866	
		Internet-driven market channels		
MARK1	.757	.945	.812	
MARK2	.804	.942	.845	
MARK3	.816	.941	.865	
MARK4	.874	.936	.901	α = .949
MARK5	.923	.931	.931	
MARK6	.878	.935	.895	
MARK7	.727	.948	.804	
		Customer Internet interactions		
CUST1	.780	.939	.838	
CUST2	.801	.938	.854	
CUST3	.815	.937	.866	
CUST4	.853	.935	.894	
CUST5	.755	.941	.801	α = .945
CUST6	.788	.939	.831	
CUST7	.797	.938	.842	
CUST8	.781	.939	.823	
		Supplier Internet interactions		
SUPP1	.868	.961	.917	
SUPP2	.929	.943	.945	
SUPP3	.929	.943	.941	
SUPP4	.899	.952	.920	α = .962
SUPP5	Item dropped during CITC			
SUPP6	Item dropped during CITC			
		Internet-enhanced distribution		
DIS1	.834	.928	.896	
DIS2	.895	.917	.937	
DIS3	.832	.928	.895	α = .941
DIS4	.835	.927	.896	
DIS5	.806	.934	.875	
Note: Analysis was conducted using SPSS 12.0				

The CITC test allows for scale purification by the elimination of items whose CITC scores are below 0.50. Items are also eliminated if the "alpha if deleted" score associated with that item is higher than the overall Cronbach reliability score. For the Business Internet Use construct, none of the items had CITC scores below 0.50. However, SUPP5 and SUPP6 had "alpha if deleted" scores higher than the Cronbach alpha coefficient for the related dimension, and were removed prior to dimension level factor analysis. For the Internet Performance construct, none of the items had CITC scores below 0.50, and none of the items had "alpha if deleted" scores higher than the Cronbach alpha coefficient for the related dimension. The results are displayed in Tables 3 and 4, as well as results of dimension level factor analysis, which reaffirmed the CITC analysis.

Table 4. Instrument Assessment for Internet Performance

Items	CITC Scores	CITC Alpha if Deleted	Dimension Level Factor Analysis	Cronbach Alpha
		Relationship Enhancement		
REL1	.654	.803	.826	
REL2	.724	.771	.843	α = .838
REL3	.661	.799	.850	
REL4	.644	.807	.792	
		Revenue Expansion		
EXP1	.758	.909	.867	
EXP2	.878	.885	.886	
EXP3	.798	.901	.886	α = .920
EXP4	.765	.907	.788	
EXP5	.774	.906	.759	
		Cost Reduction		
CRED1	.833	.939	.885	
CRED2	.821	.941	.875	
CRED3	.880	.934	.920	α = .949
CRED4	.863	.936	.908	
CRED5	.826	.941	.880	
CRED6	.827	.941	.881	
		Time Reduction		
TRED1	.735	.919	.820	
TRED2	.827	.901	.913	
TRED3	.833	.899	.929	α = .926
TRED4	.806	.905	.904	
TRED5	.804	.906	.852	
Note: Analysis was conducted using SPSS 12.0				

Factor analysis was then performed at the construct level using principal components as the means of extraction and varimax as the method of rotation. With respect to the Business Internet Use dimension, four items (MARK7, CUST5, CUST7, and CUST8) did not load on any of the five dimensions. After removing these items, factor analysis was performed with the remaining items. The results are shown in Table 5. All items loaded on their respective factors and the cumulative variance explained by the five factors was 83.7%. With respect to the Internet Performance construct a similar procedure resulted in five items being dropped from further analysis. EXP5 loaded on a different dimension, time reduction, and four other items (TRED1, REL3, CRED1, and CRED5) cross-loaded onto two dimensions. A final factor analysis without these five items explained 78.8% of variance (See Table 6).

4.4 Assessment of Validity using Structural Equation Modeling

Although factor analysis is useful in identifying underlying factor structure and thus providing evidence of unidimensionality, convergent validity, and discriminant validity, it assumes that the measurement errors of the items are uncorrelated. However, realistically, there is always some degree of error correlations among items and this cannot be detected by factor analysis [Raghunathan and Raghunathan, 1999]. Structural equation modeling (SEM) tests the degree of correlation among the error terms and thereby makes further refinement possible. Segars and Grover [1998] stated that "each of the measured factors be modeled in isolation, then in pairs, and then as a collective network. Proceeding in this manner provides the fullest evidence of measurement efficacy and also reduces the likelihood of confounds in full structural equation modeling which may arise due to excessive error in measurement".

Table 5. Convergent and Discriminant Validity at the Construct Level for Business Internet Use

Dimension	Item	Construct Level Factor Loadings	Standardized Regression Weight	p-value	Overall Model Fit
Internet-driven market channels	MARK1	0.790	0.732	< 0.001	GFI = 0.990 AGFI = 0.948 NFI = 0.994 CFI = 0.996 RMSR = 0.020 IC = 0.861
	MARK2	0.791	Excluded due to correlation with item		
	MARK3	0.608	0.830	< 0.001	
	MARK4	0.715	Excluded due to correlation with item		
	MARK5	0.797	0.977	< 0.001	
	MARK6	0.760	0.911	< 0.001	
	MARK7	Excluded due to low loadings during factor analysis			
Internal Internet operations	IIP1	0.793	Excluded due to correlation with item		GFI = 0.965 AGFI = 0.918 NFI = 0.983 CFI = 0.988 RMSR = 0.030 IC = 0.924
	IIP 2	0.805	0.934	< 0.001	
	IIP 3	0.804	0.918	< 0.001	
	IIP 4	0.801	0.900	< 0.001	
	IIP 5	0.777	Excluded due to correlation with item		
	IIP 6	0.788	0.938	< 0.001	
	IIP 7	0.739	0.883	< 0.001	
	IIP 8	0.759	0.852	< 0.001	
Customer Internet interactions	CUST1	0.805	0.901	< 0.001	GFI = 0.985 AGFI = 0.925 NFI = 0.991 CFI = 0.993 RMSR =0.033 IC = 0.855
	CUST2	0.848	0.946	< 0.001	
	CUST3	0.807	0.982	< 0.001	
	CUST4	0.766	Excluded due to correlation with item		
	CUST5	Excluded due to low loadings during factor analysis			
	CUST6	0.606	0.680	< 0.001	
	CUST7	Excluded due to low loadings during factor analysis			
	CUST8	Excluded due to low loadings during factor analysis			
Supplier Internet interactions	SUPP1	0.803	0.887	< 0.001	GFI = 0.979 AGFI = 0.896 NFI = 0.990 CFI = 0.992 RMSR = 0.028 IC = 0.933
	SUPP2	0.835	0.943	< 0.001	
	SUPP3	0.806	0.957	< 0.001	
	SUPP4	0.807	0.932	< 0.001	
Internet-enhanced distribution	DIS1	0.659	0.872	< 0.001	GFI = 0.998 AGFI = 0.992 NFI = 0.999 CFI = 1.000 RMSR = 0.008 IC = 0.886
	DIS2	0.803	0.938	< 0.001	
	DIS3	0.763	0.864	< 0.001	
	DIS4	0.757	0.865	< 0.001	
	DIS5	0.667	Excluded due to correlation with item		

