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Influence of Quality of Information System Success (ISS) on Customer Intention to Continue Use in B2B E-commerce: A Contingency Approach of System Anxiety

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ABSTRACT

The purpose of this study is to examine the influence of quality of Information System Success (ISS) on customer intention to continue use in B2B E-commerce. In addition, this study proposes a model to develop a contingency model from a system anxiety approach. One hundred and eleven online services professional users in Taiwan were recruited and Structural Equation Modeling was used to test the research hypotheses. The result indicates that how three dimensions of the using quality of information system success impacted trust. In addition, how three dimensions of trust have a positive direct effect on customer intention to continue use. In addition, system anxiety moderates the effect of quality of ISS on trust. Finally, this study discusses the theoretical and managerial implications of the findings.

Key words: B2B e-commerce, information system success, trust, intention to continue use, market intelligence industry

INTRODUCTION

For online services, increased choice and access are essential from a customer perspective, particularly regarding product and service information. Firms have begun seeking market intelligence to obtain current information on markets and trends. According to Berst (1999), e-service "may be the key to long-term advantage in the digital age (Sohn and Tadisina, 2008)." Recent studies have explored the impact of e-service quality on customer behavior in the context of e-banking services (Marimon *et al*., 2012) and multichannel (Sousa and Voss, 2012) or supplier-dealer marketing channels (Chang *et al*., 2012). Some studies have even applied the service quality concept to information systems and information technology (Sohn and Tadisina, 2008; Hsu *et al*., 2013). Therefore, understanding specific information system success (ISS) quality for an e-service context and investigating the impact of ISS factors on the intention to continue e-service use are necessary. Customer relationships have received attention from both academics and practitioners in recent years (Richard *et al*., 2007). The majority of relevant previous studies have focused on the single approach of trust (e.g., Chang *et al*., 2012; Liang and Chen, 2009; Richard *et al*., 2007; Tsao and Hsieh, 2012; Sohn and Tadisina, 2008), particularly in the context of e-commerce. Few studies have focused on the relationship between various trust aspects and customer intention to continue use from the perspective of ISS quality (e.g., Palvia, 2009; Ranaweera and Prabhu, 2003; Sweeney and Swait, 2008). Hsu *et al*. (2013), in which a model for e-loyalty and positive WOM was developed, is an exception (Cyr *et al*., 2007; Luarn and Lin, 2003). Thus far, most research on relationship marketing has involved products rather than e-service

environments. The ISS model suggests that information, systems and service quality are key antecedents to a successful information system (DeLone and McLean, 2003; Petter and McLean, 2009). In recent years, researchers have begun exploring service quality which can be used to retain customers and develop customer loyalty (DeLone and McLean, 2003). Including service quality (e.g., customer support) is crucial when applying the IS success model to e-commerce, because it influences customer retention and sales (Gounaris, 2005). In the IS research domain, there are many studies regarding the relationships between uncertainty (risk or security) (Liang and Huang, 1998; Lee *et al*., 2009). This process uncertainty perception will reduce user trust in enterprise, technology and website. In a similar vein, previous research showed that system anxiety moderate the effect of web quality on customers' trust (Lee *et al*., 2009).

Thus, this research attempts to fill these research gaps. We empirically tested the relationships among the using quality of information system success, trust and customer intention to continue use in the market intelligence industry. The purposes of this paper are: (a) To identify the effects of using quality of information system success and in different respect of trust in the market intelligence industry, (b) To analyze the relationship between trust types and customer intention to continue use and (c) To explore the moderating variable of system anxiety impacts the relationship between quality of ISS and trust.

RESEARCH MODEL AND HYPOTHESES

This research differs from B2C website. This research views a B2B website as an interface between a company and its customers and other stakeholders. We developed a research model (Fig. 1) to investigate the factors that influence customer intention to continue use in the market intelligence industry. In order to grasp the process of trust formation, we explore the moderating effects of system anxiety. The proposed model incorporates several constructs that we theoretically link to customer intention to continue use in the following subsections.

