Assessing the effects of e-quality and e-satisfaction on website loyalty

Hao-erl Yang

***Abstract*—**The e-quality metric needs continued development and validation when measuring customer's satisfaction and loyalty in e-shopping environment. Adding the newly developed service quality scales E-S-Qual to the D&M IS Success Model to assess a website loyalty model, a set of empirical data including 668 usable questionnaires were collected by online survey to test estimates in the model. The findings of this research indicate that the service quality and information quality have strong impacts on e-satisfaction, which, in turn, has a significant effect on e-loyalty and the mediating role of e-satisfaction is evidenced in this model.

***Keywords*—**D&M IS Success Model, e-loyalty, e-satisfaction, e-shopping, E-S-Qual.

I. Introduction

THE Internet has changed everything, particular has a dramatic impact on business operations [1], [2]. At the same time, the online business to consumer has been growing rapidly and brought a great impact on e-tailers and boosted the development of e-business. As a result of the tremendous business opportunity, the number of e-stores has increased by leaps and bounds. Companies take advantage of the Internet as a critical channel for selling goods and services and e-commerce sales, especially, online retail sales jumped greatly [3], [4]. Meanwhile, most e-shoppers' expectation rose and their satisfaction with e-tailers declined. In addition, only a small portion of the e-customers are repeat customers [4].

The exponential increases in online shopping and the rapid growth in the number of retailers selling online have made the marketplace extremely competitive. In addition, the collapse of large numbers of dot.com companies has required managers to relearn that profits indeed do matter [1], [5]. Service profit chain model asserts that satisfied customers tend to purchase more, increasing the revenue and profits of the organization and customer satisfaction is a critical intervening variable in the model [6], [7]. The literatures revealed that satisfaction is considered as an immediate and important factor affecting online shoppers' loyalty to e-tailers. Loyal customers can bring many benefits to a firm including a continuous stream of profit [8]- [11].

Manuscript received November 26, 2006: Revised version received March 19, 2007. This paper was partially funded by Tatung University, Taipei, Taiwan.

Hao-erl Yang is with the Business Management Department, Tatung University, Taipei Taiwan (phone: +886-2-25925252 ext. 2435; fax: +886-2-25925252 ext. 3494; e-mail: heyang@ ttu.edu.tw).

Most companies try their best to continually satisfy their customers because customer satisfaction seems to be an important barometer of customer's behavioral intentions and has been regarded as an important antecedent of loyalty [1], [12]. In recent marketing research, the measures of perceived quality, satisfaction, and loyalty on behalf of customers have been used to assess firm's productivity and its marketing performance in the service industry [13]. Consumer satisfaction has been the subject of much attention in the literature because of its potential influence on consumer behavioral intention and customer retention [14]. Similarly, in a B2C channel satisfaction model, satisfaction is considered as an important construct because it affects participants' motivation to stay with the channel [8].

Online service quality may impact e-tail success through online customer satisfaction and loyalty [15]. Although the relationship between satisfaction and loyalty seems almost intuitive, the relationship has been found vary significantly under different conditions [1]. An understanding of the role, specifically, the mediating role of the satisfaction in the model including perceived quality, satisfaction, and loyalty must be a basic parameter used to evaluate the performance of products and services [16]. Few studies have investigated these issues in an online shopping context, so this study employs an extended model as a conceptual framework to examine the effects of e-quality on website consumer satisfaction and loyalty and explain consumers' behavioral intentions. The DeLone and McLean's Information Systems Success Model (D&M IS Success Model) [2], [17], including two important quality constructs: system quality for measuring the communication system success and interaction with the system, and information quality for assessing the success of the information conveyed, have been validated and widely used as a framework and model for measuring the e-commerce system success. However, some researchers argued that there is a danger to measure IS effectiveness without including a measure of IS service quality and service quality measure should be a part of IS success and service quality may become the most important quality component [2], [18]. References [18] and [19] employed and tested the 22-item instrument, SERVQUAL, proposed by [20] for assessing customer perceptions of service quality in IS context. Although the SERVQUAL is a valuable analytical tool for IS managers, the SERVQUAL metrics needs continued development and validation [2], [21]. Specifically, when the items were used to assess the IS success, the wordings and the validity assessment of the SERVQUAL scales are

required [18], [22].

