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Key Dimensions of E-commerce Service Quality and Its Relationships to Satisfaction and Loyalty

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Abstract

Evidence exists that one successful strategy to satisfy and retain customers is offering superior service quality. Motivated by the growing interest in e-commerce, we focus our research questions on identifying the key dimensions of e-commerce service quality and its relationships to customer satisfaction and loyalty. In exploring answers to our research questions a hypothesized model is proposed and empirically tested using a research survey with 370 online shoppers. Salient results include: (1) key dimensions of e-commerce service quality are website usability, information quality, reliability, responsiveness, assurance and personalization; (2) customer satisfaction is influenced mostly with the perception of reliability, while customer loyalty is affected by the perception of assurance; (3) customer retention is predicted by the customer satisfaction index. Results of the study contribute to the nascent body of research in e-service quality and offer unique insights for managers of online firms on how to manage the quality of their e-commerce e-service.

Keywords: E-commerce, service quality, SERVQUAL, satisfaction, loyalty

1 Introduction

During the last decade companies accepted and adopted advanced web technologies to establish a web presence (Aladwani & Palvia, 2002). Such web presence not only supports traditional activities, but also supports new opportunities that arise from using the web as a new channel to conduct business-to-customer electronic commerce transactions. Establishing a web presence enables companies to reach global presence with low operating cost, offering information depth and providing their customers superior electronic service (e-service) quality (Vatanasombut et al., 2004). On the other hand, the web introduces industry to increased competition that makes satisfying customers difficult (Khalifa & Liu, 2004) and retaining customers a challenging issue (Vatanasombut et al., 2004).

Both concepts of customer satisfaction and customer retention have become increasingly important issues for e-business. A satisfied customer is more likely to stay with the same company (Lee & Lin, 2005), and effective loyalty building strategies enables e-business to grow in size and population (Vatanasombut et al., 2004). One way of enhancing customer satisfaction and increasing customer loyalty is through offering superior e-service quality (Lee & Lin, 2005; Zeithaml et al., 1996).

Unlike the concept of satisfaction that has been prominent and advanced to a level of substantial sophistication in the literature (Parasuraman & Grewel, 2000), and the construct of loyalty that has gained increasing attention (Zeithaml et al., 1996), the e-service quality area is in an early stage of research. According to Zeithaml et al. (2000), e-service quality is defined as the extent the web facilitates effective shopping, purchasing and delivery of products and services. Service quality is an elusive and abstract construct that is difficult to capture and measure (Cronion & Tayler, 1992). The most accepted and widely adopted instrument to measure service quality in traditional stores is the SERVQUAL model. The SEVQUAL model that was developed by Parasuraman et al. (1988) measures service quality on five dimensions, namely: tangibles, reliability, responsiveness, assurance and empathy. The developed instrument has been tested across spectrum of settings such as physical stores, healthcare, tourism, festivals, the automobile industry and information systems (Li et al., 2002).

Furthermore, the SERVQUAL model has been used in the context of e-commerce service (e.g., Sullivan & Walstrom, 2001; Barnes & Vidgen, 2002). Prior research adopted the SERVQUAL model by rewording, dropping or adding some items to measure e-service quality (Li et al., 2002). However, academic research has found that relevant aspects of service quality in traditional stores cannot simply be employed in the context of e-commerce (Parasuraman & Grewel, 2000; Parasuraman et al., 2005). In fact, researchers suggest using a modified and extended version of the SERVQUAL model to be used meaningfully in the context of e-service quality measurement (Lee & Lin, 2005; van Riel et al., 2001).

The current study attempts to drive the instrument dimensions of e-service quality through restructuring the dimensions of the SERVQUAL model. Moreover, the study develops the research model that examines the relations among the dimensions of e-service quality and the two concepts of customer satisfaction and loyalty intentions.

Consistent with research on satisfaction-loyalty relationships in traditional settings, this study examines the satisfaction-loyalty relation in the context of e-service.

