An empirical study of factors affecting e-service satisfaction

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Abstract. E-service is the integration of business processes, policies, procedures, tools, technologies, and human efforts to facilitate both assisted and unassisted customer services using the Internet and other networks. To examine factors affecting user satisfaction with e-services, a survey was conducted using a questionnaire. The questionnaire was based partially on existing studies, and was validated by a panel of researchers and industry experts. More than 700 usable responses to the questionnaire were collected and analyzed. The results showed that user satisfaction with e-services is correlated with perceived convenience, users’ skills and experiences, and perceived security.

Keywords: E-service, e-commerce, Web, Internet, user satisfaction, security, convenience, site characteristics, use intention

1. Introduction

E-service is an integration of business processes, policies, procedures, tools, technologies, and human efforts to facilitate both assisted and unassisted customer services using the Internet and other networks.
E-service has great potential for improving service quality while at the same time creating substantial savings for the providers. By leveraging e-services, many organizations have successfully opened new revenue streams, lowered costs, improved customer satisfaction, and attracted new customers [77].

Despite its promising potential, however, the effectiveness of e-service depends on the quality of the services, along with the level of satisfaction customers experience when they interact with the systems. E-service users not only expect access to a reliable system at any time; they also demand that the system provide what they need and want. In other words, companies cannot simply move traditional services online and expect to please their customers – their e-services must meet customers’ increasing expectations and adapt to the unique features of the Internet in order to gain user acceptance.

Tornatzky and Fleischer [72] show that technological innovation is essentially information organized in a new way. Consistent with the view that technology involves organization, Rogers and Shoemaker [64, p. 20] refer to innovation as “an idea, practice or material artifact”. Since its inception, e-service has been constantly evolving to incorporate new and continuous technological innovations. Currently, there exists a lack of empirical research on e-services, except for anecdotal evidence that occasionally appears in trade magazines and some journals. While there are a plethora of findings relevant to service quality in physical settings e-service research remains an area in need of future investigation.

The purpose of this study was to investigate the potential effects of several factors on e-services. The primary construct of interest was user satisfaction. The study examined factors such as site characteristics, users’ prior experiences, perceived convenience, satisfaction, and intention to use the service. Understanding these relationships should increase the understanding of e-services and further their enhancement. To explore these relationships we examine the issue of perceived convenience within an e-service setting. To our knowledge, the extant IS literature does not investigate this construct and its inclusions represents a contribution to e-service and the interrelation among the relevant variables. The testing of this model and the interrelationships among the variables is an innovation to IS literature. Convenience is one of the most important motivating factors in e-service usage. Our work also advances the theoretical understanding of perceived convenience and builds a basic foundation for further study on perceived convenience within an e-service setting. In addition, we identify determinants of customer satisfaction factors that help managers diagnose e-service problems and better address issues to improve business performance. Lastly, our model helps refine the definition the variables as required for the context of fitting with an e-service model.

In addition to theoretical innovation, we propose a set of managerial implications and provided innovative suggestions relevant to our research findings. For example, to improve the interface for e-service users companies should add innovative features; to enhance perceived security of e-service systems a security rating provided by professional organizations will increase the users’ positive impression about security; to improve perceived convenience personalization techniques may help. Also we support the notion that better understanding the customers’ needs and simplifying transaction processes for existing customers is a valuable effort that allows providing periodic product information via emails to customers that bought the same or similar products. In addition, we suggest that e-service providers send customized thank you notes as well as greeting messages before major holidays or offering discounts or e-coupons.

2. Foundations of research questions and hypotheses

A thorough study of e-services should encompass both marketing and MIS research, simply because of its interdisciplinary nature [25,65]. In essence, the goal of e-service is to provide consumers a highly satisfactory experience that achieves many of the traditional service objectives while simultaneously providing faster service delivery via nearly instant communication with users [56]. Consequently, marketing theories provide an appropriate background for starting e-service studies. Before conducting this study, we reviewed the marketing literature related to SERVQUAL as well as the MIS literature on assessment of e-services [6].

