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UNDERSTANDING REPEAT PURCHASE INTENTIONS AND UNCERTAINTY IN THE CONTEXT OF ONLINE SHOPPING

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Abstract

The distant and impersonal nature of e-commerce (EC) and the unpredictability of the Internet infrastructure generate an implicit uncertainty around online transactions. Moreover, customer repeat purchasing is critical to the e-commerce vendor's survival and success. However, few studies explain online repeat purchase from an uncertainty perspective. The purpose of this study is to propose a conceptual model to examine the sources of uncertainty and types of uncertainty in an online transaction, which affect online repeat purchase intentions. We drew on uncertainty and online repeat purchase literature to formulate a conceptual model that identifies the sources of uncertainty, and three types of uncertainty (seller uncertainty, product uncertainty and environmental uncertainty) are respectively proposed as formative second-order constructs. The proposed structural model is empirically tested with data from 554 experienced online shoppers, and then analyzed using Structure Equation Model (SEM). The results show that seller uncertainty and environmental uncertainty have a negative effect on repeat purchase intentions. Implications for theory and practice and suggestions for future research are discussed.

Keywords : Online shopping, Seller uncertainty, Product uncertainty, Environmental uncertainty, Repeat purchase intentions

1 INTRODUCTION

The rapid proliferation of the Internet is promoting e-commerce (EC) as an important application for both enterprises and customers. The advantages of EC: rich information, convenience, time savings, broader selections and competitive pricing, are well known. Despite constant growth in the past decade, the EC market is still small, and how to attract customer repurchase remains a concern for e-commerce vendors (e-vendors) (Johnson & Hult, 2008). Compared to shopping in a traditional brick and mortar environment, customers maintain a higher level of uncertainty about the shop, the seller, the quality of the product, and the settlement performance in the online shopping environment (Tan & Thoen 2001). It is reported that only a small minority of website visitors returns to make purchases (Gupta & Kim, 2007). The spatial and temporal separation between consumers and e-vendors and the unpredictability of the Internet infrastructure generate an implicit uncertainty around online transactions (Brynjolfsson & Smith, 2000). As a consequence, consumers' intentions to repurchase products online may be impaired (Liang et al., 2005). However, acquiring new customers may cost up to five times as much as retaining existing ones (Parthasarathy & Bhattacharjee, 1998). E-vendors are concerned about customer repurchase because of the comparatively high cost of acquiring new customers." (Johnson & Hult, 2008; Reichheld & Scheffer, 2000).

Since repeat purchasing is critical to the survival and success of online sellers, management scholars are paying paramount attention to the buyer-supplier relationship in the online repurchase context (Chiu et al., 2009; Khalifa & Liu, 2007; Otim & Grover, 2006; Qureshi et al., 2009; Tsai & Huang, 2007; Yen & Lu, 2008). Moreover, most of the studies have focused on exploring the relationship between online repurchasing intention and other constructs such as trust, satisfaction, and actual purchases. (Chiu et al., 2009; Khalifa & Liu, 2007; Otim & Grover, 2006; Qureshi et al., 2009; Tsai & Huang, 2007; Yen & Lu, 2008). However, few empirical studies have been conducted on the effect of uncertainty or have looked into what factors cause the uncertainty in an Internet shopping environment from the experienced online shoppers' viewpoint.

A variety of uncertainties arise in the online transaction (Silverman & Perlstein, 2003). Two major research questions are addressed in this study as follows. First, what drives the perceived uncertainty of buyers? That is, what are the sources of uncertainty from customers' perspective? Second, what types of uncertainties influence the repeat purchase intentions? The objective of this study is to understand the repeat purchase intentions of customers in online context from uncertainty perspective. This research proposes a framework which identifies a set of key factors related to different types of uncertainty in the B2C context. The outcomes of this study are expected to be of consequence to business, consumers and researchers.

