



Consumer perception of interface quality, security, and loyalty in electronic commerce

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ABSTRACT

Customer interface quality, perceived security, and customer loyalty are critical factors for success of an e-commerce website; however, the relationships among them are not fully understood. We proposed a model for testing the relationships among them and the important outcomes of the site: switching costs and customer loyalty. Data was collected to test the model using a web-based survey, and empirical analyses were performed using SEM. The analytical results demonstrated that customer interface quality and perceived security positively affected customer satisfaction and switching costs, and thus customer loyalty to an e-commerce website. Specifically, our study showed that switching costs positively moderated the effect of customer satisfaction on customer loyalty; this moderating effect is discussed.

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1. Introduction

It is difficult to build customer loyalty in e-commerce transaction primarily because of the low switching costs when competition is only a click away. Hence, online companies have been eager to launch loyalty programs whereby customers obtain benefits by conducting most of their online shopping at one website, creating positive lock-in.

Marketers have attempted to discover the major factors leading to customer loyalty. Customer satisfaction is obviously one, and although many studies have identified other factors [10], the impact of the customer interface and its perceived security on customer loyalty has generally been ignored.

In real-world commerce, salespeople influence customer satisfaction, but in the context of e-commerce, they are replaced by a customer interface, which provides information to prospective customers and helps to counter the disadvantages of impersonal websites. Consequently, the quality of the customer interface can influence consumers' purchase intentions and, thus, the financial performance of the e-business. Moreover, consumer attitudes and beliefs about security have significant effects on the

intention to purchase online. This is possibly because customers no longer interact with a salesperson and must rely on electronic payment methods, which increases their perceived risk. Hence, lack of security, as perceived by online consumers, is one of the main obstacles to the development of e-commerce, and studies [14] have recognized perceived security as being important in online purchase decisions. However, despite the recognition of a need to build a perception of security, little effort has been made to investigate the factors that affect it in an online shopping context.

Furthermore, while customer interface quality and perceived security have been recognized as critical factors for success, few studies have examined whether they affect customer satisfaction and switching costs, and in turn, influence customer loyalty. Therefore, in order to understand the relationships among customer interface quality, perceived security, customer satisfaction, switching costs, and customer loyalty, we developed a research model to examine the relationships among these constructs in the context of e-commerce.

2. Literature review

2.1. Customer interface quality

Customer interface quality is a multi-faceted concept that is a measure of the shoppers' perception of quality of a transaction from pre- to post-purchase [15]. Parasuraman et al. [16] developed a scale with four dimensions (i.e. efficiency of the website, system

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availability, privacy, and the post-transaction experience) while Bauer et al. [5] used five eTransQual dimensions (functionality/design, enjoyment, process, reliability and responsiveness).

Since all of these measures have several components, a single study cannot include all possible customer interface features from all previous studies. For an online store, the customer interface serves as the store “atmospherics” [7,9], which is an attempt to design a web environment that has positive emotional effects on a visitor (a potential buyer) to increase the chance of making a sale. Based on this, our study primarily focused on the components of customer interface quality that are related to online store atmospherics rather than to the entire online buying experience. We adopted four components of customer interface quality that deal with its atmosphere:

- *Convenience* → the extent to which a customer feels that a website is easy to navigate (i.e. user-friendly). About two-thirds of all e-commerce transactions are not completed because shoppers cannot find the information they need to complete the purchase quickly.
- *Interactivity* → the degree to which an e-commerce website facilitates two-way communication with its customers. In physical stores, the atmosphere includes the staff and fellow customers. For an online store, the customer interface substitutes for the salesperson when interacting with customers. The interactive nature of websites has been credited with positively affecting consumer response, including a desire to return to the website.
- *Customization* → the ability of a website to tailor products, services, and the transactional environment to individual customers. It increases the probability that customers will find something that they wish to buy and creates the perception of increased choice by enabling users to focus on what they really want, making the site more appealing.
- *Character* → an overall image or personality that the online store projects via its website to consumers through the use of inputs (fonts, graphics, colors, and background patterns), which can serve the function of making the visual content easy to read, can create an atmosphere that makes the shopping experience more pleasurable, or instill a sense of confidence in shopping with a previously unknown online store.