The constructs convenience and satisfaction are transferred from the marketing literature and site characteristics, perceived security is based on the IS literature. Particularly, our operationalization of site characteristics includes two dimensions: usefulness and ease of use with a focus on information system perspective.

The theory of Reasoned Action (TRA) is relevant to the constructs we investigate. TRA was formulated
by Fishbein and Ajzen [9] who posit that actual behavior is determined by behavior intention which is determined by attitude and subjective norms. Attitude toward a behavior is determined by the addition of many salient beliefs. The TRA is useful for predicting and explaining behavior and Ajzen and Fishbein [1, p. 4] claim that TRA is “designed to explain virtually any human behavior”. Building upon the robustness and predictive power of TRA Davis [9] developed the Technology acceptance model (TAM) to explain computer usage behavior and determinants of computer acceptance.

TAM predicts that perceived usefulness and perceived ease of use determine attitude which further determines behavior intention. Behavior intention predicts usage of a system. Perceived usefulness and perceived ease of use are caused by external variables. Numerous studies validate TAM and confirm its validity in traditional computing environment and more recent work confirms it applicability to Web based systems [42,45,51].

Venkatesh and Davis [75] argued there was a need to better understand the predictive power of perceived usefulness by adding additional antecedents of perceived usefulness. Based on this rational, TAM2 was created by including social influence and cognitive predictors of perceived usefulness into the TAM model. The social influence variables included in TAM2 are subjective norm, voluntarness and image. The cognitive predictors included in TAM2 are job relevance, output quality, and result demonstrability.

In this work, we examine the user’s satisfaction with the e-service system. Although TAM is a robust, powerful, and parsimonious model for predicting user acceptance, it was not designed to measure satisfaction. We believe our model compares favorably with TAM. Our model provides an alternative to understand e-service adoption and consumers’ satisfaction level. The marketing literature shows that satisfaction is a strong predictor of behavior intention [3,69]. It is important for firms to identify factors that contribute to e-service satisfaction. In our model, we include factors specific to e-service setting and include marketing concept convenience and satisfaction in our model whereas satisfaction is not present in TAM model.

2.1. Traditional services vs e-service

Traditional services and e-services provide different delivery channels and different methods for customer interactions. During traditional service delivery through brick and mortar stores, customers physically go to the store to receive services and communicate with service representatives. When customers use e-services that are available via the Internet they engage in the service via an Internet Web site. An established instrument exists to measure traditional service delivery – SERVQUAL, developed by Parasuraman et al. [56]. This instrument measures five dimensions that relate to service quality: tangibility, reliability, responsiveness, assurance, and empathy. Several studies found that the SERVQUAL dimensions of reliability and responsiveness remain applicable to an e-service environment [36,77,78].

2.2. Existing e-service studies

Prior works provide definitions of e-commerce and e-service. Zwass [81] defines e-commerce as the sharing of business information, maintaining of business relationships, and conducting of business transactions by means of telecommunication networks. Ruyter et al. [65] define e-service as an interactive, content-centered and Internet-based customer service, driven by the customer and integrated with related organizational customer support processes and technologies with the goal of strengthening the customer-service provider relationship. Using these definitions, we can conclude that e-service belongs to a subset of e-commerce systems but in our view e-service focuses on the service aspect of e-commerce systems.

2.3. User characteristics

Understanding how individuals behave when they act as purchasers of products or services online is a key issue in consumer behavior research [5]. Individual differences such as demographic factors are also believed to influence consumer behavior and attitudes toward e-commerce systems [8,19,32]. These demographics have also been shown to explain consumers’ tolerance level and attitude toward waiting time online [29,43]. In the IS discipline, individual differences are operationalized differently, but are also studied extensively. Factors such as cognitive styles, self-efficacy, playfulness, demographic variables, prior experiences, and many other factors have been studied extensively. Many studies have discovered significant relationships between individual differences and IT acceptance, satisfaction, usage, and other constructs [15,32,33]. Individual differences in terms of computer proficiency and user experiences are also important constructs that
affect the outcomes of IT implementation, acceptance, usage, and task-effectiveness [10,17,44,63]. Building upon prior studies that address individual differences in terms of computer proficiency, we extended the concept into the e-service context for the purposes of this paper. The first hypothesis for the study addresses the potential relationship between individual differences in terms of computer proficiency and perceived user satisfaction.

