

# Exploring the Role of Computer Self-Efficacy and Computer Anxiety in the Formation of e-Satisfaction

Young Sik Kang and Heeseok Lee<sup>a</sup>

<sup>a</sup> Graduate School of Management, Korea Advanced Institute of Science and Technology  
207-43, Chongryangri-dong, Dongdaemun-gu, Seoul, 130-012, Korea  
Tel: +82-2-958-3655, Fax: +82-2-958-3604, E-mail: [yskang, hsl]@kgsm.kaist.ac.kr

## Abstract

Customer satisfaction with e-retailing, or e-satisfaction, is not only the primary driver of customer behavior, but also the key to building and retaining a loyal base of long-term customers. Therefore, the exploration of e-satisfaction has gained increasing importance in the IS and marketing disciplines. Although much progress has been made as to its exploration in these two perspectives, the process of e-satisfaction formation and the conditions under which the process may vary have not been sufficiently explored. In order to address this knowledge gap, this paper attempts to develop a model to explore how website information satisfaction, its system satisfaction, and overall e-service quality form e-satisfaction, and computer-related individual differences such as computer self-efficacy and computer anxiety moderate the process of e-satisfaction formation. We draw on the theory of reasoned action (TRA) and its synthesis of other prior research on service quality and satisfaction in marketing, and self-efficacy and anxiety in social psychology. We then test the model using a sample of 274 respondents who have made online purchases within the last three months. The results suggest that our antecedents play a key role in forming e-satisfaction and our moderators toward the e-satisfaction formation are important. The model could help managers improve their customers' satisfaction, build and retain a loyal base of long-term customers, and thus achieve endurance and success for their online business.

## Keywords:

E-satisfaction, electronic commerce, computer self-efficacy, computer anxiety, theory of reasoned action

## Introduction

Customer satisfaction with e-retailing, or e-satisfaction, is not only the primary driver of customer behavior, but also the key to building and retaining a loyal base of long-term customers and thus endurance and success for online business [12]. Therefore, the exploration of e-satisfaction has gained increasing importance in the IS and marketing disciplines in recent times [e.g., 4,12,16].

Drawing from the user satisfaction and technology acceptance, IS researchers have investigated e-satisfaction. From the user satisfaction perspective, IS researchers take

two different approaches. First, on the basis of the DeLone and McLean IS success model [9], the constructs for the process by which e-satisfaction is formed have been investigated [e.g.,16]. Second, a new instrument for measuring e-satisfaction has been developed and validated [25]. From the technology acceptance perspective, IS researchers have explored e-satisfaction as an antecedent to continuous intention of e-commerce services [e.g.,4]. In marketing fields, antecedents to e-satisfaction and its consequent effects have been examined [e.g.,12].

Although much progress has been made as to the exploration of e-satisfaction in the two disciplines, there are two knowledge gaps not sufficiently explored. First, in the IS discipline, based on the model by Spreng et al. [21], Mckinney et al. [16] posit that e-satisfaction has two antecedents: website information satisfaction and its system satisfaction. However, their study fails to include service quality delivered by a website, or e-service quality, because it only focuses on the information search phase. In the marketing discipline, based on the service quality and satisfaction literature [8], it has been demonstrated that e-service quality has a positive impact on e-satisfaction [27]. However, few studies have explored the three antecedents to e-satisfaction simultaneously and the possible relationships among them. Second, considering the significance of the computer interface in the customer-business relationship in the context of e-commerce [12], it is important to explore how computer-related individual differences such as computer self-efficacy and computer anxiety serve as a moderator toward the process.

To fill this knowledge void, this paper attempts to explore the three key antecedents to e-satisfaction and their possible relationships. It also aims to investigate the moderating effects of computer self-efficacy and computer anxiety on the relationships. While computer self-efficacy represents one's belief about his or her ability to use computers in diverse situations, computer anxiety is associated with negative attitudes toward use of computers [24]. Within the context of innovation diffusion research, computer self-efficacy and computer anxiety address well-established dynamic, situation-specific individual differences [23]. These individual differences reflect malleable inclinations that influence responses to stimuli within a specific situation [23]. These two constructs are potentially critical to connecting website information and system satisfaction found in IS with e-satisfaction and its other antecedents found in marketing because they can play an important role

in affecting customers' responses to a retail-oriented website within an online purchasing situation.