Based on D&M IS Success Model, the authors of reference [23] proposed a general model of online satisfaction including three dimensions of e-quality – system quality, information quality, and service quality. System quality describes measures of the information processing system, such as ease of access to and interaction with the system. Information quality represents measures of information system output, such as informativeness and entertainment of the information provided by the online service. Service quality measures the five dimensions of SERVQUAL, i.e., tangibility, reliability, responsiveness, assurance, and empathy. They used the model to test the effects of the three antecedents on online satisfaction and online loyalty moderated by online experience. The results of the tests of the overall online satisfaction model showed that system quality and service quality have significant effects on online satisfaction, but both of them do not have direct effects on online loyalty; information quality does not have significant effect on online satisfaction, but has a significant direct effect on online loyalty; online satisfaction only has weakly significant effect on online loyalty. However, the SERVQUAL metric needs continued development and validation [2], [21]. In this study I replace SERVQUAL metric with E-S-Qual metric, the newly developed and validated by the same authors of the SERVQUAL metric, in the e-customer satisfaction model. Therefore, the purpose of this paper is

1. Based on the general online satisfaction and loyalty model to hypothesize a model by using D&M IS Success Model including Parasuraman et al.'s E-S-QUAL scale [3] and assess the model with empirical data;
2. To assess the mediating effects of customer satisfaction in the online model;
3. To compare the relative importance of the dimensions used in measuring the three e-quality constructs that affect e-shopping satisfaction and loyalty.

II. Conceptual Framework and Research Hypotheses

The conceptual framework linking the three major components of e-quality, customer satisfaction, and loyalty is presented in Fig. 1, where I replaced SERVQUAL with the newly developed E-S-QUAL construct of the e-SQ in the updated D&M IS Success Model [2], [3] and intended to assess the effects of three online quality components on the websites satisfaction and the consequences of e-customer satisfaction. Recent research revealed that the measures of perceived quality, satisfaction, and loyalty on behalf of customers have been used to assess firm's productivity and its marketing performance [13]. Consumer satisfaction has been the subject of much attention in the literature because of its potential influence on consumer behavioral intention and customer retention [14]. Similarly, in a B2C channel satisfaction model, satisfaction is considered as an important construct because it affects participants' motivation to stay with the channel [8]. An understanding of customer satisfaction must be a basic parameter used to evaluate the performance of products and services [16].

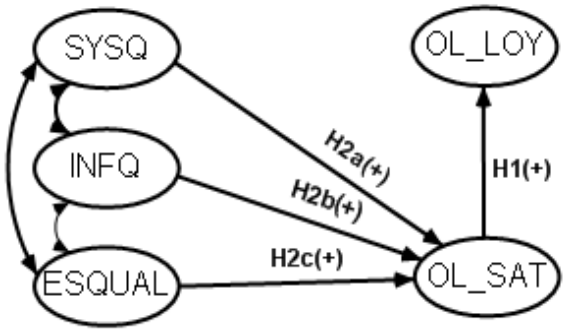

Fig. 1 Conceptual framework

The extant literature suggests that service quality is strongly related to online satisfaction [8], [24]. Prior research has found that satisfaction with a product or service has been identified as an important determinant for enhancing existing customers' loyalty. Satisfied customers are more likely to possess a stronger repurchase intention and to recommend the product/service to their acquaintances [9], [25]-[27]. Numerous studies have revealed that online customer loyalty resulted from customer's satisfaction with the EC channel and that the positive impact of online satisfaction on loyalty was evidenced in the context of electronic commerce [1], [8] , [23], [28], [29]. From the review of the past research, it is presumable that high satisfaction with the online shopping will yield high online purchase intentions and loyalty.

Previous studies consider overall satisfaction to be primarily a function of perceived service quality [30], [31]. Reference [32] found that both information quality and system quality were positively related to online satisfaction. Overall satisfaction reflects customer's cumulative impression of a firm's service performance and that, in turn, may serve as a better predictor of customer loyalty [33]. Recently, it has attracted researchers to pay attention to the formal tests of the mediation effects of customer satisfaction in an integrated loyalty model or behavioral intentions model (e.g., [7], [11]). Reference [11] found that the mediating role of satisfaction in an online shopping environment, where the effects of three antecedents: website technology, transaction cost, and service quality, on loyalty were completely mediated by satisfaction. Therefore, the mediating effects of online satisfaction when the mediational model involves latent constructs will be tested formally in this study.

Based on the foregoing review of the relationships between the e-quality and its consequences suggests that the following hypotheses may be posited in the integrated model:

H1 : Online satisfaction (OL_SAT) will have a significant positive impact on online loyalty (OL_LOY).

H2a: Online satisfaction will be positively affected by system

quality (SYSQ).

H2b: Online satisfaction will be positively affected by information quality (INFQ).

H2c: Online satisfaction will be positively affected by service quality (ESQUAL).