Relationships between the using quality of ISS and trust: Several researchers extended the model, such as or e-commerce (e.g., DeLone and McLean, 2004). Past qualitative research has

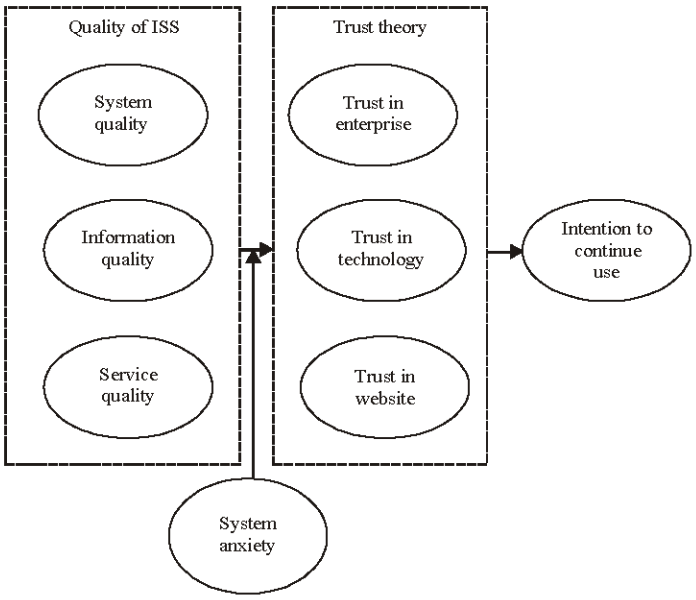

Fig. 1: Research model

recognized that the features of a website can lead the trust or mistrust of websites (Sillence *et al.*, 2004). Khalifa and Liu (2004) to explore antecedents of user satisfaction as being technical or recognized that the features of a website can lead the trust or mistrust of websites (Sillence *et al.*, 2004). Khalifa and Liu (2004) to explore antecedents of user satisfaction as being technical or semantic which can also be considered as system quality and information quality (McKinney *et al.*, 2002; Wixom and Todd, 2005). Studies on the relationship between website quality and trust consistently support that these two constructs are strongly related (Gregg and Walczak, 2010). Chen *et al.* (2008) indicated out that service quality is the key factor to the operation of the enterprise. In recent years, many studies have emphasized the importance of service quality in the success of information systems (Bruwer, 1984; Goodhue and Thompson, 1995). Later, DeLone and McLean revised to the original model and proposed service quality of third dimension.

We developed hypotheses and extended the relationship between the using quality of IS success and trust in differ aspects. To the best of our knowledge, there is no study used to inform the formulation of the following hypotheses.

System quality: In order to evaluate the contribution of information systems in the organization, some I/S researchers have focused on the processing system itself. Researchers tested a productivity model for computer systems, including such performance measures as resource utilization and investment utilization (Kriebel and Raviv, 1980, 1982). In recent years, many scholars putting focus on technical level of communication (Petter and McLean, 2009). System quality can be defined as an "equivalent to the technical level of communication" (Petter and McLean, 2009). Rattanawicha and Esichaikul (2005) indicated that website design characteristics is positively related to web users' trust. The more the customers perceived good quality with their interaction with a service technology, the more they will trust in enterprise, technology and website. Therefore, we hypothesized that:

- **H1a:** System quality is positively related to trust in enterprise
- **H1b:** System quality is positively related to trust in technology
- **H1c:** System quality is positively related to trust in website

Information quality: Information quality can be defined as an "equivalent to the semantic level of communication" (Petter and McLean, 2009). I/S researchers have also preferred to focus on the quality of the information system output. In the past study, Ahituv (1980) combined five information characteristics into a multi-attribute utility measure of information value: accuracy, timeliness, relevance, aggregation and formatting. Bailey and Pearson (1983) proposed 39 system-related items for measuring information accuracy, output timeliness, reliability, completeness, relevance, precision and currency. Nicolaou and Mcknight (2006) indicated that information cues available to a user during an initial exchange session can help build trusting beliefs. That is, the more the customers perceived good quality with their interaction with a service communication delivery, the more they will trust in enterprise, technology and website. Therefore, we hypothesized that:

- **H2a:** Information quality is positively related to trust in enterprise
- **H2b:** Information quality is positively related to trust in technology
- **H2c:** Information quality is positively related to trust in website

Service quality: Service quality can be defined as an overall judgment of attitude relating to the excellence of service (Zeithaml, 1988). The original D and M information system success model only measure system quality and information quality, so Pitt *et al.* (1995) indicates service quality need to be taken into account for another measurement indicator to the success of information systems. Service quality can reflect the role of the IT department's service. Eisingerich and Bell (2008) indicated that perceived service quality is positively related to customer trust. Customers' perceptions of service quality increase trust in a B2B environment (Caceres and Paparoidamis, 2007). The more the customers perceived good service with their interaction with a service provider, the more they will trust in enterprise, technology and website. Therefore, we hypothesized that:

- **H3a:** Service quality is positively related to trust in enterprise
- **H3b:** Service quality is positively related to trust in technology
- **H3c:** Service quality is positively related to trust in website

Trust theory: Trust is a significant concern issue to users. It can be defined as "one party's confidence in the other relationship members reliability, durability and integrity and the belief that its actions are in the best interest of and will produce positive outcomes for the trusting party" (Peppers and Rogers, 2004). Trust is a concept studied in various disciplines and, as a result, there are different definitions for trust. Usually, trust is seen as an expression of security between partners when making an exchange, or in another type of relationship (Garbarino and Johnson, 1999), as a belief that the partner in a negotiation will not exploit or take advantage of the other's vulnerability (Dwyer *et al.*, 1987). Doney and Cannon (1997) defined trust as the perceived credibility and benevolence of a target party. Friedman *et al.* (2000) stated that trust is based on the expectation that a trustee will act in the interests of the trustor without a guarantee and with minimizing the risk of harm. Hansen (1999) asserts that a well designed site can build trust and confidence. Generally, control trust can be distinguished from party trust (Tan and Thoen, 2002). This study adopts the latter perspective and view trust as the website user's perception of confidence in the site owner's reliability and integrity.

Relationships between trust and customer intention to continue use: In relationship marketing, Blois (1999) linked the construct of trust with the interest in general and particularly in the context of B2B markets. Past researches (Shamdasani and Balakrishnan, 2000; Coulter and Coulter, 2002; Shankar *et al.*, 2003; Ribbink *et al.*, 2004; Cyr *et al.*, 2007) showed a link between trust and customer loyalty. Some studies (Singh and Sirdeshmukh, 2000; Lee *et al.*, 2000; Coulter and Coulter, 2002; Shankar *et al.*, 2003; Luarn and Lin, 2003; Ribbink *et al.*, 2004; Sanchez-Franco *et al.*, 2009) have shown customer loyalty to be a consequence of trust. When customers develop trust in a service provider, it is very likely that they will stay with that service provider. In traditional commerce, trust is important and may be created through direct interactions with the vendor (Qiu and Benbasat, 2005). Trust is a complex concept that has been defined in different perspectives. For example, trust has been defined as "the willingness to be vulnerable to the actions of another party" (Mayer *et al.*, 1995) and as a willingness to rely on an exchange partner in whom one has confidence" (Moorman *et al.*, 1992) and as "a trustor's expectations about the motives and behaviors of a trustee" (Jarvenpaa *et al.*, 2000). Prior research has indicated that trust is an antecedent to behavior intentions (De Ruyter *et al.*, 2001). This finding was confirmed by other researchers in B2B marketing (Cater and Zabkar, 2009; Mukherjee and Nath, 2007; Rauyruen and

Miller, 2007). Antecedents to intention to continue use, based on the literature of intention to continue use related above. This research attempts to adopt three dimensions: (1) Trust in enterprise, (2) Trust in technology and (3) Trust in website.

That is, the more the customers trust the company, the more they will intention to continue use. Therefore, we hypothesized that:

- **H4a:** Trust in enterprise is positively related to customer intention to continue use
- **H4b:** Trust in technology is positively related to customer intention to continue use
- **H4c:** Trust in website is positively related to customer intention to continue use

System anxiety: Anxiety about the implications of computer system use for fear of other possible mistakes (Thatcher and Perrewe, 2002). System anxiety traits depends on customers using the technology of the past experience (Cui *et al*., 2009; Parasuraman, 2000). Thus, system anxiety factor play a key role. System anxiety is an apprehension or fear that results when user is faced to the possibility of using IS (Hackbarth *et al*., 2003). System anxiety influences web customers' affective responses, such as satisfaction or trust, because it is a negative affective reaction toward system use (Igbaria and Chakrabarti, 1990). Jarvenpaa *et al*. (2000) indicated that size and reputation of the Internet stores, related to anxiety of the system, were found to influence the consumer assessments of the store's trustworthiness and willingness to patronize the store. Lee *et al*. (2009) explores the effect of website system satisfaction on relationship quality is weaker for those with higher system anxiety than for those with lower system anxiety. Thus, it is anticipated that the positive effect of quality of ISS on trust will be weaker when the system quality are higher and that the positive effect of quality of ISS will be stronger when the system anxiety are lower.