2.2. Perceived security

In e-commerce, consideration of security refers to customer perceptions of the security of the transaction as a whole (including means of payment and mechanisms for the storage and transmission of all personal information). A lack of perceived security is a major reason why many potential consumers do not shop online because of common perceptions of risks involved in transmitting sensitive information, such as credit card numbers, across the Internet. Consumers who provide personal information during transactions assume the risk of having this information compromised. Hence, a major concern of online customers is the security of their transactions. Accordingly, we defined perceived security as the extent to which a potential customer believes that the e-commerce website is secure for transmitting sensitive information. This definition denotes a personal perception rather than any objective measurement, and assumes a customer's intuitive ability to assess risk.

2.3. Customer satisfaction

Customer satisfaction is an affective response to a purchase, and it is an important goal in consumer marketing. There are two different ways of determining overall satisfaction:

- the *transaction-specific* approach considers the emotional response by consumers to their most recent experience with a provider, while
- *cumulative customer satisfaction* is based on the customer's overall experience with a particular firm over time.

In addition, some see overall satisfaction as a function of perceived service quality. Here we treat customer satisfaction as a cumulative factor.

2.4. Switching costs

Switching costs have been investigated from many perspectives. Burnham et al. [6] broke down switching costs into procedural (the time and effort involved), financial (quantified loss) and relational (personal and brand relationship loss causing psychological discomfort due to the breaking of bonds). Thus switching costs are not only economic in nature, but can also be psychological and emotional. We therefore defined switching costs as the consumers perceptions of the time, money, and effort associated with changing e-service providers.

2.5. Customer loyalty

Most of the early literature emphasized the behavioral dimensions of loyalty, such as repeat purchase behavior, concentrating on the development of models designed to predict repurchase rates. Later, this was considered insufficient, because it did not distinguish between true customer loyalty and spurious customer loyalty, possibly resulting from a lack of alternatives. So, recently, customer loyalty has been considered an attitude construct. Thus in our research, we defined customer loyalty as a customer's favorable attitude toward an e-commerce website that predisposes the customer to repeat buying behavior.

3. Research model and hypotheses development

3.1. Research model

Our research model is shown in Fig. 1, in this a relatively old cognition–affect–behavior (C–A–B) model was adopted. *Cognition* consists of beliefs, thoughts, or perceptions formed through interaction with marketing stimuli (e.g. products, services, and shopping environments). *Affect* refers to a favorable disposition toward a stimulus that leads to a relative preference for the product in that particular stimulus. Based on the model, our study posited that customer perceptions of interface quality and security (i.e. cognition) formed through interaction with an e-commerce website positively affected customer satisfaction and switching costs (i.e. the affect), and thus customer loyalty (i.e. behavioral intention).

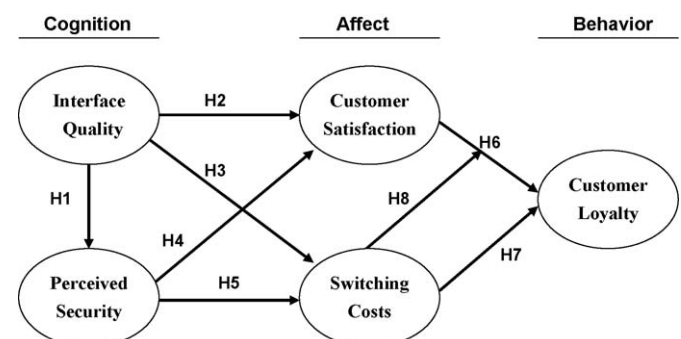


Fig. 1. Research model.

3.2. Hypotheses development

3.2.1. Customer interface quality and perceived security

From an environmental psychology perspective, physical store “atmospherics” elicit cognitive responses, influencing people’s beliefs about a place. For an online store, the customer interface replaces the atmosphere of the physical store, and thus serves as an online environmental cue, especially during transactions. Therefore, if a website is aesthetically pleasing, customized and well-organized, consumers may assume that the online store is willing to invest in maintaining a relationship with them, and consequently may regard the online retailer as trustworthy [13], thus raising the level of perceived security.

