온라인 쇼핑에서 소비자의 구매의도에 영향을 미치는 불확실성 요인에 관한 연구

A Study of Uncertainty Factors Affecting Consumers' Purchase Intention in Online Shopping

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　　기술, 처리절차 및 규제 등의 개선에도 불구하고 많은 소비자들은 여전히 온라인 구매에 대해 불확실성이 높다고 생각하고 있다. 본 연구의 목적은 온라인 쇼핑에서의 불확실성 요인을 파악하고, 이들 요인들과 구매의도와의 관계를 이해하는데 있다. 이와 같은 목적을 달성하기 위해 우선 선행연구들로부터 판매자 익명성(seller anonymity), 제품의 투명성 결여(lack of product transparency), 그리고 프로세스의 투명성 결여(lack of process transparency) 등을 온라인 쇼핑의 불확실성에 영향을 미치는 요인으로 도출하였다. 그리고 이들 불확실성 요인들을 선행변수로, 소비자 구매의도를 결과변수로 하여 이들 변수들 사이의 관계를 개념화하는 인과관계 모형을 개발하였다. 이 모형에는 지각된 불확실성을 불확실성 요인들과 구매의도 사이의 매개변수로 포함하였다. 또한 구매관여(purchase involvement) 정도를 지각된 불확실성과 구매의도 사이의 조절변수로 포함하였다. 이 연구 모형을 설문을 통해 실증적으로 분석하고, 각 변수들 사이의 관계에 대한 가설을 검정하였다. 실증분석 결과, 모든 선행변수는 지각된 불확실성에 유의한 정의 영향을 미치고, 지각된 불확실성은 소비자의 구매의도에 영향을 미치는 것으로 나타났다. 또한 구매관여 정도는 지각된 불확실성과 온라인 구매의도와의 사이의 관계에 유의한 조절효과가 있는 것으로 나타났다.

키워드 : 온라인 쇼핑, 지각된 불확실성, 제품 투명성, 프로세스 투명성, 구매관여도, 구매의도

Ⅰ. Introduction

New era has introduced the Internet with new business models, which also accompanied a lot of

questions. Still the question of uncertainty remains crucial when it comes to online transaction. In e-commerce systems, especially B2C and C2C systems, how to secure the trade between two parties has always been a problem (Zhang, 2005). Consumer's perceived uncertainty has been analyzed from different points of view that helped many practi-

tioners to handle various Internet questions in some extent. Yet, recent surveys suggest a general lack of consumer confidence in transaction online pushing us to learn more about uncertainty (Chatterjee, 2008). Most importantly, on one hand, vast array of third parties such as Veri Sign and buy Safe with their state-of-the-art technologies are struggling to reduce consumer uncertainty and eliminate other online transaction obstacles. On the other hand, newer threats exploiting the inherent nature of Internet-based networks are burgeoning-leaving e-commerce customers uncertain (Chatterjee, 2008). Thus, their effectiveness is getting questionable.

Although many enterprises are shifting their businesses from offline to online market, the number of consumer damages is increasing due to e-commerce inefficiencies. In 2008, Korean consumer damages concerning e-commerce reached 3,080 cases. This is a 16.7% increase compared to 2007 (2,639 cases). Moreover, consumer damages in electronic goods have also risen. For example, in 2008, 97 claims were made for laptop computers, which was a 83% growth from 53 cases in 2007 (KISA, 2009). It is necessary to point out that many shopping malls in Korea fail to offer safe transactions and to guarantee consumers' cooling-off right.

Carefully considering above, following questions arise concerning consumer confidence in online shopping. *Why consumers are still uncertain to get involved in online shopping? What uncertainty factors affect consumers' purchase intention in online shopping? What other factors moderate between consumer uncertainty and intention to purchase online?* The purpose of this study is to map out the present behavior of consumers related to online shopping. Furthermore, the research aims at finding and analyzing factors that might help marketers when persuading the consumers to increase their

usage of Internet as a purchasing channel for any kind of items. Overall, this study aims to contribute theoretically and practically pursuing critical perspective. What lies behind the critical approach is developing and analyzing the adverse factors that affect intention to purchase online. Through building a novel model of online shopping intention, the study challenges researchers develop and continue the discussed ideas for the development of e-commerce in the context of consumer persuasion. Furthermore, the study assists practitioners to be familiar with online shopping drawbacks and set up their business strategies accordingly.

The paper is organized as follows. First, theoretical background for our questions is explained and factors affecting consumer uncertainty are derived based on previous researches. Then, summarizing the preceding arguments, a research model is proposed that aims to understand and prescribe how uncertainty can affect online purchase intention. In turn, perceived uncertainty is explained by the following antecedents derived from previous researches which we call uncertainty factors: *anonymity, lack of product transparency, lack of process transparency.* In addition, purchase involvement is investigated as a moderating variable between perceived uncertainty and intention to purchase. We assumed that purchase intention is more hindered by perceived uncertainty when higher purchase involvement. The research model was tested empirically by using a survey data. This paper concludes with a summary of our research and the discussion of implications of research results along with some suggestions for future research.

Ⅱ. Research Background and Literature Review

As it is mentioned earlier, this study describes

the development of a research model that can be used to examine consumer's perceived uncertainty and its determinants in the context of online shopping adoption. So far, many researches have been done regarding online transactions. They have focused on perceived channel characteristics (such as perceived risk, relative advantages, online shopping experience, service quality, trust), consumer characteristics (consumer shopping orientations, demographic variables, computer/internet knowledge and usage, consumer's orientation to innovation, psychological variables, etc.), website and product characteristics (risk reduction measures, website features, product characteristics) in the domain of online shopping adoption (Chang *et al.*, 2005).

Despite many findings, researchers have given little attention to the effect of consumers' perceived uncertainty to adoption of online shopping. Most empirical models have attempted to test the trust or risk related models. There have been few studies which handled the online shopping adoption from uncertainty point of view. This research specifically focused on uncertainty factors associated with online transactions, specifically online shopping.

It should be noted that online market inherits several inefficiencies compared with its offline equivalent. Transactions occur online between buyers and sellers. Online buyers have to rely on a website in which transaction systems are inhabited and buy goods offered by anonymous sellers. Thus, untransparent market creates uncertainty on buyers' perception to do transaction in online shopping. Moreover, because markets are not fully centralized, the problem of imperfect information about the price still lies in buyers' main concern. Consumers will search information if the marginal gain from this activity is higher than the marginal cost. In other words, they will search until they meet the desired price (Stigler, 1961).