A single factor measurement model was specified for each dimension of Business Internet Use and Internet Performance respectively. Model-data fit was evaluated based on multiple fit indices. The chi-square statistic is perhaps the most popular index to evaluate the goodness of fit of the model. It measures the difference between the sample covariance and the fitted covariance. However, this index has some disadvantages. The chi-square index is sensitive to sample size and departures from multivariate normality. Therefore, it has been suggested that it must be interpreted with caution in most applications [Chau, 1997, Joreskog and Sorbom, 1989]. Researchers are hence turning to multiple fit criteria as suggested by Bollen and Long [1993] to reduce any measuring biases inherent in different measures. Fit measures can be categorized by three types: absolute (GFI, RMSR), relative (NFI, CFI), and adjusted (or parsimonious) (AGFI) indices [Maruyama, 1998]. An absolute fit index provides information about how closely the model fit compares to a perfect fit [Maruyama, 1998]. A relative fit index is a measure of how the model compares with other possible models with the same data [Maruyama, 1998]. Adjusted or parsimonous fit indices look at how a model combines fit and parsimony [Maruyama, 1998]. Goodness-of-Fit Index (GFI) indicates the relative amount of variance and covariance jointly explained by the model. The Adjusted Goodness-of-Fit Index

(AGFI) differs from the GFI in that it adjusts for the number of degrees of freedom in the model. GFI and AGFI values range from 0 to 1, with higher values indicating better fit [Byrne, 2001]. GFI and AGFI scores in the 0.80 to 0.89 range are generally interpreted as representing reasonable fit; scores of 0.90 and above represent good fit [Chau, 1997]. The Root Mean Square Residual (RMSR) measures the average discrepancy between the elements in the sample covariance matrix and the model-generated covariance matrix. RMSR values range from 0 to 1, with smaller values indicating better models; values below 0.05 signify good fit [Byrne, 1989]. Bentler and Bonnett's [1980] Normed Fit Index (NFI) and Comparative Fit Index (CFI) compares the theoretical model to a baseline model. A recommended value of fit for both NFI and CFI is above 0.90 [Hair et al., 1998]. A final measure for internal consistency (IC) was used to measure reliability at the structural level [Werts et al., 1974], with a value of 0.80 or higher as an acceptable level of reliability.

Following Sethi and King [1994], iterative modifications were made for each of the constructs by observing modification indices and coefficients to improve key model fit statistics. Further, as recommended by Joreskog and Sorbom [1989], only one item was altered at a time to avoid over-modification of the model. This iterative process continued until all model parameters and key fit indices met recommended criteria. If a construct had less than 4 items, model fit statistics could not be obtained. In these cases, a two-factor model was tested by adding the items of another construct. The items of another construct are added only to provide a common basis for comparison and to keep items in a sufficient number so that model fit statistics could be obtained. Tables 5 and 6 include the details of this modification process and the final items. After this modification, MKT2, MARK4, IIP1, IIP5, CUST4, and DIS5 were removed from the Business Internet Use construct, and TRED5 was removed from the Internet Performance construct. The items in the final instrument are presented in Appendix A.

Structural equation modeling was also used to test the discriminant validity for Business Internet Use and Internet Performance. A test of discriminant validity is performed by taking two dimensions at a time. The dimensions are considered to be distinct if the hypothesis that the two dimensions together form a single dimension is rejected. To test this hypothesis, a pair-wise comparison of models was performed by comparing the model with constrained correlation to one with an unconstrained model. A difference between the chi-square values (df = 1) of the two models ($p < 0.05$) would indicate support for the discriminant validity criterion [Joreskog, 1971]. Appendix E reports the results of the pair-wise tests of discriminant validity for Business Internet Use and Internet Performance. All chi-square difference are significant at the $p<0.05$ level, indicating strong support for discriminant validity.

Table 6. Convergent and Discriminant Validity at the Construct Level for Internet Performance

Dimension	Item	Construct Level Factor Loadings	Standardized Regression Weight	p-value	Overall Model Fit
Relationship Enhancement	REL1	0.552	0.777	< 0.001	GFI = 0.974 AGFI = 0.930 NFI = 0.974 CFI = 0.983 RMSR = 0.043 IC = 0.850
	REL2	0.806	0.739	< 0.001	
	REL3	Excluded due to cross-loading during factor analysis			
	REL4	0.557	0.759	< 0.001	
Time Reduction	TRED1	Excluded due to cross-loading during factor analysis			
	TRED2	0.711	0.867	< 0.001	
	TRED3	0.685	0.909	< 0.001	
	TRED4	0.670	0.811	< 0.001	
	TRED5	0.754	Excluded due to correlation with item		
Revenue Expansion	EXP1	0.586	0.811	< 0.001	GFI = 0.999 AGFI = 0.996 NFI = 0.999 CFI = 1.000 RMSR = 0.009 IC = 0.829
	EXP2	0.802	0.926	< 0.001	
	EXP3	0.643	0.858	< 0.001	
	EXP4	0.691	0.776	< 0.001	
	EXP5	Excluded due to low loadings during factor analysis			
Cost Reduction	CRED1	Excluded due to cross-loading during factor analysis			GFI = 0.992 AGFI = 0.961 NFI = 0.995 CFI = 0.997 RMSR = 0.022 IC = 0.855
	CRED2	0.568	0.828	< 0.001	
	CRED3	0.719	0.884	< 0.001	
	CRED4	0.651	0.925	< 0.001	
	CRED5	Excluded due to cross-loading during factor analysis			
	CRED6	0.808	0.883	< 0.001	

5. Validation of a Second-Order Construct

Business Internet Use was conceptualized as a second-order model composed of five dimensions. The fit statistics for the second-order model were GFI = 0.987, AGFI = 0.936, and RMSR = 0.024, representing good model-data fit. The lambda coefficients were all significant at $p<0.01$. The target coefficient, which is the ratio of the chi-square value for the first-order model to the chi-square value for the higher-order model, was calculated [Doll et al., 1995]. It indicates the percentage of variation in the first-order factors that can be explained by the second-order construct. The chi-square value was 614.2 for the first-order model and 660.9 for the second-order model. The target coefficient index was 92.9%, which is strong evidence of the existence of a higher-order construct.