- **H5:** The positive relationship between user quality of ISS and trust is weaker when system anxiety increase

METHODOLOGY

Questionnaire and sampling: The sample members are from the 385 organizational members of the Market Intelligence Center (MIC) in Taiwan, who had been using the online information system at least for the past three months. Because this survey is based on respondents with B2B interaction experience, 2-5 users of the market intelligence services in each department from each firm were randomly data collected sampling techniques as target samples. Eight hundred fourty seven questionnaires were delivered, 339 surveys were returned from 111 firms.

Measures: The items used to measure each of constructs are presented in Appendix 1. The scales for measuring the using quality of ISS were adapted from Ahn *et al*. (2004). The scale items used to measure trust in differ aspects were adapted from Teo *et al*. (2008). The scales for intention to continue use were derived from Bhattacherjee and Premkumar (2004). The scales for system anxiety were derived from Hwang and Kim (2007). All items were measured on a seven-point Likert scale (1: strongly disagree, 7: strongly agree).

DATA ANALYSIS AND RESULTS

Measurement model: Measures of overall fit evaluate how well a CFA model reproduces the covariance matrix of the observed variables. The measurement model showed adequate fit:

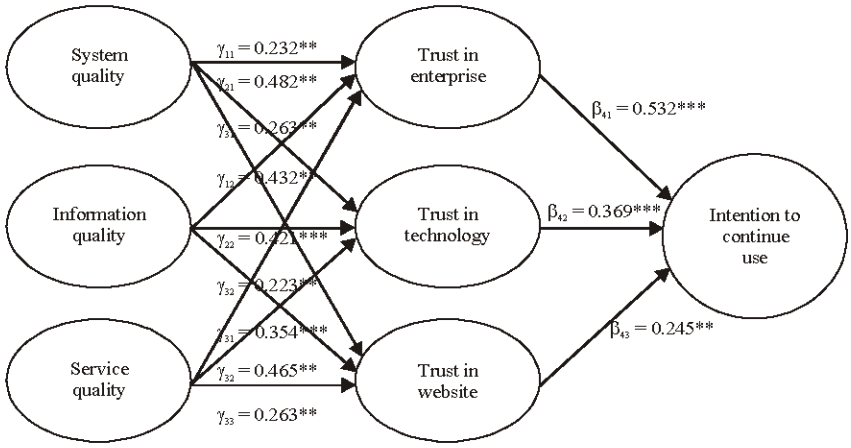

Fig. 2: Hypothesized model, Reported parameter estimates are from the completely standardized solutions, Significant **p<0.01; ***p<0.001

x^2/df = 2.264, Goodness-of-fit Index (GFI) = 0.861, Nonnormed Fit Index (NFI) = 0.893, Comparative Fit Index (CFI) = 0.937, Incremental Fit Index (IFI) = 0.937 and Root Mean Square Error of Approximation (RMSEA) = 0.056. As shown in Table 1, the CR for each construct was above 0.817, demonstrating a reasonable degree of internal consistency between the corresponding indicators. Results also showed support for the convergent and discriminant validity. As evidence of convergent validity, each item loaded significantly on its respective construct (Anderson and Gerbing, 1988).

Evidence of discriminant validity exists when the square root of the Average of Variance Extracted (AVE) in each construct exceeds the coefficients representing its correlation with other constructs (Fornell and Larcker, 1981). As shown in Table 2.

Structural model: The fit of data to the proposed model was adequate: (χ^2 = 888.721, df = 390, GFI = 0.859, NFI = 0.891, CFI = 0.935, IFI = 0.936 and RMSEA = 0.056). The chi-square test is sensitive to sample size, but the ratio of chi-square to degrees of freedom (χ^2/df = 2.279) still fell within the suggested value of 5 or below (e.g., Bollen, 1989). In addition, the other indices (GFI = 0.859, NFI = 0.891) were below the 0.9 benchmark, but it exceeded the recommended cut-off value 0.8 (Hu and Bentler, 1999). Therefore, there was a reasonable overall fit between the model and observed data. Fig. 2 provides a graphic representation of the estimates in the path diagram and presents the results of the hypotheses tests. The results showed support for the twelve sub-hypotheses.