In the market, finding a best price is not the only solution for the transaction to occur. Since the online shopping embodies distance transaction between transacting parties, consumers also need to search best sellers whom they can trust. Reducing the costs incurred in searching best partners, establishing a good contract, etc. (mainly referred as transaction cost) (Williamson, 1975) is the main concern in any exchange. This phenomenon also applies to online exchanges. Consumers will choose a channel which has lower transaction costs (Liang and Huang, 1998). In online shopping, a consumer must deal with unlimited sellers and products which require much time and effort to search satisfactory seller and the intented product. Since online shopping mostly rely on anonymous exchanges, it has higher transaction costs which overcome the benefits of doing online shopping. This may also leave consumers uncertain about online transaction.

Carefully analyzing the characteristics of online shopping, the matter of uncertainty is a serious concern because of the following reasons: products are less transparent, sellers are more anonymous, and processes are less visible. These features of online shopping make the consumers much more uncertain about shopping online.

In order to capture the key online market inefficiencies, we have reviewed and analyzed many related researches available in the IS literature. Previously Liang and Huang (1998) investigated consumers' acceptance of products in electronic markets based on transaction cost model. In their model relationship between uncertainty and acceptance is mediated by transaction cost. Their findings confirmed that the higher the perceived transaction costs compared to the traditional channel, the less likely a product will be purchased online. They al-

so tested five kinds of products (book, shoes, toothpaste, microwave oven, flower) which have different transaction costs and found that books and flowers are more likely to be ordered by consumers than others since their transaction costs are relatively low. In Lee and Turban (2001) and Pavlou's (2003) studies, risk and trust were emphasized as the fundamentals of online shopping. Lee and Turban (2001) have proved that the trust between Internet merchant and the consumer is as important as the trust between the consumer and the computer system through which transactions are executed. They also found that trust propensity plays an important role in building online trust.

In a similar line of inquiry, Gefen *et al.* (2003) created an integrated model of trust and TAM in online shopping. They pointed out that situational normality, structural assurances, and familiarity with the e-vendor are the key factors which form trust. They concluded that "E-vendors should build Web sites that are not only useful and easy to use, as TAM suggests, but that also include trust-building mechanisms."

Moreover, Grabner-Kraeuter (2002) approached to this issue from different perspective. He categorized e-commerce uncertainties into two: First, system-dependent uncertainty where he characterized as exogenous or environmental uncertainty. This type of uncertainty primary caused by technological defects and system security failures which is beyond the control of other transacting party. Second, transaction-specific uncertainty, which is characterized as endogenous or market uncertainty that can be resulted from the decision of actors caused by asymmetric information (eg. quality of products or services). Overall, he suggested that increasing the system security and online-retailers' trustworthiness will remove the uncertainty in online transaction.

Later, Lim *et al.* (2004) analyzed the uncertainty avoidance characteristics of consumers in internet shopping. They found that the key strategic focus for high uncertainty avoidance countries (e.g. Belgium, France, Thailand, Turkey) should be on reducing perceived uncertainty. On the other hand, in low uncertainty avoidance countries (e.g. Hong Kong, Indonesia, Malaysia) the focus should be on building trust. Some of these factors are also found in Yoon's (2009) work.

In the latest researches, Pavlou *et al.* (2007) analyzed the perceived uncertainty and purchase intention relationship. They focused on different antecedents of perceived uncertainty from those proposed in this study. Chatterjee *et al.* (2008) have found e-commerce inefficiencies and empirically tested their proposed model. However, that study did not analyze the relationship between uncertainty and intention to shop online when the uncertainty is influenced by those factors. More likely, previous studies have analyzed the uncertainty with different perspectives. To carry on and contribute to the previous researches, this study aims to explore the effects of perceived uncertainty to the consumer's intention to purchase online. Since online shopping involves more uncertain environments than brick and mortar, it is necessary reexamine the notion of perceived uncertainty and its determinants. In particular, it is important to (1) develop a notion of consumer's perceived uncertainty specific to the online shopping context, (2) discover the existing level of consumer's perceived uncertainty toward online shopping, (3) develop and empirically test a model of consumer's perceived uncertainty and its antecedents in the context of online shopping.

The following <Table 1> shows brief summary of previous researches done on consumer uncertainty in online stance along with their research purposes.

〈Table 1〉 Previous Research Preview

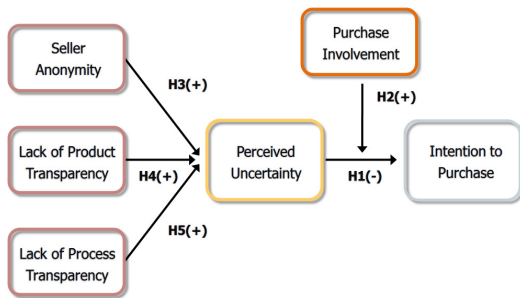| Research Topic	Author(s)	Theories/Theoretical Perspectives	Research Purpose
Examining Inefficiencies and Consumer Uncertainty in E-Commerce	Chatterjee and Datta (2008)	Economics of Information Theory (Stigler 1961) Transaction Cost Economics (Williamson 1975; 1985)	Analyzing e-commerce inefficiencies that precipitate consumer uncertainty in e-commerce.
Understanding and Mitigating Uncertainty in Online Exchange Relationships: A Principal-Agent Perspective	Pavlou, Liang, and Xue (2007)	Agency theory (Akerlof 1970; Rothschild and Stiglitz 1976; Spence 1973) Principal-agent Perspective. Information Asymmetry.	Drawing upon and extending the principal-agent perspective to identify and propose a set of four antecedents of perceived uncertainty in online buyer-seller relationships.
Consumer Acceptance of Electronic Commerce: Integrating Trust and Risk with the Technology Acceptance Model	Pavlou (2003)	Technology Acceptance Model. Theory of Reasoned Action.	Predicting the drivers of consumer intentions to accept e-commerce and engage in online transaction behavior.
A Trust Model for Consumer Internet Shopping	Lee and Turban (2001)	Personality theory, Sociology and economics, Social psychology	Investigating trust and its antecedents in the context of Internet shopping.