Furthermore, according to inference theory, people make judgments about the unknown on the basis of information they receive from cues that are available to them [3]. Online shoppers are particularly worried about disclosing personal information, because they think it may be put to fraudulent use. Thus, consumers may use interface quality as a surrogate indicator when forming beliefs about security. For example, a website’s convenience refers to the extent to which a customer feels that a website is user-friendly. When clear paths are not provided, shoppers are unable to navigate the website, and have difficulty getting the information they need; this may generate negative perceptions about site security. Hence, we posited that:

H1. Customer interface quality has a significant positive influence on perceived security.

3.2.2. Customer interface quality, satisfaction and switching costs

Studies have shown that customer satisfaction toward a website depends primarily on the evaluation of its attributes; for example, Szymanski and Hise [20] found convenience, site design, and security to be important factors in e-commerce customer satisfaction.

Furthermore, despite the ease of making comparisons online, online shoppers perform less comparison shopping than brick and mortar shoppers, because the search costs associated with shopping across online stores increases with the number of alternatives. A good website avoids wasting customer time by providing orderly screens, simple search paths, fast and readable presentations, and simple navigation; these, in turn, reduce customer switching behavior. Although there has been little research in this area, it is likely that customers keep on using whatever website they perceive as having high interface quality. Hence, we posited:

H2. Customer interface quality has a significant positive influence on customer satisfaction.

H3. Customer interface quality has a significant positive influence on switching costs.

3.2.3. Perceived security, satisfaction and switching costs

Consumers’ attitudes and beliefs about security have had significant effect on their intention to purchase online. Personal risk behavior may be understood by measuring perception of web-based security; and previous work has shown that perceived security is a significant contributor to customer satisfaction [11].

According to social exchange theory, exit from, or maintenance of, exchange relationships depends on expectations about the costs and benefits of the relationships, weighted against the expected benefits of alternatives. Thus, online customers tend to keep on using a website that they perceive as having high security. Thus high switching costs are engendered when a customer perceives one e-commerce website as being secure; thus high perceived

security is likely to be associated with high switching costs. We thus posited:

H4. Perceived security has a significant positive influence on customer satisfaction.

H5. Perceived security has a significant positive influence on switching costs.

3.2.4. Customer satisfaction, switching costs and loyalty

Satisfaction results from the cumulative impressions of online customers of a specific website’s performance. According to expectations-disconfirmation theory, when customers are satisfied, they believe that a website will deliver what they expect. Therefore, customer satisfaction acts as an antecedent to loyalty. In addition to customer satisfaction having a significant association with customer loyalty, switching costs also have explanatory power. In fact, switching costs have a stronger effect on customer loyalty, explaining more variance than satisfaction.

Furthermore, the moderating effect of switching costs on the customer satisfaction–loyalty link was found to be negative in much empirical research (e.g. [2,12]). The influence of customer satisfaction on customer loyalty decreases under conditions where high switching costs are perceived by customers. In contrast, Yang and Peterson [21] argued that switching costs may positively moderate the effect of satisfaction on customer loyalty. However, the results of their study showed that the overall moderating effects were insignificant, and the positive moderating effect of switching costs was significant only when customer satisfaction was higher than average.

In e-commerce, switching costs include not only those that can be measured in monetary terms, but also the psychological effect of becoming a customer of a new product or service provider, and the time and effort involved in buying products from a new provider. Switching costs can thus increase online customer dependence on an existing provider. Despite the ease of making comparisons online, empirical evidence suggested that online shoppers perform less comparison shopping and tend to switch suppliers less than brick and mortar shoppers [4]. Accordingly, our study inferred that there is a weaker relationship between customer satisfaction and loyalty when an online customer perceives high costs of switching. We thus posited:

H6. Customer satisfaction has a significant positive influence on customer loyalty.

H7. Switching costs have a significant positive influence on customer loyalty.

H8. The relationship between customer satisfaction and loyalty is weaker when customers perceive higher switching costs.