Table 7. Convergent and Discriminant Validity for the Aggregated Construct for Business Internet Use and Internet Performance

Construct	Dimension	Standardized Regression Weight	p-value	Overall Model Fit
Business Internet Use	Internet-driven market channels	0.770	< 0.001	GFI = 0.991
	Internal Internet operations	0.821	< 0.001	AGFI = 0.933
	Customer Internet interactions	0.737	< 0.001	NFI = 0.993
	Supplier Internet interactions	0.853	< 0.001	CFI = 0.995
	Internet-enhanced distribution	0.793	< 0.001	RMSR = 0.019 IC = 0.847
Internet Performance	Relationship enhancement	0.764	< 0.001	GFI = 0.997
	Time reduction	0.898	< 0.001	AGFI = 0.986 NFI = 0.998
	Revenue expansion	0.879	< 0.001	CFI = 1.000
	Cost reduction	0.887	< 0.001	RMSR = 0.010 IC = 0.878

For Internet Performance, the fit indices for the second-order model were GFI = 0.997, AGFI = 0.986, and RMSR = 0.010, indicating a good model-data fit. The lambda coefficients were all significant at $p<0.01$. The chi-square value for the first-order model was 233.4 and for the second-order model were 240.1. The target coefficient index was 97.2%, indicating once again strong support for the existence of a higher order construct. (See Table 7 for a summary of measures and loadings.)

5.1 Predictive Validity

A structural model was constructed to test the hypothesized relationship between Business Internet Use and Internet Performance (See Figure 1). Bagozzi and Heatherton [1994] suggested that the use of aggregated variables is preferred when the total number of items exceeds 30. With 20 items for Business Internet Use and 14 for Internet Performance (total of 34 items), the use of aggregated dimensions reduced measurement error and enhanced model-data fit. Five aggregated dimensions represented Business Internet Use and four represented Internet Performance. Using LISREL 8.54, a model was constructed similar to Figure 1. Table 8 shows the path coefficients and model fit indices.

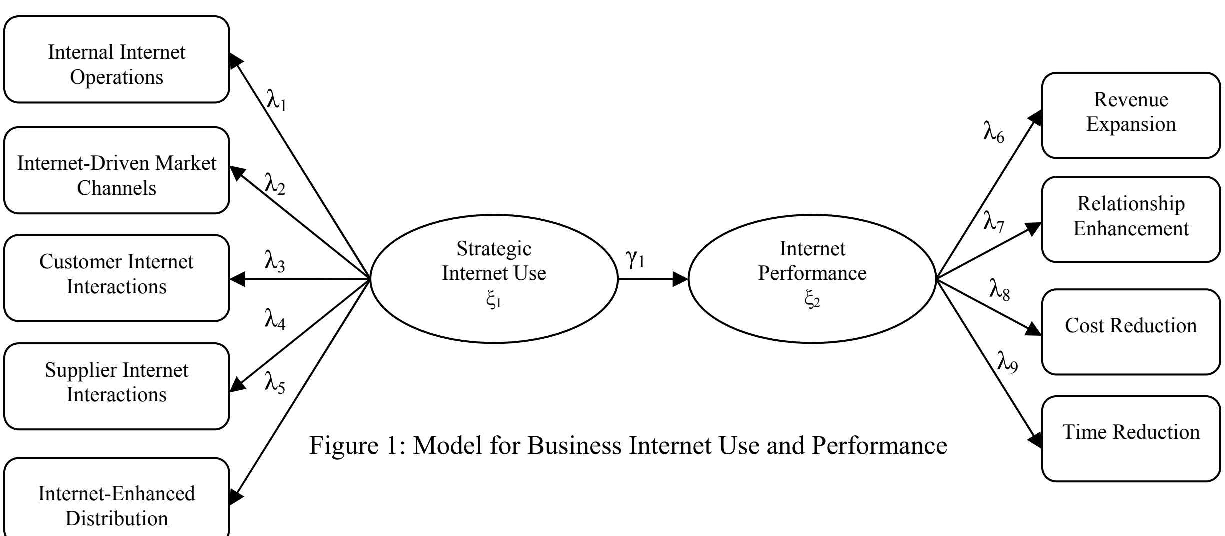

Figure 1: Model for Business Internet Use and Performance

Each of the fit indices are within acceptable ranges (above 0.90 for GFI, NFI, and CFI, above 0.80 for AGFI, and less than 0.10 for RMSR). The factor loadings for each dimension on its respective latent variable is significant ($p < 0.01$). This is shown in Table 6 as the paths denoted by Lambda variables. The path from Business Internet Use to Internet Performance was also significant, indicating a strong relationship between these two latent variables, which supports Hypothesis 1 that suggested a strong relationship between the two constructs.

Table 8. Loadings and Path Coefficients for Business Internet Use and Performance

Path	Business Internet Use (ξ_1)	Internet Performance (ξ_2)	Path Coefficient	Model Fit Measures
λ_1	0.845			GFI = 0.963 RMSR = 0.032 NFI = 0.977 CFI = 0.988 AGFI = 0.920
λ_2	0.788			
λ_3	0.772			
λ_4	0.831			
λ_5	0.772			
λ_6		0.883		
λ_7		0.758		
λ_8		0.908		
λ_9		0.881		
γ_1			0.922	

6. Discussion

The major contribution of this study is the development of the Business Internet Use and Internet Performance constructs as well as a rigorously validated measurement instrument for collecting data in further studies. The confirmation process is according to the typical standards of scale development [Anderson and Gerbring, 1988, Raghunathan and Raghunathan, 1999, Sethi and King, 1994]. We believe the instrument developed in this paper is parsimonious and will be of use to researchers for further studies of the Internet and its relationships with other organizational processes and outcomes. However, it is hard the extract any practical implications of the relationship between Business Internet Use and Internet Performance at the construct level. Therefore, to better assess its implications, regression was used to identify relationships between each dimension of Internet Performance (dependent variable) and Business Internet Use (independent variables), using the enter method through SPSS 12.0 (See Table 9).