Our research model is tested by a field survey of online shoppers and several analytical methods (factor analysis and structural analysis). Results of the study offer unique insights for managers of online firms on how to manage the quality of their e-commerce e-service. It also contributes to the vast amount of research in information systems, service marketing and consumer behavior by providing insights about e-service quality concept and its relation with customer satisfaction and loyalty.

This paper proceeds as follows. The second section presents the literature review. Next, we discuss the research model and hypotheses. Section four presents the research methodology. The fifth section explains research work and results. In light of the research findings, the paper provides conclusions and implications in section six. The paper ends with an acknowledgement of the study limitations and direction for future research.

2 Literature Review

Quality service is the customer's subjective assessment that the service they are receiving meets and exceeds their expectations (Parasuraman et al., 1988). A combination of theoretical and empirical research on traditional service quality resulted in developing the SERVQUAL model. The widely used SERVQUAL instrument is composed of five dimensions (Parasuraman et al. 1988):

- *Tangibles*: Appearance of physical facilities, equipment, personnel and communication materials
- *Reliability*: Ability to perform the promised service dependably and accurately
- *Responsiveness*: Willingness to help customers and provide prompt services
- *Assurance*: Knowledge and courtesy of employees and their ability to convey trust and confidence
- *Empathy*: Caring and individualized attention provided to customers

Several studies have applied the SERVQUAL model to measure service quality in the context of online stores. For example, Sullivan and Walstrom (2001) applied the five dimensions of the SERVQUAL model to measure service quality of web-based book dealers on five dimensions: tangibles, reliability, responsiveness, assurance and empathy. Similarly, Barnes and Vidgen (2002) carefully reworded the SERVQUAL model resulting in the development of the WebQual scale including five factors: usability, design, information, trust and empathy. Iwwarden et al. (2004) used the SERVQUAL instrument by rewording its measures to identify dimensions of e-service quality. Their work resulted in identifying five dimensions: fast access, easy navigation on the website, presentation of complete offer, order's overview before final purchase decision, assurance and simple registration process. However, this procedure of employing the SERVQUAL model by rewording its items has been found to be insufficient in the context of e-commerce (Parasuraman et al., 2005). Moreover, the generic dimensions of the SERVQUAL model need to be reformulated

to be used meaningfully in the context of e-service (Lee & Lin, 2005). Service quality research indicates that studying e-service quality is more valuable when it is associated with variables such as perceived control, perceived risk and satisfaction (Lee & Lin, 2005; Zeithaml et al., 2000). As online customers are more difficult to satisfy and retain compared to the traditional customer (Lee & Lin, 2005), this study focuses on online customer satisfaction and loyalty.

Customer satisfaction is an evaluative process, where customers examine the results of their service use and is defined as "... a judgment that a product of service feature, or the product or service itself, provided (or is providing) a pleasurable level of consumption-related fulfillment, including levels of under or over fulfillment" (Oliver, 1997, p. 13). Customer satisfaction is captured as positive feeling (satisfaction), indifference, or negative feelings (dissatisfaction) (Bhattacharjee, 2001). Dissatisfaction in the context of e-commerce has been observed in several sectors such as Internet service providers, e-brokerage and e-retailing (Bhattacharjee, 2001). For example in e-retailing, dissatisfaction is evident when customers are disillusioned with unfulfilled promises, late delivery, and out-of-stock items (Bhattacharjee, 2001). Prior research has distinguished between two types of customer satisfaction, namely, (a) service encounter satisfaction that is transaction-specific and (b) the overall satisfaction that is relation-specific (Shankar et al., 2000), i. e. the latter being the type of customer satisfaction this study focuses on.

Research suggests that satisfaction with the purchase decision relates to customers retention (Lee & Lin, 2005). Loyalty can be defined as the customer's commitment to a company, or intentions to maintain an ongoing relationship with the service provider (Zhang & Prybutok, 2005). The satisfaction-loyalty relationship has been found to apply in both offline as well as in online stores (Zhang & Prybutok, 2005). For example, Kim et al. (2002) found a significant relationship between customer satisfaction and loyalty intentions in virtual malls, search portals, online stock brokerages and online network games. Based on prior research, the current study develops and tests empirically a model of e-service quality and the interrelations among e-service quality, customer satisfaction and loyalty.

