

An assessment of customers' e-service quality perception, satisfaction and intention

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ABSTRACT

This study examines the dimensions of web service quality based on e-customer's, expectations and perceptions. We develop operationalized web service quality constructs, and analyze, their relationships with customer satisfaction and behavioral intentions in an e-business environment. The three identified dimensions of web service quality are perceived risk, web content and service, convenience. One of the major findings of this study is that although less perceived risk may lead to a favorable perception of web service quality, it does not necessarily translate to customer satisfaction, or positive behavioral intentions. Individual PC skill sets may affect perception of service convenience, but seems to have no influence on how customers assess web service quality, customer satisfaction or, behavioral intentions to use the e-service. The indirect or mediating influence of satisfaction on web, service quality and behavioral intentions is indeed stronger than the direct influence of web service, quality on behavioral intentions.

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1. Introduction

Computer-aided services have grown in number and significance in proportion to the rapid growth of Internet adoption. E-service growth, also known as web-based self-service, has further magnified the importance of service sector roles in modern economies (Calisir & Gumussoy, 2008; Heinze & Hu, 2006). As commonly reported in the news media, service sectors in world economies continue to expand while manufacturing sectors are experiencing shrinkage, especially in the U.S. as electronic business environments post a new set of challenges to companies. One such new challenge is the quality of the electronic service (e-service) provided by company web sites and other electronic media (Liao, Palvia & Lin, 2006). The quality of enterprise web sites has become a key indicator of how well a company is likely to satisfy its customers (King & Liou, 2004). Another new challenge is the rapid increase in the expectations and level of sophistication of the e-customers. In recent years, research efforts have been directed at understanding how e-customers perceive the quality of e-service as well as how these perceptions translate into customer satisfaction and behavioral intentions. Adding to the challenges of managing e-customers, it has become crucial to understand how individual customer differences, in terms of their information technology (IT)

skills, influence their online experience, behavior and attitudes. Some studies (Agarwal & Venkatesh, 2002; Chen & Macredie, 2005; Ford, Miller, & Moss, 2001; Lin & Lu, 2000) have indicated that individual differences can influence IT acceptance and satisfaction with IT use.

E-service quality, as defined by Santos (2003), is the overall customer perceptions, judgments and evaluations of the quality of service obtained from a virtual marketplace. Both practitioners and researchers use e-service quality and web service quality interchangeably. For instance, Zeithaml (2002) defines e-service quality as the extent to which a web site facilitates efficient and effective shopping, purchasing and delivery of goods and services. Zhang and Prybutok (2005) refer to the same concept as web site service quality. Several authors (Santos, 2003; Zeithaml, 2002) have developed diverse instruments to measure e-service quality. Since these instruments have little in common, exploratory studies are needed to derive a common instrument that can effectively evaluate e-service quality. Rowley (2006) has further asserted that since research endeavors in e-service are still in their infancy more efforts are needed to obtain the correct definition and measure of e-service quality.

Several studies on service quality in physical encounters have concluded that some factors are responsible for customers' perceptions of quality which are likely to lead to customer satisfaction and which, in turn, may lead to behavioral intentions to purchase. Some authors (Zeithaml, Berry, & Parasuraman, 1996; Zhang & Prybutok, 2005) have pointed out that behavioral intentions may predict behavior, implying that customer service quality constructs are relevant to behavioral intentions. Given that satisfied customers are

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more likely to stay with a company for long periods, behavioral intentions directly impact company profitability. In this study, we review e-service related literature in order to identify the dimensions of e-service quality (or herein referred to as web service quality) and to subsequently develop and test their constructs. Zhang and Prybutok (2005) proposed a model to assess e-service quality but the model explained only 33% of e-service quality and so they called for more research by stating "...the R-square of 0.33 suggests the likely existence of other factors for predicting Web site service quality. Future work should be directed to the exploration of additional variables in Web site service quality" (page 473). Another aim of the present study is to investigate the effect of risk perception on perceived service quality, user satisfaction and the user's intention to continue to shop online. Past studies reached opposing conclusions on the impact of perceived risk (Chang, Cheung, & Lai, 2005; Gefen & Straub, 1997; Lopez-Nicolas & Molina-Castillo, 2008; Shih, 2004; Zhang & Prybutok, 2005) and so we deem it worthwhile to weigh in on it. Our logic to investigate perceived risk is based on the fact that over the years, internet service providers have improved on security technologies while at the same time the average internet user has become savvier and hence more comfortable than say five years ago. The purpose of the present study is to:

1. understand the e-customer's expectations or perception of web service quality;
2. develop and test the instrument that captures the constructs of the dimensions of web service quality based on the major related studies;
3. investigate the relationship between web service quality, e-customer satisfaction and behavioral intentions to purchase;
4. explore how the role of risk perception on satisfaction and intentions has changed (if at all) in recent times.

The rest of this paper is grouped into six sections. Section two presents the theories of web service quality upon which our proposed model is based while section three is a review of how service quality has been measured in previous studies with particular attention to SERVQUAL scale. In section four, we present the research model and the study hypotheses. The survey instrument is explained in section five while data analysis and results are discussed in section six. Our conclusions and managerial implications of the major findings can be found in section seven.

2. Theories of web service quality

Theories used to explain web service quality are generally drawn from the disciplines of marketing and information systems, which themselves are grounded in other theories of attitude such as Learning Theories, Expectancy-Value Theories (Fishbein, 1963), and Attribution Theory (Heider, 1958). The Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1975) assumes that if people view a behavior as positive (attitude), and if they believe that others would prefer them to perform the behavior (subjective norm), there will be a greater intention (motivation) to behave in that manner and they are thus more likely to do so. Ajzen (1985) extended TRA as the theory of planned behavior (TPB) with "the addition of one major predictor, perceived behavioral control, to the model. This addition was made to account for times when people have the intention of carrying out a behavior, but the actual behavior is thwarted because they lack confidence or control over behavior" (Miller, 2005, p. 127). Information systems research studies generally refer to this concept as 'self-efficacy', or the judgment of an individual's ability to use a computer technology (Compeau, Higgins & Huff, 1999). According to Agarwal and Prasad (1999), experience with computer technology and perceived outcome and

usage are positively related. Other studies have indicated a strong effect of computer self-efficacy on the user's responses to information technology, which includes online shopping (e.g. Agarwal & Prasad, 1999; Venkatesh & Davis, 2000)

From information systems perspective, other relevant, and related, theories include the Technology Acceptance Theory (TAM) (Davis, 1989), the Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh, Morris, Davis, & Davis, 2003), the Information Systems Continuance Model (Bhattacharjee, 2001), and the DeLone and McLean IS Success Model (DeLone & McLean, 1992).