4. Research methodology

4.1. Measurement

We used a questionnaire to measure consumer perceptions of the research constructs using multiple-item scales, adapted from previous studies that reported high statistical reliability and validity. The scale for measuring customer interface quality was that of Srinivasan et al. [19]. The items for perceived security were derived from Salisbury et al. [18], with slight revisions. The scale for switching costs was adapted from a rather old study by Ping [17], while the items to assess customer satisfaction and customer loyalty were based on Anderson and Srinivasan [1]. Each item was measured on a seven-point Likert scale ranging from (1) Strongly Disagree to (7) Strongly Agree.

The questionnaire was first pilot tested with a convenient sample, and items were revised before finalizing the main survey content. 79 questionnaires were completed in the pilot test, and we evaluated the results using an item identification analysis procedure that combined descriptive statistics with the identification of extreme values and tests of homogeneity into an acceptability index score that should not exceed 2. The final 27 measurement items obtained from the pilot test were then used for the main study.

4.2. Data collection

Our research subjects were adults in Taiwan who had at least one year's online shopping experience. The respondents were asked to fill out the questionnaire with a 'familiar e-commerce website' in mind. Data was collected by a web survey, and we distributed the link to the survey through university listservs and online discussion boards. The participants were volunteers who were interested in the research topic.

The main survey had 363 responses. A total of 49 were invalid, incomplete or gave the same rating for all items; these were eliminated, and thus 314 questionnaires were retained for analysis. Demographically, 51% of the respondents were men; 78% were aged between 20 and 30; and 22% were aged between 31 and 40. Fifty-one percent of the respondents had a master's degree, and almost all of the respondents' education was at the institute/college level or above. 44% of the respondents were students, and 52% were employed. Approximately 35% of the respondents used the Internet for more than 28 h per week, and the top four online shopping websites considered were Yahoo.com (103), Yahoo auction (78), PChome.com (40), and Books.com (35).

All items among the constructs were tested against demographic controls (gender, age, level of education and occupation) using Student's *t*-test or ANOVA. The mean scores of the items were all insignificant ($p > 0.05$); indicating the validity of analyzing the data as a single group.

5. Data analysis and results

5.1. Analysis of the measurement model

We first developed the measurement model by conducting confirmatory factor analysis (CFA). The SEM was then estimated for hypotheses testing. The models were assessed by the maximum likelihood method using AMOS 5.0. To evaluate the fit of the models, a chi-square with degrees of freedom, normed fit index (NFI), GFI, adjusted goodness of fit index (AGFI), comparative fit index (CFI), and RMSEA were employed. A good fit is normally deemed to exist when NFI, GFI and CFI were all greater than 0.9, AGFI was greater than 0.8, and RMSEA was less than 0.08.

The measurement model yielded a chi-square value of 593 with 296 degrees of freedom ($p = 0.000$), indicating a general lack of fit. However, the chi-square test is sensitive to sample size, and so we used the ratio of chi-square to degrees of freedom ($\chi^2/\text{d.f.} = 2$), which fell within the suggested value of 3 or below. In addition, the other indices satisfied the recommended values (NFI = 0.90, GFI = 0.88, AGFI = 0.84, CFI = 0.94, and RMSEA = 0.06), except for the GFI. The GFI was slightly below the 0.9 benchmark, but it exceeded the recommended cut-off value of 0.80 [8]. Therefore, there was a reasonable overall fit between the model and the observed data.

In order to confirm the multidimensionality of the website quality construct, we compared a first-order model in which all the items were weighted as a single factor, with a second-order model in which various dimensions measured the construct under consideration. As shown in Table 1, the second-order factor model

Table 1

Comparison of measurement models of customer interface quality.

Model	$\chi^2/\text{d.f.}$	NFI	GFI	AGFI	CFI	RMSEA
First-order model	8.94	0.74	0.78	0.69	0.76	0.16
Second-order model	2.64	0.93	0.93	0.90	0.95	0.07
Recommended value	≤ 3	≥ 0.9	≥ 0.9	≥ 0.8	≥ 0.9	≤ 0.08

of interface quality demonstrated acceptable fit and performed better than the first-order model in terms of all fitness measures. We thus concluded that the second-order factor model was suitable for modeling perceived interface quality.