**H1: User computer proficiency is associated with user satisfaction toward e-services.**

### 2.4. Perceived convenience

The second construct of interest is service convenience. The study includes service convenience as a research construct for two reasons: First, convenience is a general construct that fits a number of business contexts, and so is important when it is found in either the traditional or e-service environment. Second, the notion of convenience is an emphasis for both IS and marketing studies.

Our definition of convenience is founded on the work of Berry et al. [6] and uses access convenience and transaction convenience to measure perceived convenience. Perceived usefulness and perceived ease of use are constructs developed by Davis et al. [9]. Perceived ease of use was operationalized with six items that measure ease of learning, controllability, clarity and understandability, flexibility, ease of obtaining skills, and ease to use. Perceived usefulness was measured with six items related to working more quickly, job performance, increasing productivity, effectiveness, making a job or task easier, and usefulness.

Comparing our dimensions of perceived convenience with perceived usefulness and perceived ease of use, we find that these are conceptually distinct constructs. In many e-service studies perceived convenience, perceived usefulness, and perceived ease of use are defined differently but in practice they may be inseparable to users. It is highly likely that at the high level of the construct, the respondents would think convenience means useful. But when we operationalize the perceived convenience construct, the respondents should not be confused with perceived usefulness.

Despite its importance, the concept of convenience is difficult to define and not well understood. It can include multiple dimensions, such as less waiting and effort savings [6]. Many IS studies on e-commerce conclude that convenience is a major factor that encourages consumers to conduct transactions online [37,49]. Some prior studies have linked convenience with satisfaction [48,80]. Based on these prior studies, the second hypothesis addresses the potential link between perceived convenience and user satisfaction toward e-services.

**H2: Perceived convenience is positively associated with user satisfaction toward e-services.**

Online shopping provides convenience to Web shoppers McKinney et al. [50]. Several studies made contributions in relating convenience to satisfaction. For example, Szymanski and Hise [70] conclude that convenience, site design, and financial security are the dominant factors in consumer assessments of e-satisfaction. Huang et al. [28] examine the successful factors related to employee to business systems. Their results show that convenience, delivery, interface, accuracy, price and security influence employee assessments of satisfaction. Yang et al. [77,78] extend traditional service quality dimensions to the context of Internet retailing and find that the most frequently mentioned service attribute resulting in consumer satisfaction were responsiveness, credibility, ease of use, reliability, and convenience.

Our construct site characteristics is similar to Szymanski and Hise’s site design [70], and Huang et al’s interface [28]. Because prior studies show site design, convenience, and ease of use are significant predictors for satisfaction. No extant work tested the relationship between site characteristics and convenience. It is reasonable to infer site characteristics and convenience are correlated. Furthermore, marketing literature shows that location is an indicator for convenience [35]. Seiders et al. [67] propose ease of search could translate to convenience. When we apply these marketing concepts to Web design, if Web sites put elements in a location that is easily found or build search engine to facilitate information searching, a great convenience is provided to users. Therefore, this study also examines the potential relationship between site characteristics and perceived convenience.

**H3: Site characteristics are correlated with perceived convenience.**

### 2.5. Perceived security

A fundamental difference between e-services and traditional customer service is the concern for security. When a customer is required to provide personal or fi-
financial information online, security concerns naturally arise, and these concerns have generally retarded the growth of e-services and e-commerce.

Security refers to freedom from risk or doubt during the service process [66], affects consumers' confidence in online transactions, and is one of the factors affecting satisfaction, which in turn may be related to the consumer's site commitment and actual purchase behavior [56,73]. Some studies even suggest that security and privacy are more important than information content and site design for determining purchase intention [61]. Other studies have confirmed that security leads to perceived usefulness of e-services, which in turn leads to satisfaction [53]. It has been suggested that e-commerce businesses should put more emphasis on employing state-of-the-art security technology to enhance customer satisfaction [45]. Based on these prior studies related to security, the fourth hypothesis of the study is:

H4: Perceived security is correlated with user satisfaction toward e-services.