2 THEORETICAL BACKGROUND, RESEARCH MODEL AND HYPOTHESES

By drawing upon existing e-commerce studies and uncertainty literature, a research model is proposed to empirically test the relationship between three types of uncertainty and repeat purchase intentions in an online context. Fig. 1 presents the proposed model. The dependent variable, repeat purchase intentions, is posited as the primary construct to determine buyers' repeat purchase behaviors. This paper reviews the literature on uncertainty and proposes a formative model to identify three types of uncertainty—seller uncertainty, product uncertainty, and environmental uncertainty as formative constructs. Three formative second-order constructs are individually driven by different sources of uncertainty. The rationale for the proposed formative model is as follows. Here, we take the seller uncertainty as an example. First, consistent with the conceptualization of the proposed sources of seller uncertainty, any of dimensions of seller uncertainty can singly, or in some combination, cause the perception of seller uncertainty. Second, the three underlying components of seller uncertainty are not highly correlated. For example, buyers' perceptions about information privacy concerns have nothing to do with buyers' perceptions about customer support concerns. Therefore, a formative

model is proposed to accurately and parsimoniously capture the multidimensional nature of uncertainty.

2.1 Sources of Uncertainty in Online Transactions

According to Pfeffer & Salancik (1978), uncertainty refers to the degree to which the future states of the environment cannot be accurately anticipated or predicted due to imperfect information. Applying the principal-agent perspective to buyer-seller relationships, buyers are viewed as the principals that hire a seller (agent) to deliver a product as advertised in a timely manner. In the online transaction, it involves an imbalance of power due to two information problems: adverse selection (hidden information) and moral hazard (hidden action). Hidden information refers to the pre-contractual misrepresentation of the seller's characteristics and the quality of its products (Pavlou et al., 2007). Previous studies have identified various sources of risk or uncertainty in the context of online transaction, such as product quality, seller quality (Pavlou et al., 2007; Ghose, 2009), product performance, financial, psychological, performance, time/convenience risks (Forsythe & Shi, 2003), branding, behavioral, environmental uncertainty (Teo & Yu, 2005), etc. Moreover, this paper summarized the sources of uncertainty derived from multiple studies (Cho et al., 2006; Forsythe & Shi, 2003; Liang et al., 2005; Liang & Huang, 1998; Pavlou et al., 2007; Pavlou, 2003; Teo & Yu, 2005) and identifies three types of uncertainty—seller uncertainty, product uncertainty, and environmental uncertainty from the perspectives of buyers (see Table 1).

Contracts Author	Seller Uncertainty			Product Uncertainty			Environmental Uncertainty		
	Fears of Opportunism	Information Privacy Concerns	Customer Support Concerns	Product Price Concerns	Product Quality Concerns	Product Delivery Concerns	Website Design Concerns	Information Security Concerns	Reputation Concerns
Cho et al. (2006)	✓			✓	✓				✓
Forsythe & Shi (2003)		✓			✓	✓	✓	✓	
Liang et al. (2005)	✓				✓				
Liang & Huang (1998)	✓				✓	✓	✓		
Pavlou et al. (2007)	✓	✓						✓	
Pavlou (2003)	✓	✓			✓		✓	✓	
Teo & Yu (2005)	✓		✓		✓		✓		✓

Table 1. Summary of relevant studies on sources of Uncertainty

2.1.1 Seller Uncertainty

The seller is in a position of power and can decide whether to hide the product's true characteristics, keep the product quality and condition as promised, interact with buyers in a timely manner, and etc. (Chiu et al., 2009). However, the buyers are in a vulnerable situation because of potentially incomplete or indistinct information provided by the seller, i.e. information asymmetry (Ba & Pavlou, 2002). Seller uncertainty is defined as the buyer's perceived uncertainty arises because e-vendors have the chance to have opportunistic behavior by taking advantage of the distant and impersonal