Consistent with H1a, H1b and H1c, system quality positively influenced trust in enterprise (γ_{11} = 0.232), trust in technology (γ_{21} = 0.482) and trust in website (γ_{31} = 0.263), respectively. Consistent with H2a, H2b and H2c, information quality positively influenced trust in enterprise (γ_{12} = 0.432), trust in technology (γ_{22} = 0.421) and trust in website (γ_{32} = 0.223), respectively. Consistent with H2a, H2b and H2c, service quality positively influenced trust in enterprise (γ_{31} = 0.354), trust in technology (γ_{32} = 0.465) and trust in website (γ_{33} = 0.263), respectively.

Trust in enterprise positively affected customer intention to continue use (β_{41} = 0.532) and trust in technology positively affected customer intention to continue use (β_{42} = 0.369). Trust in website positively affected customer intention to continue use (β_{43} = 0.245). H4a, H4b and H4c were

Table 1: Analysis of measurement

	MLE estimates			
Constructs	Factor loading (λ_x/λ_y)	Measurement error (δ/ε)	Composite reliability	Average of variance extracted (AVE)
Using quality of ISS				
System Quality (SYSQ)			0.873	0.495
SYSQ1	0.666***	0.556		
SYSQ2	0.662***	0.562		
SYSQ3	0.711***	0.495		
SYSQ4	0.693***	0.519		
SYSQ5	0.723***	0.477		
SYSQ6	0.747***	0.442		
SYSQ7	0.721***	0.480		
Information Quality (IQ)			0.855	0.496
IQ1	0.704***	0.504		
IQ2	0.706***	0.501		
IQ3	0.670***	0.551		
IQ4	0.727***	0.471		
IQ5	0.697***	0.514		
IQ6	0.720***	0.482		
Service Quality (SQ)			0.843	0.574
SQ1	0.729***	0.469		
SQ2	0.719***	0.483		
SQ3	0.770***	0.407		
SQ4	0.808***	0.348		
Trust				
Trust in enterprise			0.897	0.684
TE1	0.829***	0.313		
TE2	0.834***	0.305		
TE3	0.809***	0.346		
TE4	0.836***	0.301		
Trust in technology			0.856	0.664
TT1	0.827***	0.315		
TT2	0.821***	0.325		
TT3	0.796***	0.367		
Trust in website			0.833	0.624
TW1	0.794***	0.370		
TW2	0.798***	0.363		
TW3	0.777***	0.396		
Intention to continue use			0.845	0.645
ICU1	0.784***	0.386		
ICU2	0.818***	0.332		
ICU3	0.806***	0.351		
System anxiety			0.867	0.663
SA1	0.757***	0.428		
SA2	0.777***	0.397		
SA3	0.888***	0.212		
SA4	0.828***	0.314		

***$p<0.001$

Table 2: Correlation matrix for measurement scales

Constructs	SYSQ	IQ	SQ	TE	TT	TW	ICU	SA
SYSQ	0.703							
IQ	0.621	0.704						
SQ	0.313	0.385	0.758					
TE	0.416	0.411	0.543	0.827				
TT	0.366	0.333	0.501	0.786	0.815			
TW	0.364	0.393	0.535	0.758	0.694	0.790		
ICU	0.546	0.559	0.272	0.451	0.418	0.477	0.803	
SA	0.426	0.426	0.229	0.388	0.329	0.398	0.719	0.814

SYSQ: System quality, IQ: Information quality, SQ: Service quality, TE: Trust in enterprise, TT: Trust in technology, TW: Trust in website, ICU: Intention to continuance use, SA: System anxiety, Diagonal elements are the square roots of the average variance extracted

Table 3: Chi-square difference test between low and high system anxiety group

Fit index:	Constrained model	Unconstrained model	$\Delta\chi^2$
Chi-square (d.f)	152.844 (18)	106.864 (16)	45.98***(H5)
GFI	0.871	0.909	
CFI	0.859	0.905	
NFI	0.845	0.892	
IFI	0.861	0.906	
RMSEA	0.155	0.135	
		System anxiety	
		High	Low
Quality of ISS→Trust		0.213***	0.087

***p<0.001

supported. Overall, these results find that the using quality of ISS can influence customer intention to continue use via trust in different aspects.

Testing the moderating effect of system anxiety: A multi-group causal analysis was used to test the moderating effect of system anxiety. Respondents were divided into high and low groups based on their perceived system anxiety (performing a median-split). A structural model linking quality of ISS with trust was constrained to force equal loading between high and low system anxiety groups. A chi-square difference test was then conducted between the two groups to identify whether their paths were significant different. As shown in Table 3, the chi-square difference was 45.98 ($p<0.001$) for the quality of ISS and trust link. H5 proposed a positive moderating effect of system anxiety on the relationship between quality of ISS and trust. The results showed that the relationship between quality of ISS and trust was significantly negative when system anxiety was high, whereas this relationship was not significant when system anxiety were low, supporting H5.