Ⅲ. Research Model and Hypotheses Development

3.1 Research Model

Online shopping relies on an Internet based online market comprising of a network of buyers and sellers offering heterogeneous products and services. Online shopping has in many ways its own benefits. However, it does have its own problems too, such as cyber attacks, late or wrong delivery, system failures and hacking incidents, etc. These problems result in consumers' uncertainty perceptions which hinder consumers from carrying on online shopping transactions. Consumers' perceived uncertainty mainly comes from the characteristics of online shopping such as seller anonymity, lack of product transparency, and lack of process transpa-

rency. We call these characteristics uncertainty factors because we assume that they are main characteristics of online shopping which make it uncertain and, therefore, they are assumed to affect consumers' perceived uncertainty on online shopping in this research.

Existing theoretical and empirical studies (see <Table 1>) imply that people's perceived uncertainty is vital for purchasing goods and services online. A research model <Figure 1> is proposed to examine how selected antecedents affect consumers' perceived uncertainty in online market and how these antecedents and perceived uncertainty hinder intention to do online shopping. Perceived uncertainty variable therefore mediates the antecedents and purchase intention. Furthermore, the proposed model also illustrates the effect of purchase involvement as a moderating variable between perceived un-

certainty and intention to purchase.

〈Figure 1〉 Proposed Research Model

3.2 Research Hypotheses

3.2.1 Perceived Uncertainty and Intention to Purchase

This paper defines perceived uncertainty as the consumers' difficulty to accurately predict the outcome of the transaction. This uncertainty about the reaction of other persons may be due to incomplete information about their goals or about how an outcome will be evaluated and rewarded (Frederick, 1972).

As it is discussed earlier, each online transaction inherits uncertainty. Buyers cannot exactly predict if the outcome of transaction will be successful. They believe that there may be negative consequences too. For example, a successful outcome happens when a buyer receives the same product what he/she has bought on the online shopping mall. However, buyers are not certain that the transaction will be completed without problem due to the untransparent market. A number of possibilities of wrong delivery (damaged, delayed), wrong product (different color, size, expired, illegal) can be considered by the buyer prior to his/her purchase online which may leave him/her uncertain on doing online shopping. Online shopping has the following

two main disadvantages: First it relies more on untransparent technologies or processes. Second, these technologies and standards create vulnerable environment for new threats and deceptions (Chatterjee, 2008).

In an online context, information about a product is given only by a seller. Through these information a buyer can get the product specifications, images, movies, etc. Therefore, the true nature of the product is still ambiguous since there is no physical contact. Seller's true identity, location, and his reliability is another matter. The information about him provided on the Website may be forged or not true. For example, suppose a person is selling a smartphone in an online shopping mall under the seller ID of "hoing 123." This ID may belong to other person (his father, brother, friend, or stolen, etc.) where all the personal information were attached on his name. Imagine, who has the responsibility if the delivery is problematic: the owner of the product or the owner of the account? Unclear responsibilities in case of transaction failure as well as incomplete information create a sense of uncertainty about purchasing online.

Unknown outcomes, possibility of potential loss, lack of information, all these adverse possibilities increase consumer's uncertainty perception in online shopping environment which in turn leaves them reluctant to participate in online shopping (Pavlou *et al*., 2007). We thus hypothesize:

H1: Perceived uncertainty negatively affects a consumer's intention to purchase products online.

3.2.2 Moderating Role of Purchase Involvement

Purchase involvement has been widely used in consumer behaviour related researches. Several IS

researches have also studied purchase involvement in the context of online purchase. In this study the concern about the purchase involvement is the buyer's relevance with the purchase and therefore the buyer will be motivated to make a more careful purchase decision (Zaichkowsky, 1985). Thus, high involvement means high personal relevance. Moreover, Zaichkowsky (1985) suggests that different involvement level is acquired based on people, objects, and situations.

Purchase involvement results from the personal meaning or importance attributed by an individual to the purchase (Howard and Sheth, 1969). It is important to note that purchase involvement is different from product involvement. For instance, a buyer may have a low level of involvement with a product (e.g. electronic kettle), but, he/she might have a high level of involvement in its purchase because to save money or make a better choice among brands.

It has been found that buyers' behavior, particularly their level of information searching and the nature of purchase decision making, is strongly influenced by purchase involvement (Dholakia, 2001). High involvement buyers try to acquire more information about the product than low involvement buyers during purchasing process. The reason is that they are afraid of making a wrong decision. Therefore, they are inclined to carefully search and analyze all needed information about the product (Petty *et al.*, 1983). Therefore, if they feel that the information is not enough, they are likely to give up their purchase or delay it for a while.

Buyers tend to assign more weight to the dimensions of risk importance and risk probability in their decision making for higher involvement purchases (Venkatraman, 1989). Higher involvement purchases inherit higher probability of loss. There-

fore, it requires more information search in order to collect satisfactory level of information for the purchase. For that reason, buyers are more likely to feel more uncertain, which means it will reinforces the negative relationship between their perceived uncertainty and purchase intentions. From the arguments given above, we hypothesize that the higher the level of purchase involvement is, the stronger the negative relationship between perceived uncertainty and purchase intention is.

H2: A consumer's purchase involvement positively moderates (reinforces) the negative relationship between perceived uncertainty and intention to purchase products online.

3.2.3 Anonymity and Perceived Uncertainty

The study defines anonymity as consumer's perceived inability to scope the correct identity of retailers (Williamson, 1975). Widespread of Internet usage brought both the benefits and harms. Because of Internet's open access to too many sellers, the online fraudulent actions are taken place everywhere. Therefore, the authenticity of online retailers is still a concern.

Korea is taking strong actions by enacting mandatory Identity Verification (IDV) rules in order to prevent any illegal actions online which may cause by anonymity. In the initial stage, on July 27th 2007, the law was applied to a smaller subset of Internet bulletin boards, including the portal websites having more than 300,000 visitors a day and the user-created contents (UCC) sites and Internet media having over 200,000 daily visitors. In January 2009, the regulation was revised to be applied to those websites with over 100,000 daily visitors

(Byeong, 2009).

However, this regulation has faced many domestic and international controversies so far surrounding human rights. In 2008, Korean Internet auction site was hacked causing personal information of more than ten million people to be exposed, and one of the major ISPs, Hanaro-Telecom, intentionally abused its more than six million clients' personal information (the number of leaked records were more than eighty five millions) (APC, 2008).