3 Research model and hypotheses

Because the existing research on e-service quality has been described as fragmented and unvalidated (Wolfenbarger & Gilly, 2003), a comprehensive framework is needed to identify the dimensions of e-service quality and their influence on customer satisfaction and customer loyalty (Zeithaml et al., 2000). This study aims to cover this gap in research by proposing and testing empirically the following research model.

3.1 Dimensions of e-service quality

This study reformulates the generic dimensions of the SERVQUAL model. Following we will discuss in some details how each of the SERVQUAL model dimensions (tangibles, reliability, responsiveness, assurance and empathy) is restructured and defined in the context of e-service.

Tangibles

As the tangibles dimension of the SERVQUAL model corresponds to the staff appearance and physical facilities the interface design and website usability are the tangible elements of the online store (Zeithaml et al., 2000). Offering customers a well-designed website that is easy to use is the starting point for the user to gain confidence (Muda & Muda, 2002). The website's search function, download speed and organization are among the key elements that affect usability (Parasuraman et al., 2005).

Reliability

Reliability in the SERVQUAL model is the company's ability to do what it promises (Parasuraman et al., 1988). Reliability is the dominant dimension in traditional service quality (Parasuraman et al., 1988). In the context of the web, reliability is defined as the proper functioning of the website and the ability to perform the promised services dependably and accurately (Parasuraman et al., 2005). Moreover, the reliability of the website can be reflected in the reliability of the information that is captured by information quality. Miller (1996) states that information quality should meet certain criteria, namely: accuracy, timeliness, relevance and understandability. The presence of high quality information increases satisfaction with both the experience and product purchase (Lee & Lin, 2005).

Responsiveness

In an examination of the top 100 U.S. retailers, responsiveness was a key indicator of e-service quality (Zeithaml et al., 2000). Responsiveness is measured by the promptness with which the e-retailer responds to customer questions and problems. In offering good customer service, the response to the customer inquiry promptly improves the perception of service quality (Parasuraman et al., 1988) and customer satisfaction (Lee & Lin, 2005).

Assurance

One of the primary barriers to online shopping is the concerns about security (Zeithaml et al., 2000). Despite the technical advancements in Internet security such as cryptography, digital signatures, certificates, online customers are still concerned about security issues when shopping (Ranganathan & Ganapathy, 2002). It has been found though that perceived assurance has a significant influence on the intentions to purchase online (Lee & Lin, 2005). Zeithaml et al. (2000) refer to assurance in virtual space as "... the degree to which customers believe the site is safe from intrusion and personal information is protected ... involves the confidence the customer feels in dealing with the site and is due to the reputation of the site and the products or services it sells" (p. 16).

Personalization

Empathy in the SERVQUAL model refers to the individualized attention that companies offer their customers. In this respect, empathy in the context of the web becomes the personalization construct (Zeithaml et al., 2000). The Internet is a bi-directional communication (Li et al., 2001). Therefore, online firms are empowered to know the customer's shopping habits, preferences and needs. Offering customized products and recommendations that meet customers' preferences influences their satisfaction and intentions to repurchase (Lee & Lin, 2005). Accordingly, it is hypothesized that:

H_{1.1-1.7}: Dimensions of e-service quality are interface design; website usability, information quality, reliability, responsiveness, assurance and personalization are the key dimensions of e-service quality.