Table 9. Dimension Level Regression Analysis Internet Performance

	Dimensions of Internet Performance			
Dimensions of Business Internet Use	***Revenue expansion***	***Relationship enhancement***	***Cost reduction***	***Time reduction***
Internet-driven market channels	**0.252**[1]	**0.184**[2]	0.114	0.052
Internet-enhanced distribution	0.084	0.082	**0.184**[1]	0.105
Customer Internet interactions	**0.462**[1]	**0.163**[2]	0.088	**0.149**[2]
Supplier Internet interactions	0.023	**0.290**[1]	**0.174**[1]	**0.253**[1]
Internal Internet operations	0.059	0.055	**0.319**[1]	**0.359**[1]

Note: [1] *$p< 0.01$,* [2] *$p<0.05$*

For many organizations, when they decide to deploy Internet technologies into their business processes, they are doing so with a specific purpose. For example, an organization may look to increase sales through the use of Internet (revenue expansion), by offering an additional channel for marketing and customer interaction. They may not be interested in all facets of Internet performance in the initial deployment. Therefore, which aspects of Business Internet Use relate directly to their business initiatives? The results in Table 9 offer some insight into these relationships. For revenue expansion and relationship enhancement, two dimensions were significantly related, Internet-driven market channels and customer Internet interactions, with relationship enhancement also having a significant relationship with supplier Internet interactions. Internet-driven market channels and customer Internet interactions make logical sense in its relationship to revenue expansion, as they have an external forward approach to Internet technology. By adding additional market channels and incorporating technology to enhance a personalized customer experience, the opportunity for expanded revenues and enhanced relationships increases.

Also, for relationship enhancement, a relationship existed with supplier Internet interactions, which indicates that by enabling real time communication with suppliers, customer can receive instant feedback on any customized or complementary products or services.

Cost reduction and time reduction are more internal performance measures that occur through streamline information and processes through automated and real time transmission [Kettinger and Hackbarth, 2004]. For both dimensions, supplier Internet interactions and internal Internet operations were found to be significantly related. These two dimensions of Business Internet Use offer companies the opportunity to use the Internet for processes that affect the operations of their organization. First, by enabling Internet interaction with suppliers, the time and cost of searching for the right supplier or extracting information from current suppliers can be reduced. Second, the processing of orders, communication with employees, and administrative information can be greatly enhanced with the use of the Internet. For example, an organization may receive an order from a customer and it can automatically be entered into their system. Once entered into the system, the Internet allows companies to instantaneously communicate with suppliers to ensure swift delivery of their products or services, as well as communicate the receipt of the new order to internal employees, thus improving the speed and cost of processing the order.

Cost reduction also has a distinct relationship with Internet-enhanced distribution, based on the opportunity to use third party distribution systems that have fully capable real time Internet enabled systems. For example, it may be more cost effective for organizations to use companies like FedEx or UPS to deliver their products. By integrating their internal system with one of these carriers through a web-enabled interface, orders can instantly be placed for pickup and tracked in real time. Customers can also track their orders through these third party carriers without contacting the organization that they placed the order, which also saves cost to the company.

For time reduction, another independent variable that was significantly related was customer Internet interactions. This dimension, as well as supplier Internet interactions and internal Internet operations, lends itself to an Internet enabled system that goes from the customer to internal operations and back to the supplier. This fully integrated value chain would drastically reduce the time it would take to place orders by eliminating the need for manually entering or placing orders [Reinhardt and Levesque, 2004]. What used to take organizations days to process could now be completed within seconds.

Many organizations still tend to consider the Internet as being the same as the use of any new technology without consideration to its strategic impact. Although some organizations realize the importance of the Internet, they lack an understanding of what constitutes a comprehensive set of Internet technology components. Whether a company is looking to improve their organization for a specific reason, such as revenue expansion, or if they are looking at completely transition their company to fully integrated Internet technologies, there are specific paths and strategic planning that must first occur. The measures of Business Internet Use and Internet Performance provided in this paper can be useful to IT and functional managers in evaluating their current Internet deployment within their organizations. This can help managers identify the strengths and weaknesses of their Internet usage, as well as provide a conceptual map for developing a business-driven approach to the Internet.

7. Limitations of the Study and Conclusion

As with most empirical research, there are a few limitations of the present study. First, by utilizing the Internet for survey responses, the response rate was relatively low compared to other studies. This may hinder the validation of our hypothesis, but based on the stringent processes of instrument assessment and expansive check for nonresponse bias, this was minimized. Second, because of the limited number of observations, the revalidation of constructs was not carried out in this research. Future research should revalidate measurement scales developed in this research. Finally, the use of single respondent may generate some measurement inaccuracy. Future research should survey multiple respondents (ex. marketing, operations managers) from a single organization using the instrument developed in this study; the discrepancies of their perception between the groups and the impact of such discrepancies on overall performance can thus be examined.

In conclusion, this research was an attempt to conceptualize and develop constructs for Business Internet Use and Internet Performance and a parsimonious measurement instrument. The instrument was rigorously tested for content validity, unidimensionality, discriminant validity, predictive validity and reliability. The development of these measures is expected to motivate and facilitate further theory development and empirical investigation in this field. It also expands on the implications of business Internet use and its affects on performance. By examining the relationship between the two constructs, as well as analyzing its relationships at the dimension level, organizations can better understand the link between Internet technology and performance, and the path it must take to achieve optimal performance.

REFERENCES

Amit, R. and Zott, C. "Value Creation in E-Business," Strategic Management Journal, Vol. 22, No. 493-520, 2001.

Anderson, J. C. and Gerbring, D. W. "Structural Equation Modeling in Practice: A Review and Recommended Two-Step Approach," Psychological Bulletin, Vol. 103, No. 3: 411-423, 1988.

Applegate, L. M., Austin, R. D. and McFarlan, F. W. "Creating Business Advantage in the Information Age," Boston, MA: McGraw Hill/Irwin, 2002.

Armstrong, J. S. and Overton, T. S. "Estimating Nonresponse Bias in Mail Surveys," Journal of Marketing Research, Vol. 14, No. 3: 396-402, 1977.

Bagozzi, R. P. and Heatherton, T. F. "A General Approach to Representing Multifaceted Personality Constructs: Applications to State Self-Esteem," Structural Equation Modeling, Vol. 1, No. 1: 35-67, 1994.

Bagozzi, R. P., Yi, Y. and Phillips, L. W. "Assessing Construct Validity in Organizational Research," Administrative Science Quarterly, Vol. 36, No. 3: 421-458, 1991.

Barua, A., Konana, P., Whinston, A. B. and Yin, F. "Driving E-business Excellence," MIT Sloan Management Review, Vol. 43, No. 1: 36-44, 2001.

Barua, A., Kriebel, C. H. and Mukhopadhyay, T. "Information Technologies and Business Value: An Analytic and Empirical Investigation," Information Systems Research, Vol. 6, No. 1: 3-23, 1995.