5.2. Psychometric properties of measures

After purifying the measurement model, each construct was evaluated separately by examining the indicator loading, construct reliability, convergent validity, and discriminant validity. All of the loadings of the items on their latent constructs were statistically significant (t -values > 2). The reliability assessment was based on the composite reliability (CR) and average variance extracted (AVE). As shown in Table 2, the CRs ranged from 0.72 to 0.91 and the AVEs ranged from 0.51 to 0.78, both above their respective recommended cut-off levels of 0.70 and 0.50. Furthermore, the item loading ranged from 0.61 to 0.91, which was above the recommended cut-off level of 0.60, demonstrating adequate convergent validity.

Lastly, discriminant validity was tested. We performed the chi-square difference test for all the constructs in pairs to examine whether the restricted model was significantly different from the freely estimated model. In the restricted model, the correlation was fixed at 1 for the pair of constructs under examination. A significant chi-square difference indicated discriminant validity between the pair of constructs. The results of the chi-square differences ranged from 12.6 to 505 ($p < 0.01$), suggesting that the constructs under analysis were distinct and discriminately valid.

5.3. Analysis of the SEM

5.3.1. Testing the structural model

Table 3 shows the various fit indices calculated for the model. A comparison of all fit indices with their corresponding recommended values indicated a good model fit ($\chi^2/\text{d.f.} = 2.51$, NFI = 0.90, GFI = 0.89, AGFI = 0.86, CFI = 0.94, RMSEA = 0.07), while the GFI value of 0.89 was at a marginal acceptance level. Table 3 shows the structural model estimates, where the estimate parameters were standardized path coefficients, and all path coefficients, except for the path of interface quality to switching costs, were significant at the 95% level.

H1 posited that interface quality would positively affect perceived security, and the results in Table 3 provided support for this hypothesis ($\gamma_{11} = 0.44$, $p < 0.001$). The results also showed that customer interface quality positively influenced customer satisfaction ($\gamma_{21} = 0.73$, $p < 0.001$), providing strong support for H2. Unexpectedly, interface quality did not influence the consumers' perceived switching costs ($\gamma_{31} = 0.01$, $p > 0.5$); thus, H3 was not supported. As predicted in H4 and H5, perceived security were positively related to customer satisfaction ($\beta_{21} = 0.17$, $p < 0.01$) and switching costs ($\beta_{31} = 0.2$, $p < 0.01$), and both hypotheses were thus supported.

H6 proposed that customer satisfaction would positively affect customer loyalty, and the results strongly supported this ($\beta_{42} = 0.73$, $p < 0.001$). Finally, switching costs significantly affected customer loyalty ($\beta_{43} = 0.22$, $p < 0.001$), providing support for H7. Table 3 also shows the R^2 values, which indicated how well the antecedents explained an endogenous variable. Alto-

Table 2
Summary of measurement scale.

Factor	Measurers	CFA loading	t-value	CR	AVE
Convenience					
CI1	A first-time buyer can make a purchase from this website without much help.	0.63	11.7	0.83	0.63
CI2	This website is user-friendly.	0.82	16.7		
CI3	This website is very convenient to use.	0.90	19.1		
Interactivity					
CI4	This website has a search tool that enables me to locate products.	0.76	14.2	0.76	0.51
CI5	This website does not have a tool that makes product comparisons easy.	0.68	12.4		
CI6	I feel that this is a very engaging website.	0.70	12.8		
Customization					
CI7	This website makes purchase recommendations that match my needs.	0.73	13.2	0.76	0.51
CI8	The advertisements and promotions that this website sends to me are tailored to my situation.	0.75	13.9		
CI9	This website makes me feel that I am a unique customer.	0.65	11.5		
Character					
CI10	This website design is attractive to me.	0.61	11.6	0.72	0.68
CI11	For me, shopping at this website is fun.	0.91	20.4		
CI12	I feel comfortable shopping at this website.	0.91	20.3		
Perceived security					
PS1	This website is a secure site through which to send sensitive information.	0.88	19.1	0.91	0.78
PS2	I would feel totally safe providing sensitive information about myself through this website.	0.89	19.7		
PS3	Overall, this website is a safe place to transmit sensitive information.	0.88	19.1		
Switching costs					
SC2	In general it would be a hassle changing websites.	0.82	16.4	0.86	0.68
SC3	It would take a lot of time and effort to change websites.	0.82	16.4		
SC4	For me, the costs in time, money, and effort to switch websites are high.	0.83	16.6		
Customer satisfaction					
SA1	I am satisfied with my decision to purchase from this website.	0.78	15.9	0.87	0.62
SA2	If I had to purchase again, I would feel differently about buying from this website.	0.63	12.0		
SA3	My choice to purchase from this website was a wise one.	0.88	19.2		
SA4	I think I did the right thing by buying from this website.	0.84	17.7		
Customer loyalty					
LO1	I try to use the website whenever I need to make a purchase.	0.72	14.2	0.89	0.62
LO2	When I need to make a purchase, this website is my first choice.	0.79	16.4		
LO3	I like using this website.	0.81	16.9		
LO4	To me this site is the best retail website to do business with.	0.78	15.8		
LO5	I believe that this is my favorite retail website.	0.83	17.3		