TAM (Davis, 1989) states that user adoption of a given information system can be explained by the users' intention to use the system, which in turn is determined by the users' beliefs about the system. Consistent with TRA, TAM assumes that attitudes about a system (operationalized as 'perceived usefulness' and 'perceived ease of use'), will impact the motivation (intention) to use a system, which in turn leads to actual usage. The TAM has been used and modified by several studies and has been proved to be a reliable predictor of a person's acceptance of information technology (Gefen, Karahanna, & Straub, 2003; King & He, 2006; Wang, 2003). With respect to internet usage, Chen, Gillenson, and Sherrell (2002) equate usefulness to consumers' perceptions that using the Internet will improve their shopping and information seeking experience while ease of use refers to the amount of effort involving in online shopping such as in clarity and navigation on the web pages.

UTAUT (Venkatesh et al., 2003), consistent with TAM, also assumes that user intentions to use an information system lead subsequent usage behavior. However, in response to what the authors see as a weakness, they extend TAM by suggesting that four distinct constructs (performance expectancy, effort expectancy, social influence, and facilitating conditions) are the primary determinants of usage intention and subsequent behavior. Performance Expectancy is the degree to which an individual believes that using the system will help him/her to attain gains in job performance (similar to 'perceived usefulness' in TAM). Effort Expectancy is defined as the degree of ease associated with the use of system (similar to 'perceived ease' of use in TAM). Social Influence was operationalized as the degree to which an individual perceives that important others believe he/she should use the new system (similar to subjective norms in TPB). Facilitating conditions refer to the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system (similar to perceived behavioral control in TPB and TAM). Additionally, UTAUT views the individual variables of gender, age, experience, and voluntariness of use as mediating factors that affect the four constructs.

Motivated by the valid reasoning that the initial adoption of a system by a user is not the same as the continued use of the system, which is when a system can be considered successful, Bhattacharjee (2001) proposed the Information Systems Continuance Model. This model is based on the consumer's behavior theory of Expectation-Confirmation and TAM, but it further attempts to explain the users' intention to continue to use information systems after the initial acceptance. The model is sometimes referred to as post-adoption model because it extends beyond the initial acceptance stage. The sequence of acceptance and continued use of a system by a user has five stages namely: (a) the initial expectation prior to use, (b) acceptance and use of the systems, (c) perception development after use, (d) assessment of the original expectation and the subsequent satisfaction or dissatisfaction with the system (e), and forming of continuance intention to use the systems if satisfied with it. The IS Continuance Model has been modified and used by a number of researchers and has been shown to predict the user's intention to continue to use a new information system (Ifinedo, 2006; Limayem & Cheung, 2003). Limayem and Cheung

(2003) extended the IS Continuance Model by adding a moderating effect called IS habit which is defined as “learned sequences of acts that become automatic responses to specific situations which may be functional in obtaining certain goals or end states.” The IS Continuance Model has several similarities with the SERVQUAL model since both models are based on consumer behavior theory and literature. For example, both approaches relate to customer’s evaluation of the discrepancy between expectation and performance and both emphasize intention to continue to use the system.

In addition to relying on many of the constructs from the above theories, our model also includes constructs from the DeLone and McLean (2003) IS Success Model which was developed to provide explanation to causal interrelationships among six success dimensions. Based on findings of over 300 studies by other authors, the authors updated their model such that the quality variable now consists of only three dimensions: information quality, system quality, and service quality. They suggest that these three success dimensions have causal relationships with user satisfaction and intention to use, which can ultimately cause net benefits to accrue.

Our model also considers the construct of risk on the users’ behavioral intentions as well as the perceived quality of the website itself. User fears of identity theft and transaction fraud over the internet have been well documented. Sinclair, Wilkes, and Simon (2006) conducted a survey to examining user perceptions of the internet or the degree to which individuals discriminate between online versus traditional companies. Respondents reported feeling more at risk and less safe when giving information to firms that conduct business only online than when giving information to firms that conduct business only in the traditional face-to-face manner in an office or store. They further found that 65% of the respondents believe that using the internet can result in personal privacy problems.

3. Measurement of web service quality

Consensus generally exists that service quality is a distinct construct, but there are discrepancies regarding service quality measurement. One of the first and most widely used instruments to measure service was developed by Parasuraman, Zeithaml, and Berry (1988) and was intended to provide managers with insights into IS service perceptions, and subsequently to provide a benchmark across IS business processes (Ketinger and Lee, 1997). SERVQUAL, as it is called, emphasizes measuring service quality based on the concept of service quality gap (SQG) (Parasuraman et al. (1988) between an organization’s service quality performance and customer service quality needs (Expectations–Perceptions). Parasuraman et al. (1988) originally developed a service quality model based on five SQGs (measured after service is given). Parasuraman, Zeithaml, and Berry (1994) later adapted and extended the model to include dimensions reflecting e-service quality, defined as the extent to which a website facilitates efficient and effective shopping, purchasing and delivery, many of which are identical to the dimensions proposed as factors impacting service quality in physical service encounters.

The original SERVQUAL consists of five dimensions:

- *Tangibles*, including the appearance of physical facilities, equipment, personnel, and communication material;
- *Reliability*, or the ability to perform the promised service dependably and accurately;
- *Responsiveness*, or the willingness to help customers and provide prompt service;
- *Assurance*, or the knowledge and courtesy of employees and their ability to inspire trust and confidence; and

- *Empathy*, or caring and individualized attention that the firm provides its customers

DeLone and McLean (2003) added service quality as a new component for measuring IS success. They further recommended that their updated model can benefit from SERVQUAL constructs since service quality is the most important success variable in the model. Several authors have since validated and extended the IS Success Model. For example, Seddon (1997) established significant relationships between system quality and user satisfaction and between information quality and user satisfaction. Rai, Lang, and Welker (2002) used the model in an e-commerce systems context and found significant relationship between information quality and net benefits. With the modified SERVQUAL constructs used in the present study, the system quality and information quality dimensions are captured in “Web Site Content” factor while service quality dimension is captured in “Web Service Quality” factor. In effect, the proposed theoretical model is fully grounded in IS and consumer behavioral studies that have been used in the past and uses a modified SERVQUAL instrument to measure satisfaction and behavioral intention of online customers, as proposed in the present study, is a major contribution especially if the constructs of the modified instrument are validated.