H3a: Online satisfaction (OL_SAT) will mediate the effects of system quality (SYSQ) on online loyalty (OL_LOY).

H3b: Online satisfaction (OL_SAT) will mediate the effects of information quality (INFQ) on online loyalty (OL_LOY).

H3c: Online satisfaction (OL_SAT) will mediate the effects of service quality (ESQUAL) on online loyalty (OL_LOY).

III. Method and Results

A. Data Collection

In order to test the hypotheses, this study relied on five sets of constructs and their indicators. All indicators came from the items in a survey questionnaire designed with a 7-point scale from strongly disagree (1) to strongly agree (7). The items were validated in prior studies were used with minor wording modification to apply to an online shopping context (e.g., [3], [8], [23], [34]. The online survey questionnaire was established on a survey portal provided by Chunghwa Telecom in Taiwan, where the interested online users can connect the portal. Those who complete the survey have a chance to receive one of several gift coupons prizes (about USD $30) by random drawing. Of the 799 questionnaires returned, 704 were usable. Since outliers may unduly influence the outcome of any multivariate analysis, 36 observations were identified as significantly different from multivariate perspective with the Mahalanobis D^2 measure and were deleted from further analysis [35]. A total of 668 questionnaires were analyzed using SPSS 14.0 and AMOS 6.0 procedures. Out of the 668 participants, 69.6 % of them are business workers and only 10.8 % students; 69.8% are females, about 83.1% between 20 and 40 years of age, only 1.6% above 50. Most respondents (82.0%) have at least a college degree and most respondents (56.1%) shopped online for 1-5 times and 22.6% for 6-10 times in 2006.

B. Research Constructs and Items

The construct of system quality was used to capture ease of access to and interaction with the website, where ease of access was measured by four items (ACC1~ACC4) and interactivity by three items (INT1~INT3). Information quality was measured in terms of two dimensions: informativeness including four items (INF1~INF4) and entertainment by four items (ENT1~ ENT4). Service quality was assessed by four dimensions: efficiency measured by eight items (EFF1 ~ EFF8,) fulfillment by seven items (FUL1 ~ FUL7,) system availability by four items (SYA1 ~ SYA4,) and privacy by three items (PRI1 ~ PRI3). The mediating construct of online satisfaction (OL_SAT) was measured by three items (SAT1 ~ SAT3) and online loyalty (OL_LOT) by five items (LOY1 ~ LOY5).

Since the maximum likelihood method used in this study can be deployed for the data with minor deviations from normality [36], even when the data deviate moderately from a normal distribution [37]. A simple check of normality, i.e., the univariate skewness and kurtosis for all items in the sample were checked and they were ranging from –1.656 (INT1) to –0.473 (ENT4) for skewness and –0.392 (ACC2) to 3.591 (INT1) for kurtosis, within the maximum limits of an absolute value of two for skewness and seven for kurtosis recommended by [38]. A total of 45 indicators for five constructs in the questionnaire were analyzed together in the model to check the multicollinearity. The results indicated that the variance of inflation factors (VIFs) ranging from 2.066 (INT3) to 5.999 (LOY2), which did not exceed the recommended threshold of 10 [39], [40] and all variables were kept for further analysis.

For comparisons, the summed scores for the four E-S-QUAL dimensions (SEFF, SFUL, SSYA, and SPRI) were used as indicators of e-service quality for assessing their relative importance [3]. In this study I also computed two summed scores (SACC and SINT) for the two dimensions of system quality and two summed scores (SIFQ and SENT) for the two dimensions of the information quality. All the eight summed scores were employed as indicators of their respective constructs in the model.

C. Analysis of the Measurement Model

A confirmatory factor analysis (CFA) was used to assess the goodness-of-fit of the measurement model, which considering three quality constructs as predictor variables, satisfaction construct as mediating variable, and loyalty construct as dependent variable. Although the items used as the indicators to measure their respective constructs in this study were based on the related literature review, the test of reliability and validity (covergent validity and discriminant validity) were important for establishing construct validity [41], [42]. Anderson and Gerbing's recommendations were followed first in evaluating and refining the measurement model prior to the simultaneous estimation of the measurement and structural equation models [43].