On one hand, many researches try to find new solutions to tackle anonymity issues. On the other hand, intruders are exploring new ways to steal sensitive information, which is causing tremendous financial loss. In short, they fail to come up with a complete solution for consumer uncertainty.

There is no way for any consumer to actually know if the entities (sellers) are what they really are. In the absence of any physical interaction, transacting entities remain faceless (Chatterjee, 2008). A seller can use popular domain names, but may do fraudulent actions behind to take advantage of "fragile" buyers. A buyer can easily be deceived by a seller offering cheap price. For example, a buyer can search a product from price comparison sites such as www.enuri.com or www.danawa.com. He may find a variety of sellers who are offering same product. However, the best price may not be the credible seller's. In short, because of anonymity, spoofing and hiding identities are easier online compared to offline which increases consumers' uncertainty perceptions. Thus, we set up the following hypothesis:

H3: Anonymity in online shopping positively affects a consumer's perception of uncertainty about online purchase.

3.2.4 Lack of Product Transparency and Perceived Uncertainty

Product transparency exists when the exact characteristics of the product from a supplier are made available. Availability of information about product characteristics is very important to a consumer (Granados, 2005). The less information about the product is available, the less transparent the product is. Most consumers expect information about the product as much as possible in a clear way in order to do further purchase. In the scope of this study, product transparency refers to a consumer's ability to totally understand all necessary product attributes required to make an informed decision (Williamson, 1975).

Here, our main concern about the product transparency is for physical products. Since physical products are fully understood or felt whenever a buyer interacts physically by seeing, touching, smelling, etc. In contrast, abstract products such as information, software, video, mp3, etc. will not require any physical contact. Because they are intangible.

Information asymmetry can enormously favor for a seller in dealing with physical goods in online shopping. In B2C and C2C e-commerce, different sellers may represent the same physical product in a number of ways online (Cahtterjee, 2008). Lacking product tangibility in online shopping, consumer's understanding of the product completely depends on sellers' information.

In short, online stores are limited to give the true nature of a product forming an elevated sense of wariness and uncertainty among consumers. Online shopping therefore augments buyer perceptions of uncertainty owing to a lack of physical product transparency. Hence, we derive the following hypothesis:

H4: Lack of product transparency in online shopping positively affects a consumer's perception of uncertainty about online purchase.

3.2.5 Lack of Process Transparency and Perceived Uncertainty

Process transparency refers to consumer's perception of visibility and verifiability of the underlying operation and execution process in any transaction (Williamson, 1975). Transactions in offline shopping allow customers to maintain a level of control of the transaction process. However, in online shopping, the control significantly shifts to Web technologies. Buyers cannot fully control or follow online purchasing process. Because of technological complexity, they cannot fully comprehend what is going on or how and how accurate the money is electronically transferred to the seller. When a buyer purchases online he/she is not sure if the message is sent correctly to the seller or at least on time.

However, buying process is simpler and clearer in offline market than its counterpart. Consumers will simply visit a supermarket, chose the exact product they want, pay the money to the cashier. Almost nothing will remain uncertain during purchasing process. Everything is handled realtime by physical and visual interaction providing much more control over the process. In contrast, online shopping process is much more complex and provides little control to the buyer. It takes also more time until the buyer receives the product. A buyer is informed about the purchase processes by just textual information (e.g. giving product status such as "processing", "sent", "complete", etc.). However, visual information is far beyond the ability of online shopping. Even though it is theoretically possible, it may take practically too much cost. The buyer cannot see whether the seller received the money, sent the appropriate product to deliveryman, and how he delivers, etc. Also, the buyer is not sure if his/her private information given during the online purchasing process is not shared with or disclosed to the inappropriate people or entity. These processes are unique to online shopping and less controllable by the buyer which leaves uncertainty.

Moreover, unlike offline shopping, consumers give a special attention to the safety of their perso-

〈Table 2〉 Summary of Survey Items

Variables	Definition	Sources
Seller Anonymity	Consumer's perceived inability to scope the correct identity of retailers.	Williamson (1975)
Lack of Product Transparency	Consumer's inability to totally understand all necessary product attributes required to make an informed decision.	Williamson (1975)
Lack of Process Transparency	Consumer's perception of invisibility and unverifiability of the underlying operation and execution process in any transaction.	Williamson (1975)
Perceived Uncertainty	Consumers' difficulty to accurately predict the outcome of the transaction due to incomplete information.	Knight (1921) Ducan (1972) Hubbard (2010) Frederick (1972)
Purchase Involvement	Buyer's relevance with the purchase.	Zaichkowsky (1985)
Intention to Purchase	Intention to buy a product from an online store.	Ajzen (1991)

nal information in online shopping. They concern about identity and credit card theft, spyware, malware, phishing, packet sniffing and spamming. Buyers therefore remain uncertain about whether the site is secure, whether network is secure, or whether the data storage is secure. Moreover, increase in the number of ActiveX controls, browser add-ins, plug-ins etc. while using the web leads to higher consumers' alertness of uncertainty. Lack of process transparency therefore remains one of the antecedents of uncertainty perception which consequently affects intention to purchase online. Considering all above, we hypothesize:

H5: Lack of process transparency in online shopping positively affects a consumer's perception of uncertainty about online purchase.

Ⅳ. Research Method and Analysis Results

4.1 Research Method

A survey-based approach was employed to investigate the research model and to test hypotheses. First, SPSS 16.0 for Windows was used to analyze the reliability of our model through Cronbach's alphas. Second, AMOS 16.0 for Windows package was used to assess the validity (discriminant validity and convergent validity) through confirmatory factor analysis. Last, research hypotheses and model fit were tested by Structural Equation Modeling using PLS.

4.1.1 Measurement Development

The variables used in this study were measured using multi-item scales tested in previous researches. Almost all measurement items were adopted

from existing measures. However, they were modified for this study and translated into Korean since our population subjects were Korean. The response categories for each scale were ranked according to the Likert's seven-point scale between 0 (strongly disagree) and 7 (strongly agree). All measurement items of Anonymity, Lack of product transparency, Lack of process transparency, and Perceived uncertainty constructs were reverse coded since we wanted the reverse data of asked questions about each construct. The entire questionnaire items can be found in the Appendix and are shown along with their sources.