Some of the major issues involved in understanding and resolving issues relating to service quality and customer satisfaction, in both physical and electronic encounters, include:

3.1. Measurement of service quality constructs

Should customer perceptions only be used to measure quality (Cronin & Taylor, 1992) or should disconfirmation (Expectations–Perceptions) be used (Parasuraman et al., 1988). If disconfirmation is used, should it be computed or measured (Dabholkar, Shepherd, & Thorpe, 2000)?

3.2. Operationalization of service quality constructs

It has been argued that the question items in the SERVQUAL instrument (Parasuraman et al., 1988; Zeithaml, 2002) are global in nature. Thus, the outcome of administering the SERVQUAL scale to service consumers is of little utility value for instituting operational service improvement processes. Hence, some researchers (Babakus & Boller, 1992; Lapierre, 1996) have suggested that the search for universal conceptualization of the service quality construct may be futile, and to be of practical utility, a service construct should not only be operational (non-global), but should also be context specific.

3.3. The antecedent relationships between the constructs

Is service quality an antecedent of service satisfaction (Brady & Robertson, 2001; Cronin & Taylor, 1992; Zeithaml, 2002)? Further, does customer satisfaction act as a mediating factor between service quality and behavioral intentions, thereby strengthening the prediction of the latter (C, Brady, & Hult, 2000; Parasuraman et al., 1988)?

We advance some hypotheses to examine these issues with respect to electronic customers in the next section.

4. Research model and hypotheses

In an effort to add to this body of research, we propose a conceptual model to examine the impact of web service quality (as impacted by web site content) on selected consumer attitudes such as perceived risk, perceived satisfaction, behavioral

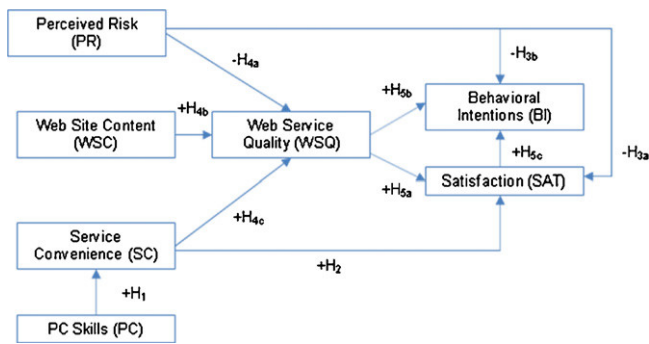


Fig. 1. The study model and hypotheses.

intention (which is affected by perceived risk and moderated by satisfaction) service convenience (moderated by individual PC skills), satisfaction (which is also impacted by perceived risk and service convenience), and behavioral intention (which is also moderated by perceived risk and satisfaction). Fig. 1 shows the model relationships and hypotheses. The individual components are discussed before the related hypotheses are stated.

4.1. Individual PC skills (PC)

The skill level of e-customers in manipulating the prevailing technology can affect the outcome of the service experience. One difference between traditional service encounters and e-service experiences is that the e-customer relies entirely on his or her ability to use technology to obtain the service, thus becoming a partner in the delivery of the e-service (Kim, Chun, & Song, 2009; Kuisma, Laukkanen, & Hiltunen, 2007). Ford et al. (2001) establish a strong relationship between individual differences and behavior in internet search. Rowley (2006) argues that increasing a customer's knowledge and skill sets with a service process is a key organizational strategy for managing customer satisfaction. She maintains that firms need to go beyond simply providing good web site design and clear navigation instructions to implementing learning processes which will help their e-customers become more skillful when engaging in e-service encounters. The learning processes have to capture unique customer inclinations, learning styles and skill levels. Sanchez-Franco and Roldan (2005) point to the fact that differences in individual expertise can account for differences in perceived e-service quality and satisfaction. A skillful web user is more likely to overcome website challenges and hence more likely to have a favorable assessment of web service (Shih, 2004).

The technology acceptance model (TAM) has been used to show how individual differences affect the outcome of a given IT adoption. Alford and Biswas (2002) concluded that individual differences account for the difference in intentions to search and/or purchase among e-customers.

The related hypothesis we intend to test is stated as follows:

H1 (:). In the e-business environment, PC skills positively impact service convenience.

4.2. Service convenience (SC)

One of the major benefits of online shopping is convenience of service in terms of access, information availability, lack of time or geographical barriers, and anonymity. Some studies indicate that online customers often cite convenience as a major reason for conducting business online (Chang et al., 2005; King & Liou, 2004; Yang et al., 2001). According to Kim, Kim, and Lennon (2006), customer satisfaction is positively affected by the convenience of an online marketplace. Other authors (Srinivasan, Anderson, & Ponnarolu, 2002; Torkzadeh & Dhillon, 2002) have found that service convenience has a significant influence on perceived service quality as well as on customer satisfaction. In contrast, Zhang and Prybutok (2005) failed to find any significant influence on either perceived service quality or customer satisfaction. Accordingly, the second hypothesis to be tested is as follows:

H2 (:). In an e-business environment, service convenience has a positive association on customer satisfaction.

4.3. Perceived risk (PR)

Risk, as perceived by the e-customer, has been identified as one of the major barriers to online shopping and thus major e-business firms have taken steps to address risk concerns with security technologies, awareness campaigns, and assurance policy statements (Chang et al., 2005; Liao & Cheung, 2002; Lopez-Nicolas & Molina-Castillo, 2008; Shih, 2004). Perceived risk is also often denoted by such terms as personal risk, privacy risk, economic risk, psychological risk, technological risk (Liebermann & Stashevsky, 2002; Ring & Ven, 1994; Zhang & Prybutok, 2005). Since system failure is part of perceived risk and is often associated with a loss, it is easy to understand how perceived risk can impact e-service quality and e-customer satisfaction. Lopez-Nicolas and Molina-Castillo (2008) and Gefen et al. (2003) concluded that perceived risk influences shopping behavior and e-purchasing intentions: the higher the perceived risk, the less likely an e-customer's intention to purchase. Perceived risk evokes good or bad feelings which may in turn affect beliefs, attitudes and behavioral intentions (Pavlou, 2003). Zhang and Prybutok (2005) concluded that perceived risk has a significant influence on e-customer perceptions of e-service quality and as well as satisfaction. However, Chang et al. (2005) conducted a thorough literature review to determine the effect of perceived risk on online shopping, among other factors, and concluded that while some studies found significant negative impacts, others found no impact at all. The corresponding hypotheses are:

H3a (:). In the e-business environment, perceived risk negatively impacts customer satisfaction.

H3b (:). In the e-business environment, perceived risk negatively impacts behavioral intentions.