- *Reliability and Validity*

Using AMOS 6.0, the measurement model was assessed and refined according to the modification indices allowing some pairs of error terms to have non-zero covariance. The measurement model fit showed that all goodness-of-fit indices such as, the ratio χ^2/df=3.449, GFI=0.945, AGFI=0.918, CFI=0.977, NFI=0.968, TLI=0.970, and RMSEA=0.061, met the generally recommended threshold levels. The results revealed that all standardized factor loadings were ranging from 0.723(SPRI) to 0.930(LOY2) and each individual item's coefficient was statistically significant at $p<0.000$ and greater than twice its standard error, reflecting that the items represent their corresponding underlying constructs. The composite reliability values, weighted by factor loadings, ranging from 0.808 (SYSQ) to 0.942 (OL_LOY), exceeded the often used practical level of 0.70, indicating an acceptable internal consistency for each construct [35], [44]. The

variance-extracted estimates, ranging from 0.673(ESQUAL) to 0.813(OL_SAT), exceeded the 0.50 lower limit [35], [45]. All the three evidences supported the convergent validity of the items as measures of their respective underlying constructs.

The chi-square difference test and confidence interval test were conducted to examine the discriminant validity of the constructs in the model [43]. Each possible pair of constructs by constraining the estimated correlation parameter between them to 1.0 in the model (called constrained model) was assessed. All the differences in χ^2 values for the fixed and free solutions, as showed in Table 1, were significant at $p<0.000$ indicating the existence of discriminant validity of any two constructs. However, this is a necessary condition; a complementary method, i.e., confidence interval test, was also used to assess the discriminant validity. The confidence interval (± two standard errors) around the correlation estimate between any two constructs did not include 1.0, the discriminant validity is evidenced [43]. The results of the CFA model suggest a high statistical measurement quality associated with the five constructs.

Table 1 Chi-square difference test

Construct Pairs	Standard Measurement Model $\chi^2(92)=131.388$	
	Constrained model $\chi^2(93)$	$\Delta\chi^2(1)$*
ESQUAL <—> INFQ	365.57	48.29
ESQUAL <—> OL_SAT	788.58	471.30
ESQUAL <—> OL_LOY	949.88	632.6
OL_LOY <—> OL_SAT	638.68	321.40
OL_LOY <—> INFQ	513.54	196.26
OL_SAT <—> INFQ	502.09	184.81
SYSQ <—> ESQUAL	383.27	65.99
SYSQ <—> INFQ	365.43	48.15
SYSQ <—>OL_SAT	535.78	218.50
SYSQ <—> OL_LOY	574.42	257.14

*: All Chi-Square Differences are significant at $p<0.000$.

- *Common Method Bias*

Harman's one-factor test was used to assess the existence of the influence of common method bias. The one-factor model yielded a $\chi^2(102)=1938.38$ comparing with the $\chi^2(92)=317.279$ for the measurement model, resulted in a considerably worse ($p<0.000$) for the one-factor model than for the measurement model, indicating no serious common method bias threatening the analysis and interpretation of the data.

D. Analysis of the Structural Model

The proposed structural equation model (Fig. 1) was tested using AMOS 6.0. The model fit indices showed that the ratio χ^2/df=3.563, GFI=0.942, AGFI=0.917, CFI=0.975, NFI=0.966, TLI=0.969, and RMSEA=0.062, met the generally recommended threshold levels, suggesting that the proposed model fits the data very well. The factor loadings and the hypothesized relationships among the constructs were tested using their associated t-statistics. The t-values > 1.96, 2.58, and 3.29 were considered to be significant at the 0.05, 0.01, and 0.001 levels, respectively. The results reveal that all the indicators have significant loadings (0.724 ~ 0.930, all p's < 0.001), as given in Table 2, to their corresponding construct, implying that 52.4~86.5 percent of the variance (R^2) for indicators can be explained by their corresponding construct.

Table 2 Factor loadings and R^2

Path		R^2	Loading	Standard Error	t-value*
SYSQ	→ SACC	0.702	0.838	0.021	39.905
	→ SINT	0.655	0.809	0.021	38.524
INFQ	→ SENT	0.619	0.787	0.021	37.476
	→ SIFQ	0.781	0.884	0.015	58.933
ESQUAL	→ SEFF	0.822	0.907	0.013	69.769
	→ SSYA	0.687	0.829	0.019	43.632
	→ SFUL	0.660	0.813	0.019	42.789
	→ SPRI	0.524	0.724	0.022	32.909
OL_SAT	→ SAT1	0.803	0.896	0.013	68.923
	→ SAT2	0.839	0.916	0.015	61.067
	→ SAT3	0.786	0.886	0.017	52.118
OL_LOY	→ LOY1	0.794	0.891	0.014	63.643
	→ LOY2	0.865	0.930	0.009	103.333
	→ LOY3	0.799	0.894	0.012	74.500
	→ LOY4	0.712	0.844	0.018	46.889
	→ LOY5	0.655	0.809	0.020	40.450

*: All p's<0.001.

