Comparing the effects of website quality on customer initial purchase and continued purchase at e-commerce websites

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To succeed in the highly competitive e-commerce environment, it is vital to understand the impact of website quality in enhancing customer conversion and retention. Although numerous contingent website attributes have been identified in the extant website quality studies, there is no unified framework to classify these attributes and no comparison done between customer conversion and retention according to the different website quality attributes and their varying impact. This study adopts the model of Information Systems (IS) success by DeLone and McLean to provide a parsimonious and unified view of website quality, and compares the impact of website quality on intention of initial purchase with that on intention of continued purchase. With the proposed framework, we seek to understand how a company can increase customer conversion and/or retention. Our findings demonstrate the strength of our framework in explaining the impact of website quality on intention to purchase on the Web, and that website quality constructs exert different impact on intention of initial purchase and intention of continued purchase. The results suggest that an online company should focus on system quality to increase customer conversion, and on service quality for customer retention.

Keywords: Website quality; Intention of initial purchase; Intention of continued purchase; Customer conversion; Customer retention

1. Introduction

The years since 1995 have witnessed a surge in business-to-consumers (B2C) e-commerce activities over the Internet. In fact, the growth of sales over the Internet has outpaced that of traditional retailing (Levy and Weitz 2001). Accordingly, attracting new customers and retaining existing customers through a website is vital to B2C success, with evidence indicating that many consumers who search websites with the intention to make purchases subsequently abandon their purpose due to the low quality of the websites (Forrester Research 1999, Boston Consulting Group 2000). In its review of 239 well-known B2C websites, Jupiter Research (2003) found that one in seven B2C websites displayed errors on their home pages that were prominent enough to cause visitor defection. Since an e-commerce website represents the online presence of a company, low website quality reflects poorly on the company and undermines customer intention to make purchases or return to the website (Nielsen 2000). Creating quality websites with attributes that attract both first-time purchase and repeat visits from customers are important objectives for e-commerce websites (Vassilopoulou et al. 2001).

Accordingly, there has been a plethora of research on identifying various attributes of website quality influencing e-commerce website success (e.g. Chau et al. 2000, Liu and Arnett 2000, Koufaris et al. 2001, Koufaris 2002, Palmer 2002, Raganathan and Ganapathy 2002). However, these...
studies are often fragmented (Raganathan and Ganapathy 2002), offering isolated website quality attributes that could be linked to a certain level of customer satisfaction (Vassilopoulou et al. 2001). The literature has yet to provide a unified view of website quality or a standardized framework for classifying the known attributes of a website for the evaluation of its quality. Moreover, certain website quality studies have used user satisfaction or other outcomes of website quality as surrogate measures for the impact of website quality on customer purchase behaviour, leading to confusion over the definition of website quality and failure to differentiate the direct impact of website quality on intention to purchase for the first time and intention to purchase again from the website in the future. In an attempt to fill this research gap, this study focuses on developing a parsimonious website quality model that unifies the various website quality attributes identified by past research. With the proposed model, which is based on DeLone and McLean’s model of IS success (DeLone and McLean 1992, 2002, 2003), we investigate the impact of website quality on two types of purchase intention: intention of initial purchase and intention of continued purchase.

The remainder of the paper is organized as follows. The next section reviews past website quality studies and considers their inherent limitations. The third section of the paper presents DeLone and McLean’s model of IS success and its relevance to analysing the differing impact of website quality on intention of initial purchase and intention of continued purchase. The fourth section discusses our research models and develops hypotheses to differentiate the impact of website quality on the two types of purchase intention. The fifth section describes our research methods while the sixth reports our data analysis. The seventh section discusses the results, their implications for research and practice, and directions for future research. The last section summarizes the study’s contributions.

2. Website quality

As the web storefront is a primary user interface for internet-enabled business, it is important to assess website quality attributes of the website and what users and customers would want at the website (Straub and Watson 2001). Moreover, given the large investments that organizations make in their web storefronts, it is essential for them to evaluate what makes their e-commerce websites effective and successful (DeLone and McLean 2003). These needs underlie the research interest in measuring website quality.

In several research attempts to examine website quality, the concept of website quality was initially limited to usability. Usability is a characteristic of systems design and is defined by the International Organization for Standardization as the extent to which a product can be used by specific users to achieve goals with effectiveness, efficiency and satisfaction (ISO 9241-11, 1998). Several studies have measured website usability using these three measures (e.g. Lindenberg and Neerinex 1999, Frokjaer et al. 2000, Teo et al. 2003). Frokjaer et al. (2000) argued that effectiveness, efficiency and satisfaction should be studied as an independent aspect of usability and be included in usability testing. Lindenberg and Neerinex (1999) suggested a generic test environment that would facilitate usability testing of web-based services using the measures of effectiveness, efficiency and satisfaction. Generally, prior usability research has indicated that usability is associated with numerous positive outcomes (such as reduction in the number of errors, enhanced accuracy, more positive attitude towards the target system, and increased usage; Lecerof and Paterno 1998, Nielsen 2000). However, such indicators are outcomes of usability rather than measures of website quality dimensions or website attributes per se (e.g. the product information provided by the website).