2.6. User satisfaction and intention

It is well established in marketing that satisfaction leads to loyalty and that loyalty influences customers to repeat the purchase of products or services from the same provider. Bailey and Pearson found that a variety of factors are related to the delivery of information products and services [4]. They developed satisfaction instrument to measure users satisfaction with information. Many studies have provided empirical results to support these beliefs [2,69]. In MIS studies, user satisfaction is also an important research construct [11, 18,32], which has been used as a surrogate for system success in many research efforts due to the difficulty of measuring information system success [30,46,60].

In e-commerce settings and the traditional commerce context, there exist numerous studies on satisfaction. Some of the research in e-commerce satisfaction studies built upon marketing measures for satisfaction. For example, Szymanski and Hise [70] develop measures to assess satisfaction with e-tailers. Anderson and Srinivasan [3] also use the same approach to measure customer satisfaction with e-commerce firms. Although some significant attempts were made to define e-services and its dimensions, studies relate to e-service satisfaction are scant. Szymanski and Hise [70] conclude that convenience, site design, and financial security are antecedents of satisfaction. Yang et al. [77,78] claim that responsiveness, credibility, ease of use, reliability, and convenience contribute to customer satisfaction. Because e-service is a subset of e-commerce, the measure for e-commerce is suitable for e-service satisfaction. Therefore, to support our view of e-service satisfaction we include satisfaction research in e-commerce as well.

This study hypothesizes a correlation between user satisfaction and use intention toward e-services. Intention is an important construct in the impersonal service environment [68] because it indicates customers' desire to expand their relationships with a business and give positive word-of-mouth recommendations about the company [79]; so intention and satisfaction are closely related constructs. A positive relationship between satisfaction and intention was found in an online business context [38] and as part of another e-commerce model [80].

H5: User satisfaction is correlated with intention to use e-services.

3. The research model

Our research model addresses the social and technological context of online purchasing issues. For example, we use satisfaction and intention to address the social impact of using e-service systems; perceived convenience, perceived security and site characteristics to emphasize the technological impact of e-service systems; and, finally, prior experience and computer skills to relate to personal factors to e-service system. In essences, our research model portrays the components and relationships among important e-service factors. Technology is a tool that allows companies to automate service delivery process and transaction processes.

Our research model contains the constructs perceived convenience, perceived security, Web site design characteristics, user satisfaction, and intention. This research is an extension of Zhang and Prybutok's [80] model that includes substantial changes. First, perceived convenience and perceived security and Web site characteristics are not included in the prior model. This constitutes a set of important changes to an e-commerce model because security is a critical concern in online services. Second, the prior model used e-satisfaction and this model incorporates user satisfaction and while these two constructs sound similar they are conceptually different. We proposed this change because we believe the newer user satisfaction
construct is a theoretical improvement over the prior construct. This new measure is based on a different set of literature support. Third, we explore the added construct of perceived convenience in this paper and this construct is different and an extension of the e-service convenience construct presented in Zhang and Prybutok’s [80] work. Fourth, the significance of satisfaction and intention in the marketing literature and practice makes these constructs worthy of inclusion in most e-commerce models. As a result we included intention and user satisfaction in our new model because the model would not be meaningful or useful for understanding e-service without the inclusion of satisfaction or intention.

E-tailers realize the importance of satisfying customers. Therefore, identifying the factors that create a satisfying online experience is critical. While end-user computing satisfaction has been studied extensively, new aspects remain unexplored in online environment [28]. Several studies made significant attempts in exploring satisfactory factors in online context. Hong and Kim [26] propose six evaluation criteria derived from an architectural perspective in the evaluation of buildings. These criteria include internal reliability and external security for structural robustness, useful content and usable navigation for functional utility, and system interface and communication interface for aesthetic appeal. They found that these criteria impact user satisfaction and loyalty. Gummerus et al. [21] investigate the determinants of customer loyalty to a content-based service, a healthcare Web site and their results reveal that loyalty to the health site is satisfaction-driven and trust is the main antecedent of satisfaction but responsiveness, security and technical functionality of the Web site influence trust. Kim et al. [38] proposes six dimensions of architectural metrics for Internet businesses: internal stability, external security, information gathering, order processing, system interface, and communication interface.