Table 3 presents the estimated path coefficients of the structural equation model and the squared multiple correlations (SMC) for dependent latent constructs OL_SAT and OL_LOY and the results of the four hypothesized relationships (H1, H2a, H2b, and H2c) among the study constructs. Three of the four hypothesized relationships were found to be significant, of which the path coefficient from online satisfaction to online loyalty was very large with $p<0.000$ and the hypothesis H1 was supported. Among the three quality dimensions, hypotheses H2B, and H2c were found to be significant at the 0.01 level and were supported. However, H2a predicts positive path from system quality to online satisfaction was not significant and not supported.

Table 3 Hypothesis results for the structural model

Research hypothesis		R^2	Path coefficients	Standard Error	t-value	Conclusion
H1 : OL_SAT	→ OL_LOY	0.768	0.876	0.017	51.53**	Supported
H2a: SYSQ	→ OL_SAT	0.627	-0.144	0.121	-1.19 #	Not Supported
H2b: INFQ	→ OL_SAT		0.394	0.167	2.36 *	Supported
H2c: ESQUAL	→ OL_SAT		0.545	0.146	3.73 **	Supported

*: $p<0.05$, **: $p<0.001$, #: $p>0.10$.

The relative importance of the quality dimensions can be assessed by their loadings to their corresponding construct. Although all the loadings are positive and significant, the relative effects are different. As can be seen in Table 2, effects

of efficiency (SEFF) and informativeness (SIFQ) on online satisfaction (OL_SAT) are the largest two and the most important facets of website quality. The effects of efficiency (SEFF) and informativeness (SIFQ) on online satisfaction (OL_SAT) are the largest two and then system availability (SSYA), fulfillment (SFUL), and interaction (SINT).

E. Results of Mediating Effect Test

For testing the mediating effects of online satisfaction on the relationship between three quality dimensions (system quality, information quality, and service quality) and online loyalty, I linked the paths from three quality dimensions to online loyalty to form an alternative structural equation model. The model fit indices showed that the ratio χ^2/df=3.449, GFI=0.945, AGFI=0.918, CFI=0.977, NFI=0.968, TLI=0.970, and RMSEA=0.061, met the generally recommended threshold levels, suggesting that the proposed model fits the data very well. The goodness-of-fit indices of the proposed and alternative models are almost equal. Besides, the proposed model is more parsimonious with less estimated parameters (41) than the alternative model (44). However, the alternative model can be employed to test the mediating effects of online satisfaction in the model and to spotlight the role of online satisfaction in the model. So I kept the alternative model for the mediation analysis.

The mediation analysis would be done by a structural equation modeling program when latent variables were included in the model [46]. The measures and tests of indirect effect can address mediation more directly than a series of separate significance tests not directly involving the indirect effect in the mediation model [47]. The amount of mediation of one initial variable (e.g., ESQUAL, one of the antecedents of the mediator OL_SAT) can be estimated by the indirect effect of the initial variable when adding the path from the initial variable to the so-called outcome variable (i.e., OL_LOY), while controlling the mediator (OL_SAT) and the other initial variable (i.e., SYSQ or INFQ) as covariate in the mediation model [46]. In the mediation model the total effect can be used to estimate the direct effect of the initial variable on the outcome variable (OL_LOY) when the model does not include the mediator (OL_SAT). If the total effect of the initial variable is significant meaning that there is an effect that can be mediated. In addition, if the direct effect is not significant in the alternative model, the mediator has a complete mediating effect on the relationship between the initial variable and the outcome variable. If the direct effect is still significant, the mediator has a partial mediating effect on the relationship between the initial variable and the outcome variable [47].

Using AMOS 6.0 with 5000 bootstrapping samples to assess the total, direct, and indirect effects, the results with t values were given in Table 4, showing that the total effect of ESQUAL and INFQ on OL_LOY were 0.559 (t=4.022, p<0.001) and 0.638 (t=3.564, p<0.001), respectively, indicating that there existed effects that can be mediated. When I checked their direct effects on OL_LOY in the alternative model, I found that the direct effect of INFQ on OL_LOY was 0.346 and significant at p<0.05, meaning that the effect of INFQ on OL_LOY was partially mediated by OL_SAT. On the other hand, the direct effect of ESQUAL on OL_LOY was -0.061 and not significant, demonstrating that OL_SAT completely mediated the effect of ESQUAL on OL_LOY. Therefore, hypotheses H3b and H3c were supported. As to SYSQ, the total effect of it on OL_LOY was -0.174 and not significant, indicating that OL_SAT had no mediating effect on the relationship between SYSQ and OL_LOY. As a result, the hypothesis H3a was not supported.