Website quality is a broader concept which encompasses usability. In several well-documented questionnaire-based website assessment techniques such as the Questionnaire for User Satisfaction (Harper et al. 1997) and the Website Analysis and Measurement Inventory (Kirakowski et al. 1998), researchers measured user satisfaction against the design of web user interfaces with traditional usability evaluation measurements such as attractiveness, control, efficiency, affect and learnability. However, both techniques are lacking in the following ways: (1) they do not adequately address the features of an e-commerce website, and (2) they still rely on user satisfaction as a surrogate measure of usability, which is also an outcome of usability.

To overcome the first limitation, many Information Systems (IS) researchers have focused on examining the effects of characteristics inherent in a web storefront on e-commerce success. Some factors influencing e-commerce website success include download delay, ease of navigation, interactivity, responsiveness and quality content (Palmer 2002); search mechanisms (Koufaris et al. 2001); and design, security and privacy (Raganathan and Ganapathy 2002, Dinev and Hart 2004). Although the findings of these studies may lead to the conclusion that website quality is crucial for e-commerce success, they have done so by examining numerous disparate website attributes, and there is no unified model or framework to classify the attributes for use in assessing e-commerce website quality.

In assessing website quality, the measurement of user satisfaction is not a good gauge of actual customer online buying behaviour. The findings of Neal (1999) support the observation that the relationship between satisfaction and repeat purchase behaviour is weak. This is consistent with evidence from the psychology literature, which suggests that the measurement of behavioural intention is a better predictor of the actual behaviour of an individual than
satisfaction (Davis 1989). This suggests that researchers need to investigate the direct relationship between actual website quality dimensions and customer intention of purchase (instead of user satisfaction); this is a need that has been neglected in prior e-commerce website quality research.

There are two types of intentions pertinent to e-commerce website quality studies: intention of initial purchase and intention of continued purchase, and they are closely related to the customer conversion and retention rates of e-commerce websites. Customer conversion is defined as the extent to which the website is able to convert prospective customers into purchasing customers (Gefen et al. 2003) while customer retention refers to the extent to which the website is able to attract existing customers of the website to purchase again in the future (Ittner and Larcker 1998, Reichheld and Schefter 2000). Although the distinction between intention of initial purchase and intention of continued purchase is crucial, previous studies have failed to differentiate between the effects of website quality on one from those on the other. Some have chosen to simply investigate the effects of website quality on intention of purchase, which includes both initial and continued purchase (e.g. Vassilopoulou et al. 2001). Others have focused on intention of returning to the website, which does not necessarily reflect the purchase intention of customers (e.g. Koufaris et al. 2001, Koufaris 2002, Palmer 2002). Liang and Lai (2002) reported that better-designed online stores can increase actual online purchases, intention to revisit and intention to purchase again in the future; however, they did not differentiate the effects of online store design on actual online purchases from those on intention to purchase again in the future.

It is crucial from both the academic and practical perspectives to distinguish between the effects of website quality on intention of initial purchase and those on intention of continued purchase. From the academic point of view, the psychology literature has shown that past purchase experience at a website can affect intention to return and purchase (Fishbein and Ajzen 1975, Eagley and Chaiken 1993). The relationship marketing literature has also pointed out that web technology can provide a better understanding of customer needs, create value, enable long-term relationships to be forged, and subsequently draw customers back to the website to make purchases (Gordon 2000, Sisodia and Wolfe 2000). From the practical point of view, companies need strategic focus in investing their limited resources: whether they should increase customer conversion rate or retention rate at a certain point of time. Thus, we deem it vital in this study to differentiate the effects of website quality on intention of initial purchase from those on intention of continued purchase.

3. DeLone and McLean’s model of IS success

Although prior research efforts have presented other website quality models to evaluate the effectiveness of e-commerce websites (i.e. Zhang and Dran 2002, Kim and Stoel 2004), some quality dimensions of these website quality models pertain to the outcomes of using the website and do not directly evaluate website attributes per se. For example, the 11 website quality dimensions of Zhang and Dran (2002) include cognitive outcomes (whether the user learns new knowledge) and enjoyment (whether the website is fun for the user to explore). Likewise in another study, the 5 website quality dimensions of Kim and Stoel (2004) include emotional appeal (whether the user is happy using the website) and trust (whether the user feels safe using the website). Clearly, there are various disparate website quality models and a unified view of website quality in previous literature is lacking. To provide a parsimonious and unified view on website quality, we adopt the IS success model of DeLone and McLean (1992, 2002, 2003) to directly assess the attributes of an e-commerce website. In contrast with previous website quality models, DeLone and McLean’s IS Success model (1992, 2002, 2003) provides only three quality dimensions, namely system quality, information quality and service quality, which can effectively capture all the attributes identified in previous website quality studies (see table 1).

Using these three quality dimensions, various existing website attributes can be organized to form a more parsimonious website quality framework. System quality corresponds to the technical level (characteristics of the e-commerce system on the website which produces product information) of Shannon and Weaver (1949), while information quality relates to their semantic level (success of product information on the website in conveying intended meaning). The IS success model has recently been extended to include service quality to reflect the success of online peripheral support provided through a website (e.g. feedback, frequently asked questions) (Pitt et al. 1995, DeLone and McLean 2003). Accordingly, we define website quality as consisting of three dimensions: system quality, information quality and service quality (DeLone and McLean 1992, 2002, 2003). Other constructs such as use, user satisfaction, individual impact and organizational impact are omitted from the definition of website quality as they fall under Shannon and Weaver’s classification of effectiveness or influence level which are measured by the two different types of intention of purchase examined in this study.