With knowledge gleaned from the prior research described above, we constructed the research model (see Fig. 1, below). The two-way arrows indicate the hypothesized correlations, without implying casual effects.

4. Research methods

To test the hypotheses derived from existing studies, data was collected using a survey questionnaire. Most items in the questionnaire were adopted from or constructed based on previous studies. For example, user computer skills and experience were taken from a prior study [80] because that study showed the importance of these constructs in evaluation of e-commerce models. We adopted the construct from the prior study and modified the text slightly to better fit the context of the current study. Table 1 lists the constructs, measures, and references of the constructs. Some items were created specifically for this study because no suitable existing measures were available. A seven-point Likert scale was used for most of the items in the instrument. Because limited studies exist on security, after extensive literature reviews, we created our own measures for security and these measures are aimed at credit card, personal information, hardware security and software security dimension.

Our study was designed to explore the users’ perception of the online e-service experience and we did not focus on the application of e-service within a particular

![Fig. 1. Initial research model.](image)
Table 1
Constructs and measures

<table>
<thead>
<tr>
<th>Constructs</th>
<th>Measures</th>
<th>Sources and references</th>
</tr>
</thead>
<tbody>
<tr>
<td>User Satisfaction</td>
<td>Three-item measure</td>
<td>Bailey and Pearson, 1983; Pan et al., 2002; Zeithaml, 2002; Yang et al., 2003; Hong and Kim, 2004; Yang et al., 2003; Szymanski and Hise, 2000</td>
</tr>
<tr>
<td>Use Intention</td>
<td>Four-item measure</td>
<td>Igbaria, Guimarães and Davis (1995)</td>
</tr>
<tr>
<td>Perceived Convenience</td>
<td>Two dimensions</td>
<td>Parasuraman, Zeithaml and Berry, 1988; Berry, Seiders and Grewal, 2002</td>
</tr>
<tr>
<td>• Access convenience</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Transaction convenience</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Site Characteristics</td>
<td>Two dimensions</td>
<td>Jarvapaa et al., 1997; Davis, 1986</td>
</tr>
<tr>
<td>• Useful</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Ease of Use</td>
<td></td>
<td></td>
</tr>
<tr>
<td>User Skills and Experiences</td>
<td>Two dimensions</td>
<td>Hong et al., 2001; Igbaria et al., 1995; Venkatesh and Davis, 1996</td>
</tr>
<tr>
<td>• Basic Computer Skills</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Knowledge of Internet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived Security</td>
<td>Four-item measure</td>
<td>Jarvapaa et al., 1997; Lohse and Spiller, 1998</td>
</tr>
</tbody>
</table>

industry. To address our research questions we used a survey methodology to explore the users’ e-service experience. We deem that survey methodology is appropriate for exploring and identifying “what” questions. If a lab experiment or controlled environment were used, a consistent e-service experience could be reported. However, our purpose was not to obtain a consistent experience but rather to investigate the emerging e-service issues in various consumer related areas. Different consumers may shop online in varying degrees for electronics, entertainment, clothing, cosmetics, car parts, etc. But all these products are consumer products and our analysis of respondents that use such sites contributes to the understanding of e-service.

4.1. Instrument validation

To verify the face validity of the survey instrument, a panel of ten experts was asked to examine the instrument. Three of these experts are marketing professors with expertise in consumer behavior; the other five have extensive industry experience in information technology and the development of corporate Internet strategies. Of these latter five, one is CIO of a middle-sized technology firm and has more than twenty years’ experience in information technology. Multiple iterations were conducted before the survey was finalized. A pilot study was carried out using 45 students. The results of the pilot study indicated that the items were easy to understand and suitable for use in a large-scale study.