nature of e-commerce(EC) (Pavlou, 2003). The seller's opportunistic behaviors include product misrepresentations, false identity demonstrations, private information leaks, misleading advertising, and denunciations of warranties. That is, buyers have fears that sellers may act opportunistically to serve their self-interest due to the anonymous identities of online seller (Ba & Pavlou, 2002). Therefore, fears of seller opportunism form the sources of uncertainty. The open Internet infrastructure allows personal information of buyer to be easily collected and used by sellers, as buyers have to provide their personal information, such as their private (e.g., personal data, product preferences) and monetary (e.g., credit card) information in online transactions. However, data transmitted over the open Internet infrastructure are beyond the seller's full control. Thus, online buyers have concern about whether the sellers have the ability or willingness to effectively manage their personal information. They also worry that sellers will misuse or disclose their personal information to third parties without their approval outside the focal transaction. Information privacy concerns are distinct from product quality uncertainty, and they only relate to seller quality (Pavlou et al., 2007). In addition, post-purchase service and support of online transaction such as maintenance, refund, and change of product are conducted by e-vendors that are not under control of the customers and are usually performed after payment (Qurush et al., 2009). From an online customer's perspective, post-purchase service and support have some degree of risk and uncertainty leading to more concerns about post-purchase service and support of e-vendor. Therefore, fears of seller opportunism, information privacy concerns, and customer support concerns may lead to buyers' perceived uncertainty from sellers in online transaction.

2.1.2 *Product Uncertainty*

In online markets, product characteristics cannot always be reliably described or verified prior to a transaction. Since the product attributes, such as product condition, are difficult to communicate in electronic markets, an information asymmetry problem for electronic markets is produced (Ghose, 2009). This information asymmetry can lead to adverse selection and moral hazard problems (Akerlof 1970) and is often associated with the uncertainty of a product. Therefore, three types of product concerns arise from buyers and lead to product uncertainty. One relates to the financial risk regarding a product's price, i.e., perceived uncertainty resulting from overspending in buying the product (Cho et al., 2006). The second arises because buyers cannot easily monitor how product delivery is undertaken. The last relates to the situation where sellers may purposely misrepresent their true characteristics before purchase, and reduce the promised product quality after payment (Pavlou et al., 2007). Hence, product price concerns, product delivery concerns and quality delivery concerns may cause buyers' perceived uncertainty from products in online transaction.

2.1.3 *Environmental Uncertainty*

The impersonal and distant nature of the on-line environment and the implicit uncertainty of using a global open infrastructure have rendered risk (Pavlou, 2003). Environmental uncertainty is naturally present in online transactions. Online shoppers need to transact with the e-vendors through the website interface, and have more concerns about the website design of e-vendors (Gefen & Straub, 2000). If customers perceive an e-vendor's website to be of high quality, they will likely have a positive attitude towards it which translates into a higher intention to revisit (Pavlou & Fygenon, 2006). According to Qureshi et al.(2009), the website quality of an e-vendor is positively related to the purchase intentions of returning customers. Other research also reports that website characteristics have direct effects on initial purchase (Liu & Arnett, 2000; Koufaris, 2002). Because the Internet environment exposes a variety of security weaknesses, there is concern about the reliability of the Internet itself and the related security of the transaction medium (e.g., encryption, authentication, firewalls). Information security concerns of buyer relate to both hidden information and hidden action, since buyers cannot select sellers who have the ability to protect their monetary information from hackers leading to uncertainty (Pavlou et al., 2007). In addition, a seller's reputation is perhaps even more critical to the customer's evaluation of the company's credibility since there are fewer visible signals of credibility and greater risks in an online environment (Wirtz & Lihotzky, 2003). Similar to website quality, reputation has been found as a trust-building lever in the first-time online purchase context (Jarvenpaa et al., 2000; Yoon,2002; Koufaris & Hampton-Sosa, 2004). The good reputation

of e-vendor will lead to buyer's confidence; however, uncertainty emerges from the belief that e-vendors with a bad reputation and untrustworthy behavior are perceived to be more frequent in online context (Granovetter, 1985; Kramer, 1999). Thus, website design concerns, information security concerns and reputation concerns may form environmental uncertainty in online transactions.