Content of the questionnaire had been pretested among a small group of people to know how it would reflect in people's mind and to check the

〈Table 3〉 Demographics of Survey Respondents (N = 337)

	Distribution	Number	Percentage (%)
Gender	Male	162	48.1
	Female	175	51.9
Age	under 25	257	76.3
	25~30	62	18.4
	31~40	13	3.9
	over 40	5	1.5
Occupation	Student	324	96.1
	Office worker	4	1.2
	Businessman	5	1.5
	Others	4	1.2
Daily time spend for Internet	under 1hr	38	11.3
	1~2hrs	162	48.1
	3~4hrs	105	31.2
	over 4hrs	32	9.5
Online shopping experience	under 1yr	34	10.1
	1~2yrs	42	12.5
	2~3yrs	56	16.6
	3~4yrs	69	20.5
	over 4yrs	136	40.5

psychometric properties of the measurement scales. Following this pretest, the measurement instrument was refined, some wording mistakes were corrected and validated for its statistical properties.

4.1.2 Survey Administration

The survey was conducted between October 10th to 25th in 2011 with the questionnaire mentioned earlier. The sample was selected generally among university students and other off-campus individuals who may represent true online shopping users. Out of 400 questionnaires distributed, a total of 372 responses were obtained making 93% of response rate. Due to reckless responses and/or incomplete re-

sponses, 35 responses were eliminated and 337 responses were used for further analysis.

Somewhat heterogenous distribution has been found in our sample in terms of age group being 76.3% of subjects belonged to the age group under 25. Demographic and online shipping experience statistics are summarized in <Table 3> and <Table 4>, respectively.

4.2 Data Analysis and Results

In order to get more accurate result, different methods have been applied in this research. The SPSS 16.0 was used for Cronbach's alpha, AMOS 16.0 for CFA (Confirmatory Factor Analysis) and SEM (Structural Equation Modeling) was incorporated in SmartPLS 2.0.M3 for path analysis and hypotheses testing.

Descriptive statistics of variables used in this study are summarized in <Table 5>. The results indicate that online shopping lacks process transparency with relatively high level (mean of 3.81) and sellers in online shopping remains anonymous (mean of 3.84) in consumers' perception. On the other hand, the level of lack of product transparency (mean of 4.12) were relatively higher than those of other antecedent variables, anonymity of sellers and lack of process transparency. This means consumers perceive lack of product transparency more seriously than other uncertainty factors in online shopping. Purchase involvement shows considerably high mean value (4.90) which indicate consumers purchase relatively important and significant items to them from online shopping and therefore spend some time to gather information before purchasing. Intention to purchase online also shows high mean value (4.82) which indicates consumers have relatively high intention to purchase online.

〈Table 4〉 Descriptive Statistics of Survey Respondents Opinions about Online Shopping

Question Type	Sections	Number	Percentage (%)
Best online store	Gmarket	170	50.4
	Auction	53	15.7
	CJmall	13	3.9
	Danawa	14	4.2
	Others	86	25.5
Frequently used online store	Gmarket	161	47.8
	Auction	53	15.7
	CJmall	13	3.9
	Danawa	4	1.2
	Others	105	31.2
Negative experience in online shopping	Yes	284	73.6
	No	89	26.4
Online shopping negative experience related with	Seller	9	2.7
	Product	174	51.6
	Website	4	1.2
	Delivery	38	11.3
	Refund	27	8.0
	Others	4	1.2
Part of online shopping that needs improvement	Seller	16	4.7
	Product	157	46.6
	Website	20	5.9
	Delivery	23	6.8
	Refund	95	28.2
	Others	20	5.9

〈Table 5〉 Descriptive Statistics of Latent Variables

Variables	Mean	Standard Deviation
Seller Anonymity	3.84	0.89
Lack of Product Transparency	4.12	1.02
Lack of Process Transparency	3.81	1.04
Perceived Uncertainty	4.03	0.91
Purchase Involvement	4.90	1.10
Intention to Purchase	4.82	1.07

4.2.1 Reliability Testing

While construct validity is an issue of measurement between constructs, reliability is an issue of measurements within a construct (Straub, 2004). In this study, internal consistency technique using Cronbach's alphas (α) is applied to assess the prior reliability of each factor since this method is more commonly used in IS researches than other traditional ways.

As <Table 6> shows, Cronbach's alphas' range from 0.846 to 0.928 providing strong support for the internal consistency of each construct used in our model with high reliability because Cronbach's alpha values of all variables are well above the recommended threshold value of 0.7. Some measurement items of correspondent latent variables were dropped due to their negative effect in establishing internal consistency, which are summarized in <Table 6>.

4.2.2 Validity Testing

The purpose of validation is to give researchers, their peers, and society as a whole a high degree of confidence that positivist methods being selected are useful in the quest for scientific truth (Nunnally, 1978).

Theory suggests that establishing the construct validity is a mandatory research practice, in general. Construct validity, specifically convergent and discriminant validity, can be examined using factor analytic techniques such as common factor analysis, PCA, as well as confirmatory factor analysis in SEM using softwares such as LISREL, AMOS, PLS, and etc. (Sraub, 2004). Convergent and discriminant validity are established by examining the factor loadings to ensure that, once cross-loading items are dropped, items load cleanly on constructs (factors) upon which they are posited to load and do not cross-load on constructs upon which they should not load. Although how to handle items that do not load properly is a matter of some debate, the important point is factor analysis can show the way to "clean up" the construct.

In this study, survey data were examined for reliability and validity. Convergent and discriminant

〈Table 6〉 Internal Consistency (Cronbach's α)

Latent Variables	Number of Items	Dropped Items	Cronbach's α
Seller Anonymity	5	ANON1	.867
Lack of Product Transparency	4	-	.858
Lack of Process Transparency	4	PROC1	.852
Perceived Uncertainty	5	UNC1, UNC5	.846
Purchase Involvement	3	-	.928
Intention to Purchase	3	-	.894

validities were tested using confirmatory factor analysis through AMOS. <Table 7> and <Table 8> summarize the test results of convergent and discriminant validities. All indicators of each factor had high loading values, confirming convergent and discriminant validities.