3.2 Customer satisfaction and loyalty

Customer satisfaction has become one of the top management priorities of today's businesses (Kardaras & Karakostas, 1999). Satisfied customers are less expensive and perform as a source of positive word-mouth that is even more effective than advertising in print or mass media channel (Bhattacharjee, 2001). Moreover, customer satisfaction helps to ensure customer retention, which is far less costly than customer replacement (Hill, 1997). Pervious research has found that customer satisfaction is a function of perceived service quality (Lee & Lin, 2005). Several studies examined satisfaction-loyalty in physical stores (Shankar et al., 2002), but still we do not know how this relation is transferred in the e-commerce setting. Building on prior research, it is hypothesized that:

H_{2.1-2.7}: The perception of e-service quality influences positively customer satisfaction

H_{3.1-3.7}: The perception of e-service quality influences loyalty intentions

H₄: Customer satisfaction influences positively loyalty intentions

4 Research methodology

In order to develop the instrument dimensions of e-service quality, dimensions of e-service quality have been first conceptualized (see table 1 for the conceptualization of the instrument dimensions). This step is important in that it refers to relevant research that can be used to generate samples of items to operationalize the envisioned and proposed constructs. Measures of satisfaction and loyalty were adopted from Zhang and Prybutok (2005) and Parasuraman et al. (2005), respectively. Scale's items were measured using seven-point Likert-type scales ranging from (1) strongly disagree to (7) strongly agree.

Table 1. Definition of e-service quality constructs

Construct	Definition
Website Design	The extent to which the website interface is well designed and visually appealing
Website usability	The extent to which the website is well-structured and easy to navigate
Information quality	The extent to which the website offers high content quality
Service reliability	The extent to which the website performs services as promised and the correct technical functioning of the website
Responsiveness	The extent to which it is possible to get a quick response and needed help using automated and human factors
Assurance	The extent to which the website conveys trust and confidence
Personalization	The extent to which the website provides individualized attention

Research has demonstrated the importance of considering customer perception when studying service quality (Zeithaml et al., 1990). The current study invited college students to participate in the research as targeted subject for the following reasons. First, the young adult population is the most active among web users (Jupiter, 2004). Second, about 86% of college students have unlimited free access to the Internet and were rather familiar with the medium (Walczuch & Lundgren, 2002). Third, 81 % of college students have made an online purchase for products (64 % compact disks, 58% books and 42% clothing) (Pastore, 2000) which are the type of products this study focuses on. Fourth, the use of college students decreases the effect of variance on web-based literacy when not exposed to all factors (structure, roles and responsibilities) of the real world environment (Lee & Lin, 2005). The obtained sample size (N = 370) is considered sufficient and exceeds the five cases to one item ratio needed in conducting factor analysis and structural analysis (Hair et al., 1998). The age profile of participants represents most age groups, with the majority (46 %) being in the 20 to 32 age range and sixty-four percent of the respondents were male. As a result, the sample is considered representative to United States Internet users (Burns, 2005). After the data collection, data are purified by conducting reliability analyses and exploratory factor analysis.

4.1 Exploratory factor analysis

Exploratory Factor Analysis (EFA) provides a useful method for data purification, especially, when a confirmatory factor analysis is needed in a subsequent step (Hair et al., 1998). According to Garson (2006), it is recommended to use Principal Axis Factoring (PAF) as the extraction method and Varimax rotation when the factors are going to be used in a subsequent analysis. EFA using the Varimax rotation and the PAF extraction method was conducted on the 47 items related to quality. The resulting factor solution indicates the existence of six factors: website usability,

information quality, reliability, responsiveness, assurance and personalization. Items of the *interface design* dimension were eliminated in terms of loading significantly on more than one dimension and low correlation with items of the same trait following the recommendations of Hair et al. (1998). As a result, the scale refinement process shortened the scale to 27 items.

4.2 Structural equation modeling

Structural Equation Modeling (SEM) was conducted by following a two-step process recommended by Anderson and Gerbing (1988). First, a measurement model was developed by conducting confirmatory factor analysis. Second, a theoretical model was built to test the hypothesized research model.