To achieve these research objectives, we draw on the theory of reasoned action (TRA) [1], and its synthesis with other prior research on the service quality and satisfaction in marketing, and self-efficacy and anxiety in social psychology. Practically, this paper could help managers improve their customers' satisfaction, build and retain a loyal base of long-term customers, and thus, achieve endurance and success for their online business.

### Conceptual Model: Theory and Hypotheses

Our research model is depicted in Figure 1. We now discuss the constructs and motivate the paths in the model.

#### E-Satisfaction and E-Loyalty

E-loyalty, which is a consequent effect of e-satisfaction, is included in our model to conceptualize the model and advance the related hypotheses based on TRA. E-loyalty is defined as the behavioral intention of a customer to repurchase products through a particular website and the behavioral intention measure is employed in this study [18]. Researchers in the satisfaction literature commonly recognize satisfaction as a quasi-attitudinal construct and often consider fully as an attitude [13]. Therefore, e-satisfaction can be recognized as behavioral attitude from the attitudinal and behavioral perspective.

Several researchers in marketing have shown that e-satisfaction has a positive impact on e-loyalty. Therefore, based on the above studies, we advance hypothesis 1.

#### Overall e-Service Quality

Exploratory research conducted by Parasuraman et al. [17] supports the notion that service quality is an overall evaluation similar to attitude. Many researchers in the

service quality literature concur with this notion [8]. Several studies have examined the association between service quality and behavioral intentions [8]. Thus, overall e-service quality, related but not equivalent to e-satisfaction, can also be recognized as behavioral attitude.

As in the traditional context, based on the service quality and satisfaction literatures [8], it has been shown that e-service quality is positively related to e-satisfaction in the e-commerce environment [27]. Hence, we propose hypothesis 2.

#### Efficiency and Fulfillment

Studies in online shopping point to price and service as the two most important elements for online shoppers [5]. For that reason, Song and Zahedi [20] argued that perceived price and perceived service are two salient behavioral beliefs, which influence web customers' attitude toward online purchasing. However, satisfaction with the website's overall information quality and satisfaction with its system performance, or website information and system satisfaction, do not directly impact perceived price. Therefore, perceived price is not included in our model.

We define the behavioral beliefs regarding perceived service based on the basic E-S-QUAL dimensions, which were developed by Parasuraman et al. [18] to measure e-service quality delivered by a retailing-oriented website. The scale consists of efficiency, fulfillment, system availability, and privacy. Of the four dimensions, efficiency and fulfillment have the strongest impact on overall e-service quality perceptions [18]. The importance and relevance of the two dimensions are also underscored by other studies in online shopping [11,27], although they may not be exhaustive. Therefore, fulfillment and efficiency are recognized as behavioral beliefs in our study. However, the dimension of efficiency was defined as a combination of belief about a behavior such as perceived effort and belief about a website