4.2. Subjects

Data were collected at two large public universities in the United States, one in the Southeast and the other in the Northeast. A total of 1550 subjects were asked to participate in the survey. A follow-up run was conducted to encourage subjects who did not respond initially. Altogether, 704 usable responses were collected. The overall response rate was 45.4 percent. To determine if a non-response bias existed, T-tests were conducted to compare the mean scores of the first round with those of the follow-up round. The T-test results suggested that no statistically significant differences existed among the items tested. Thus, non-response bias was deemed a minor issue of concern for this study.

We used student subjects for this study because this group contains relevant respondents for the context of this study. In e-commerce related research, it is increasingly acceptable to use student subjects because: (1) e-services depend on technologies and students are more technology savvy than older generations (2) students are frequent users of e-services and this experience makes them better candidates to evaluate e-service and e-commerce related issues.

The respondents’ characteristics are summarized in Table 2. The number of male respondents was slightly higher than that of female respondents. Most of the respondents were under 30 years old, with the majority falling between 21 and 25. (This distribution is typical when using university students as subjects.)

In order to determine if it was appropriate to combine the data collected from the two locations, we performed an analysis of variance (ANOVA) on the de-
Table 2
Respondent profile

<table>
<thead>
<tr>
<th>Respondent characteristics</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>54.50</td>
</tr>
<tr>
<td>Female</td>
<td>45.50</td>
</tr>
<tr>
<td>Age</td>
<td></td>
</tr>
<tr>
<td>Under 25</td>
<td>77.00</td>
</tr>
<tr>
<td>26–35</td>
<td>16.00</td>
</tr>
<tr>
<td>36–45</td>
<td>6.00</td>
</tr>
<tr>
<td>Over 46</td>
<td>1.00</td>
</tr>
<tr>
<td>Average Years of Internet Experience</td>
<td>6.04</td>
</tr>
</tbody>
</table>

Table 3
ANOVA: Comparing data collected from the two institutions

<table>
<thead>
<tr>
<th></th>
<th>Age</th>
<th>Gender</th>
<th>Years of Internet experience</th>
<th>F-value</th>
<th>Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1.40</td>
<td>0.31</td>
<td>0.46</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Significance</td>
<td>0.22</td>
<td>0.58</td>
<td>0.94</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

mographic data from the two locations and compared the results [13]. The results did not indicate significant differences. Therefore, we determined that it would be appropriate to combine the data collected from the two regions, and so commingled the 704 usable responses to conduct the data analysis below. Table 3 summarizes the F-values and the significance levels for this analysis.

4.3. Validity and reliability

The questionnaire included both newly constructed items and items from existing studies; therefore, a test of its validity and reliability was needed. The convergent and discriminant validity of the constructs were verified using conventional exploratory analysis technique – principal component analysis with a varimax rotation. The criteria we used were that all factors have Eigen values greater than 1 and that all items have factor loadings above 0.5 on the primary factor. To examine discriminant validity, we compared the shared variances between constructs with the average variance extracted from the individual constructs [16]. This analysis showed that the shared variance between constructs was lower than the average variance extracted from the individual constructs, thus confirming discriminant validity. The alpha values (greater than 0.7) showed that all the constructs had high internal consistency or reliability [52]. In summary, the analysis results showed that the instrument possessed adequate reliability, convergent validity, and discriminant validity.

Table 4 summarizes the validity and reliability measures.

4.4. Structural equation modeling

The existence of adequate theoretical support allows the study to verify the model using structural equation modeling techniques [26,32]. LISREL 8.51 was used to test the proposed model. After several iterations and trials, the resulting path diagram emerged, as shown in Fig. 2.

Researchers generally agree that a single statistical measurement is insufficient to justify the use of a proposed model – it is better to use multiple-fit indices to assess the overall fit of any proposed model [49]. The commonly reported fit indices are the Chi-Square Degree of Freedom ratio, GFI, AGFI, NFI, NNFI, CFI, and RMSEA. The Chi-square value for our model is 2399. The ratio of chi-square to the degree of freedom was 2.97, which is within the recommended level of 3 [19,20]. The other fit indices produced also indicated a good model fit (see Table 5).