1) Convergent Validity

Convergent validity is evidenced when items thought to reflect a construct converge, or show significant, high correlations with one another, particularly when compared to the convergence of items relevant to other constructs, irrespective of

〈Table 7〉 Results of Confirmatory Factor Analysis

Variable	Measurement Items	Factor Loading	Standardized Factor Loading	S.E	t-value	SMC	Construct Reliability	Average Variance Extracted
Seller Anonymity	ANON2	1.000	0.809	0.322	-	0.654	0.853	0.593
	ANON3	1.114	0.815	0.383	15.768	0.664		
	ANON4	1.107	0.771	0.511	14.812	0.594		
	ANON5	1.066	0.764	0.493	14.672	0.584		
Lack of Product Transparency	PROD1	1.000	0.747	0.682	-	0.558	0.804	0.507
	PROD2	0.998	0.741	0.703	12.956	0.550		
	PROD3	1.090	0.834	0.447	14.410	0.696		
	PROD4	0.982	0.785	0.518	13.695	0.616		
Lack of Process Transparency	PROC2	1.000	0.806	0.465	-	0.650	0.799	0.571
	PROC3	1.050	0.786	0.586	14.729	0.618		
	PROC4	1.101	0.842	0.431	15.520	0.708		
Perceived Uncertainty	UNC2	1.000	0.786	0.382	-	0.617	0.834	0.627
	UNC3	1.078	0.819	0.352	14.808	0.670		
	UNC4	1.151	0.812	0.421	14.717	0.659		
Purchase Involvement	PI1	1.000	0.909	0.264	-	0.826	0.904	0.759
	PI2	0.994	0.935	0.177	26.485	0.875		
	PI3	0.861	0.859	0.331	22.786	0.738		
Intention to Purchase	IP1	1.000	0.841	0.409	-	0.707	0.861	0.676
	IP2	1.123	0.933	0.186	20.222	0.870		
	IP3	0.940	0.806	0.472	17.546	0.649		

Type	Chi-square ratio	GFI	AGFI	NFI	CFI	TLI	RMR	RMSEA
Threshold	≤ 3.0	≥ .90	≥ .90	≥ .90	≥ .90	≥ .90	≤ .05 (≤ .10)	≤ .08 (≤ .10)
Value	1.581	.937	.914	.940	.977	.971	.041	.042

Note) Goodness of Fit Index (GFI), Adjusted Goodness of Fit Index (AGFI), Normed Fit Index (NFI), Comparative Fit Index (CFI), Tucker Lewis Index (TLI), Root Means Residual (RMR), Root Mean Square Error of Approximation (RMSEA).
Chi-Square/df = 245.086/155.
Standardized Regression Weights (≥ 0.7), Average Variance Extracted, AVE (≥ 0.5).

method. The comparison with other constructs is one element that distinguishes convergent validity from reliability (Straub, 2004).

As <Table 7> shows, the findings provide support for convergent validity since the values obtained exceed the recommended values of 0.7 for standardized factor loadings and 0.5 for AVEs. Moreover, all *t*-values are greater than the absolute value of ±1.96 which satisfies the recommended value.

In short, all of the above estimates provide further evidence of the scales' convergent validity. Therefore, all items are significantly related to their specified constructs.

2) Discriminant Validity

Discriminant validity is achieved when different instruments are used to measure different constructs and the measures of these different constructs are weakly correlated (Lani, 2011).

Discriminant validity may be supported by demonstrating that the items share more common variance with their construct than with other constructs

(Fornell and Larcker, 1981). For this test, the average variance extracted (AVE) is examined for each construct compared to the squared correlation between the constructs. <Table 8> shows the square root of AVEs on the diagonal. The correlations between the latent constructs are on the off diagonal elements of <Table 8>. As <Table 8> shows, all of the correlations are substantially less than the corresponding square root of AVEs providing the evidence of discriminant validity. This approach demonstrates adequate discriminant validity of the constructs included in the model.

CFA model fit indices (see <Table 7>), factor loadings, squared multiple correlations, and construct reliability suggest that the indicators account for a large portion of the variance of the corresponding latent constructs and therefore provide support for the reliability and validity of the measures.

4.3 Structural Equation Modeling

Following Anderson and Gerbing's (1988) work, this study presented two-step approach. After test-

〈Table 8〉 Results of Discriminant Validity Analysis

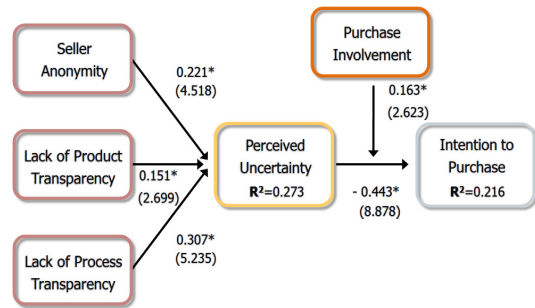|	Construct	1	2	3	4	5	6
1.	Seller Anonymity	0.770					
2.	Lack of Product Transparency	0.345	0.712				
3.	Lack of Process Transparency	0.482	0.386	0.755			
4.	Perceived Uncertainty	0.453	0.378	0.523	0.792		
5.	Purchase Involvement	-0.014	-0.068	-0.038	-0.034	0.871	
6.	Intention to Purchase	-0.282	-0.252	-0.269	-0.486	0.077	0.822

Note) Diagonal elements are the square root of the average variance extracted (AVE). Off-diagonal elements are the correlations among constructs.

ing reliability and validity of measurement model, the Structural Equation Model (SEM) was estimated. The estimated model was validated using AMOS 16.0 and verified using the SmartPLS 2.0.M3.

SEM techniques using PLS and LISREL are the second generation data analysis techniques which have become popular in IS researches ensuring high quality statistical analysis. One of the advantages of SEM over other first generation regression models such as linear regression, LOGIT, ANOVA, and MANOVA is its capability in analyzing multiple independent and dependent variables simultaneously where the latter can analyze only one layer of relations between dependent and independent variables at a time (see Gefen *et al.* (2000) for further information). Moreover, in SEM, factor analysis and hypotheses testing are done in the same analysis. This technique also evaluates loadings of observed measurements on their expected constructs. Thus, SEM provides better and fuller results about proposed research model than regression analysis especially when analyzing more complex models. In this research we used SEM instead of regression analysis because we wanted to see all the relationships among antecedent variables, intermediate variable, and dependent variable simultaneously and we also wanted to take advantage of its convenience in analysis in addition to the advantages of SEM mentioned above.