4.4. Web site content (WSC)

Web site content can be defined as the presentation and layout of the information and functions that captures the overall firm presence and its public image, and is assumed to affect how a customer perceives web service quality (Chen & Macredie, 2005; Huang, 2000; Liao, To, & Shih, 2006). This construct includes such dimensions as information quality, appropriateness of the amount of information, types of media, presentation mode, size and types of the images, and the overall appeal of the web site. Content quality can be compromised by too little, or too much, information or the appeal it presents to the visitor. A combination of pictures and graphics can be used to augment text in order to improve the quality of website content. Yang et al. (2001) identified six dimensions of e-service quality, four of which were content-based: (1) Web site substance, (2) accuracy of the content, (3) aesthetics, which includes site attractiveness, and (4) pictures and graphics. Koernig (2003) argues that effective web site content can positively influence customer attitudes toward the quality of web-based service they receive and hence can lead to behavioral intentions to continue to use the services of the website. Effective web content can make web-based service more "real" and experiential to the e-customer (Landrum, Prybutok, & Zhang, 2007; Udo & Marquis, 2002; Liu & Arnett, 2000; Yang, Cai, Zhou, & Zhou, 2005). Size and style of graphs can be used to influence the perceptions of online

shoppers. Researchers have also shown that the size and style of graphs not only influence perceptions but can also attract and retain e-customers (Nitse, Parker, Krumwiede, & Ottaway, 2004; Raney, Arpan, Pashupati, & Brill, 2003). Montoya-Weiss, Voss, and Grewall (2003) also confirm that graphic styles, among other dimensions of web site content, can influence online channel use and overall satisfaction. DeLone and McLean IS Success Model (DeLone & McLean, 1992) refers to Web site Content as “systems quality.”

4.5. Web service quality (WSQ)

Since all e-service encounters are via web sites, some authors have emphasized the importance of web service quality as antecedents of e-customer satisfaction (Udo & Marquis, 2002; Lociacono, Watson, & Goodhue, 2002; Negash, Ryan, & Igbaria, 2003; Yang & Jin, 2002). Web service quality is crucial not only because it is the primary asset that e-customers look for, but also because it shapes their initial impression of a web site's value and determines whether they will continue their present and future searches on the web site (Barnes & Vidgen, 2006; Than & Grandon, 2002; Yang et al., 2005). Lee and Lin (2005) also found that web service quality contributes to the overall e-customer satisfaction. Wolfinbarger and Gilly (2001) posit that e-customers' quality judgment, satisfaction and loyalty are positively influenced by the design quality of the firm's web site. In the DeLone and McLean IS Success Model (1992), service quality (same as web service quality in this study) is the most important variable in affecting user satisfaction.

Cho and Park (2001) studied 435 e-customers in order to develop a user satisfaction index, and found that web service quality has a dominant influence on e-customer satisfaction. Lociacono et al. (2002) developed a web service quality instrument (WebQual) consisting of 12 dimensions which were found to be significantly related to e-customer satisfaction.

4.6. Behavioral intentions (BI)

According to a model presented by Zeithaml et al. (1996), behavioral intentions can be captured by such measures as repurchase intentions, word of mouth, loyalty, complaining behavior, and price sensitivity. High service quality (as perceived by the customer) often leads to favorable behavioral intentions while low service quality tends to lead to unfavorable behavioral intentions. Zeithaml et al. (1996) further emphasized that behavioral intentions are relevant to a customer's decision to remain with or leave a company. Zhang and Prybutok (2005) concluded that customer experiences are related to behavioral intentions. The more positive the customer's experience, the more likely he or she is willing to reuse the service. Several authors (Ajzen, 1985; Bhattacharjee, 2001; Rai et al., 2002; Venkatesh et al., 2003) have used behavioral intention as an indicator of system success. Again, we used three of Zhang and Prybutok's (2005) items to capture respondents' behavioral intentions: “I intend to use the e-service”, “I intend to use the e-service frequently”, and “In the future, I intend to use the e-service whenever I have a need.”

4.7. Customer satisfaction (SAT)

Several studies conclude that satisfaction is an affective, rather than cognitive, construct (Oliver, 1997; Olsen, 2002). Rust and Oliver (1994) define satisfaction as the “customer's fulfillment response” which is an evaluation as well as an emotion-based response. It is an indication of the customer's belief of the probability of a service leading to a positive feeling. While Cronin et al. (2000) assessed service satisfaction using items that include interest, enjoyment, surprise, anger, wise choice, and doing the ‘right

thing’, we employ three items that have been used in previous studies (Zhang & Prybutok, 2005). The items are: “I am satisfied with my previous online shopping experience.” “Online shopping is a pleasant experience.” and “Overall, I am satisfied with my e-service experience.” The following theories upon which the present study derives its theoretical foundation also addressed satisfaction in their models: DeLone and McLean IS Success Model (1992); TAM (Davis, 1989); TPB (Ajzen, 1985); Information Systems Continuance Model, (Bhattacharjee, 2001) and UTAUT (Venkatesh et al., 2003)

The fourth set of hypotheses are:

H4a (:). Perceived risk impacts web service quality.

H4b (:). Web site content impacts web service quality.

H4c (:). Service convenience impacts web service quality.

Interrelationships among SQ, SAT, and BI. The literature is somewhat inconsistent about the causal ordering of service quality (SQ) and satisfaction (SAT) and which of the two constructs is a better predictor of behavioral intentions (BI) (Cronin & Taylor, 1992). One group of researchers holds that satisfaction is antecedent to service quality (SAT → SQ), while another group believes that service quality is antecedent to satisfaction since service quality is a cognitive evaluation and positive perceptions of service quality can lead to satisfaction which in turn leads to favorable behavioral intentions (SQ → SAT → BI) (Brady & Robertson, 2001). A third group of researchers maintain that there is a non-recursive relationship between service quality and satisfaction (Taylor & Cronin, 1994). This perspective holds that none of the two constructs is an antecedent or subordinate to the other.

According to Dabholkar (1995), the antecedent role of service quality and satisfaction depends on whether the consumer is cognitive or affective oriented. Cognitive-oriented customers perceive satisfaction as being affected by service quality while affective-oriented consumer will perceive service quality as being affected by satisfaction. Brady and Robertson (2001), tested this proposition in the fast food industry across two distinct cultures: the U.S., (cognitive-oriented), and Ecuador (affective-oriented). Their results suggest that the SQ → SAT causal order holds well for both cultures. Moreover, a preponderant evidence of research results tends to support the SQ → SAT model (Cronin et al., 2000).