2.2 Uncertainty and Repeat Purchase Intentions in Online Transaction

Uncertainty has been widely touted as the primary barrier to online transactions. Transaction uncertainty can result from the impersonal nature of the electronic environment. To better understand the research on uncertainty, this paper summarized several prior studies which have examined the uncertainty or risk in EC context (see Table 2). With the growing importance of e-commerce, practitioners and researchers are paying more attention to customer retention and repurchasing in online transactions. Repurchase behavior is conceptually different from initial (or first-time) purchase intention and widely recognized as a major behavioral manifestation (Otim & Grover, 2006; Qureshi et al., 2009). According to Chiu et al. (2009), repeat purchase intentions refer to the subjective probability that a customer will continue to buy products from the sellers in the future.

Since no study has made a category of uncertainty nor operationalized the type of uncertainty as second-order formative indicators, this study examine the effects of uncertainty on repeat purchase intentions in the EC context. More specifically, (a) the spatial and temporal separation between buyers and sellers increases fears of e-vendors opportunism, information privacy concerns, and customer support concerns arising from seller uncertainty (Pavlou et al., 2007), (b) there is concern about the delivery, price, and quality of product offerings, (c) web design, information security, and reputation concerns raise from the future states of the environment cannot be accurate. Overall, these three differences increase the consumer's uncertainty perceptions in the repurchase context, thereby reducing the consumer's willingness to buy from an e-vendor again. Consistent with numerous empirical studies, it has been found that uncertainty influences consumer acceptance of e-commerce and purchase intention negatively (Liang & Huang, 1998; Jarvenpaa et al., 2000; Pavlou, 2003, Liang et al., 2005; Pavlou et al., 2007). Hence, the following hypotheses are proposed.

Hypothesis 1: Seller uncertainty is negatively related to the consumer's willingness to buy from an e-vendor again.

Hypothesis 2: Product uncertainty is negatively related to the consumer's willingness to buy from an e-vendor again.

Hypothesis 3: Environmental uncertainty is negatively related to the consumer's willingness to buy from an e-vendor again.

3 RESEARCH METHODOLOGY

3.1 Measurement development

Items selected for constructs were primarily adapted from prior studies to ensure content validity. A pretest of the Chinese questionnaire was performed using three experts and four Ph D. students, whose research areas are all related to EC, to assess its logical consistencies, ease of understanding, sequence of items, and contextual relevance. The comments collected from these experts and students led to several minor modifications of the wording and the item sequence. Furthermore, a pilot study was conducted involving twenty Ph D. and master students who all majored in MIS. Comments and suggestions on the item contents and structure of the instrument were solicited. All questions in the instrument were measured on seven-point Likert scales, ranging from "strongly disagree" (1) to 'strongly agree' (7).

3.2 Survey administration

In order to establish generalizability, allow replicability, and have statistical power, survey method was used to test the research model. The research model was tested with data from repeat customers who had the shopping experience on Internet shopping store. Subjects were selected by placing a message with a hyperlink connecting to web survey on a number of campus BBS, chat rooms and popular virtual communities. Also, individuals with online shopping experience on Internet shopping stores were cordially invited to support this survey. A cover letter was attached to explain the purpose of this study and to ensure the participants' confidentiality. Fifteen randomly selected respondents were contacted through e-mail in order to get their names and address for mailing an incentive gift. The returned questionnaires were screened for reliability and usability; 625 responses were found to be valid for data analysis. The data was collected from September 22 to October 23, 2009.

3.3 Data analysis

Data analysis involves analyses of the measurement model and structural model. PLS (partial least squares, SmartPLS version 2.0.M3) provides the analysis of both a measurement model and a structural model. PLS places minimal restrictions on measurement scales, sample size and residual distribution (Chin & Newsted, 1999). PLS allows latent constructs to be modelled as formative or reflective indicators, as was the case with our model. PLS was used because our research model contains three formative second-order constructs, i.e. seller uncertainty, product uncertainty and environmental uncertainty.