The three quality dimensions of DeLone and McLean’s IS success model (1992, 2002, 2003) are also relevant to the philosophy of Customer Relationship Management (CRM) in e-commerce. In CRM, quality reflects how well the needs of customers are met (Lengnick-Hall 1996) and it can
Table 1. Mapping of website quality attributes to DeLone and McLean’s three quality dimensions.

<table>
<thead>
<tr>
<th>Quality dimensions</th>
<th>Website quality attributes from past research</th>
<th>References</th>
</tr>
</thead>
</table>

enable organizations to attract new customers and increase retention of profitable relationships (Lengnick-Hall 1996, Bradshaw and Brash 2001). Reinartz et al. (2004) has cited that the success of CRM is affected by how well the company uses supporting information technology in its interaction with users and customers. Similarly in the CRM framework of Payne and Frow (2005), the technologies used to support the activities that involve direct interface with customers are crucial for CRM success. Since the e-commerce website is a primary interface for customers to interact with the company (Straub and Watson 2001), website quality (how well the website meets the online purchasing needs of customers) would be critical for companies to effectively manage customer relationships online. The three quality dimensions of DeLone and McLean’s IS success model encompasses all the aspects of the customer’s online interaction with the company on the website. System quality captures the customers’ desired characteristics of an e-commerce system on the website such as ease of navigation and download delay. Information quality captures customers’ desired attributes of product content provided by the company on the website. Service quality is the overall support provided by the company on the website for its customers. Following DeLone and McLean’s (2003) argument that system quality, information quality and service quality affect intention of IS use, we examine the impact of these three website quality dimensions on intention of purchase in the context of e-commerce. We take the additional step of differentiating intention of purchase into intention of initial purchase, which we relate to the conversion of a potential customer into an actual customer, and intention of continued purchase, which we relate to retention of existing customers.

4. Model and hypotheses

Utilizing the reorganized website quality dimensions based on DeLone and McLean’s model of IS success, we analyse the differing impact of website quality on intention of initial purchase and intention of continued purchase. Figure 1 depicts the research models to be compared in this study.

4.1 Website quality antecedents of initial and continued purchase intention

Intention of initial purchase is defined in this study as the likelihood that a potential customer will purchase from an e-commerce website for the first time at a given point of time (Davis 1989), while intention of continued purchase is defined as the likelihood that an online customer will return to the website and purchase again in the future (Davis 1989). The two types of purchase intention are fundamentally different, as intention of initial purchase refers to the subjective probability that the customer will make a purchase right after experiencing the website for the first time while intention of continued purchase refers to the subjective probability that the customer will return to the website in the future and make a purchase after the first and/or subsequent purchases. Hence, we will hypothesize the different impacts of quality dimensions on these two distinct yet related intentions in section 4.2. The relationships between website quality beliefs and intentions of purchase in our research models are based on behavioural intention theories such as the theory of reasoned action, the technology acceptance model and Triandis’ model of human behaviour (Fishbein and Ajzen 1975, Triandis 1982, Davis 1989).

4.1.1 Perceived system quality. Previous usability studies have referred to usability as a form of system design characteristic which corresponds to system quality (Harper et al. 1997, Kiraskowski et al. 1998). Similarly, we define perceived system quality as the degree to which the user believes the website is easy to navigate (Palmer 2002) and the interface interaction is consistent (Vassilopoulou et al. 2001, Raganathan and Ganapathy 2002). Usability
researchers suggest that organization and navigation are ‘important to outcomes’ (Nielsen 2000). The design, layout and sequencing of web pages should make it easy for customers to navigate (Schonberg et al. 2000). Yoo and Kim (2000) revealed in their study that designing effective link structures for customer interfaces is vital for the success of e-commerce websites. Similarly, difficulties in navigating e-commerce websites have been cited as a barrier for online purchases (Palmer 2002, Raganathan and Ganapathy 2002), while well-designed navigation is noted to exert a positive impact on sales at the website (Bellman et al. 1999). A good website interface will sustain customer interest in continuing to navigate the website. It enhances customer experience, and eventually, increases the likelihood of purchase at the website. Consistency of interface interaction is also important in system quality (Vassilopoulou et al. 2001, Palmer 2002, Raganathan and Ganapathy 2002). This means similar operations at a website should follow the same procedure; for example, the same blue button on each page should be clicked on to activate the search function (Vassilopoulou et al. 2001).

Hence, we propose:

**Hypothesis 1:** The perceived system quality of an e-commerce website is positively associated with intention of initial purchase and intention of continued purchase.

4.1.2 **Perceived information quality.** Perceived information quality is defined in this study as the degree to which the user believes that the information at the website possesses the attributes of content, accuracy, format (Rai et al. 2002) and timeliness (Doll and Torkzadeh 1988). Empirical findings support the observation that information quality positively influences user satisfaction (Negash et al. 2003) and perceived usefulness (Lin and Lu 2000). Palmer (2002) found that high information quality is positively associated with website success. In the e-commerce context, consumers are not fully informed about the quality of products and services offered at a website. As such, consumers seek information that allows them to distinguish a seller of high-quality goods or services (Boulding and Kirmani 1993). As there can be several websites offering information about similar products and services, what may draw users to a particular website to make purchases are the attributes of the information provided by the website (Raganathan and Ganapathy 2002). Thus, we propose:

**Hypothesis 2:** The perceived information quality of an e-commerce website is positively associated with intention of initial purchase and intention of continued purchase.