Table 6 shows the path coefficients and T-values for each path in the hypothesized model. As expected, hypotheses H1, H2, H3, H4, and H5 were confirmed. The conclusions drawn from this study are provided in the discussion below.

5. Discussion

The relationship between user computer proficiency and user satisfaction was supported, as expected [26,71]. The moderately positive but statistically significant coefficient implies that more computer-literate users are, the more likely they are to give e-services a favorable evaluation. This relationship can be explained in several ways: First, competent users are more likely to be able to solve technical problems encountered when using the service (less likely to have difficulty using the process). As a result, they perceive that the quality of the service they have received is higher. On the other hand, less-experienced users may encounter more problems and not be able to solve them immediately. Because of their lack of technical knowledge, they may not realize that the causes of the problems they experience are in their own computer skill deficiencies. Instead, they will likely blame the sites for poor design and poor service. Further, if they attempt to obtain technical support and encounter additional obstacles, their perception of service quality...
Table 4

<table>
<thead>
<tr>
<th>Factors</th>
<th>Loadings</th>
<th>Eigen value</th>
<th>Variance extracted (percent)</th>
<th>Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>User Satisfaction</td>
<td></td>
<td>9.80</td>
<td>69.31</td>
<td>0.86</td>
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<tr>
<td>Overall satisfaction</td>
<td>0.83</td>
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<tr>
<td>Satisfaction with the service</td>
<td>0.72</td>
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<td></td>
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<tr>
<td>Satisfaction with information provided</td>
<td>0.76</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Site Characteristics</td>
<td></td>
<td>1.80</td>
<td>74.35</td>
<td>0.91</td>
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<tr>
<td>Ease of use</td>
<td>0.76</td>
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<tr>
<td>Useful</td>
<td>0.66</td>
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<tr>
<td>Perceived Convenience</td>
<td></td>
<td>3.00</td>
<td>67.14</td>
<td>0.84</td>
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<tr>
<td>Transaction convenience</td>
<td>0.60</td>
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<td></td>
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<tr>
<td>Access convenience</td>
<td>0.64</td>
<td></td>
<td></td>
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<tr>
<td>Intention to Use</td>
<td></td>
<td>3.40</td>
<td>58.18</td>
<td>0.87</td>
</tr>
<tr>
<td>Intention to use</td>
<td>0.81</td>
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<tr>
<td>Intention to purchase</td>
<td>0.63</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Intention to use frequently</td>
<td>0.83</td>
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<tr>
<td>Intention to buy more</td>
<td>0.65</td>
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<tr>
<td>Perceived Security</td>
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<td>1.30</td>
<td>63.17</td>
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<td>Credit card</td>
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<tr>
<td>Personal information</td>
<td>0.83</td>
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<td>66.40</td>
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Table 5

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<th>Index</th>
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Table 6

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<th>Coefficient</th>
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<td>Intention ↔ Satisfaction</td>
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<td>Perceived Convenience ↔ Site characteristics</td>
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<td>Satisfaction ↔ Perceived convenience</td>
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<td>↔ Perceived security</td>
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<tr>
<td>↔ Individual differences</td>
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</table>

*** P < 0.001.

will be even lower. As more people become computer literate, it is possible that their opinions of e-service quality will be increasingly positive. In the meantime, e-service sites may want to revamp their systems so that both skilled and less-skilled users will be satisfied.

The coefficient between perceived service convenience and satisfaction was 0.73, which was significantly higher than that for user competency and perceived security. As indicated in the literature review, service convenience includes dimensions such as effort savings, and shorter waiting time. Thus, e-service providers may want to invest more resources to reduce customer time spent on the site by eliminating non-essential steps, thus shortening response time. In
addition, e-service sites should try to make users feel that it is easier to use the site than to pick up the telephone and call a customer service representative. For example, many e-service sites require users to fill out lengthy forms before getting service. Much of the information requested is either unnecessary or repetitive. Users who are unwilling to put up with all the typing-in may feel frustrated and thus seek the same services in alternative venues that are often more expensive for the host to provide.