3.4 Measurement model

The second-order constructs, seller uncertainty, product uncertainty and environmental uncertainty, were approximated using the approach of repeated indicators suggested by Chin et al. (2003). A second-order construct is directly measured by observed variables for all the first order constructs that are measured with reflective indicators. This procedure can be used with approximately equal numbers of indicators for each construct. Chin suggests that the method of repeated manifest variables will cause the R^2 for the second-order construct to end up as 1.0 (Chiu et al., 2009). The adequacy of the measurement model was evaluated on the criteria of reliability, convergent validity and discriminant validity. Reliability was examined using the composite reliability values, which should be greater than the benchmark of 0.7 to be considered adequate (Fornell & Larcker, 1981). Table 3 shows that all the values are above 0.7, indicating adequate reliability. Additionally, the convergent validity of the scales was verified by using two criteria suggested by Fornell & Larcker (1981): (1) all indicator loadings should be significant and exceed 0.7 and (2) average variance extracted (AVE) by each construct should exceed the variance due to measurement error for that construct (i.e., AVE should exceed 0.50). As shown in Table 3, most items exhibited loading higher than 0.7 on their respective construct, providing evidence of acceptable item convergence on the intended constructs. AVE ranged from 0.74 to 0.93 (see Table 4). Hence, both conditions for convergent validity were met.

Discriminant validity was tested using the following three tests. First, an examination of cross-factor loadings indicates good discriminant validity, because the loading of each measurement item on its assigned latent variable is larger than its loading on any other constructs (Chin, 1998). Second, the correlations among all constructs are all well below the 0.85 threshold (Kline, 1998), suggesting that all constructs are distinct from each other. Third, the square root of the AVE from the construct is much larger than the correlation shared between the construct and other constructs in the model (Fornell & Larcker, 1981). In this study, three conditions for discriminant validity were met.

3.5 Structural model

In PLS analysis, examining the structural paths and the R^2 scores of endogenous variables assesses the explanatory power of a structural model. All hypotheses except hypothesis two were supported. Figure 1 shows the result of path coefficients. Hypothesis 1 (The seller uncertainty negatively influences the buyer's intentions to purchase again from an e-vendor), and Hypothesis 3 (The

environmental uncertainty negatively influences the buyer's intentions to purchase again from the e-vendors) exhibited a P-value of less than 0.05. As can be seen, seller uncertainty ($\beta = -0.32$, $t\text{-value} = 4.42$), and environmental uncertainty ($\beta = -0.53$, $t\text{-value} = 13.21$) all showed significant relationships with repeat purchase intentions. Therefore, hypothesis 1 and 3 were supported. However, the relationship between product uncertainty and repeat purchase intentions ($\beta = 0.07$, $t\text{-value} = 1.37$) did not show significant relationship. Hypothesis 2 was not supported. In addition, the R^2 value for Repeat Purchase Intentions is .29, indicating approximately 29% of the variance in usage is explained by the model. Thus, the fit of the overall model is good.

Author(s)	Internet context	Constructs (Abbreviation)	Findings
Cho et al. (2006)	general website	Perceived Uncertainty (PU), Online Shopping Hesitation (OSH)	Trust \rightarrow PR(-) PR \rightarrow IN(-)
Forsythe & Shi (2003)	general website	Product Performance Risk (PPR), Financial Risk (FR), Psychological Risk (PR), Time/Convenience Risk (TCR), Online Shopping Behavior (OSB)	PPR \rightarrow OSB (-) FR \rightarrow OSB (-) PR \rightarrow OSB (-) TCR \rightarrow OSB (-)
Liang et al. (2005)	online prescription filling website	Uncertainty (UC), Intention (IN), Opportunistic Behavior (OB), Information Asymmetry (IA)	Trust \rightarrow UC (-) Trust \rightarrow IN (+) UC \rightarrow IN (-) OB \rightarrow UC (+) IA \rightarrow UC (+)
Liang & Huang (1998)	general website	Uncertainty(UC), Asset Specificity(AS), Transaction Cost(TC), Acceptance(AT)	UC \rightarrow TC (+) UC \rightarrow TC (+) UC \rightarrow AT(+) TC \rightarrow AT (-)
Pavlou et al. (2007)	bookstore, prescription drug websites	Perceived Uncertainty (PU) Purchase Intentions(PI)	PU \rightarrow PI(-)
Pavlou (2003)	Amazon, general website	Trust Perceived Risk (PR) Intention to Transact (IN)	Trust \rightarrow PR(-) PR \rightarrow IN(-)
Teo & Yu (2005)	general website	Uncertainty (UC), Transaction Cost (TC) Branding Uncertainty (BU), Performance Uncertainty (PU), Behavioral Uncertainty (BU), Environmental Uncertainty (EU), Consumers' Willingness to Buy Online (CW)	UC \rightarrow TC (+) BU \rightarrow TC (+) PU \rightarrow TC (+) BU \rightarrow TC (+) BU \rightarrow TC (+) Trust \rightarrow TC (-) TC \rightarrow CW (-)