Baruch, Y. "Response Rate in Academic Studies: A Comparative Analysis," Human Relations, Vol. 52, No. 4: 421-438, 1999.

Bauer, C. and Colgan, J. "Planning for Electronic Commerce Strategy: An Explanatory Study for the Financial Services Sector," Logistics Information Management, Vol. 14, No. 1/2: 24-32, 2001.

Bentler, P. M. and Bonett, D. G. "Significance Tests and Goodness of Fit in the Analysis of Covariance Structures," Psychological Bulletin, Vol. 88, No. 3: 588-606, 1980.

Bollen, K. A. and Long, J. S. "Testing Structural Equation Models," Newbury Park: Sage Publications, 1993.

Boyer, K. K. and McDermott, C. "Strategic Consensus in Operations Strategy," Journal of Operations Management, Vol. 17, No. 289-305, 1999.

Brynjolfsson, E. "The Productivity Paradox of Information Technology," Communications of the ACM, Vol. 36, No. 12: 67-77, 1993.

Byrne, B. M. "Multigroup Comparisons and the Assumption of Equivalent Construct Validity Across Groups: Methodological and Substantive Issues," Multivariate Behavioral Research, Vol. 24, No. 4: 503-523, 1989.

Byrne, B. M. "Structural Equation Modeling with AMOS: Basic Concepts, Applications, and Programming," Mahwah: Lawrence Erlbaum Associates, Inc., Publishers, 2001.

Campbell, D. T. and Fiske, D. E. "Convergent and Discriminant Validation by the Multitrait-Multimethod Matrix," Psychological Bulletin, Vol. 56, No. 81-105, 1959.

Chang, K. C., Jackson, J. and Grover, V. "E-Commerce and Corporate Strategy: An Executive Perspective," Information & Management, Vol. 40, No. 663-675, 2003.

Chatterjee, D., Grewal, R. and Sambamurthy, V. "Shaping up e-Commerce: Institutionalized Enablers of the Organizational Assimilation of Web Technologies," MIS Quarterly, Vol. 26, No. 2: 65-89, 2002.

Chau, P. Y. K. "Reexamining a Model for Evaluating Information Center Success Using a Structural Equation Modeling Approach," Decision Sciences, Vol. 28, No. 2: 309-344, 1997.

Churchill, G. A. "A Paradigm for Developing Better Measures of Marketing Constructs," Journal of Marketing Research, Vol. 16, No. 11: 64-73, 1979.

Cohen, J. "A Coefficient of Agreement for Nominal Scales," Educational and Psychological Measurement, Vol. 20, No. 1: 37-46, 1960.

Colombo, R. "A Model for Diagnosing and Reducing Nonresponse Bias," Journal of Advertising Research, Vol. 40, No. 1/2: 85-93, 2000.

Davis, F. D. (1986) Massachusetts Institute of Technology, Boston, MA.

Davis, F. D. "Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology," MIS Quarterly, Vol. 13, No. 9: 319-332, 1989.

Dehning, B. and Richardson, V. "Returns on Investment in Information Technology: A Research Synthesis," Journal of Information Systems, Vol. 16, No. 1: 7-30, 2002.

Devarj, S. and Kohli, R. "Performance Impacts of Information Technology: Is Actual Usage the Missing Link?" Management Science, Vol. 49, No. 3: 273-289, 2003.

Dillman, D. A. "Mail and Internet Surveys: The Tailored Design Method," New York: Wiley, 2000.

Doll, W. J., Raghunathan, T. S., Lim, J.-S. and Gupta, Y. P. "A Confirmatory Factor Analysis of the User Information Satisfaction Instrument," Information Systems Research, Vol. 6, No. 2: 177-188, 1995.

Earl, M. and Khan, B. "E-commerce is Changing the Face of IT," MIT Sloan Management Review, Vol. 43, No. 1: 64-72, 2001.

Feeny, D. "Making Business Sense of the E-Opportunity," MIT Sloan Management Review, Vol. 42, No. 2: 41-51, 2001.

Frohlich, M. T. "e-Integration in the Supply Chain: Barriers and Performance," Decision Sciences, Vol. 33, No. 4: 537-556, 2003.

Fruhling, A. L. and Digman, L. A. "The Impact of Electronic Commerce on Business-Level Strategies," Journal of Electronic Commerce Research, Vol. 1, No. 1: 13-22, 2000.

Galliers, R. D., Swatman, P. M. C. and Swatman, P. A. "Strategic Information Planning: Deriving Comparing Advantage from EDI," Journal of Information Technology, Vol. 10, No. 149-157, 1995.

Garciano, L. and Kaplan, S. N. "The Effects of Business-to-Business E-Commerce on Transaction Costs," The Journal of Industrial Economics, Vol. 44, No. 4: 463-485, 2001.

Giaglis, G. M. "Assessing the Impact of Electronic Commerce on Business Performance," Electronic Markets, Vol. 9, No. 1/2: 25-31, 1999.

Graham, G. and Hardaker, G. "Supply-Chain Management Across the Internet," International Journal of Physical Distribution and Logistics Management, Vol. 30, No. 34: 286-296, 2000.

Hair, J. F., Anderson, R. E., Tatham, R. L. and Black, W. C. "Multivariate Data Analysis," Upper Saddle River, NJ: Prentice Hall, 1998.

Holsapple, C. W. and Singh, M. "Toward a Unified View of Electronic Commerce, Electronic Business, and Collaborative Commerce: A Knowledge Management Approach," Knowledge and Process Management, Vol. 7, No. 3: 151-164, 2000.

Joreskog, K. G. "Statistical Analysis of Sets of Congeneric Tests," Psychometrika, Vol. 36, No. 2: 109-133, 1971.

Joreskog, K. G. and Sorbom, D. "LISREL 7: A Guide to the Program and Applications," Chicago: SPSS, Inc., 1989.

Jutla, D., Bodorik, P. and Wang, Y. "Developing Internet E-Commerce Benchmarks," Information Systems, Vol. 24, No. 6: 475-493, 1999.

Kalakota, R. and Robinson, M. "e-Business 2.0," Boston, MA: Addison-Wesley, 2000.

Kettinger, W. J., Grover, V., Guha, S. and Segars, A. H. "Strategic Information Systems Revisited: A Study in Sustainability and Performance," MIS Quarterly, Vol. 18, No. 3: 31-58, 1994.

Kettinger, W. J. and Hackbarth, G. "Integration of Electronic Commerce Networks into the Sales Processes of Small Firms," Journal of Electronic Commerce Research, Vol. 5, No. 3: 153-171, 2004.