Whatever the causal ordering of these two constructs, most authors conclude that both service quality and satisfaction have direct links to behavioral intentions (Cronin & Taylor, 1992; Cronin et al., 2000). However, opinions are mixed as to whether service quality has a direct relationship with behavioral intentions in all service contexts. Using sample data from six industries (spectator sports, participative sports, entertainment, health care, long-distance carrier, and fast food), Cronin et al. (2000) concluded that the direct link between service quality and behavioral intentions is significant. However, when the data for the industries were tested separately, the authors found that: “service quality had a direct effect on consumer behavioral intentions in four of the six industries with exceptions being the health care and long-distance carrier industries.” In the present study, we intend to test for the direct and indirect effects of web service quality on behavioral intentions with the following three hypotheses.

H5a (:). Web service quality has direct effects on customer satisfaction.

H5b (:). Web service quality has direct effects on behavioral intentions.

H5c (:). Customer Satisfaction plays a mediating role between web service quality and behavioral intentions in the context of e-commerce environment (i.e., WSQ → SAT → BI).

Table 1

Construct sources and number of items used.

| Constructs name | No. Items | Source of scale |
|------------------------|-----------|---|
| Individual PC Skills | 3 | Al-Gahtani and King (1999) and Zhang and Prybutok (2005) |
| Perceived risk | 4 | Zhang and Prybutok (2005) and Sweeney et al. (1999) |
| Convenience of Service | 3 | Zhang and Prybutok (2005) and Torkzadeh and Dhillon (2002) |
| Web Site Content | 7 | Montoya-Weiss et al. (2003), Wolfenbarger and Gilly (2001) |
| Web Service Quality | 4 | Zeithaml, 2002, Zhang and Prybutok (2005) and Yoo and Donthu (2001) |
| Customer Satisfaction | 3 | Olorunniwo et al., 2006 and Zhang and Prybutok (2005) |
| Behavioral Intentions | 3 | Zhang and Prybutok (2005) and Bhattacharjee (2001) |

If the mediating effect is significant, an additional issue is whether the direct effect of service quality on behavioral intentions (i.e., WSQ → BI) is statistically significant when WSQ → SAT → BI is also simultaneously examined in the same conceptual model.

5. The survey instrument

Based on the model constructs and previous research discussed above, a survey instrument, using a seven-point Likert scale for each of the construct components, was developed. All the items used in each measurement have been used in previous studies, but some were modified to suit an e-business environment. The constructs, and their individual components, are discussed below; the survey instrument is given in Appendix 1. The sources of the questionnaire items are given in Table 1.

5.1. Web site content

The seven items used for this construct were taken from previous studies (Montoya-Weiss et al., 2003; Wolfenbarger & Gilly, 2001) but were modified to more accurately reflect an e-commerce environment. The questions were intended to evaluate the general content of the website, as the number of, and appeal of, the website graphics.

5.2. Web service quality

Measures of web service quality have been developed in recent years by several authors (Yang et al., 2001; Zeithaml, 2002; Zhang & Prybutok, 2005). The four items for this measure were taken verbatim from those studies and reflect ease of navigation, responsiveness, assurance, currency of information and other design qualities.

5.3. Service convenience

The three items that measure the service convenience construct were developed and used in three previous studies including Torkzadeh and Dhillon (2002), Zhang and Prybutok (2005) and Kim, Lee, Han, and Lee (2002). The items measure the customer's perceived level of comfort, as well as the savings of effort and time, as a result of shopping online compared to a physical shopping experience.

5.4. Individual PC skill

This construct consists of five items and was developed and used by Al-Gahtani and King (1999) and also by Zhang and Prybutok (2005). Individual IT skill differences are based on personal computer (PC) skills using the most popular software applications: Microsoft Excel, Power Point and Internet browser. The general belief is that the more technologically skillful a customer is the better he or she can handle e-service technology.

5.5. Perceived risk

This measure captures the possible harm or loss that e-customer's fear as a result of an online shopping experience. These include issues of privacy, security and credit card theft. The four items used to measure this construct were taken from two previous studies: Zhang and Prybutok (2005) and Sweeney, Soutar, and Johnson (1999).

5.6. Customer satisfaction

This construct measures the overall assessment of the customer's e-experience including overall pleasure and satisfaction with service received. We adopted three items from Zhang and Prybutok (2005) which were modified to reflect e-service context. Bhattacharjee's (2001) construct on satisfaction is very similar to the one used in this study.

5.7. Behavioral intentions

A customer's behavioral intentions were captured using three seven-point items: (1) intention to use e-service frequently, (2) intention to use e-service, and (3) intention to use e-service in the future. These items are taken from previous studies including (Olorunniwo, Hsu, & Udo, 2006; Zhang & Prybutok, 2005).

5.8. Data

The survey was administered to 211 senior business administration students at a large public university in the southwest US. In order to participate in the study, the student had to have made at least one online purchase within the previous six months. Descriptive respondent data are given in Table 2. About 83% of the participants indicated that they abort online shopping at least once for some reasons. The reasons for aborting or opting out of an online shopping session were slow speed (11.9%), privacy or security (20.4%), total price (including shipping and handling) (28%), and others including doubts about quality, change of mind, payment options (19%).

While the use of undergraduate students in studies is often questionable, there are precedents for this type, and area, of research. Previous studies have concluded that the use of undergraduate students in modeling attitude-behavior relationships and scale development is appropriate (Yavas, 1994). Earlier studies involving perceptions of website quality have also relied on undergradu-

Table 2

Respondent data.

| | |
|------------------------------|---|
| Gender | 51% female; 49% male |
| Age | <24 (68.2%); 24 < 35 (20.4%); 35 > (8.3%) |
| Salary | < \$30K (82.3%); 30K > < \$50K (9.4%); \$50K > (8.3%) |
| Online shopping ^a | <2 (7.8%); 2 > < 6 (16.6%); 6 > (75.6%) |
| Opting Out ^b | Yes (83.1%); No (15.9%) |

^a Number of times respondent shopped online in the past year.

^b Aborting an online shopping encounter.