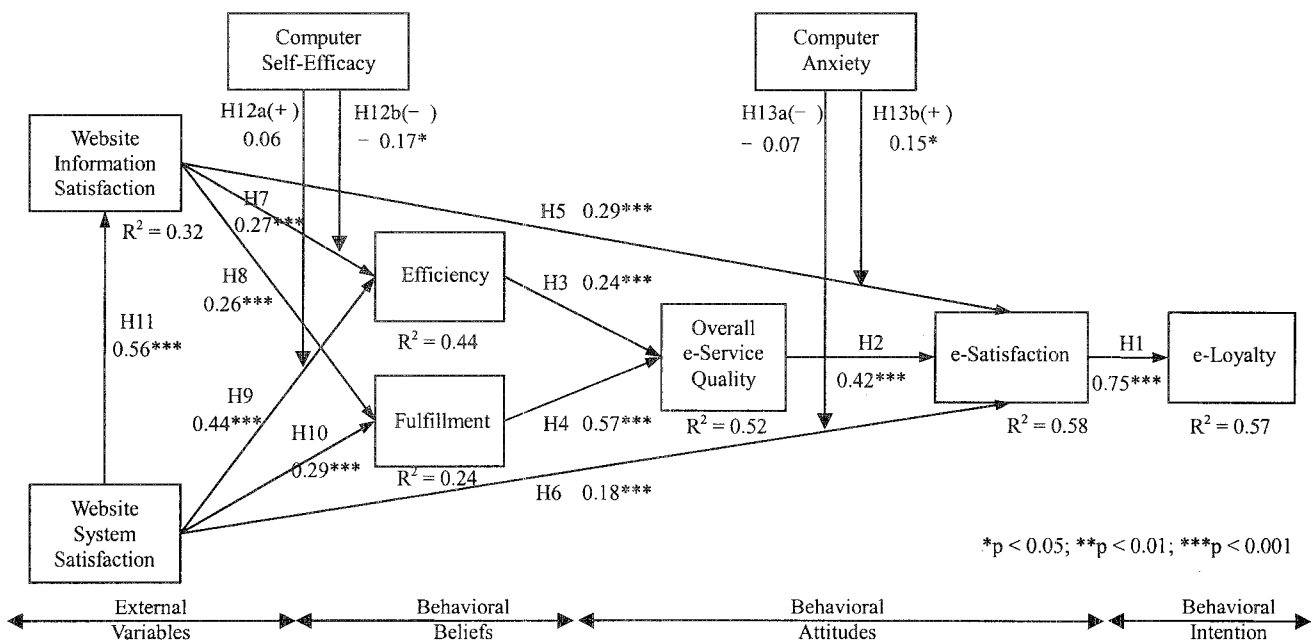


Figure 1 Research Model and Analysis Results

such as perceived processing speed of the website [18]. Thus, the inclusion of this dimension is not appropriate because the TRA model requires the inclusion of salient behavioral beliefs [1]. Therefore, we include the dimension of efficiency defined as a combination of perceived effort and ease of use about online purchasing [11].

Finally, efficiency and fulfillment have been found to have strong impacts on overall e-service quality, respectively [18,27]. Hence, we put forward hypotheses 3 and 4.

#### **Website Information and System Satisfaction**

Satisfaction toward a retailing-oriented website can be separated into website information satisfaction and its system satisfaction [16], which serve as important surrogates of e-commerce success from the user satisfaction perspective [10].

Based on Spreng et al.'s [21] research which identified that information and attribute satisfaction are antecedents of overall satisfaction, McKinney et al. [16] posited that website information and system satisfaction are important antecedents of e-satisfaction. Website information satisfaction is similar to the construct of information satisfaction, which is based on quality of the information used in deciding to purchase a product. However, website system satisfaction differs from the construct of attribute satisfaction, which measures a customer's level of contentment with a product. In case of online purchasing of a physical product, a website is not the product online shoppers want to buy. Thus, the relationships deserve further validation. Hence, we propose hypotheses 5 and 6.

There is much evidence supporting that attitudes toward an object serve as external stimuli or variables [1,26]. Therefore, within an online purchasing situation, website information and system satisfaction can serve as external stimuli or variables. Theoretically, these external variables may influence intention and behavior that are fully mediated by behavioral beliefs and attitudes [1]. In the context of traditional information system, Wixom and Todd [26] demonstrated that information and system satisfaction serves as external variables with impacts on beliefs about using the system to accomplish a particular task (ease of use and usefulness).

As noted above, efficiency and fulfillment can be recognized as behavioral beliefs within the online purchasing context. Therefore, it is expected that website information and system satisfaction as external variables will shape, in part, efficiency and fulfillment. Therefore, we put forward hypotheses 7, 8, 9, and 10.

Finally, website information is produced by its system. Thus, the correct functioning of the system is a necessary condition for producing effective information. Hence, customers' sense of satisfaction with the system is likely to influence their level of satisfaction with the information. Therefore, we assume hypothesis 11.