Table 4 The direct, indirect, and total effects

Research hypothesis			Direct Effect	Indirect Effect	Total Effect
OL_SAT	→	OL_LOY	0.748		0.748
			(12.897)		(12.897)
SYSQ	→	OL_SAT	-0.119		-0.119
			(-1.063)		(-1.063)
	→	OL_LOY	-0.174	-0.089	-0.263
			(-1.426)	(-1.072)	(-1.865)
INFQ	→	OL_SAT	0.346		0.346
			(2.232)		(2.232)
	→	OL_LOY	0.379	0.259	0.638
			(2.984)	(2.313)	(3.564)
ESQUAL	→	OL_SAT	0.559		0.559
			(4.022)		(4.022)
	→	OL_LOY	-0.061	0.419	0.358
			(-0.488)	(3.708)	(2.224)

Note: t values are in parentheses; t> 1.96, p<0.05; t>2.58, p<0.01; t>3.29, p<0.001.

IV. Conclusion and Impleications

Adding service quality scale E-S-Qual to the D&M IS Success Model to assess the websites satisfaction model, the proposed model fits the data very well. It explains a substantial amount of variance for online satisfaction (R^2=0.627), which, in turn, also explains a substantial amount of the variance for online loyalty (R^2=0.768). The results of data analysis and hypotheses testing revealed that two of the perceived quality dimensions, information quality and service quality, have strong effects on online satisfaction and which, in turn, has significant effect on online loyalty. It implies that the more the consumers are satisfied with the information quality provided and the service quality offered, the more the consumers are more likely loyal to the websites they visited.

Consumers concern more with information quality and service quality, which were significantly mediated by online satisfaction in affecting online loyalty. Their significant indirect effects on online loyalty, as showed in Table 4, suggest their important mediating effects. Besides, their significant total effects, 0.638 (t=3.564) for information quality and 0.358 (t=2.224) for service quality indicate their relative importance in affecting the online loyalty. Furthermore, the significant loadings for informativeness and entertainment on information quality indicate that e-shoppers concern more with the correct, real-time, latest, and complete information, which make them

feel happy and enjoying when shopping online. As regards service quality, the different loadings reveal that respondents concern more with efficiency, and then system availability and fulfillment, and a little less with privacy (see table 2). The addition of service quality to the model may be useful in explain online loyalty because of its significant total and indirect effects on it. However, the hypothesized positive relationship between system quality and satisfaction was not supported. In addition, the results from the test of the alternative model show that the direct effect of system quality on loyalty was also insignificant. One explanation for these insignificances might be that the advancement of technology has largely reduced the cost of the system hardware and software and upgraded the system quality to be easy to access to and interact with the e-store website to have quick response and a wide range of options provided are perceived by e-shoppers almost indifferent.

E-satisfaction has been considered as a natural antecedent to e-loyalty [1]. In this study I further validate the mediating role of e-satisfaction in the model. The significant direct effects of online satisfaction mediate the positive effects of service quality and information quality create the mediating role of e-satisfaction in the model. As customers become more demanding and e-tailers face in the keen competition in the information age, it is essential that managers should do their best to provide reliable and well-organized complete information and present it to consumers in a readily understandable and entertaining manner. Besides, the relative importance of the four service quality dimensions perceived by respondents was different. e-tailers should learn that customers more concern with efficiency, and then system availability and fulfillment, and privacy.

Although the results support the prediction that service quality is an important quality components in proposed online satisfaction and loyalty model, the relative importance for the other two components – system quality and information quality – are quite different from that reported by [23], where system quality was found significant, but information quality not significant, opposite to the findings of this study. In addition, the results revealed the insignificance of system quality as a predicator of online satisfaction in the negative sign, opposite to the hypothesized positive direction. The inconsistency of the results needs to be clarified in the future research.

ACKNOWLEDGMENT

First of all, the author gratefully acknowledges the assistance of Feng-Shii Tsai for helping data collection. Because of him, the author can progress this research smoothly and precisely. Also, the author is grateful to anonymous reviewers and other Professors' assistance of this manuscript.

REFERENCES

[1] R. E. Anderson and S. S. Srinivasan, "E-satisfaction and e-loyalty: A contingent framework," *Psychology & Marketing*, vol.20, pp.123–138, 2003.

[2] W. H. DeLone and E. R. McLean, "The Delone and McLean Model of information systems success: A ten-year upgrade," *Journal of Management Systems*, vol.19, no.4, pp. 9-30, 2003.

[3] A. Parasuraman, V. A. Zeithaml, and A. Malhotra, "E-S-QUAL: a multiple-item scale for assessing electronic service quality," *Journal of Service Research,* vol. 7, no.3, pp. 213-233, 2005.