DISCUSSION

Conclusion and managerial implications: The purpose of this research is to propose and empirically test a model for customer intention to continue use building in B2B e-commerce. Specifically, we explored the antecedents of customer intention to continue use in B2B e-commerce from an ISS perspective. In recent years, many companies began to notice the importance of the e-service component, but they still lack reasonable ways of benchmarking to monitor their quality of ISS strategies. This study provides an important insight to identify which quality of ISS should

be fostered in market intelligence firms of e-service. The findings provide support for the research model and the 12 research sub-hypotheses. This research results offer important managerial implications for managers in B2B e-commerce. An online service provider should understand the needs of their customers in order to deliver effective intelligence services from IS perspective. Especially, the design of a system, information richness and service quality plays an important role in keeping customers. These ways of benchmarking will be more likely to enhance customer trust in enterprise, technology and website. This research stated trusts in different aspects are the critical centre of successful relationship marketing. At the same time, The key mediating variables of customer trust in enterprise, technology and website will lead to customer intention continue to use. The findings suggest that quality of ISS play key roles in forming trust. Furthermore, the moderator of our research model is found to be important. Further, this research also demonstrates that system anxiety moderate the negative effect of quality of ISS on trust. When system anxiety increase, the level of quality of ISS directly negatively influences trust, whereas when system anxiety decrease, such an effect was not observed. Therefore, system manager should provide the necessary assistance and operating manual for user reference in order to effectively reduce the anxiety of the user. Besides, vendors which focus on trust for success should attempt to categorize customers according to their system anxiety levels and offer operation training.

As all research, this research is not without shortcomings. First, limitation of this investigation was the sample generalizability. This research recommends that future research examines the robustness of the proposed model by including samples from other market intelligence firms. Second, as prior studies in relationship marketing have focused on the effect of satisfaction, trust and commitment, future research should add trust in different aspects to the research model in order to examine how customers' trust in different aspects and behavior results. Finally, this study did not control for the customer relationship length, depth and breadth (Liang and Chen, 2009). Future research may need to control for or manipulate some of these variables.

APPENDIX 1: SCALE ITEMS

Using Quality of ISS (cite from Ahn *et al.*, 2004)
System Quality (SYSQ)
(The website) has an appropriate style of design for site type.
(The website) has easy navigation to information.
(The website) has fast response and transaction processing.
(The website) keeps personal information secure from exposure.
(The website) can use when I want to use.
(The website) has good functionality relevant to site type.
(The website) keeps error-free transactions.
Information Quality (IQ)
(The website) has sufficient contents where I expect to find information.
(The website) provides complete information.
(The website) provides site-specific information.
(The website) provides accurate information.
(The website) provides timely information.
(The website) provides reliable information.

Service Quality (SQ)
(The website) anticipates and responds promptly to user request.
(The website) can be depended on to provide whatever is promised.
(The website) instills confidence in users and reduces uncertainty.
(The website) gives a professional and competence image.
Trust (revise from Teo *et al.*, 2008)
Trust in Enterprise
I feel that the website store acts in shopper's best interest.
I feel fine interacting with the website store since the website store generally fulfills its duties efficiently.
I always feel confident that I can rely on the website store to do their part when I interact with them.
I am comfortable relying on the website store to meet their obligations.
Trust in Technology
The internet has enough safeguards to make me feel comfortable using it.
I feel assured that legal and technological structures adequately protect me from problems on the internet.
I feel confident that encryption and other technological advances on the internet make it safe for me to transact there.
Trust in website
This website is trustworthy.
This website seems to be honest and truthful to me.
This website can be trusted.
Intention to continue use (revise from Bhattacherjee and Premkumar (2004)
I intend to continue using this website rather than discontinue its use.
My intentions are to continue using this website than use any alternative means.
If I could, I would like to discontinue my use of the website (reverse coded).
System Anxiety
It scares me to think that I could cause to destroy a large amount of information by hitting the wrong key in this information intelligence system.
I hesitate to use this information intelligence system for fear of making mistakes that I cannot correct.
This information intelligence system is somewhat intimidating to me.
I feel apprehensive about using this information intelligence system.

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