#### **Moderating Effects of Computer Self-Efficacy and Computer Anxiety**

In order to reach a fuller understanding of the process of e-satisfaction formation, we explore the moderating effects

of computer self-efficacy and computer anxiety on the process (See Figure 1).

#### **General Role of Computer Self-Efficacy and Computer Anxiety in IS**

Based on the broader construct of self-efficacy which is a key element in social learning theory [2], Compeau and Higgins [7] defined and developed computer self-efficacy. Computer self-efficacy refers to "individuals' judgment of their capabilities to use computers in diverse situations" [7]. A number of IS studies have explored the construct of computer self-efficacy in relation to both computer use and skill development [7,23].

Computer anxiety refers to "fear about the implications of computer use such as the loss of important data or fear of other possible mistakes" [19]. Researchers have found that computer anxiety, like computer self-efficacy, influences how individuals perceive and use IT [14].

#### **Moderating Role of Computer Self-Efficacy and Computer Anxiety**

Within innovation diffusion research, computer self-efficacy and computer anxiety are well-established dynamic, situation-specific individual differences; These individual differences reflect malleable inclinations that influence responses to stimuli within a specific situation [23]. Thus, computer self-efficacy and computer anxiety can play an important role in affecting web customers' responses to stimuli such as website information and system satisfaction. Specifically, self-efficacy is a major cognitive factor in social learning theory [2]. For that reason, computer self-efficacy affects web customers' cognitive responses like efficiency and fulfillment to these stimuli. On the other hand, computer anxiety influences web customers' affective responses such as e-satisfaction to stimuli because it is a negative affective reaction toward computer use [24].

There is another evidence supporting that computer self-efficacy can moderate the relationships between attitudes toward an object and efficiency. According to self-efficacy research, one's self-efficacy has been found to moderate the appraisal-coping relationship [3]. Coping is defined as "the cognitive and behavioral efforts exerted to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of the person" [15, p. 141]. Efficiency can be recognized as perceived cognitive effort associated with online purchasing. Thus, it can be argued that computer self-efficacy moderates the relationship between the appraisal of a website (website information and system satisfaction) and the cognitive effort (efficiency) perceived by a web customer. For that reason, although fulfillment can be recognized as a cognitive response, the moderating effect of computer self-efficacy on the relationships between attitudes towards an object and fulfillment is not considered in our model.

Web customers with lower computer self-efficacy do not fully notice and use the features provided by a retailing-oriented website due to lack of confidence in their

computer skills. In addition, they tend to engage in fewer challenging efforts. Thus, they are disinclined to adopt new and innovative features and systems such as Amazon.com's one-click ordering system. The Amazon system allows users to register all relevant information with the company, and then purchase products by having to only click one time. Although one-click ordering is fast and easy way to place orders at Amazon.com, the customers who do not use the system due to their lower computer self-efficacy will not fully perceive the ease and reduced effort of using the website. Thus, we propose hypothesis 12a.

The information provided by a website can help web customers with lower computer self-efficacy well understand the complex features provided by the website and their benefits such as efficiency. For example, if the customers are satisfied with detailed and relevant information about the Amazon.com's one-click ordering system, their perception of ease and lessened effort of using the website will be more raised. Therefore, we put forward hypothesis 12b.

As noted above, computer anxiety is associated with negative attitudes toward use of computers. Thus, the effect of website system satisfaction on e-satisfaction will be weaker for web customers with higher computer anxiety. Although they are satisfied with website system performance, they are not likely to be satisfied with online shopping due to fear about the implications of computer use in online shopping such as having personal information stolen by hackers. Thus, we advance hypothesis 13a.

Finally, if customers with higher computer anxiety are satisfied with the quality of website's information about guarantee/warranty policy, security, customer's privacy, and others, the level of their overall contentment with their purchasing experiences will be more raised. Accordingly, we propose hypothesis 13b.