Table 3
Factor loadings.

| Construct and indicators | Standardized loading | (Cronbach's alpha) ^a |
|--|----------------------|---------------------------------|
| Indiv PC skill diff | | 0.61 |
| PC1: Rate your skill in Microsoft Excel | 0.77 | |
| PC2: Rate your skill in Microsoft Power Point | 0.87 | |
| PC3: Rate your skill in using the Internet | 0.60 | |
| Service convenience | | 0.84 |
| SC1: Using the Internet makes it easier for me to shop | 0.88 | |
| SC2: Online shopping is convenient | 0.90 | |
| SC3: Shopping online saves time compared to going to traditional store | 0.83 | |
| Perceived risk | | 0.88 |
| PR1: I worry about credit card information being stolen | 0.86 | |
| PR2: I worry about the product quality on the Internet | 0.78 | |
| PR3: I worry about safe transaction online | 0.88 | |
| PR4: I worry about how my personal information might be used when I buy online | 0.89 | |
| Web site content | | 0.91 |
| WSC1: The website has an ideal amount of images/graphics | 0.80 | |
| WSC2: The graphics on this website are appealing | 0.86 | |
| WSC3: The contents of this website are useful for my purpose | 0.86 | |
| WSC4: I am kept well informed of the developments at this website | 0.84 | |
| WSC5: It is easy to navigate on this site | 0.64 | |
| WSC6: The information about the products for your needs/interest is sufficient to make a purchase decision | 0.76 | |
| WSC7: The information about the products/services is adequate | 0.81 | |
| Web service quality | | 0.83 |
| WSQ1: The vendor gives prompt service to customers | 0.67 | |
| WSQ2: It was easy to find what you were looking for | 0.79 | |
| WSQ3: The site seems to be up to date | 0.73 | |
| WSQ4: The web site provides high quality information | .81 | |
| Satisfaction | | 0.84 |
| SAT1: I am satisfied with my previous online shopping experience | 0.87 | |
| SAT2: Online shopping is a pleasant experience | 0.88 | |
| SAT3: Overall, I am satisfied with my e-service experience | 0.86 | |
| Behavioral intentions | | 0.82 |
| BI1: I intend to use e-service frequently | 0.86 | |
| BI2: I intend to use e-service | 0.90 | |
| BI3: In the future, I intend to use e-service whenever I have a need | 0.81 | |

^a As a rule of thumb, a Chronbach's alpha of 0.70 or higher is considered indicative of a reliable instrument.

ate student subjects (van Iwaarden, van der Wielea, Ball, & Robert Millen, 2004). A number of studies have found that younger individuals (corresponding to our sample ages) tend to spend significantly more time in product searches products (Sorce, Perotti, & Widrick, 2005) and tend to make more purchases online (Taylor, Zhu, Dekkers, & Marshall, 2004) than do their older counterparts. This corresponds to our finding that 75.6% of respondents had made six or more purchases online in the previous year.

6. Data analysis and results

6.1. Measurement model analysis

Construct validity was assessed using the Covariance Analysis of Linear Structural Equations (CALIS) procedure in SPSS. To test measurement model reliability, an exploratory factor analysis (EFA) was first conducted, as shown in Table 3. Only three questions (*"Rate your skill in using the Internet"*, *"It is easy to navigate on this site"*, *"The vendor gives prompt service to customers"*) failed to load at acceptable levels (a Cronbach's alpha of 0.70; Nitse et al., 2004) and were dropped from further analysis. The measure of customer satisfaction and behavioral intentions are subject to the validity and reliability analysis in the same fashion as the other measures. The values of Cronbach alpha are 0.84 for customer satisfaction and 0.82 for behavioral intentions, which suggest no need for refinement of items making up each construct.

A more rigid procedure was performed to assess the dimensionality of the service quality measure. Specifically, the measurement model (Fig. 2) identifies four factors and indicates the relation-

ships between the indicator variables and their associated factor dimensions. Examination of the fit statistics (to be discussed below) leads to the conclusion that the proposed model is an acceptable measurement model. Empirically, construct validity was ensured by two schemes: convergent and discriminant validity. Convergent validity was assessed by reviewing the *t* tests for the factor loadings. In terms of the parameter estimates (factor loadings), the loading items for each factor were set exactly as suggested by the model. The metric for each scale was established by fixing the coefficient for one indicator to 1.00 for each of the four factors (i.e., 'Individual PC Skill,' 'Service Convenience,' 'Web Site Content,' and 'perceived risk'). Other than the fixed loadings, each item evidenced highly significant *t*-statistics ($p < 0.01$), suggesting that all indicator variables provide good measures to their respective construct. These results generally supported the convergent validity of the indicators (Anderson & Gerbing, 1988). It is also generally assumed that a construct displays convergent validity if the average variance extracted (AVE) is at least 0.50 (i.e. when the variance explained by the construct is greater than measurement error). The AVE values of constructs (shown in italics as diagonal elements of Table 4) varied from 0.751 to 0.872.

To test for discriminant validity (the degree to which the measurement items are dissimilar) we first considered the correlations between the variables (Table 4). Findings of discriminant validity are further supported by the relatively small inter-item correlations and by the large differences observed between the square root of average variance extracted (AVE) for each variable. As a measure of discriminant validity, we examined the average variance extracted (AVE). In this method, the constructs are considered different if AVE

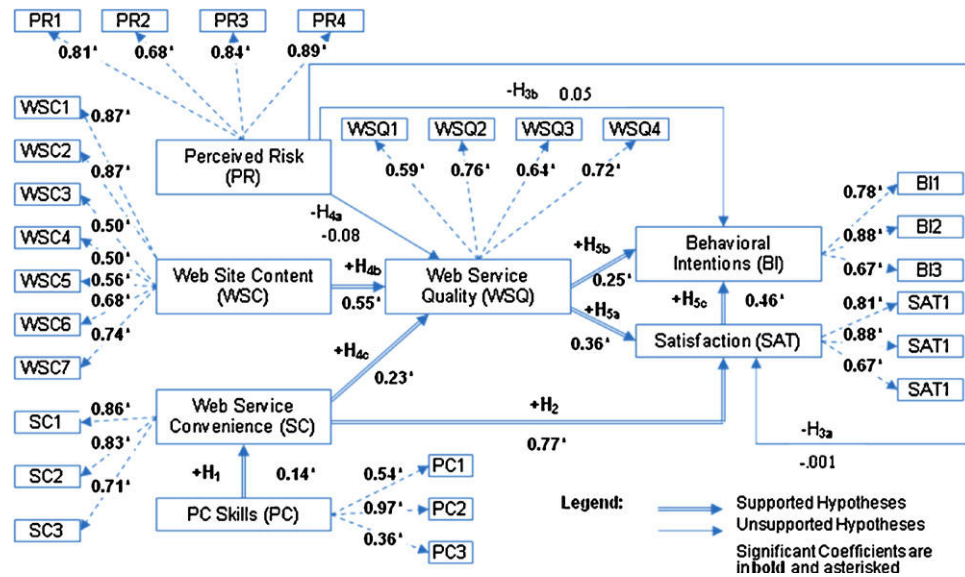


Fig. 2. Study model with path coefficients.

is greater than their shared variance. The square root of the AVE for a given construct should be greater than the absolute value of the standardized correlation of the given construct with any other construct in the analysis (Fornell & Larcker, 1981).