4.2.1 Confirmatory factor analysis

Confirmatory Factor Analysis (CFA) was run on the purified scale to examine the reliability and validity of the measurement model (Hatcher, 1994). Variety of indices were used to assess the model's goodness of fit such as normed Normed χ^2 (Ratio of the chi-square to the degrees of freedom), Goodness of Fit Index (GFI), Adjusted Goodness of Fit Index (AGFI), Bentler's Comparative Fit Index (CFI), the Bentler & Bonett Non-Normed Fit Index (NNFI) and the and Root Mean Square Error of Approximation (RMSEA) (Hatcher, 1994). The Normed χ^2 was 1.73 less than the cut-off value of 3.0 suggested by Bagozzi and Yi (1988). The Goodness of Fit Index (GFI) value was 0.95 and the Adjusted Goodness of Fit Index (AGFI) was 0.91 both indicating good fit (Bagozzi and Yi, 1988), while both of the CFI test and the NNFI test were 0.96 and 0.95, respectively, exceeding the cut-off value of 0.90 and indicating a very good incremental fit. The value of the RMSEA was .047 indicating a good fit (Hatcher, 1994) (see table 2).

4.2.2 Reliability and validity evaluation

Reliability of the developed instrument was tested by calculating coefficients Alpha for constructs of e-service quality (see table 2 for a complete list of reliability coefficients).

All of the e-service quality dimensions exhibited an acceptable level of reliability as they exceeded the 0.70 (Hair et a., 1998). Results of confirmatory factor analysis indicate that each item loaded significantly on its respective underlying construct, significantly with t-values greater than 2, indicating the convergent validity of the instrument (Hatcher, 1994). Discriminant validity was assessed using the confidence interval test. None of the calculated confidence intervals included the value of one, providing evidence on the discriminant validity of the constructs (Hatcher, 1994).

Table 2. Results of confirmatory factor analysis

Construct/Item	Loadings (a)	t-value (b)	Std Err	Cronbach h Alpha
Information Quality				0.891
IQ1: Information is current and timely	.881	19.71	0.07	
IQ3: Information is accurate and relevant	.867	19.65	0.08	
IQ4: Information is at the right level of detail	.844	19.52	0.08	
IQ5: Information is pretty much what I need to carry out my tasks	.851	19.45	0.08	
	.848	19.54	0.07	
IQ6: Information is easy to understand				0.910
Website usability	.881	18.76	0.07	
US1: website well organized.	.876	18.20	0.06	
US2: Navigation is consistent and standardized	.845	18.64	0.07	
US4: Scrolling through pages is kept to minimum.	.838	18.57	0.07	
US5: Graphics and animation do no detract from use				0.876
Reliability	.901	17.23	0.07	
REL1: When the website promises to do something it does so	.871	17.45	0.07	
REL2: Relevant order confirmation details is sent to the customer	.866	17.73	0.06	
	.864	18.31	0.07	
REL3: Order cancellation and returns are confirmed	.887	18.23	0.06	
REL4: Order tracking details are available until delivery	.712	20.01	0.07	
REL5: Website service performs the service right the first time				0.873
REL6: Website is available all time	.899	18.06	0.06	
Responsiveness				
RES1: Website service shows a sincere interest in solving customer's problems	.876	18.01	0.05	
RES2: Automated or human e-mail responses give customer prompt service	.869	17.95	0.06	
	.865	17.66	0.06	
RES3: Emails' responses are relevant and accurate	.767	16.89	0.05	
RES4: Emails' content is appropriate to customer requirements				
RES5: Website addresses are included in all existing documentation, publicity and advertising channel	.923	21.12	0.08	0.889
Assurance	.941	21.18	0.08	
ASS1: Security policy is accessible	.867	19.24	0.07	
ASS2: Privacy policy is accessible	.888	19.32	0.07	
ASS3: The website contains company details				
ASS4: The website's retailer is widely known for having a good reputation	.923	17.11	0.05	0.924
Personalization	.885	18.10	0.05	
PER1: The website gives me personal attention				
PER2: The website enables me to order the product in a way that meets my needs	.862	18.64	0.05	
PER3: The website understands my specific needs				

(a). Extraction Method: Principal Axis Factoring ; Rotation Method: Varimax with Kaiser Normalization.; loadings < 0.30 not shown

(b). These are standardized loadings estimates from CFA using the CALIS procedure of SAS package.