4.1.3 **Perceived service quality.** Perceived service quality is defined in this study as the degree to which the user believes the website is responsive, interactive (Palmer 2002), clear about security and privacy policies, and effective in its search and comparison capabilities (Vassilopoulou et al. 2001). Customer service on the Web can take many forms, such as answering customer enquiries and providing search and comparison capabilities (Koufaris et al. 2001, Vassilopoulou et al. 2001). Tools that enhance customer service include personalized web pages, the listing of frequently asked questions and web-based helpdesks. These tools may be classified under the service categories of interactivity and responsiveness. Interactivity includes the ability to customize the look, feel and content of the site as well as the provision for interaction with the user (Palmer 2002). Responsiveness is the provision of feedback to users and the availability of response from customer representatives (Palmer 2002). Websites must also demonstrate that the information they provide is to the benefit of customers and will not be used in any way detrimental to customer privacy concerns (Dinev and Hart 2004). Assurance that the website is secure for transactions is necessary to allay fears that the information customers send will not be intercepted by others (Sisodia and Wolfe 2000). Therefore, we hypothesize:

**Hypothesis 3:** The perceived service quality of an e-commerce website is positively associated with intention of initial purchase and intention of continued purchase.
4.2 Comparison of impact of website quality on initial and continued purchase intention

The direct relation that various website quality constructs maintain with intention of initial purchase and intention of continued purchase have not been closely examined in the IS literature. However, gleaning from related findings in other literature, we posit that different website quality constructs are likely to demonstrate different effects on the two types of purchase intention.

First, we expect system quality to exert a stronger effect on intention of initial purchase than on intention of continued purchase. As system quality is the primary interface between the user and the online company, it provides the user with the initial experience of the vendor, and could act to confirm or undermine initial impressions of the website. If users find the interface too difficult to use in achieving their purpose, they would have a poor impression of the company and defect to a rival website (Jupiter Research 2003). Conversely, if users are comfortable navigating the website on their first visit, they will be impressed with the ease of use of the website, gain confidence in it, and extend the confidence to the online company (McKnight et al. 2002). As users who have experience with a website are less likely to be daunted by the system features that have appeared at the site since their previous visit (Luhmann 1979), we posit that the impact of perceived system quality is weaker on intention of continued purchase than on intention of initial purchase.

Hypothesis 4. The positive association of perceived system quality with intention of continued purchase is weaker than that with intention of initial purchase.

Second, we argue that the respective effects of information quality on the two types of purchase intention are not significantly different. The information that an online company provides through its website is the primary means by which the customer understands more about the product or service being offered, and the decision to purchase or return in the future is often dependent on the information (Agarwal and Venkatesh 2002, Raganathan and Ganapathy 2002). Providing the correct and appropriate amount of information in a timely manner and in a suitable format at the website’s interface is critical to converting prospective customers into purchasing customers. It is also critical to maintaining satisfying relationships with existing customers (Sisodia and Wolfe 2000), and consequently, motivating them to return to the website to make purchases. As customers buy different products and services at various times and the information related to these products and services can change over time, the timeliness of information is often carefully examined for each purchase. Hence, quality of information is essential for the decision to purchase at the website for the first time as well as for making purchases in the future. Accordingly, we postulate that the impact of information quality on intention of initial purchase and that on intention of continued purchase are not significantly different:

Hypothesis 5: The positive association of perceived information quality with intention of initial purchase is not significantly different from that with intention of continued purchase.

Service quality often constitutes the purchase experience of customers with an online vendor as well as their expectations of it (Parasumaran et al. 1985), which cannot be evaluated easily until the transaction is experienced. The relationship marketing literature emphasizes the importance of purchase experience for retaining existing customers over acquiring customers (e.g. Ganesan 1994, Doney and Cannon 1997). With enhanced service quality made available at the website by the online vendor, value delivery improves, and longer-term relationships with customers are established, resulting in greater customer retention and loyalty (Reichheld and Schefter 2000, Sisodia and Wolfe 2000). Rogers and Peppers (1997) advocated that learning relationships, where web technology is used to maintain records of customer preferences and taste (e.g. personalization, transaction history, recommendations and customized search), can enhance customer convenience. Hence, we hypothesize that the impact of service quality is stronger on intention of continued purchase than on intention of initial purchase:

Hypothesis 6: The positive association of perceived service quality with intention of continued purchase is stronger than that with intention of initial purchase.

5. Methodology

In this section, we empirically validate the application of DeLone and McLean’s IS success model to a website quality study to predict customer intention of initial purchase and intention of continued purchase. We also seek to compare the differing impact of website quality on the two types of purchase intention using a website quality questionnaire.

5.1 Measurement of variables

Wherever possible, we draw on the existing literature and adapt existing instruments for measuring the variables in our study (Churchill 1979). In particular, we adapt the definition of intention to use in Davis (1989) to develop the constructs of intention of initial purchase and intention of continued purchase in e-commerce. Prior research has empirically justified the use of one item to measure
intention (e.g. Fishbein and Ajzen 1975). The other items are adapted from studies which measured the quality constructs in various contexts (see table 2). The variables were measured with a seven-point Likert scale (1 = strongly disagree, 2 = disagree, 3 = slightly disagree, 4 = neutral, 5 = slightly agree, 6 = agree, 7 = strongly agree).