## **Research Method**

### **Measure Development**

Our research model contains seven constructs and two additional moderators. The measurements items for the seven constructs were derived from both IS and marketing literature on e-commerce. Because the construct of efficiency was defined as a behavioral belief, items related to perceived effort and ease of use about online purchasing were only derived from the previous research [11,18]. Each item of the seven constructs used seven-point Likert-type scales anchored between "strongly disagree" and "strongly agree." Computer self-efficacy was measured with ten items developed by Compeau and Higgins [7], and computer anxiety was measured with four items employed by Thatcher and Perrewé [23]. Operational definitions, sources, scale items for these constructs are available from the first author.

The initial version of this instrument was pre-tested for content validity using two doctoral students of MIS and two practitioners engaged in e-retailing. Amendments were made based on their feedback. Then, to check the psychometric properties of the scales, the resulting survey

was pilot tested using 42 undergraduate students. The Cronbach's alpha of all the scales was acceptable, with the lowest being efficiency at 0.82.

### **Survey Administration and Sample**

The research questions were examined by actual online buyers to enhance the study's relevance and generalizability. Data used to test the research model were gathered from 200 undergraduate engineering students from two universities and 200 company employees who work in a global bank and a leading credit card company. Respondents were requested to choose one of the retailing-oriented websites at which they had frequently made a purchase. If the selected website was included in the listed websites, they were asked to mark the website. Otherwise, they were asked to write down the name of that website. Then, they were requested to complete the questionnaire with regard to the last purchasing experience at that website. 386 responses were obtained. Among them, 39 incomplete questionnaires were discarded and questionnaires from respondents who had not experienced online purchasing within the last three months were also discarded. This elimination resulted in an analysis sample of 274.

To increase response rate, we asked two instructors at the two universities to gather data from the undergraduate students during their class hours. We also asked two informants who work in the two companies to collect data from their colleagues, supervisors, subordinates in person. Of the respondents, 145 were men. Most sample respondents fell in the 19- 30 year old age group ( $n = 212$ , 77.4%). About 97% of the respondents were attending universities or completed university degree. The respondents whose frequency of online purchasing per month was less than 3 were 224 (81.7%). The demographic data are relatively close to those of average online buyers, who are relatively young and generally well educated.

## **Research Results**

To analyze our data, we used partial least squares (PLS), a structural equation modeling (SEM) technique.

### **Measurement Validation**

We assessed reliability using internal consistency scores, calculated by the composite reliability scores. Internal consistencies of all variables are considered acceptable because they all exceed 0.90.

To assess convergent validity, we examined the average variance extracted (AVE). AVE values were 0.7 or higher, over the cutoff of 0.5, suggesting good convergent validity. For satisfactory discriminant validity, the AVE from the construct should be greater than the variance shared between the construct and other constructs in the model. All AVEs are greater than the off-diagonal elements in the corresponding rows and columns, demonstrating discriminant validity.

### **Testing the Structural Model and the Moderating**

## Effects

The overall results of our analysis are shown in Figure 1. As expected, all the paths excluding H12a and H13a were significant.

All interaction indicators were computed by the use of the procedure of Chin et al. [6] by cross multiplying the standardized indicators of each construct. These interaction indicators are used to reflect the latent interaction variable.

The moderating role of computer self-efficacy and computer anxiety was partially supported. While computer self-efficacy insignificantly reinforces the positive impact of website system satisfaction on efficiency (path = 0.06), it significantly attenuates the effect of website information satisfaction on efficiency (path = - 0.17,  $p < 0.05$ ). These results only support H12b. As expected, computer anxiety significantly reinforces the positive effect of website information satisfaction on e-satisfaction (path = 0.15,  $p < 0.05$ ). However, computer anxiety insignificantly attenuates the relationship between website system satisfaction and e-satisfaction (path = - 0.07). These results only confirm H13b.

Tests comparing the  $R^2$  values between the main and interaction effects were performed using Cohen's  $f^2$ , following Chin et al. [6]. The Cohen's  $f^2$  moderating size effects (H12b: 0.03, H13b: 0.04) are small but meaningful (following the guidelines of Chin et al. [6]). In addition, the estimated betas for the interaction terms are larger than those found in most past IS studies. These results support the meaningful moderating effects of computer self-efficacy and computer anxiety.