[4] M. T. Elliott and P. S. Speck, "Factors that affect attitude toward a retail Web site," *Journal of Marketing Theory and Practice*, pp. 40-51, Winter, 2005.

[5] D. M. Szymanski and R. T. Hise, "E-satisfaction: An initial examination," *Journal of Retailing*, vol.76, no. 3, pp. 309-322, 2000.

[6] J. L. Heskett, W. E. Sasser Jr, and L.A. Schlesinger, *The service profit chain*. New York: Free Press, 1997.

[7] G. A. Gelade, and S.Young, "Test of a Service Profit Chain Model in the Retail Banking Sector," *Journal of occupational and organizational Psychology*, vol.16, pp. 1-22, 2005.

[8] F. Devaraj, M. Fan, and R. Kohli, "Antecedents of B2C channel satisfaction and preference: validating e-commerce metrics," *Information System Research*, vol.13, no.3, pp. 316-333, 2002.

[9] I. Skogland and J. A. Siguaw, "Are your satisfied customers loyal?" *Cornell Hotel and Restaurant Administration Quarterly*, vol.46, no.3, pp. 221-234, 2004.

[10] Y. Yi, and S. La, "What influences the relationship between customer satisfaction and repurchase intention? Investigating the effects of adjusted expectations and customer loyalty," *Psychology & Marketing*, vol.21, no. 5, pp. 351-373, 2004.

[11] H. E. Yang and S. H. Lin," The Role of Customer Satisfaction in an Online Shopping Environment," In IAMOT 2006 Proceddings of the Fifth International Conference on Management of Technology, Beijing, China, 2006, track 11.

[12] H. E. Yang and K. H. Yeh, "The role of service quality and mediating factors in a customer behavioral intentions model," *Int. J. Services Operations and Informatics*, vol. 1, no. 1/2, pp. 38-53, 2006.

[13] M. Cortinas, M. Elorz, and M. L. Villanueva, "Retail store loyalty management via an analysis of heterogeneity of the service elements," *Int. Rev. of Retail, Detail, Distribution, and consumer Research*, vol.14, no.4, pp.407-436, 2004.

[14] J. J. Cronin, Jr., Brady, M. K., and Hult, G. T., "Assessing the effects of quality, value, and customer satisfaction on consumer Behavioral intentions in service environments," *Journal of Retailing*, vol.76, pp.193-218, 2000.

[15] D. Weathers and I. Makienko, "Assessing the relationships between e-tail success and product and web site factors," *Journal of interactive marketing*, vol.20, no. 2, pp. 41-54, 2006.

[16] Y. Yoon and M. Uysal, "An examination of the effects of motivation and satisfaction on destination loyalty: a structural model," *Tourism Management*, vol.26, pp. 45-56, 2005.

[17] W. H. DeLone and E. R. McLean, "Information systems success: The quest for the dependent variable," *Inforniaiitm Systems Research*, vol.3, no. 1, 1992, pp.60-95.

[18] L. F. Pitt, R. T. Watson, and C. B. Kavan, "Service quality: a measure of information systems effectiveness," *MIS Quarterly*, vol.19, pp. 173-187, 1995.

[19] W. J. Kettinger and C. C. Lee, "Perceived service quality and user satisfaction with the information services function," *Decision Sciences*, vol.25, 5-6, pp. 737-765, 1995.

[20] P. Parasuraman, L. L. Berry, and V. A. Zeithaml, "Refinement and reassessment of the SERVQUAL scale, *Journal of Retailing,"* vol.67, pp. 420–450, 1991.

[21] J. J. Jiang, G. Klein, and C. L. Carr, "Measuring information systems service quality: SERVQUAL from the other side," *MIS Quarterly*, vol.26, no.2, pp. 145-166, 2002.

[22] Y. S. Wang and T. I. Tang, "Assessing customer perceptions of Website service quality in digital marketing environments," *Journal of End User Computing*, vol.15, no 3, pp. 14-31, 2003.

[23] W. Rodgers, S. Negash, and K. Suk, "The moderating effect of on-line experience on the antecedents and consequences of on-line satisfaction," *Psychology & Marketing*, vol.22, no. 4, pp. 313-331, 2005.

[24] C. L. Carr, "A psychometric evaluation of the expectation, perception, and difference-scores generated by the IS-adapted SERVQUAL instrument," *Decision Science,* vol.33, pp.281-296, 2002.

[25] E. W. Anderson, C. Fornell, and D. Lehman, "Customer satisfaction, market share, and profitability: findings from Sweden," *Journal of Marketing,* vol.58, pp.53-66, 1994.