To verify the questionnaire, a pre-test was conducted with 20 students in a large university a month before the final questionnaire was administered. The main purpose of the pre-test was the validation of instruments and to check if all the constructs were statistically free of problems in terms of reliability and validity of items. As we wanted to know if the respondents clearly understood the difference between intention of initial purchase and intention of continued purchase, we also conducted interviews during the pre-test. All the respondents reported that intention of initial purchase referred to the decision to purchase at a particular point of time, whereas intention of continued purchase referred to the decision to return and make purchases again in the future.

### 5.2 Sample and research procedure

Students from a large university were chosen to take part in the study from 21 to 31 October 2002. They were selected for their substantial experience in using websites for projects, assignments, interests and purchases. We focused on online service websites in the study as online customers obtain information about services on offer almost exclusively through the features of the website, unlike tangible products whose information can be obtained from offline sources. This meant that website features would play a more prominent role in user purchase decisions on the website. Moreover, much consumer research on intention to purchase and e-commerce website success has already been done on retail websites (e.g. Gefen and Straub 2000, Liu and Arnett 2000, Vassilopoulou et al. 2001). Service websites therefore were the better option for our study.

Specifically, Travelocity.com and Expedia.com, two international online travel companies, were chosen for our study. They were relatively unknown to the subjects, who were more exposed to local travel companies with an online presence. The choice of the two sites thus helped eliminate the effects of social influences on intention of initial purchase and intention of continued purchases among the subjects. Both the Travelocity and Expedia websites offered comprehensive features that allowed personalization, easy navigation and feedback, and they provided expert advice on vacation planning.

The students were invited to take part in the research through advertisements, and a cash reward was offered for their participation. Of all the students selected, 50 were randomly assigned to use Travelocity.com and the other 51 to Expedia.com. All confirmed they had not heard of or used the target websites before participating in the study. The subjects were asked to assume the role of a customer planning a vacation at a fixed destination in Asia with a given budget. The prices offered by both travel websites for the destination were very similar, and since only one destination within the budget was used, the effects of price and type of service offered on intention of initial purchase and intention of continued purchase were controlled for.

The subjects had to follow a comprehensive set of procedures on an instruction sheet to simulate the scenario of an online travel planning experience. This ensured the subjects went through the full decision making process that required them to access the various features necessary to making a purchase, such as frequently asked questions, personal preferences, policies of the website and search facilities. They stopped at the point before actually purchasing the air tickets and accommodation (for example, the stage where they were asked for their credit card information). The participants wrote down the choice of their flights and accommodation in the first part of the questionnaire and proceeded to complete the rest of the questionnaire (see Appendix A).

### 6. Data analysis and results

The website quality models for customer conversion and retention were linear multiple regression models. We tested the relationships using SPSS version 12.0.0. The beta coefficients of these two models were compared using a procedure described in Cohen et al. (1990, 2003) to determine if they were significantly different for a single sample.

#### 6.1 Descriptive statistics

Means and standard deviations for the constructs in the research model are reported in table 3. To compute these descriptive statistics, multiple-item scales were summed and

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Table 2. Constructs and measurements.

<table>
<thead>
<tr>
<th>Constructs</th>
<th>Number of items</th>
<th>Measurement sources (adapted)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived information quality</td>
<td>7</td>
<td>Doll and Torkzadeh 1988, Rai et al. 2002</td>
</tr>
<tr>
<td>Perceived service quality</td>
<td>7</td>
<td>Vassilopoulou et al. 2001, Agarwal and Venkatesh 2002</td>
</tr>
<tr>
<td>Intention of planned purchase</td>
<td>1</td>
<td>Fishben and Ajzen 1975, Davis 1989</td>
</tr>
<tr>
<td>Intention of continued purchase</td>
<td>1</td>
<td>Fishben and Ajzen 1975, Davis 1989</td>
</tr>
</tbody>
</table>
averaged. The means of all the variables were between 4.5 and 5.5. Standard deviation values were less than +1.50.

6.2 Reliability and validity

To ensure that the items comprising each variable were internally consistent, we carried out reliability assessment using Cronbach’s alpha. The Cronbach’s alpha coefficients for system quality, information quality and service quality were all above 0.90, exceeding the minimum acceptable level of 0.70 recommended by Nunnally (1978). The independent variables showed no problems of multicollinearity, with the Variance Inflation Factors all less than 2.50. The item-total correlation for each item was at least 0.65, demonstrating satisfactory convergent validity. Table 4 shows the Cronbach’s alpha coefficients for each construct and the item-total correlation for each item. Factor analysis using Principal Component Analysis with VARIMAX rotation showed clean loadings in the factor structure and demonstrated discriminant validity (see table 5). Thus, the questionnaire items possess construct validity.

6.3 Hypotheses testing

Figure 2 summarizes the results of the relationships for both models. In both the models of intention of initial purchase and intention of continued purchase, all the relationships were significant. The three website quality beliefs: perceived system quality, perceived information quality and perceived service quality explained 75.9% of the variation in intention of initial purchase and 70.3% of the variation in intention of continued purchase.