Klassen, R. D. and Jacobs, J. "Experimental Comparison of Web, Electronic and Mail Survey Technologies in Operations Management," Journal of Operations Management, Vol. 19, No. 713-728, 2001.

Kotha, S., Rajgopal, S. and Rindova, V. "Reputation Building and Performance: An Empirical Analysis of the Top-50 Pure Internet Firms," European Management Journal, Vol. 19, No. 6: 571-586, 2001.

Krishnamurthy, S. "A Comprehensive Analysis of Permission Marketing," Journal of Computer Mediated Communication, Vol. 6, No. 2: 2001.

Kudyba, S. and Vitaliano, D. "Information Technology and Corporate Profitability: A Focus on Operating Efficiency," Information Resource Management Journal, Vol. 16, No. 1: 1-13, 2003.

Landis, J. R. and Koch, C. G. "The Measurement of Observer Agreement for Categorical Data," Biometrics, Vol. 33, No. 1977.

Lord, C. "The Practicalities of Developing a Success e-Business Strategy," Journal of Business Strategy, Vol. 21, No. 2: 40-43, 2000.

Loveman, G. W. "An Assessment of the Productivity Impact of Information Technologies," Allen, T. J. and Morton, M. S. S. (Eds.),Information Technology and the Corporation of the 1990's: Research Studies. Cambridge, U.K.:Oxford University Press, 1994.

Mahmood, M. A. and Mann, G. J. "Measuring the Organizational Impact of Information Technology Investment: An Exploratory Study," Journal of Management Information Systems, Vol. 10, No. 1: 97-122, 1993.

Marinova, A., Murphy, J. and Massey, B. L. "Permission E-Mail Marketing as a Means of Targeted Promotion," Cornell Hotel and Restaurant Administration Quarterly, Vol. 43, No. 1: 61-70, 2002.

Maruyama, G. M. "Basics of Structural Equation Modeling," Thousand Oaks: Sage Publications, 1998.

Moore, G. C. and Benbasat, I. "Development of an Instrument to Measure the Perceptions of Adopting an Information Technology Innovation," Information Systems Research, Vol. 2, No. 3: 192-223, 1991.

Nahm, A., Solis-Galvan, L. E., Rao, S. S. and Ragu-Nathan, T. S. "The Q-Sort Method: Assessing Reliability and Construct Validity of Questionnaire Items at the Pre-Testing Stage," Journal of Applied Statistics, Vol. 1, No. 1: 114-125, 2002.

Ozok, A. A. and Salvendy, G. "Measuring Consistency of Web Page Design and its Effects on Performance and Satisfaction," Ergonomics, Vol. 43, No. 4: 443-460, 2000.
Palmer, J. W. "Web Site Usability, Design, and Performance Metrics," Information Systems Research, Vol. 13, No. 2: 151-167, 2002.
Pinsonneault, A. and Rivard, S. "Information Technology and the Nature of Managerial Work: From the Productivity Paradox to the Icarus Paradox," MIS Quarterly, Vol. 22, No. 3: 287-311, 1998.
Plant, R. "eCommerce: Formulation of Strategy," Upper Saddle River, NJ: Prentice Hall PTR, 2000.
Porter, M. E. "Strategy and the Internet," Harvard Business Review, Vol. 79, No. 3: 62-78, 2001.
Raghunathan, B. and Raghunathan, T. S. "Dimensionality of the Strategic Grid Framework: The Construct and the Measurement," Information Systems Research, Vol. 10, No. 4: 343-355, 1999.
Rangan, S. and Adner, R. "Profits and the Internet: Seven Misconceptions," Brynjolfsson, E. and Urban, G. L. (Eds.),Strategies for E-business Success. San Francisco:Josset-Boss, 2001.
Reinhardt, G. and Levesque, M. "A New Entrant's Decision on Virtual Bricks-and-Mortar Retailing," Journal of Electronic Commerce Research, Vol. 5, No. 3: 136-152, 2004.
Robert, M. and Racine, B. "e-Strategy: Pure and Simple," New York, NY: McGraw Hill, 2001.
Saeed, K., Hwang, Y. and Grover, V. "Investigating the Impact of Web Site Value and Advertising on firm Performance in Electronic Commerce," International journal of Electronic Commerce, Vol. 7, No. 2: 119-141, 2002.
Sawhney, M. and Zabin, J. "The Seven Steps of Nirvana: Strategic Insights into E-Business Transactions," New York, NY: McGraw Hill, 2001.
Schoder, D. and Madeja, N. "IS Customer Relationship Management a Success Factor on Electronic Commerce?" Journal of Electronic Commerce Research, Vol. 5, No. 1: 38-53, 2004.
Segars, A. H. and Grover, V. "Strategic Information Systems Planning Success: An Investigation of the Construct and its Measurement," MIS Quarterly, Vol. No. June: 139-163, 1998.
Sethi, V. and King, W. R. "Development of Measures to Assess the Extent to Which an Information Technology Application Provides Competitive Advantage," Management Science, Vol. 40, No. 12: 1601-1628, 1994.
Shapiro, C. and Varian, H. R. "Information Rules: A Strategic Guide to the Networked Economy," Boston: Harvard Business Press, 1999.
Srikumar, K. and Bhasker, B. "Personalized Product Selection in Internet Business," Journal of Electronic Commerce Research, Vol. 5, No. 4: 216-227, 2004.
Steinfeld, C., Bouwman, H. and Adelaar, T. "The Dynamics of Click-and-Mortar Electronic Commerce: Opportunities and Management Strategies," International Journal of Electronic Commerce, Vol. 7, No. 1: 93-119, 2002.
Strassman, P. A. "The Business Value of Computers: An Executive's Guide," New Canaan, CT.: Information Economics Press, 1990.
Straub, D. W., Hoffman, D. L., Weber, B. W. and Steinfeld, C. "Measuring E-Commerce in Net-Enabled Organizations: An Introduction to the Special Issue," Information Systems Research, Vol. 13, No. 2: 115-124, 2002.
Tapscott, D., Ticoll, D. and Lowy, A. "Digital Capital: Harnessing the Power of Business Webs," Boston, MA: Harvard Business School Press, 2000.
Torkzadeh, G. and Dhillon, G. "Measuring Factors that Influence the Success of Internet Commerce," Information Systems Research, Vol. 13, No. 2: 187-204, 2002.
Tu, Q., Vonderembse, M. A. and Ragu-Nathan, T. S. "The Impact of Time-Based Manufacturing Practices on Mass Customization and Value to Customer," Journal of Operations Management, Vol. 19, No. 2: 201-217, 2001.
Venkatraman, N. "Five Steps to a Dot.com Strategy: How to Find your Footing on the Web," Sloan Management Review, Vol. 41, No. 3: 15-28, 2000.
Wagner, B. A., Fillis, I. and Johansson, U. "E-Business and E-Supply Strategy in Small and Medium Sized Businesses (SMEs)," Supply Chain Management: An International Journal, Vol. 8, No. 4: 343-354, 2003.
Weill, P. and Vitale, M. R. "Place to Space: Migrating to E-Business Models," Boston, MA: Harvard Business School Press, 2001.
Werts, E., Linn, R. L. and Joreskog, K. G. "Intraclass Reliability Estimates: Testing Structural Assumptions," Educational and Psychological Measurement, Vol. 34, No. 1: 25-34, 1974.
Zank, G. M. and Vokura, R. J. "The Internet: Motivation, Deterrents, and Impacts on Supply Chain Relationships," S.A.M. Advanced Management Journal, Vol. 68, No. 2: 33-40, 2003.