Table 2. Summary of relevant studies on Uncertainty of Electronic Commerce

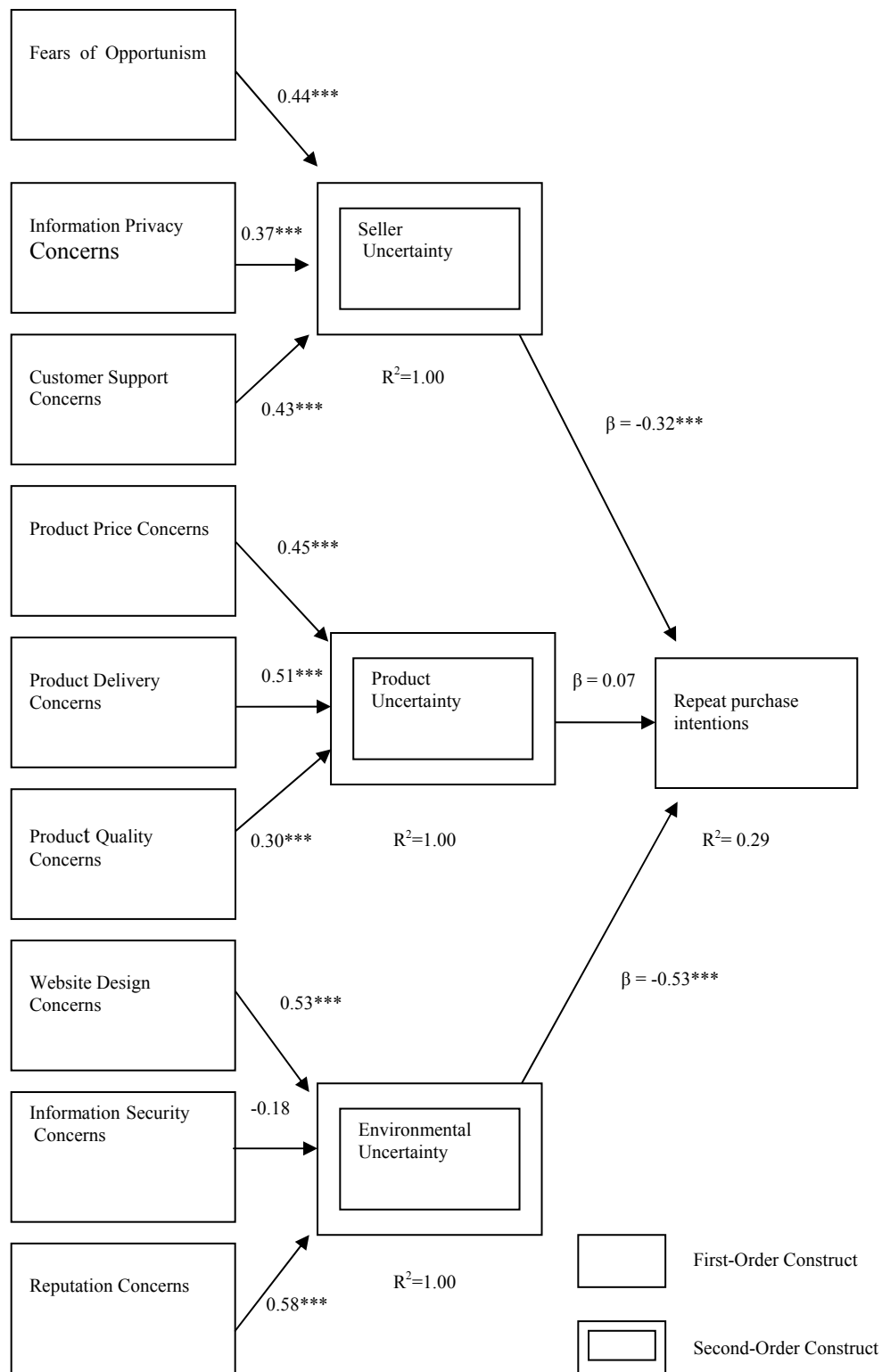
Construct	Item	Mean	Std. Dev	Loading	Composite Reliability
Fears of Opportunism (FSO)	FSO1	4.44	1.65	0.91	0.94
	FSO2	4.97	1.46	0.94	
	FSO3	4.60	4.44	0.92	
Information Privacy Concerns (IPC)	IPC1	5.25	1.34	0.91	0.93
	IPC2	5.04	1.34	0.90	
	IPC3	5.58	1.30	0.88	
Customer Support Concerns (CSC)	CSC1	5.05	1.32	0.91	0.95
	CSC2	4.97	1.40	0.94	
	CSC3	5.07	1.42	0.91	
Product Price Concerns (PPC)	PPC1	4.70	1.37	0.91	0.94
	PPC2	4.58	1.36	0.94	
	PPC3	4.66	1.35	0.90	
Product Delivery Concerns(DFC)	DFC1	4.52	1.51	0.95	0.96
	DFC2	4.54	1.49	0.95	
	DFC3	4.52	1.50	0.95	
Product Quality Concerns (PQC)	PQC1	4.77	1.40	0.97	0.97
	PQC2	4.90	1.35	0.97	
Website Design Concerns (WDC)	WDC1	5.23	1.07	0.84	0.90
	WDC2	5.06	1.03	0.88	
	WDC3	5.39	1.00	0.87	
Information Security Concerns (ISC)	ISC1	5.44	1.24	0.88	0.93
	ISC2	5.38	1.21	0.94	
	ISC3	5.54	1.14	0.90	
Reputation Concerns (RC)	RC1	5.07	1.39	0.88	0.93
	RC2	5.07	1.34	0.90	
	RC3	5.03	1.37	0.91	
Repeat purchase intentions (RI)	RI1	5.35	1.14	0.93	0.96
	RI2	5.54	1.10	0.96	
	RI3	5.54	1.12	0.94	