We used PLS in estimating our research model for the following reasons: First, it is appropriate compared to other structure equation modeling tools for situations where sample sizes are small and models are complex (Chin, 1998). Second, the research model includes a moderating variable (purchase involvement) which makes the analysis process more complex if other tooss are used. Third, various IS studies have employed PLS and have

found it to be an effective tools for SEM analysis (Chandra, 2010). Considering these, we would conclude PLS is the most appropriate for this research to test the model fit and significance of the paths as hypothesized earlier.

Note) * p < .01.

〈Figure 2〉 PLS Results of Path Analysis

<Figure 2> shows the results of path analysis along with standardized path coefficients and their respective *t*-values in the parentheses. *t*-statistics confirms that all paths are highly significant at *p* = 0.01. Based on this figure, lack of process transparency (0.307) has relatively higher impact on perceived uncertainty than the other two antecedents. However, perceived uncertainty (-0.443) has relatively strong negative effect on intention to purchase as expected. R-square values indicated that the uncertainty factors explained 27.3% of variations in perceived uncertainty. Also, perceived uncertainty explained 21.6% of variations in purchase intention.

<Table 9> demonstrates the results of hypotheses testing. The completely standardized path coefficients in the structural model are highly significant. The parameter estimates for the five hypothesized (H3, H4, H5, H1, H2) relationships within the model are statistically significant at the .05 level. It can be inferred that all three uncertainty factors sig-

〈Table 9〉 The Results of Hypotheses Testing

Hypotheses	Paths	Coefficient value	t-value	Results
H3 (+)	Anonymity → Uncertainty	0.221	4.518	Accepted
H4 (+)	Product → Uncertainty	0.151	2.699	Accepted
H5 (+)	Process → Uncertainty	0.307	5.235	Accepted
H1 (-)	Uncertainty → Intention	-0.443	8.878	Accepted
H2 (+)	Moderating effect of Purchase Involvement on Uncertainty → Intention	0.163	2.623	Accepted

nificantly affect the consumers' uncertainty which consecutively affects their purchase intention. Here, again, it should be noted that all measurement items of Anonymity, Lack of product transparency, Lack of process transparency, and Perceived uncertainty were reverse coded. Moreover, purchase involvement also found to be a significant moderator between the effect of uncertainty on intention to purchase.

Ⅴ. Discussions and Conclusion

This study has reviewed the nature of perceived uncertainty in online shopping and developed a research model to study its effect on consumers' intention to purchase. The model presents the major relationships between consumers' perceived uncertainty and intention to purchase online. Consumers' perceived uncertainty had three groups of major potential antecedents: sellers' anonymity, lack of product transparency and lack of process transparency. We called them uncertainty factors. The construct of purchase involvement is believed to positively moderate the effect of consumers' perceived uncertainty on their intention to purchase.

Furthermore, we hope that the study of this model and empirical tests with considering limitations and suggestions for future research will lead to a better understanding of the role of uncertainty in online shopping. The results will clarify and enrich the relevant theories and extend their boundaries. They will, in addition, tell online sellers, to expose and reveal themselves to online buyers by any means in order to decrease consumers' perceived uncertainty and thus improve the chances of purchasing from them. Once the relative importance of the various uncertainty factors is known, management can concentrate more on those that are relatively more important. Bearing in mind that most of the uncertainty factors are technical in nature, they may be influenced by ensuring technical drawbacks and enacting a strong rules and regulations for consumer protection. Some of uncertainty factors (antecedents) may be overcome by advertising and marketing campaigns, or more visibly by educating them (Lee and Turban, 2001).

This study has also meaningful academic contributions. One of its utmost contributions is that it challenged researchers from different perspective which is a critical analysis of consumers' intention to purchase online. It provided some theoretical and empirical framework of uncertainty factors which can be broaden later by the researchers. Thus, the study provides a starting point for an in-depth analysis of both consumer uncertainty concept and its large-scale or cross-cultural empirical analysis.

Moreover, this study provides important practical implications to online shopping mall operators as

well as policy makers. It shows the importance of perceived uncertainty to consumers' purchase intention, the role of purchase involvement, and specific factors affecting consumers' perceived uncertainty. All these give important insights what the sellers and policy makers need to do in order to increase consumers' intention to purchase online. Some of them are described as follows in more detail.

The study confirms relationship between consumers' perceived uncertainty and its antecedents in online shopping. This issue is essential in practical online businesses and the result of this study provides an important practical implications to online business operators. It is vital for sellers promoting products online to understand that inherent consumer uncertainty can be reduced by lessening sellers' anonymity and enhancing product and process transparencies. As we mentioned earlier, buyers may refrain from doing online shopping because of sellers' anonymity. Online vendors may not truly present themselves in online market. Buyers seek information until they get enough information about the seller. If an online vendor presents his or her identity through certified mechanisms, this may decrease the buyers' perceived uncertainty. For example, sellers' anonymity can be decreased by increasing consumer awareness of the sellers through publishing their names, business registration numbers, business addresses, map of locations, phone numbers, etc. Moreover, mass media or third-party assurance mechanisms using certification institutions may help sellers effectively identify themselves in an official manner. Also, using digital certificates in online shopping will help online vendors assure themselves and their businesses through Certification Authorities. Revealing a photo will also play an important role since Bente *et al.* (2012) suggested that placing a seller's photo on the website

will decrease the buyers' perceived uncertainty.

Another key factor in online shopping is process transparency. As long as the purchase process is transparent and controllable or at least clearly informed how the purchase is going to proceed, this will decrease the buyers' perceived uncertainty on online shopping and as a result they may become potential buyers of online shopping. Process transparency can be improved by open disclosure surrounding storing and use of information, security policies (e.g. encryption level, one time password, SSL or VPN tunneling, etc.), handling online payments (e.g. credit card), delivery information, return and after service policies, etc. For example, many buyers wish to track their products after they purchase online. Availability of tracking system in online shopping will increase the process transparency. Moreover, since online market lacks physical contact, much more information needs to be provided to improve transparency.

In order to increase product transparency, full information about the product, product descriptions, product specifications, various rich media representations, such as high quality pictures, flash media, 3D rendering, product videos, etc. should be provided. Availability of sample products (which are commonly less expensive) may also increase the product transparency in online wholesale market. This information much or less gives overall and clear idea about the product leading decrease in buyers' uncertainty perception on the product.