Note: t-value is significant at $p < 0.05$ when the t-value exceeds 1.96.

Table 3
The results of the structural equation model.

	Hypothesized relationship	Parameter	Estimate	t-value	Conclusion
H1:	Interface quality → Perceived security	γ_{11}	0.44	6.44	Supported
H2:	Interface quality → Satisfaction	γ_{21}	0.73	9.34	Supported
H3:	Interface quality → Switching costs	γ_{31}	0.01	0.07	Not supported
H4:	Perceived security → Satisfaction	β_{21}	0.17	3.24	Supported
H5:	Perceived security → Switching costs	β_{31}	0.20	2.69	Supported
H6:	Satisfaction → Customer loyalty	β_{42}	0.73	12.25	Supported
H7:	Switching costs → Customer loyalty	β_{43}	0.22	4.53	Supported
<i>R</i> ² value: Perceived security → $R^2 = 0.20$, Switching costs → $R^2 = 0.04$, Satisfaction → $R^2 = 0.67$, Loyalty → $R^2 = 0.61$					
Fit index: Chi-square = 363.53 ($p = 0.000$), degree of freedom (d.f.) = 145, chi-square/d.f. = 2.51, NFI = 0.90, GFI = 0.89, AGFI = 0.86, CFI = 0.94, RMSEA = 0.07					

Note: a. t-value is significant at $p < 0.05$ when the t-value exceeds 1.96. b. R^2 : square multiple correlations.

gether, the predictors accounted for 20% of the variation in perceived security, 67% of the variation in customer satisfaction, 4% of the variation in switching costs, and 61% of the variation in customer loyalty. Finally, Table 4 summarizes the decomposition of the effects of the constructs in the model on customer loyalty, customer satisfaction, and switching costs.

5.3.2. Testing the moderating effect of switching costs

We used a multi-group causal analysis to test the moderating effect of switching costs. Respondents were split into high and low groups based on their perceptions of switching costs (performing a

median-split). A structural model linking customer satisfaction with loyalty was constrained to force equal loading between the high and low-level switching costs groups. A chi-square difference test was then conducted between the groups to identify whether their paths were significantly different. As shown in Table 5, the chi-square difference was 7.1 ($p < 0.001$) for the customer satisfaction–loyalty link, exceeding the critical value of 3.8 for one degree of freedom. H8 proposed a negative moderating effect of switching costs on the relationship between satisfaction and loyalty. Unexpectedly, the results showed that the relationship between satisfaction and loyalty was stronger when switching

Table 4
Direct, indirect and total effects – estimates.

Dependent	Predictor			
	Interface quality	Perceived security	Customer satisfaction	Switching costs
Direct effects				
Perceived security	0.44			
Customer satisfaction	0.73	0.17		
Switching costs	n.s.	0.20		
Customer loyalty			0.73	0.22
Indirect effects				
Customer satisfaction	0.07			
Switching costs	0.09			
Customer loyalty	0.61	0.17		
Total effects				
Perceived security	0.44			
Customer satisfaction	0.80	0.17		
Switching costs	0.09	0.20		
Customer loyalty	0.61	0.17	0.73	0.22

Note: a. All nonzero effects are significant at $p < 0.05$. b. n.s. means a non-significant effect.