To examine if the website quality dimensions have differing impacts on intention of initial purchase and intention of continued purchase, the beta coefficients of both models were compared following the procedure of Cohen et al. (1990, 2003). The procedure began with saving the standardized predicted score of intention of initial purchase which consisted of the sum of the $\beta_i$ weighted $z_i$ scores. This score was then subtracted from the standardized score of intention of continued purchase. The difference was used as a dependent variable in a regression analysis of the three website quality constructs. The overall test of the significance of the $R^2$ would indicate whether the independent variables held different relationships with intention of initial purchase and intention of continued purchase collectively, and the tests of the individual $\beta_i$s would indicate which coefficients differed significantly and in which direction.

The $R^2$ of the resulting regression analysis described in the procedure above was 16.8% and was significant at $p < 0.01$. This illustrates that the three website quality constructs collectively held different relationships with the two dependent variables. Pertaining to the two dependent variables, system quality and service quality demonstrated significant differences. The $\beta$ coefficient of system quality in the initial purchase intention model (0.421) was higher than the $\beta$ coefficient in the continued purchase intention model (0.290), and they were significantly different at

<table>
<thead>
<tr>
<th>Item</th>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Factor 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>0.856</td>
<td>0.223</td>
<td>0.295</td>
</tr>
<tr>
<td>A2</td>
<td>0.803</td>
<td>0.191</td>
<td>0.194</td>
</tr>
<tr>
<td>A3</td>
<td>0.851</td>
<td>0.249</td>
<td>0.236</td>
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<tr>
<td>A4</td>
<td>0.725</td>
<td>0.343</td>
<td>0.334</td>
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<td>A5</td>
<td>0.756</td>
<td>0.334</td>
<td>0.221</td>
</tr>
<tr>
<td>A6</td>
<td>0.807</td>
<td>0.335</td>
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<tr>
<td>A7</td>
<td>0.689</td>
<td>0.316</td>
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<tr>
<td>B1</td>
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</tr>
<tr>
<td>C1</td>
<td>0.162</td>
<td>0.101</td>
<td>0.788</td>
</tr>
<tr>
<td>C2</td>
<td>0.209</td>
<td>0.240</td>
<td>0.777</td>
</tr>
<tr>
<td>C3</td>
<td>0.238</td>
<td>0.204</td>
<td>0.779</td>
</tr>
<tr>
<td>C4</td>
<td>0.324</td>
<td>0.323</td>
<td>0.646</td>
</tr>
<tr>
<td>C5</td>
<td>0.309</td>
<td>0.462</td>
<td>0.536</td>
</tr>
<tr>
<td>C6</td>
<td>0.278</td>
<td>0.284</td>
<td>0.621</td>
</tr>
<tr>
<td>C7</td>
<td>0.212</td>
<td>0.424</td>
<td>0.681</td>
</tr>
<tr>
<td>Eigenvalue</td>
<td>5.300</td>
<td>4.970</td>
<td>4.359</td>
</tr>
<tr>
<td>Percent explained variance</td>
<td>25.237</td>
<td>23.667</td>
<td>20.759</td>
</tr>
</tbody>
</table>

Table 3. Descriptive statistics.

<table>
<thead>
<tr>
<th>Construct</th>
<th>Mean</th>
<th>Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>System quality</td>
<td>4.90</td>
<td>1.13</td>
</tr>
<tr>
<td>Information quality</td>
<td>5.29</td>
<td>0.89</td>
</tr>
<tr>
<td>Service quality</td>
<td>5.34</td>
<td>0.89</td>
</tr>
<tr>
<td>Intention of planned purchase</td>
<td>4.96</td>
<td>1.30</td>
</tr>
<tr>
<td>Intention of continued purchase</td>
<td>5.04</td>
<td>1.25</td>
</tr>
</tbody>
</table>

Table 4. Cronbach’s alpha, item-total correlations and variance inflation factors (VIF).

<table>
<thead>
<tr>
<th>Construct</th>
<th>Cronbach’s alpha</th>
<th>Item-total correlation</th>
<th>VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>System quality</td>
<td>0.947</td>
<td>0.90, 0.78, 0.88, 0.81, 0.81, 0.81, 0.81, 0.71</td>
<td>2.078</td>
</tr>
<tr>
<td>Information quality</td>
<td>0.917</td>
<td>0.71, 0.77, 0.80, 0.81, 0.79, 0.66, 0.70</td>
<td>2.337</td>
</tr>
<tr>
<td>Service quality</td>
<td>0.900</td>
<td>0.65, 0.74, 0.76, 0.73, 0.69, 0.65, 0.75</td>
<td>2.188</td>
</tr>
</tbody>
</table>
0.01 \( (t = 2.66) \). Similarly, the \( \beta \) coefficient of service quality in the initial purchase intention model (0.250) was lower than the \( \beta \) coefficient in the continued purchase intention model (0.429) at \( p < 0.05 \ (t = 2.26) \). As we expected, the \( \beta \) coefficients of information quality in the two models were not significantly different, although the beta coefficient of information quality in the initial purchase intention model (0.312) was higher than the beta coefficient in the continued purchase model (0.226) \( (t = -1.95) \). Therefore, the results lend empirical support to all the hypotheses.