6.2. Structural model analysis

AMOS was used to create the covariance-based structural equation model (SEM). Structural equations express relationships among several variables that can be either directly observed variables (manifest variables) or unobserved hypothetical variables (latent variables). AMOS also provides a number of model fit indices. The incremental fit index (IFI) which tests the improvement of the model over a baseline model (usually a model of independence or uncorrelated variables), relative fit index (RFI) which compares a chi-square for the model tested to one from a baseline model, variations of RFI (which are not explicitly designed to provide penalties for less parsimonious models) such as the normed fit index (NFI) and non-normed fit index (NNFI or TLI), and noncentrality-based indices whereby the noncentrality parameter is calculated by subtracting the degrees of freedom in the model from the chi-square ($\chi^2 - df$) such as the comparative fit index (CFI), root-mean-square residual index (RMSR), and root-mean-square error of approximation index (RMSEA). Values greater than 0.9 are desirable for IFI, RFI, CFI, NFI and NNFI while values less than 0.1 for RMSR and RMSEA are acceptable (Anderson & Gerbing, 1988). Table 5 shows the indices obtained for the model, and indicates that the model applied was quite acceptable.

Table 4
Correlation matrix for variables (diagonal represents square root of AVE values).

| | PC | SC | PR | WSC | WSQ | SAT | BI |
|-----|---------|--------|--------|--------|--------|--------|-------|
| PC | 0.887 | | | | | | |
| SC | 0.17* | 0.867 | | | | | |
| PR | -0.21** | -0.15* | 0.922 | | | | |
| WSC | -0.05 | 0.09 | -0.11 | 0.934 | | | |
| WSQ | 0.10 | 0.29** | -0.16* | 0.55** | 0.888 | | |
| SAT | 0.15* | 0.86** | -0.16* | 0.32** | 0.68** | 0.933 | |
| BI | 0.12 | 0.49** | -0.07 | 0.35** | 0.65** | 0.58** | 0.926 |

* Significance at $p < 0.05$ level.

** Significance at $p < 0.01$ level.

The study model with the path coefficients and significance levels are given in Fig. 2. The strong validity and reliability as well as the resulting fit indices provide robust support for the study hypotheses. Table 6 summarizes the results. The results show that hypotheses 1, 2, 4b, 4c, 5a–c are supported. H1, which assumes that individual PC skills are positively associated with service convenience, is supported. However, the R^2 value indicates that only 0.02 of the variance is explained, implying that other variables may be involved in the relationship. The hypothesis (H2) that service convenience impacts customer satisfactions is also strongly supported with a standardized coefficient of 0.77. The hypothesis that in an e-business environment the dominant dimensions of web service quality include web site content (H4b), and service convenience (H4c) are also supported. The results reveal that the two major constructs of web service quality are web site content and service convenience.

Table 5
Model fit indices.

| Index | Values obtained | Recommended values |
|-------|-----------------|--------------------|
| IFI | 0.97 | ≥ 0.90 |
| RFI | 0.95 | ≥ 0.90 |
| CFI | 0.97 | ≥ 0.90 |
| NFI | 0.96 | ≥ 0.90 |
| NNFI | 0.97 | ≥ 0.90 |
| RMSR | 0.10 | ≤ 0.11 |
| RMSEA | 0.09 | ≤ 0.10 |

Table 6
Results summary.

| Hypotheses | Model | Std. regression coef. |
|------------|--|-----------------------|
| H1 | PC \rightarrow SC | 0.140* |
| H2 | SC \rightarrow SAT | 0.774** |
| H3a | PR \rightarrow SAT | -0.001 |
| H3b | PR \rightarrow BI | 0.050 |
| H4a | PR \rightarrow WSQ | -0.080 |
| H4b | WSC \rightarrow WSQ | 0.553** |
| H4c | SC \rightarrow WSQ | 0.244** |
| H5a | WSQ \rightarrow SAT | 0.362** |
| H5b | WSQ \rightarrow BI | 0.250** |
| H5c | WSQ \rightarrow SAT \rightarrow BI | 0.46** |

* Significance at $p < 0.05$ level.

** Significance at $p < 0.01$ level.

Hypothesis H5 assumes that web service quality has both a direct effect on customer satisfaction (H5a: $WSQ \rightarrow SAT$) and behavioral intention (H5a: $WSQ \rightarrow BI$) as well as an indirect effect (i.e., $WSQ \rightarrow SAT \rightarrow BI$) on behavioral intentions (see Fig. 2). The hypothesized paths between web service quality, customer satisfaction and behavioral intentions are all positive and significant, thus supporting hypothesis 5. The standardized coefficients from web service quality to customer satisfaction and from customer satisfaction to behavioral intentions are 0.36 and 0.46, respectively. This emphasizes the important role of customer satisfaction in online shopping. Also, the path between web service quality and behavioral intentions is statistically significant with standardized regression coefficient of 0.25. The implication of these results is that although the direct effect of service quality on behavioral intentions is significant, the indirect effect of web service quality on behavioral intentions (via customer satisfaction) seems to be slightly stronger for customer behavioral intentions to use the e-service again.

The only hypotheses that are not supported are H3a (perceived risk impacts satisfaction) and H3b (perceived risk impacts behavioral intentions). Furthermore, perceived risk does not influence perceptions of web service quality (H4a), despite of using standard set of questions that address the security concerns. These results are contrary to traditional findings in the literature (Gefen et al., 2003; Liebermann & Stashevsky, 2002), although a number of factors could be involved. Studies on the impact of perceived risk on online shopping tend to be inconsistent in their findings. Chang et al. (2005) reviewed nine studies on the impact of perceived risk and discovered that six found a significant negative impact while the other three found no impact, as did our study. Our explanation of the insignificant impact of perceived risk is based on three possibilities: (a) the advancement in security technology over the years, (b) the age of the respondents, and (c) the partnership of websites with leading financial service companies.