(c). Based on t-tests for null hypothesis, *t-value* greater than 1.96 are significant at $p >: 0.05$; *t-value* greater than 2.567 are significant at $p >: 0.01$; *t-value* greater than 3.29 are significant at $p >: 0.001$ (Hatcher, 1994).

Predictive validity was assessed by examining the relationship between e-service quality and the two constructs of customer satisfaction and loyalty, as discussed in the next section.

4.2.3 Structural analysis

A structural model was developed by specifying that e-service quality dimensions influence the construct of overall satisfaction and loyalty intentions. In addition, the association between customer satisfaction and customer loyalty was tested. Utilizing the modification indices of the Lagrange multiplier index and the Wald test (Hatcher, 1994) resulted in the model described in figure 1. According to the structural analysis, we have found that all dimensions of e-service quality affect significantly customer satisfaction with assurance and reliability being the most important factors that influence customer satisfaction. On the other hand, the identified dimensions of e-service quality except of personalization affect customer loyalty. Surprisingly, personalization has been found to affect customer loyalty indirectly by influencing satisfaction that affects loyalty intentions.

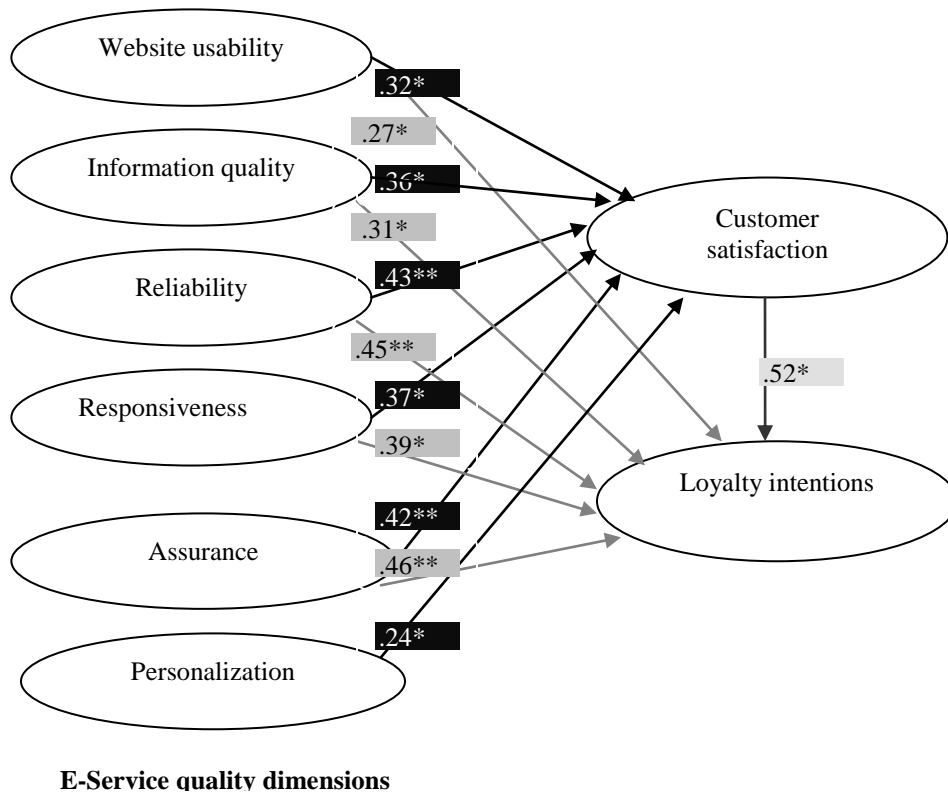


Figure 1. Results of structural analysis

5 Discussion and implications

Previous research has shown that the widespread consumer experiences of inadequate e-service quality stall the growth of the emerging economy (Santos, 2003). Therefore, it is important to develop an appropriate instrument to measure e-service quality. The current study develops a comprehensive instrument by reformulating the SERVQUAL model to be used meaningfully in the context of e-commerce. The resulting instrument measures e-service quality on six dimensions: website usability, information quality, reliability, responsiveness, assurance and personalization. The dimension of the *interface design* did not reveal as a distinct dimension. Li et al. (2002) suggest that customer preferences on such items may not be always linear. For example, some online shoppers may prefer high quality graphics, while others may prefer a simpler interface that does not include an excessive flash animation. The developed instrument helps managers of online firms in identifying potential problematic issues in their e-service systems that need taking corrective actions. Managers of online firms need to consider that employing advanced web technologies is not a guarantee of successful e-service systems. Online customers need and value human interaction of e-service systems especially, when questions arise and problems occur. Moreover, websites should be developed considering the average skills of online users by designing an easy to use website, including understandable information, offering help through different channels (e.g., callback centers, chat windows, and emails).

Improving customer satisfaction and loyalty may be more challenging in the Internet economy (Bhattacharjee, 2001). One successful strategy in improving satisfaction and customer retention is the concept of service quality (Zeithaml et al., 1996). However, a limited number of studies have examined the relation among different dimension of e-service quality, satisfaction and loyalty intentions (Lee & Lin, 2005; Parasuraman & Grewel, 2000). This study covers this gap by testing the influence of e-service quality on customers' satisfaction and loyalty intentions. The dimensions of e-service quality were found to be significantly influencing customer satisfaction and loyalty, with reliability as the factor that mostly influences