## Discussion

### Summary of Results

The findings suggest that website information satisfaction, its system satisfaction, and overall e-service quality play a key role in forming e-satisfaction. Furthermore, our two moderators toward the e-satisfaction formation are important.

Especially important are the confirmed interaction effects of computer anxiety  $\times$  website information satisfaction and computer self-efficacy  $\times$  website information satisfaction. Their standardized coefficients are 0.15 and -0.17, respectively. These results imply that one standard deviation increase in computer anxiety will increase the impact of website information satisfaction on e-satisfaction from 0.30 to 0.45 and one standard deviation decrease in computer self-efficacy will do that of website information satisfaction on efficiency from 0.27 to 0.44. These findings suggest that computer self-efficacy and computer anxiety play an important role in the e-satisfaction formation.

Finally, contrary to our expectation, interaction effects related to website system satisfaction were not found to be significant. The following may explain this lack of significant effects. In case of physical products sold by online vendors, website system is not the product online buyers want to buy, although it is necessary for online purchasing. On the contrary, website information directly and strongly influences customers' online purchasing

decisions. Our analysis results corroborate this argument. Therefore, the effects of website information satisfaction on customers' beliefs and attitudes about online purchasing may be more strongly influenced by their different levels in computer self-efficacy and computer anxiety.

### Implications

The study's findings have three theoretical implications. First, the current study provides a balanced view on the e-satisfaction formation by simultaneously exploring website information satisfaction, its system satisfaction, and overall e-service quality, which have been separately investigated within the IS and marketing disciplines. Second, perhaps most important, the current research advances the e-satisfaction literature by enriching the process of e-satisfaction formation with two moderating variables. Although their effects in enhancing  $R^2$  are modest, they provide the conditions under which the process may vary. By taking these moderating variables into account, we can be more confident in explaining and describing the complex e-satisfaction formation. Considering the significance of the computer interface in the customer-business relationship, exploring the moderating effects of computer self-efficacy and computer anxiety is especially important. Finally, this study sheds new light on the role of computer self-efficacy in IS. Although several studies examining the moderating role of gender in technology acceptance have implied that some of gender's moderating ability may be attributable to different levels of computer self-efficacy between men and women [e.g.,22], few IS studies have directly explored the moderating ability of computer self-efficacy. For the first time, to our best knowledge, based on the self-efficacy research [3], our study confirms the moderating ability of computer self-efficacy in IS. With this moderating ability of computer self-efficacy in mind, it is of particularly interest for IS researchers to carry out research on technology acceptance and computer training.

For practitioners, this research also has three implications. First, e-satisfaction is managed effectively when issues of computer-related individual differences such as computer self-efficacy and computer anxiety are addressed. For example, if online vendors target customers with higher computer anxiety such as the aged, they should focus on website information satisfaction and overall e-service quality. Therefore, their website investment and design decisions should be directed at enhancing the customers' satisfaction with the quality of their websites' information. Second, our findings provide managers, whose goal is to retain their online customers, with guidelines for long-term website investment and design decisions. Their customers' a series of successful and satisfactory purchases at the same website heighten their levels of computer self-efficacy and lower their levels of computer anxiety because enactive mastery skills such as prior experience heighten levels of self-efficacy, whose increase leads to a decrease in anxiety [23]. According to our findings, an increase in computer self-efficacy and a decrease in computer anxiety lead to lowering of the effects of website information satisfaction

on efficiency and e-satisfaction, and heightening of the effects of website system satisfaction. Thus, as the number of existing customers grows, the managers need to invest on developing innovative website systems such as Amazon.com's one-click system and Federal Express Corporation's order-tracking system. Finally, the findings also have implications for marketers. Our findings indicate that the impacts of website information and system satisfaction on e-satisfaction considerably differ from those with higher computer anxiety to those with lower computer anxiety; thus, e-tailers which focus on e-satisfaction for success should try to categorize customers according to their computer anxiety levels and design separate marketing programs for each categorized group.

## Conclusions

We hope the outcome of the present study will be a step toward a richer and more inclusive understanding of e-satisfaction. It is also hoped that more researchers will engage in finding the conditions and contexts under which the process of e-satisfaction formation may vary.

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