7. Discussion and implications

The result that all the website quality beliefs are positively related to intentions of initial and continued purchase provides support for applying DeLone and McLean’s model of IS success to examine website quality. Besides, the three dimensions of website quality explain over 70% of variance of intention of initial purchase and intention of continued purchase. This means that our research models can serve as a strong and robust yet more unified and parsimonious framework for website quality studies in the future.

In addition, the results show that the impact of each quality dimension is different not only in each model but also between models. First, our analyses demonstrate that the positive impact of system quality on initial purchase intention is higher than that of all the other website quality dimensions in the initial purchase intention model, and this impact is significantly stronger on initial purchase intention compared to continued purchase intention. Second, service quality’s positive impact is the greatest in the continued intention model, and this impact is also significantly stronger on continued purchase intention than on initial purchase intention.

The stronger impact of system quality in the initial purchase model concurs with the argument in Nielsen (2000) that users decide whether they stay or leave the website based on their initial experience with the system at the website. Users form a certain degree of confidence and trust in system quality after a favourable experience at the website. Users form beliefs about the attributes of an unknown vendor partly on the basis of their perceptions of system quality at the website (McKnight et al. 2002), and they seek assurance for their beliefs through experiential evidence (Fazio and Zanna 1981), which is obtained by navigating the website. If the system at the website makes it difficult for visitors to achieve their purposes (searching for product information and purchasing), the visitors are more likely to form negative impressions of the online company and defect to a rival website. Therefore, perception of system quality is more critical for customer conversion. Once customers have accumulated positive experience and are familiar with the website, system quality may only have limited impact in determining continued intention to purchase due to the formation of confidence and trust in the website system.

Conversely, unpleasant customer service at the website can ruin good first impressions about system quality (which come from easy navigation and consistent interfaces) and discourage customers from returning to the website. This leads to the conclusion that service quality exerts a greater influence on customer retention than on customer conversion. This is consistent with the relationship marketing literature, which emphasizes long-term relationship with consumers with the creation of values through technology (e.g. Rogers and Peppers 1997, Sisodia and Wolfe 2000). Properly and promptly answering customer inquiries, web pages that can be personalized, the frequently asked questions feature, responsive helpdesks, assurance on security and return policies, etc., can enable customers to define the value they want and enhance value for customers in the long term (Gordon 2000). As a result, customers are likely to return to the website continually in the future. Effective relationship management can be done through the website quality dimension of service quality, which is essential for customer retention in B2C commerce (Sisodia and Wolfe 2000).

On the other hand, the impact of information quality on customer conversion and retention is evident but not significantly different. This does not mean that information

\[ R^2 = 0.759 \]

\[ R^2 = 0.703 \]
quality is not significant. Rather, the result suggests that information quality is similarly important for both initial purchase and continued purchase. Customers who visit travel websites similar to those in our experiment are not likely to find an identical travel package at every travel website they visit. Hence, carefully analysing product or service information is always essential regardless of the number of visits customers make. Besides, timeliness of information is one of the critical success factors for travel websites because the price of airline tickets, for example, keep changing even by seconds. Customers use the attributes of information provided by websites to distinguish the seller of high quality goods or services from the seller of low quality goods or services (Boulding and Kirmani 1993).

We believe our research has contributed academically in three main ways. First, in view of the fragmented nature of the extant website quality research, our proposed model, which is fashioned after DeLone and McLean’s model of IS success, has served to unify past website quality studies by cogently classifying website quality attributes that have previously been identified into three quality dimensions. The statistical results, including reliability and validity tests, show that all the classifications are acceptable. Thus, these three website quality dimensions can be used to provide a more parsimonious model in website quality research in the future.

Second, we have tested three broad website quality dimensions against intention to purchase, unlike previous studies which simply examined website attributes against the outcomes of usability (e.g. satisfaction or effectiveness). Although satisfaction or effectiveness can be a surrogate measure of website quality, it may not lead to purchase, which is the final goal of improving website quality. Hence, we believe that the direct measurement of purchase intention which we have offered is a significant improvement in examining website quality.

Third, we have tested and found support for the differences in effects of website quality dimensions influencing customer initial purchase and continued purchase. The findings on the two types of purchase intention can be used by practitioners to tackle customer conversion and retention problems at e-commerce websites. To the best of our knowledge, this is the first study to differentiate the effects of website quality on initial purchase intention from those on continued purchase intention. This is a major and novel contribution as we have observed that past IS literature did not provide insight how the two types of purchase intention can be different. Our findings further confirm that consumers are affected by different dimensions of website quality based on their experience at the website. With this understanding, practitioners can efficiently differentiate website measures for converting visitors into customers and retaining existing customers.

To differentiate website quality measures for customer conversion and retention, a company can put more resources into improving system quality if it wants to increase the conversion rate while it can focus on service quality if it wishes to increase customer retention. In system quality, practitioners would do well to work on ease of navigation and consistency in layout. Appropriate sequencing of web pages and arrangement of various functionalities (i.e. standardized location of the search, purchase or check-out buttons) across web pages can increase navigability and consistency in layout. By more rigorously testing alternate site designs (Palmer 2002), website managers would know which sequences of web pages and what types of functionalities arrangement within each web page customers prefer. In service quality, websites should provide opportunities for customers to customize their experience in terms of the look, feel and content of the website. Product search and comparison can be made more effective with the inclusion of customer preferences in product search and compare tasks so that results of more relevance to the customer may be obtained. Customer feedback and questions should be addressed in the shortest possible time to show the website is responsive to customer needs. The privacy and security policies of the website ought to be conspicuously shown and easily understood by readers to address customer privacy and security concerns.