We can see that successful online retailers like Amazon.com use variety of strategies we mentioned earlier to reduce consumers' perceived uncertainty. For example, Amazon heavily advertises through offline media (mass media) so that people easily be aware of the company and recognize it as a reliable retailer. Moreover, it provides digital certificates,

contact numbers and addresses, and other company information on its Web site to improve seller anonymity. Amazon also provides delivery notice and tracking service and has a generous return policy to decrease lack of process transparency. Obviously, Amazon provides very detailed information about products they are selling including diverse product comparison information and consumers' evaluations on each product to increase product transparency.

Finally, moderating effect of purchase involvement can give clues to the online sellers for setting appropriate strategies to increase their sales in online stores. The study result shows that perceived uncertainty factors are more important in online shopping when consumers think that the products they purchase are important and significant to them. Usually higher priced non-commodity products lead to higher purchase involvement. Therefore, this study implies that those online merchants offering expensive and special goods need to make more efforts to reduce consumers' perceived uncertainty in order to increase consumers purchase intention. On the other hand, consumers' perceived uncertainty is relatively less significant for online sellers offering inexpensive commodity products.

The findings of this study should be considered in the light of its inherent limitations. Most critical limitation of this study is treatment and measurement of the moderating variable, purchase involvement. We treated and measured consumers' average or overall involvement in all the purchases instead of in a specific product purchased online. The same consumer may experience different levels of involvement in the purchase of different products. This was not considered in this study because of difficulties in collecting data. In a future study, we need to measure the purchase involvement for a specific purchase of a particular product to have

more meaningful result.

Another limitation of this study is related with its sampling and the sample used in the analysis. Most of the subjects in this study's sample were university students. They were frequent users of internet. Therefore, their positive experience with the Web may have biased the results that we obtained. For example, consumers who were less frequent users of the Internet or had negative experience might think of reputation and familiarity with a retailer's offline store as important factors for perceived uncertainty to do online shopping. In addition, the study suffers the common limitations of generalization due to the sample used which is heavily concentrated in certain demographic classes. The data were gathered primarily from university students so there is the potential for occupational, age and regional bias in the results. We used a convenience sample which may limit the external validity and generalization of the study results. Overall, future work needs to address these limitations by using more systematic approaches to sampling respondents.

To conclude, this study examines the online shopping adoption in different perspective. Employing critical approach, this study explores negative aspects of online shopping that increases consumers' uncertainty perception and its adverse consequences on their purchase intention. While online shopping promises more opportunities, it cannot be absolute solution to wipe out brick and mortar. Inherent online market inefficiencies should be reduced through governmental legislations, introducing new technologies and setting up more transparent environment. Hopefully, this will help decrease the perceived uncertainty which in turn will enable users more heavily involve in online shopping.

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〈Appendix〉 Questionnaire Items

CODE	CONSTRUCTS	REFERENCES
	Seller Anonymity	
ANON1	I believe that sellers represent themselves exactly as what they are in online store. (reverse coded)	Williamson (1975)
ANON2	I believe that I have all necessary information about any seller in online store. (reverse coded)	
ANON3	I believe that I will be able to predict the behavior of any seller in online store. (reverse coded)	
ANON4	I believe that I can trace the identity of any seller in online store. (reverse coded)	
ANON5	I believe that sellers in online store never use pseudonyms to hide their true identity. (reverse coded)	
	Lack of Product Transparency	
PROD1	A product can be represented exactly in online store as it is in the physical store. (reverse coded)	Williamson (1975)
PROD2	Products in online store are as tangible as they are in a physical store. (reverse coded)	
PROD3	I believe that online store offers me the ability to verify all important product attributes under my consideration. (reverse coded)	
PROD4	I believe that online store represents products so as to enable easy comparison with competing products. (reverse coded)	
	Lack of Process Transparency	
PROC1	I am aware of the exact steps involving the operation and execution of any transaction in online store. (reverse coded)	Williamson (1975)
PROC2	I can verify the exact steps involving any transaction in online store. (reverse coded)	
PROC3	I can control the way my information and transactions are handled in online store. (reverse coded)	
PROC4	I can verify all actions by any seller in online store concerning my purchase process. (reverse coded)	
	Perceived Uncertainty	
UNC1	I can predict the outcome of any transaction in online store. (reverse coded)	Knight (1921) Ducan (1972) Hubbard (2010) Frederick (1972)
UNC2	I have the necessary information and knowledge about all possible threats in online store. (reverse coded)	
UNC3	My decision-making in transacting in online store will always be optimal. (reverse coded)	
UNC4	I believe that transactions in online store are not risky. (reverse coded)	
UNC5	I have control over the outcome of any transaction in online store. (reverse coded)	
	Purchase Involvement	
PI1	All kinds of products that I am buying from online store are important to me.	Zaichkowsky (1985)
PI2	All kinds of products that I an buying from online store are significant to me.	
PI3	For me, all kinds of products that I am buying from online store does not matter. (reverse coded)	
	Intention to Purchase	
IP1	Given the need, I intend to transact with any online stores in the near future.	Ajzen (1991)
IP2	Given the need, I plan to purchase products from any online stores.	
IP3	I will recommend to others buying products from online stores.	

A Study of Uncertainty Factors Affecting Consumers' Purchase Intention in Online Shopping[*]

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Abstract

Despite improved technologies, procedures, and regulations, consumers are still uncertain about purchasing online. The objective of this study is to understand uncertainty factors in online shopping and their relationships with the consumers' intention to purchase. For this objective we derived seller anonymity, lack of product transparency, and lack of process transparency as uncertainty factors from previous researches which may affect consumers' perceived uncertainty on online shopping. Then, a causal model was developed to conceptualize the relationships between these uncertainty factors as antecedent variables and consumer's intention to purchase as consequent variable with perceived uncertainty as an intermediary variable. Purchase involvement was used as a moderating variable on the relationship between perceived uncertainty and the intention to purchase online.

The model was tested empirically to find meaningful relationships among these variables. The findings indicate that all antecedent variables affect perceived uncertainty significantly and perceived uncertainty negatively affects consumers' intention to purchase. Moreover, the results of analysis show purchase involvement has a significant moderating effect on the relationship between perceived uncertainty and intention to purchase online.

Keywords: Online Shopping, Perceived Uncertainty, Product Transparency, Process Transparency, Purchase Involvement, Purchase Intention

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