The coefficient between perceived security and satisfaction was also significant, confirming the hypothesis that users are concerned with security when they use e-services. Thus, companies need to build a well-defended Web site that does not just protect its own interests, but also those of its customers. Securing a site is not only a technology issue but also a management issue. Proper procedures and policies need to go hand in hand with the installment of state-of-the-art security technology.

The results of our analysis also showed that site characteristics account for only 37 percent of the variance in perceived e-service convenience; this low R-square value is an indication that other factors also affect the perceived convenience of e-services. Despite the low explanatory power of this particular link, the overall model fit indices show that the model fit the data well. The R-square between user satisfaction and future-use intention was 0.47. The path coefficient between the two constructs was 0.69. This positive relationship is consistent with prior findings [54,55].

Because potential e-service users have diverse backgrounds and computing skills, it is necessary for companies to consider the skill level and computer knowledge of their target audience when building their e-service systems. For less-skilled users, multiple ways to communicate with users should be provided. For example, providing a virtual tour for using e-service system is necessary for less-skilled user. In addition, frequently asked questions, internal search engines, and site maps are also helpful for both less-skilled users and skilled users.

6. Limitations of the study

Despite the large sample size, significant results, and an expert-validated instrument, this study had several limitations: First, fit indices in the range of 0.8 suggest that further investigation into the variables in the model is appropriate. Second, because we used student subjects our findings are limited to generalizations about younger populations. Further research is needed to address the limitations of this study and to better understand e-service quality.

7. Conclusion

E-service is a field with great potential, with numerous tools and technologies available to businesses that want to succeed in it. Businesses need to make wise decisions about choosing the right technology to manage the services their company provides on the Internet. Like many other new Internet-enabled activities, e-services come with benefits and pitfalls. Although e-services are effective in reaching more users at a relatively low cost, users frequently find them impersonal. Thus, it is important to make sure that users are satisfied with the quality of services re-
ceived online. The study concluded that user satisfaction toward e-services was affected by perceived convenience, perceived security, and user characteristics. The perceived convenience of an e-service site is influenced by site characteristics, including ease of use and responsiveness. Also, user satisfaction significantly affected future-use intention.

Based on these results, e-service providers should find ways to enhance ease of use for their e-service customers, and they should be more responsive to customers’ questions and requests that they receive as feedback from their online service sites. E-services should be designed to be easy to use; should have a good built-in knowledge base, easy-to-find contact information, internal search engines, and chat rooms. Otherwise, increased productivity and cost savings from e-services may be offset by the loss of customers.

E-service is an innovation within business and Web service is the relevant technological innovation that involves business process innovation. The W3C Web Services Architecture Working Group defines Web services as a software application identified by a URI, whose interfaces and bindings are capable of being defined, described, and discovered as XML artifacts. Web services refer to a set of programming standards used to make different types of software communicate with each other over the Internet without human intervention. Web services share three types of computer programming: Extensible Markup Language (XML), Standard Object Access Protocol (SOAP), and Web Services Definition Language (WSDL). Gartner predicts that by 2007, 40% of software purchase will be Web service enabled [24]. But standards and security are still the challenges faced by Web services.

Web services are self-contained business applications that can be published, located, and invoked by other applications over the Internet. Web services hold the promise of allowing applications integrations [47]. With the emergence of Web services, some businesses developed a new business model providing on-demand software delivery. Such model provides advantages as less up-front costs for the customer and getting software updates more frequently [35]. With this model, Web service delivery is accomplished typically by a software company selling its software to its customers as a monthly, pay-as-you-go service, rather than sending disks and letting the customers install software themselves. Web services support service-oriented computing and service-oriented architecture, new product plans and business connections [38], retrieval services from large-scale service repositories [81]. Most of the Web service related studies focus on technological issues, but recently Anderson et al. [2] made an pioneer effort on examining the significance of technological, methodological, and business factors in contributing to the success of initial Web services projects. They found that a strong focus on business factors is associated with successful Web Services strategies.

References