Table 3. Measurement Scales and Reliability

Constructs	AVE	Constructs									
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Fears of Opportunism (1)	0.85	0.92									
Information Privacy Concerns (2)	0.80	0.45	0.89								
Customer Support Concerns (3)	0.85	0.52	0.41	0.92							
Product Price Concerns (4)	0.84	0.26	0.45	0.36	0.92						
Product Delivery Concerns (5)	0.90	0.32	0.27	0.46	0.46	0.95					
Product Quality Concerns (6)	0.93	0.51	0.35	0.51	0.43	0.48	0.96				
Website Design Concerns (7)	0.74	-0.08	-0.10	-0.08	-0.12	-0.07	0.01	0.86			
Information Security Concerns (8)	0.82	0.35	0.56	0.37	0.22	0.27	0.36	-0.19	0.91		
Reputation Concerns (9)	0.80	-0.01	-0.06	-0.06	-0.18	-0.14	-0.01	0.48	-0.01	0.89	
Repeat purchase intentions (10)	0.89	-0.10	-0.03	-0.06	0.10	0.08	-0.09	-0.47	0.52	-0.44	0.94

* Diagonal elements (in bold) are the square root of the average variance extracted (AVE). Off-diagonal elements are the correlations among constructs. For discriminant validity, diagonal elements should be larger than off-diagonal elements.

Table 4. Discriminant Validity and Correlations



*Significant at $p < 0.05$; ** Significant at $p < 0.01$; *** Significant at $p < 0.001$

Figure 1. SEM analysis of the research model.