There have been drastic advancements in online security technologies over the years as online shopping has become a common place. Almost every e-commerce web site now has a detailed privacy statement aimed at boosting customer confidence. The perception of risk has been eroded by this and other factors over the years. It is also well-known that younger customers are less risk averse than older individuals (Riley & Chow, 1992). Since the respondents of the current students were undergraduate students, it is assumed that their age related to their lack of perceived risk. In other words, the impact of perceived risk on web service quality may have also been marginalized in the present study simply because of the age of the respondents. Also, Salam, Rao, and Pegels (2003) note that most, if not all, major online stores are now guaranteed by major, trusted financial institutions such as banks, credit cards companies, and others such as Pay Pal, who act as intermediaries between the online consumers and their financial institutions. These institutional intermediaries usually guarantee a refund if customers are not fully satisfied or if fraud or other improprieties result in financial loss. Lastly, it could be argued that the Internet usage has come of age such that the online customers now view security and privacy as a basic, 'must have' feature that has little or no effect on intention to continue online shopping. These mechanisms may help explain why perceived risk is no longer a major concern for today's online shopper.

7. Conclusions and managerial implications

The purpose of the present study was threefold: (1) understanding the e-customer's expectations and perception of web service quality, (2) developing and testing an instrument that captures the constructs of the dimensions of web service quality, and (3) investigating the relationship between web service quality, e-customer

satisfaction and behavioral intentions to purchase. As world commerce increasingly relies on the internet, an understanding of the impacts of web service quality research becomes more crucial.

Responding to the call of Zhang and Prybutok (2005) for an additional variables to explain the variability in e-service quality, we have added a new dimension, Web site content, and by so doing we have improved the R^2 from 0.33 (Zhang and Prybutok's result) to 0.619. This result supports the DeLone and McLean (2003) IS Success Model which states that system quality and information quality (the system in this case is the e-commerce web site) has positive relationships with user satisfaction. We have shown here that user satisfaction is in part determined by service quality, which in turn depends partly on web site content.

Service convenience was found to be directly influenced by individual PC skill differences, a result which lends further support to the finding of previous researchers (Rowley, 2006; Sanchez-Franco & Roldan, 2005). The implications of this finding for website managers and designers are clear: while consumer PC skills are beyond their control, care must be taken to develop websites that can be easily navigated; incorporating accessibility and universal usability design principles, and contain simple and readily understood instructions. Essentially, the goal is to provide the user with a pleasurable experience and avoid user frustration which not only can result in an aborted session but greatly reduces the probability of website re-visitation (Cockburn, Greenberg, Jones, McKenzie, & Moyle, 2003).

The results indicate that service convenience and web site content both have a significant positive influence on how customers perceive web service quality. Unlike past studies with five to nine factors, this result is attractive and interesting because of its simplicity (only two factors) and competitive R^2 value (0.619); past studies relying on several factors have generally yielded a much less R^2 values as this study (Lee & Lin, 2005; Santos, 2003). Once again, this is a design issue for managers and designers. In accordance with above findings, designers need to recognize that visitors, especially first-time visitors, may not be aware of what the website contains or how to access it. There are a number of design considerations for alleviating this problem, including the use of a frequently asked questions (FAQ) link.

The findings also indicate that while web service quality is an important driver of behavioral intentions, its indirect effect on customer satisfaction is equally important, if not more so, in promoting website usage. This finding supports the updated IS Success Model (DeLone & McLean, 2003). The R^2 value of 0.86 for customer satisfaction and 0.40 for behavioral intentions are significant and together explain a large portion of the model's variance. These results correspond with previous findings that while service quality has a significant direct impact on behavioral intentions, customer satisfaction, acting as a mediator between the two factors, strengthens the relationship. The implication for managers and designers is that satisfaction is a major factor in maintaining and improving competitive advantage. E-service managers need to devise operations strategies that focus on the dimensions of service quality that enhance customer satisfaction, which in turn can lead to positive behavioral intentions (Olorunniwo et al., 2006). Simply stated, satisfied e-customers are more likely to be loyal customers, revisit a website, and to recommend the service to others.

Although Service convenience was found to play a significant role in defining Web service quality, only a few of the factors that might impact service convenience were considered. Individual PC skills explain only a small percentage of the variability in Service convenience ($R^2 = 0.02$).

A major finding of this study is the non-significance of relationships between perceived risk and behavioral intentions and satisfaction was not expected, but, as noted earlier, there are a number of possible explanations. However, managers and design-

ers should not conclude that consumers are not concerned about possible theft, product quality, transaction security, and misuse of personal information. This finding may be pointing to an emerging fact that the security of a commercial website is no longer a strategic feature but rather a basic necessity which the customers are now taking for granted. To be considered a valid player, firms must provide the best online security and also convince the online customers to believe it. Further research is needed to explore the effect of perceived risk on how e-customers perceive web service quality. In addition to age and security mechanisms, such factors as culture and individual personality traits may also be involved.

Appendix A. The survey instrument

Please rate your skill in the following computer applications:
1 = low skill; 7 = high skill)

Individual PC Skills

| | Low _____ High | | | | | | |
|---|----------------|---|---|---|---|---|---------|
| 1. Rate your skill in Microsoft Excel | 1 | 2 | 3 | 4 | 5 | 6 | 7 [N/A] |
| 2. Rate your skill in Microsoft Word | 1 | 2 | 3 | 4 | 5 | 6 | 7 [N/A] |
| 3. Rate your skill in Microsoft Access | 1 | 2 | 3 | 4 | 5 | 6 | 7 [N/A] |
| 4. Rate your skill in Microsoft Power Point | 1 | 2 | 3 | 4 | 5 | 6 | 7 [N/A] |
| 5. Rate your skill in using the Internet | 1 | 2 | 3 | 4 | 5 | 6 | 7 [N/A] |

Perceived risk

1. I worry about credit card information being stolen.
2. I worry about the product quality on the Internet.
3. I worry about safe transaction online.
4. I worry about how my personal information might be used when I buy online.

Convenience of service

1. Using the internet makes it easier for me to shop.
2. Online shopping is convenient.
3. Shopping online saves time compared to going to traditional store.

Web site content

1. It is easy to navigate on this site.
2. The information about the products for your needs/interest is sufficient to make a purchase decision.
3. The information about the products/services is adequate.
4. The website has an ideal amount of images/graphics.
5. The graphics on this website are appealing.
6. The contents of this website are useful for my purpose.
7. I am kept well informed of the developments at this website.

Web service quality

- V1. The vendor gives prompt service to customers.
- V2. It was easy to find what you were looking for.
- V3. The site seems to be up to date.
- V4. The web site provides high quality information.

Customer satisfaction

- SA1. I am satisfied with my previous online shopping experience.
- SA2. Online shopping is a pleasant experience.
- SA3. Overall, I am satisfied with my e-service experience.

Behavioral intentions

- BI1: I intend to use e-service frequently.
- BI2: I intend to use e-service.
- BI3: In the future, I intend to use e-service whenever I have a need.

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