customer satisfaction and assurance as the dimension that has the greatest effect on loyalty intentions. This suggests that managers should focus on developing efficient logistic support to ensure accurate service delivery and fulfillment. Alternatively, online managers could offer their customers the ability to pickup their purchase online from physical touch-points to resolve the last mile problem of delivery. Furthermore, online managers need to pay more attention to developing secure websites considering technological issues and marketing policies. Additionally, the responsiveness, information quality and website usability dimensions were found to affect significantly both customer satisfaction and loyalty. Rationally speaking, online customers value the website that is well organized, supported with search and comparison features, associated with high quality information and responds efficiently to customer questions. Such superior quality e-service meets the customer expectation resulting in satisfaction that influences customer intention to repurchase, commit and recommend (loyalty). Thus, managers may want to emphasize the benefits associated with online shopping such

as saving time, depth of information and resolving immediate needs. Interestingly, the personalization construct was the only dimension that affects directly customer satisfaction, and indirectly (through satisfaction) customer loyalty. Firms should focus on providing customized service for their customers to improve their satisfaction. However, the online customer is unwilling to trade security with personalized offers and services. Therefore, managers should first understand their customers and cluster them into segments according to their profile. This will help in applying the right personalization technique that increases the pleasant feelings associated with customer online purchase transactions without affecting the assurance perception of the website that may weaken their loyalty.

The satisfaction-loyalty relation has previously been validated in consumer behavior research over a wide range of service contexts (Shanker et al., 2002); its validation in the context of e-commerce service further attests to the robustness of this association. Research work suggests that the satisfaction-loyalty link is significant. This implies that satisfaction is an important predictor of customer loyalty and should be considered a key business metric of customer retention. Online managers could measure the customer's satisfaction using a scale similar to the one used by this study to predict their customer retention. As other studies on service quality and consumer behavior, the study suffers from a number of limitations.

6 Limitations

The study involves a number of limitations that need to be addressed. Acknowledgement of these limitations suggests directions for future research. First, the study suffers from methodological limitations associated with survey-based research. Thus, it is recommended to replicate the study using different national and international samples. Second, the study used a modified version of the SERVQUAL model in identifying the dimensions of e-service quality. Adopting qualitative research methods may result in additional findings on how customers measure and perceive e-service quality. Thirdly, the research tests the relations between the dimensions of e-service quality and loyalty. However, other aspects of customer loyalty such as switching behavior and communicating negative word-of-mouth information have not been considered. Thus, understanding the influence of e-service quality on different aspects of loyalty would be a fruitful avenue of research.

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