4 DISCUSSIONS AND CONCLUSIONS

This paper aims to shed light on the phenomenon of buyers' repeat purchase intentions from the uncertainty perspective. Results indicate three sources of uncertainty from seller are significant formative indicators of seller uncertainty. Fears of opportunism, information privacy concerns and customer support concerns have nearly equal importance in forming seller uncertainty. In addition, three sources of uncertainty from the environment are significant formative indicators of environmental uncertainty. Website design concerns and reputation concerns have nearly equal importance in forming product uncertainty. However, the results show that information security concerns are not a significant formative indicator of product uncertainty. This finding is inconsistent with Pavlou et al. (2007) whose research indicated that the information security concerns positively influence a buyer's perceived uncertainty. A possible explanation for the relatively weak importance of information security concerns is that e-commerce related technologies and standards have matured, so that buyers are less worried about the security of online transaction (Yang et al., 2003). Moreover, the consideration about information security may be related to the online shoppers' shopping experience and the frequency of online shopping (Forsythe & Shi, 2003). As Yang and Jun (2002) noted in their study, inexperienced customers who do not have prior experience with the e-vendor are more worried about information security than experienced online shoppers.

As hypothesized, seller uncertainty has a significant negative impact on repeat purchase intentions ($b=-0.32$, $p<0.001$), validating H1. In addition, environmental uncertainty has a strong negative impact on repeat purchase intentions ($b=-0.53$, $p<0.001$), validating H2. However, results also indicate that product uncertainty do not have a negative impact on repeat purchase intention. A possible explanation for the relatively weak importance of product uncertainty is that the buyer's concerns about products may be relative to prior experiences and actual outcomes achieved with e-vendors. If most transactions are fulfilled according to the expectations of the buyers, then trust in sellers is built and maintains continuity in buyer-seller relationships (Anderson & Weitz, 1989). Prior research suggests that the impact of trust decreases with online shopping experience, especially due to familiarity with the seller (Gefen et al., 2003). Therefore, buyers are less concerned of the price, delivery and quality of product, and hence, whether they think positively or negatively about it has a less influential role in the repeat purchase intentions. This finding is consistent with Forsythe and Shi (2003) indicating that buyers who have more buying frequency and have less perceive risk in online transactions.

Our findings also provide managerial implications, particularly for e-vendors. A major finding of the study is the dominant sources of uncertainty in forming three type of uncertainty. By operationalizing the three dimensions of uncertainty (opportunism, information privacy, and customer support) as formative first-order indicators of seller uncertainty, this study contributes to our enhanced understanding of the main effects of seller uncertainty on buyers' perceptions in the uncertainty of sellers in online environment. In the same way, environmental uncertainty is proposed as a formative second-order construct driven by website design, information security and reputation. These two types of uncertainty individually contribute to repeat purchase intentions and enhance customer loyalty. As both seller uncertainty and environmental uncertainty have direct and significant effect on repeat purchase intentions and are key factors in customer retention, online vendors must stay focused on a set of 'sources of uncertainty' from sellers and environment that they can control, such as fears of opportunism, information privacy, customer support, website design, information security and reputation. From a seller's perspective, it would be especially important to interpret our results which imply that two types of uncertainties (seller uncertainty and environmental uncertainty) require more attention due to their relatively strong effects. That is, e-vendors should seek more strategies to reduce those sources of uncertainty and retain existing customers to increase market competitiveness.

For future research, several directions may be considered. First, creation and remain of a set of frequent buyers are critical to the success and sustainability of e-vendors. However, this study did not distinguish the motivational drivers of frequent buyers from those of casual or infrequent buyers. Therefore, an interesting area for future research is to examine the relative importance of the three types of uncertainty from the perspective of frequent buyers. Second, an interesting area for future

research is to examine the inter-relationship between the sources of uncertainty. Third, as the data are cross-sectional and not longitudinal, longitudinal studies will be necessary to provide any insight in the different effects of uncertainty in B2C context. Finally, future study is suggested to re-conduct our model in C2C (customer-to-customer) and investigate these relationships again.

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