In addition, due to the proliferation of B2C websites, it is crucial for companies to ensure that the information they provide satisfies the needs of users and customers (Raganathan and Ganapathy 2002); by so doing, a company would distinguish itself from the competition and improve both its customer conversion and retention rates. Managers of websites need to realize that sufficiency and depth of content are vital for customers to make a purchase. Besides content, format of information affects whether the information is effectively communicated and understood. Hence, websites need to evaluate if the information they present in terms of content and format is in line with customer perspectives. This can be achieved through customer polls whenever product information is presented to the customer. In a dynamic world where information is rapidly changing, customers would want the information to be accurate and timely. Providing information which is accredited as trustworthy and giving the timestamp of the information can increase customer perceptions about the accuracy and timeliness of the information provided.

Looking beyond the contributions of this paper, we consider the limitations of our study and how our findings may be further validated and extended in the future. First, our findings can be further validated with actual first-time customers instead of a student sample engaged in an online purchase scenario. As all respondents went through a
comprehensive set of procedures in this study, future research can be conducted with customers who are exploring website features on their own initiative to achieve greater realism and generalizability of results. Moreover, this study assumed that respondents had made the initial online purchase in answering the questionnaire item of intention of continued purchase. Future research can utilize actual first-time customers to measure intention of continued purchase. Additionally, we have only looked at the effects of website quality on a specific online travel service while consumer behaviour and expectations may vary when consumers are presented with other products (Bevan and McLeod 1994). Thus, this study can be further extended to examine consumer website quality perceptions across a range of products and services.

8. Concluding remarks

E-commerce websites no longer simply provide information on companies but seek to convert users into customers and retain existing customers to increase the bottom line of the company. Therefore, website quality studies are of major interest to managers and web designers. This study has offered a robust and parsimonious model of website quality as a framework to classify disparate website quality attributes. Moreover, this study has distinguished the effects of website quality on initial purchase intention and continued purchase intention, and has illustrated how the different impacts of website quality dimensions can affect companies’ strategic choice on resource allocation in terms of improving customer conversion and retention. We believe the model and the findings hold considerable promise in helping practitioners and researchers better understand the relationship between the three website quality dimensions and the two types of purchase intention. We hope that this study can lay the groundwork for future studies in investigating the relationship between website quality and actual initial purchase and continued purchase behaviour at e-commerce websites.

References


Appendix A. Website Quality Questionnaire

A. Details of Vacation:
Departure Flight Number: _____________
Return Flight Number: _____________
Roundtrip Air-ticket price: __________
Hotel Name: ____________________________
Nightly Room Rate: $ _____________

Please indicate your agreement with the next set of statements in the following sections using the following rating scale.

1 2 3 4 5 6 7
Strongly disagree Disagree Slightly disagree Neutral Slightly agree Agree Strongly agree

A. System Quality:

1. The Travelocity website is easy to use. 1 2 3 4 5 6 7
2. It is easy to become skilful in using the Travelocity website. 1 2 3 4 5 6 7
3. Learning to operate the Travelocity website is easy. 1 2 3 4 5 6 7
4. The Travelocity website is flexible to interact with. 1 2 3 4 5 6 7
5. My interaction with the Travelocity website is clear and understandable. 1 2 3 4 5 6 7
6. It is easy to interact with the Travelocity website. 1 2 3 4 5 6 7
7. The overall page layout is consistent throughout the Travelocity website. 1 2 3 4 5 6 7

B. Information Quality:

1. Travelocity provides accurate information I need to purchase travel services. 1 2 3 4 5 6 7
2. Travelocity provides sufficient information to enable me to purchase travel services. 1 2 3 4 5 6 7
3. Travelocity provides enough depth of information about its service products. 1 2 3 4 5 6 7
4. The information provided is helpful to me in purchasing travel services. 1 2 3 4 5 6 7
5. The information is clear for me to make a purchase. 1 2 3 4 5 6 7
6. Travelocity uses graphics or animation effectively to communicate the information necessary for me to purchase its services. 1 2 3 4 5 6 7
7. Travelocity provides up-to-date information. 1 2 3 4 5 6 7

C. Service Quality:

1. It is easy to contact the customer representatives of Travelocity. 1 2 3 4 5 6 7
2. Travelocity allows me to provide feedback about the website and services. 1 2 3 4 5 6 7
3. Security and privacy policies are conspicuously displayed. 1 2 3 4 5 6 7
4. I am satisfied with the content of the security and privacy policy of Travelocity. 1 2 3 4 5 6 7
5. Travelocity is able to personalize the type of information to suit my needs in making a decision in vacation choices. 1 2 3 4 5 6 7
6. The frequently asked questions (FAQs) feature has assisted me in my use of the Travelocity website. 1 2 3 4 5 6 7
7. The search facility is useful in my search for information on flights and accommodation. 1 2 3 4 5 6 7

Effects of website quality
D. Intention of Initial and Continued Purchase:

1. Assuming I have the budget, I am very likely to purchase vacation services from the Travelocity website.
   Why?

   __________________________________________________________

2. Assuming I have the budget, I am very likely to purchase again from the Travelocity website in the future.
   Why?

   __________________________________________________________