Zhu, K. and Kraemer, K. L. "E-Commerce Metrics for Net-Enhanced Organizations: Assessing the Value of E-Commerce to firm Performance in the Manufacturing Sector," Information Systems Research, Vol. 13, No. 3: 275-295, 2002.

Zhuang, Y. and Lederer, A. L. "An Instrument for Measuring the Business Benefits of E-Commerce Retailing," International Journal of Electronic Commerce, Vol. 7, No. 3: 65-99, 2003.

APPENDIX A: Survey Items for Final Constructs

Business Internet Use

Item	Survey Items
Internet-driven market channels (MARK)	
MARK1	The importance your organization currently places on the use of Internet to reach new customers directly
MARK2[3]	The importance your organization currently places on the use of Internet to reach new markets directly
MARK3	The importance your organization currently places on the use of Internet to reach new geographical locations directly
MARK4[3]	The importance your organization currently places on the use of Internet to reach new customers through intermediaries
MARK5	The importance your organization currently places on the use of Internet to reach new markets through intermediaries
MARK6	The importance your organization currently places on the use of Internet to reach new geographical locations through intermediaries
MARK7[2]	The importance your organization currently places on the use of Internet to provide information to potential customers
Internet-enhanced distribution (DIS)	
DIS1	The importance your organization currently places on the use of Internet to improve integration of intermediaries
DIS2	The importance your organization currently places on the use of Internet to improve integration of distributors
DIS3	The importance your organization currently places on the use of Internet to improve integration of retailers
DIS4	The importance your organization currently places on the use of Internet to improve existing distribution channels
DIS5[3]	The importance your organization currently places on the use of Internet to improve tracking of the distribution of your product
Internal Internet operations (IIP)	
IIP1[3]	The importance your organization currently places on the use of Internet to reduce time to process orders
IIP2	The importance your organization currently places on the use of Internet to reduce cost to process orders
IIP3	The importance your organization currently places on the use of Internet to reduce administrative costs
IIP4	The importance your organization currently places on the use of Internet to reduce time to fulfill orders
IIP5[3]	The importance your organization currently places on the use of Internet to reduce time to place orders
IIP6	The importance your organization currently places on the use of Internet to reduce cost in placing orders
IIP7	The importance your organization currently places on the use of Internet to reduce cost of materials
IIP8	The importance your organization currently places on the use of Internet to reduce cost of doing business
Customer Internet interactions (CUST)	
CUST1	The importance your organization currently places on the use of Internet with customers to improve feedback

CUST2	The importance your organization currently places on the use of Internet with customers to improve relationships
CUST3	The importance your organization currently places on the use of Internet with customers to respond quicker to their needs
CUST4[3]	The importance your organization currently places on the use of Internet with customers to understand their wants and needs
CUST5[2]	The importance your organization currently places on the use of Internet with customers to offer complementary products within your industry
CUST6	The importance your organization currently places on the use of Internet with customers to be the primary point of contact for your industry
CUST7[2]	The importance your organization currently places on the use of Internet with customers to provide expert information
CUST8[1]	The importance your organization currently places on the use of Internet with customers to dynamic pricing based on their current demand
Supplier Internet interactions (SUPP)	
SUPP1	The importance your organization currently places on the use of Internet with suppliers to share information
SUPP2	The importance your organization currently places on the use of Internet with suppliers to integrate planning systems
SUPP3	The importance your organization currently places on the use of Internet with suppliers to share production plans
SUPP4	The importance your organization currently places on the use of Internet with suppliers to integrate designs/design plans
SUPP5[1]	The importance your organization currently places on the use of Internet with suppliers to improve communication
SUPP6[1]	The importance your organization currently places on the use of Internet with suppliers to track status of orders

Note:
[1] item was deleted during corrected item total correlation analysis
[2] item was deleted during construct factor analysis
[3] item was deleted during structural equation modeling

Internet Performance

Item	Survey Items
Relationship enhancement (REL)	
REL1	The Internet has helped our organization improve relationship with customers
REL2	The Internet has helped our organization improve relationship with suppliers
REL3[1]	The Internet has helped our organization improve relationship with government agencies
REL4	The Internet has helped our organization improve relationship with employees
Revenue expansion (EXP)	
EXP1	The Internet has helped our organization increase revenues
EXP2	The Internet has helped our organization reach more potential customers
EXP3	The Internet has helped our organization sell a larger variety of products
EXP4	The Internet has helped our organization reduce the time to respond to customers
EXP5[1]	The Internet has helped our organization sell in new markets
Time reduction (TRED)	
TRED1[1]	The Internet has helped our organization reduce the time to produce products/services
TRED2	The Internet has helped our organization reduce the time to receive new orders.
TRED3	The Internet has helped our organization reduce the time to place orders
TRED4	The Internet has helped our organization reduce the time to receive payments from customers
TRED5[2]	The Internet has helped our organization reduce the time to send payments to suppliers

Cost reduction (CRED)	
CRED1[1]	The Internet has helped our organization reduce transactions costs with our customers
CRED2	The Internet has helped our organization reduce transaction costs with our suppliers
CRED3	The Internet has helped our organization reduce operation costs
CRED4	The Internet has helped our organization reduce the cost to market products/services
CRED5[1]	The Internet has helped our organization reduce the cost to communicate with customers
CRED6	The Internet has helped our organization reduce the cost to communicate with suppliers

Note:
[1] item was deleted during construct factor analysis
[2] item was deleted during structural equation modeling