Table 5
Chi-square difference test between low and high switching costs group.

	Constrained model	Unconstrained model	$\Delta\chi^2_{(1)}$
Fit index:			
Chi-square (d.f.)	525. (297)	518. (296)	7.1***
GFI	0.85	0.86	
AGFI	0.81	0.81	
CFI	0.93	0.93	
RMSEA	0.05	0.05	
Switching costs			
High Low			
H8: Customer satisfaction → Customer loyalty β_{42}		0.81***	0.69***

Note: Standardized estimates are shown; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

costs were high. That is, switching costs positively moderated the effect of customer satisfaction on customer loyalty, contrary to hypothesis 8.

6. Discussions and implications

Our study provided support for the research model and for the hypotheses regarding the linkages between the constructs. First, customer interface quality positively affected perceived security, which implied that a well-established website interface could improve customer perceptions of security. This is because perceived website quality positively related to both trusting belief and trusting intentions. Therefore, if consumers perceive that an e-commerce website interface is of high quality, they are likely to trust the website's competence, integrity, and benevolence, and in turn to have favorable perception of security of that site.

Second, our study demonstrated that customer interface quality both directly and indirectly influenced customer satisfaction. These results implied that the website interface provides extrinsic cues in virtual service encounters that trigger customers' affective responses. Also, although customer interface quality had no significant direct effect on customer perceptions of switching costs, customer interface quality indirectly affected switching costs via customer perceptions of security toward a specific website. These findings revealed that customer interface quality presents tangible cues that can be used to increase customer perceptions of security toward a website, which in turn increases switching costs. In addition, the total effects of customer interface quality and perceived security on customer loyalty were 0.61 and 0.17, respectively. These results implied that higher perceived

customer interface quality and security could encourage online shoppers to be more loyal, increasing the probability that they will return and repurchase from the e-commerce websites with which they were satisfied.

Finally, our study found that switching costs positively moderated the effects of customer satisfaction on customer loyalty. These findings differ from those of some previous studies, which suggested that switching costs and satisfaction may negatively interact with each other in driving customer loyalty. Maybe the moderating effect of switching costs on the customer satisfaction–loyalty link is affected by market structure. If the market has a single or overwhelmingly large provider resulting in high switching costs, then satisfaction should have little effect on loyalty. That is, a dissatisfied customer with high switching costs is unlikely to switch when there are only a few alternative providers. Hence, switching costs negatively moderate the effect of customer satisfaction on customer loyalty.

In contrast, if the market is highly competitive, resulting in low switching costs, customers will be likely to be sensitive to their satisfaction level; a dissatisfied customer will be more likely to switch to another provider. In the context of e-commerce, the market is often highly competitive, so customers face only minimal barriers to switching. Hence, a positive interaction of switching costs and customer satisfaction on customer loyalty is likely.

7. Conclusions

Customer interface quality can increase customer perceptions of security. Our study examined the influence of customer interface quality and perceived security on customer loyalty, as well as the mediating roles of customer satisfaction and switching costs based on the cognition–affect–behavior model. Our empirical results confirmed that customer interface quality and perceived security positively affected customer satisfaction and switching costs, and consequently customer loyalty.

Building customer loyalty in e-commerce is difficult; it requires online companies to differentiate themselves from their competitors. Practitioners should consider focusing more on customer interface design as a marketing strategy, particularly in improving customer convenience, interactivity, customization, and character.

8. Limitations

Care should be taken when generalizing the results of our study. First, interface quality itself is a multi-faceted concept, and although our study focused on the components of customer

interface quality which were related to online store atmospherics, other components could yield different results. Furthermore, analysis of the sample distribution of respondents showed that the majority were university students. However, students may be appropriate, because online consumers are generally young and more highly educated. Finally, this study focused on B2C trading and did not consider the other categories of e-commerce, thus limiting the breadth of the conclusions.