[26] S. A. Taylor and T. I. Baker, "An assessment of the relationship between service quality and customer satisfaction in the formation of customers purchase intentions," *Journal of Retailing*, vol.70, no. 2, pp. 163-178, 1994.

[27] F. F. Reichheld and T. Teal, *The loyalty effect*. Boston, MA: Harvard Business School press, 1996.

[28] D. L. Hoffman, T. P. Novak, and M. A. Peralta, "Information privacy in the market space: Implications for the commercial uses of anonymity on the Web," *Inform. Soc.* vol.15, no.2, 1999, pp. 129-139.

[29] S. J. Yoon, "The antecedents and consequents of trust in online-purchase decisions," *Journal of Interactive Marketing,* vol. 16, no. 2, pp. 47-63, 2002.

[30] J. J. Cronin, Jr., and S. A. Taylor, "Measuring service quality: A reexamination and extension," *Journal of Marketing,* vol.56, pp.55–68, 1992.

[31] A. Parasuraman, V. L. Zeithaml, and L. L. Berry, "SERVQUAL: A multiple-item scale for measuring consumer perceptions of service quality," *Journal of Retailing,* vol.64, no.1, pp.12-40, 1988.

[32] P. B. Seddon, "A respecification and extension of the DeLone and McLean model of IS success," *Information Systems Research*, vol.8, no. 3, pp. 240-253, 1997.

[33] Z. Yang, and R. T. Peterson, "Customer perceived value, satisfaction and loyalty: The role of switching costs," *Psychology & Marketing,* vol.21, no. 10, pp. 799-822, 2004.

[34] C. H. Park, and Y. G. Kim, "Identifying key factors affecting consumer purchase behavior in an online shopping context," *International Journal of Retail & Distribution Management,* vol.31, no.1, pp. 16-29, 2003.

[35] J. F. Hair, Jr., W. C. Black, B. J. Babin, R. E. Anderson, and R. L. Tatham, *Multivariate Data Analysis 6th ed,* Upper Saddle River, NJ: Prentice-Hall, 2006, ch. 2,10-12.

[36] J. D. Wisner, "A structural equation model of supply chain management strategies and firm performance," *Journal of Business Logistics,* vol. 24, no. 1, pp. 1-25, 2003.

[37] C. P. Chou, and P. M. Bentler, "Estimates and tests in structural equation modeling," In: R. H. Hoyle (Editors): *Structural Equation Modeling*. Thousand Oaks, CA: Sage Publications, pp.37-55, 1995.

[38] S. G. West, J. F. Finch, and P. J. Curran, "Structural equation models with nonnormal variables: Problems and remedies," In: R. H. Hoyle (Editors). *Structural Equation Modeling.* Thousand Oaks, CA: Sage Publications, pp. 56-75, 1995.

[39] R. B. Kline, *Principles and Practice of Structural Equation Modeling, 2nd ed.* New York: The Guilford Press, 2005, ch 3.

[40] M. H. Kutner, C. J. Nachtsheim, J. Neter, and W. Li, *Applied Linear Statistical Models 5th ed.* New York: McGraw-Hill, 2005, ch. 10.

[41] S. L. Ahire, D. Y. Golhar, and M. A. Walter, "Development and Validation of TQM," *Implementation Constructs. Decision Science,* vol.27, no.1, pp.21-56, 1996.

[42] Q. Tu, M. A. Vonderembsa, and T. S. Ragu-Nathan, "The Impact of Time-based Manufacturing Practices on Mass Customization and Value to Customer," *Journal of Operations Management,* vol. 19, pp. 201-217, 2001.

[43] J. C. Anderson, and D. W. Gerbing, "Structural equation modeling in practice: A review and recommended two-step approach," *Psychological Bulletin,* vol. 103, no.3, pp.411-423, 1988.

[44] J. C. Nunnally and I. H. Bernstein, *Psychometric Theory 3rd ed*. New York: McGraw-Hill, 1994, ch.7.

[45] C. Fornell, and D. F. Larcker, "Evaluating Structural Equations Models with Unobservable Variables and Measurement Error," *Journal of Marketing Research,* vol. 18, pp. 39-50, 1981.

[46] D. A. Kenny, (2006, February 7). Mediation. Available at: http://davidakenny.net/cm/mediate.htm.

[47] K. J. Preacher and A. F. Hayes, "SPSS and SAS procedures for estimating indirect effects in simple mediation models," *Behavior Research Methods, Instruments, & Computers.* vol.36, no. 4, pp. 717-731, 2004.