APPENDIX B: Summary of Q-Sort Results

Dimension or Construct	**Round 1**		**Round 2**		**Round 3**	
	Inter-Judge	Actual/ Theoretical	Inter-Judge	Actual/ Theoretical	Inter-Judge	Actual/ Theoretical
Internet-driven market channels	66.7%	57.7%	100%	72.7%	90.0%	94.4%
Internet-enhanced distribution	45.5%	100%	80%	100%	80.0%	100%
Internal Internet operations	88.9%	100%	87.5%	93.8%	80.0%	100%
Supplier Internet interactions	100%	91.7%	100%	100%	100%	91.7%
Customer Internet interactions	100%	66.7%	85.7%	90.9%	100%	76.9%
Business Internet Use	75.6%	78.0%	90.2%	89.0%	90.2%	91.5%
Cohen's Kappa Business Internet Use	0.696		0.874		0.876	
Relationship enhancement	100%	100%	100%	100%	100%	100%
Revenue expansion	83.3%	100%	71.4%	100%	100%	100%
Cost reduction	85.7%	91.7%	100%	100%	100%	100%
Time reduction	100%	85.7%	100%	78.6%	85.7%	92.9%
Internet Performance	91.3%	94.8%	91.3%	93.1%	95.6%	98.3%
Cohen's Kappa Internet Performance	0.896		0.894		0.947	
Overall (Business Internet Use and Internet Performance)	81.2%	85.0%	90.6%	90.7%	92.2%	94.4%
Cohen's Kappa Overall	0.769		0.882		0.902	

APPENDIX C: Demographics and Chi-Square Test for Differences

Corporate Position

Corporate Position	**Early Respondents (n = 97)**	**Late Respondents (n= 160)**	**Chi-Square *(p-value)***
Top Level Management	31.8%	38.3%	$\chi^2 = 3.63$

Middle Level Management	22.5%	24.2%	*(0.457)*
First Level Management	9.3%	7.5%	
Professional employee with no supervisory role	25.6%	23.3%	
Other	10.9%	6.7%	
Degrees of freedom = 4			

Industry Type

Industry	Early Respondents (n = 97)	Late Respondents (n= 160)	Chi-Square *(p-value)*
Manufacturing	13.2%	12.5%	
Medicine / Law / Education	14.7%	5.8%	
Business Service	15.5%	15.8%	
Information Technology	10.1%	12.5%	
Finance / Insurance / Real Estate	6.2%	5.0%	χ^2 = 11.527 *(0.247)*
Wholesale / Retail	17.1%	20.8%	
Government	6.2%	6.7%	
Communications	5.4%	4.2%	
Computers	4.7%	6.7%	
Other	7.1%	12.5%	
Degrees of freedom = 9			

Company Sales

Company Sales	Early Respondents (n = 97)	Late Respondents (n= 160)	Chi-Square *(p-value)*
Less than 5 million	53.5%	51.7%	
5 to 25 million	18.6%	23.3%	
25 to 100 million	8.5%	10.0%	χ^2 = 2.785 *(0.733)*
100 to 250 million	3.1%	3.3%	
250 million to 500 million	4.7%	2.5%	
500 million to 1 billion	8.5%	10.0%	
Degrees of freedom = 5			

APPENDIX D: Two Sample T-Tests for Differences between Early and Late Respondents

Construct	Sample Type	Mean	Mean Difference	t	Sig. (2-tailed)
Internal Internet operations	Early Respondents (n = 97)	3.1346	.21629	1.230	.220
	Late Respondents (n= 160)	2.9183			
Internet-driven market channels	Early Respondents (n = 97)	3.0171	.12525	.802	.423
	Late Respondents (n= 160)	2.8918			
Customer Internet interactions	Early Respondents (n = 97)	3.4466	.21830	1.413	.159
	Late Respondents (n= 160)	3.2283			
Supplier Internet interactions	Early Respondents (n = 97)	2.6616	-.00539	-.033	.973
	Late Respondents (n= 160)	2.6670			
Internet-enhanced	Early Respondents (n = 97)	2.8474	.18722	1.180	.239

distribution	Late Respondents (n= 160)	2.6602			
Revenue expansion	Early Respondents (n = 97)	3.4517	.23914	1.524	.129
	Late Respondents (n= 160)	3.2126			
Relationship enhancement	Early Respondents (n = 97)	3.0609	.08150	.558	.577
	Late Respondents (n= 160)	2.9794			
Time reduction	Early Respondents (n = 97)	3.0567	.25014	1.422	.156
	Late Respondents (n= 160)	2.8066			
Cost reduction	Early Respondents (n = 97)	3.0273	.19232	1.078	.282
	Late Respondents (n= 160)	2.8350			

Note: Each construct is represented by an aggregate measure of its items.

APPENDIX E: Correlation and Discriminant Validity

Description		Correlation	Constrained[a]	Unconstrained[b]	Difference	p-value
BUSINESS INTERNET USE						
Internet-driven market channels with:						
1	Internet-enhanced distribution	0.558	1189.08	1160.15	28.93	0.0000*
2	Internal Internet operations	0.328	1572.83	884.31	688.52	0.0000*
3	Customer Internet interactions	0.540	1285.09	730.39	554.7	0.0000*
4	Supplier Internet interactions	0.433	1394.93	798.38	596.55	0.0000*
Internet-enhanced distribution with:						
5	Internal Internet operations	0.481	1121.62	970.54	151.08	0.0000*
6	Customer Internet interactions	0.511	1001.97	814.04	187.93	0.0000*
7	Supplier Internet interactions	0.528	1064.41	530.94	533.47	0.0000*
Internal Internet operations with:						
8	Customer Internet interactions	0.446	1282.85	885.57	397.28	0.0000*
9	Supplier Internet interactions	0.422	1980.4	801.72	1178.68	0.0000*
Customer Internet interactions with:						
10	Supplier Internet interactions	0.502	1129.6	523.55	606.05	0.0000*
INTERNET PERFORMANCE						
Relationship Enhancement with:						
1	Revenue Expansion	0.574	810.02	717.81	92.21	0.0000*
2	Cost Reduction	0.403	559.12	521.62	37.5	0.0000*
3	Time Reduction	0.478	469.51	454.36	15.15	0.0001*
Revenue Expansion with:						
4	Cost Reduction	0.539	633.87	432.55	201.32	0.0000*
5	Time Reduction	0.488	725.26	392.05	333.21	0.0000*
Cost Reduction with:						
6	Time Reduction	0.398	868.86	674.63	194.23	0.0000*

Note:
[a] *represents $\chi 2$ value of constrained model for pairs*
[b] *represents $\chi 2$ value of unconstrained model for pairs*
** $p < 0.01$*