References

- [1] R.E. Anderson, S.S. Srinivasan, E-satisfaction and e-loyalty: a contingency framework, *Psychology & Marketing* 20 (2), 2003, pp. 123–128.
- [2] S. Aydin, G. Ozer, Customer loyalty and the effect of switching costs as a moderator variable, *Marketing Intelligence & Planning* 23 (1), 2005, pp. 89–103.
- [3] J. Baker, A. Parasuraman, D. Grewal, G.B. Voss, The influence of multiple store environment cues on perceived merchandise value and patronage intentions, *Journal of Marketing* 66 (2), 2002, pp. 120–141.
- [4] G. Balabanis, N. Reynolds, A. Simintiras, Bases of e-store loyalty: perceived switching barriers and satisfaction, *Journal of Business Research* 59 (2), 2006, pp. 214–224.
- [5] H.H. Bauer, T. Falk, M. Hammerschmidt, eTransQual: a transaction process-based approach for capturing service quality in online shopping, *Journal of Business Research* 59 (6), 2006, pp. 875–886.
- [6] T.A. Burnham, J.K. Frels, V. Mahajan, Consumer switching costs: a typology, antecedents, and consequences, *Journal of the Academy of Marketing Science* 31 (2), 2003, pp. 109–126.
- [7] S.A. Eroglu, K.A. Machleit, L.M. Davis, Atmospheric qualities of online retailing: a conceptual model and implications, *Journal of Business Research* 54 (2), 2001, pp. 177–184.
- [8] J. Etezadi-Amoli, A.F. Farhoomand, A structural model of end user computing satisfaction and user performance, *Information & Management* 30 (2), 1996, pp. 65–73.
- [9] J. Éthier, P. Hadaya, J. Talbot, J. Cadieux, B2C web site quality and emotions during online shopping episodes: an empirical study, *Information & Management* 43 (5), 2006, pp. 627–639.
- [10] C. Flavián, M. Guinaliu, R. Gurra, The role played by perceived usability, satisfaction and consumer trust on website loyalty, *Information & Management* 43 (1), 2006, pp. 1–14.
- [11] B. Jin, J.Y. Park, The moderating effect of online purchase experience on the evaluation of online store attributes and the subsequent impact on market response outcomes, *Advances in Consumer Research* 33 (1), 2006, pp. 203–211.
- [12] M.A. Jones, D.L. Mothersbaugh, S.E. Beatty, Switching barriers and repurchase intentions in services, *Journal of Retailing* 76 (2), 2000, pp. 259–274.
- [13] M. Koufaris, W. Hampton-Sosa, The development of initial trust in an online company by new customers, *Information & Management* 41 (3), 2004, pp. 377–397.
- [14] C. Liu, J.T. Marchewka, J. Lu, C.S. Yu, Beyond concern – a privacy–trust–behavioral intention model of electronic commerce, *Information & Management* 42 (2), 2005, pp. 289–304.
- [15] S. Negash, T. Ryan, M. Igarria, Quality and effectiveness in Web-based customer support systems, *Information & Management* 40 (8), 2003, pp. 757–768.
- [16] A. Parasuraman, V.A. Zeithaml, A. Malhotra, E-S-QUAL: a multiple-item scale for assessing electronic service quality, *Journal of Service Research* 7 (3), 2005, pp. 213–233.
- [17] R.A. Ping, The effects of satisfaction and structural constraints on retailer exiting, voice, loyalty, opportunism, and neglect, *Journal of Retailing* 69 (3), 1993, pp. 320–352.
- [18] W.D. Salisbury, A.P. Rodney, W.P. Allison, W.M. David, Perceived security and World Wide Web purchase intention, *Industrial Management & Data Systems* 101 (3/4), 2001, pp. 165–176.
- [19] S.S. Srinivasan, R. Anderson, K. Ponnnavolu, Customer loyalty in e-commerce: an exploration of its antecedents and consequences, *Journal of Retailing* 78 (1), 2002, pp. 41–50.
- [20] D.M. Szymanski, R.T. Hise, E-satisfaction: an initial examination, *Journal of Retailing* 76 (3), 2000, pp. 309–322.
- [21] Z. Yang, R.T. Peterson, Customer perceived value, satisfaction, and loyalty: the role of switching costs, *Psychology & Marketing* 21 (10), 2004, pp. 799–822.



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