

Users' Adoption of a Convergent Service: A Case of Interactive TV-based Auction Service (T-auction)

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This paper introduces an electronic auction service to be provided on interactive TV (T-auction). This converged service is expected to much enhance the quality of the service to current online auction users through vivid visualization and live interactive experience. Our study focuses on how the characteristics of the interactive TV-based shopping platform can affect users' attitudes towards the converged service. To develop our proposed research model, we extended the technology acceptance model and integrated it with a hedonic factor, or perceived enjoyment, to reflect the dual characteristics of the converged system. We also adopted the variable of intermediary trust in the service as a critical mediating determinant for a successful commutations-mediated commerce. The research model was verified with an empirical study conducted on 970 Korean online auction users. Results show that both trust and perceived usefulness positively affect user adoption of the service. Trust had not only a direct effect on users' attitudes toward T-auction but also an indirect one by mediating the service quality, information quality, perceived enjoyment, and ease of use. Meanwhile, the hedonic factor of T-auction contributes to increasing both the level of the intermediary's trust and its perceived usefulness. Users' enjoyment also was found to help form a positive attitude toward T-auction services. Theoretical and practical implications of this study for current e-auction service providers and potential t-auction service providers are also discussed.

Keywords : IS Usage, Online Auction, Interactive TV, Converged Service, Trust, T-Commerce

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I. Introduction

Electronic auction has been regarded as one of the most robust business models in the field of online shopping [Sandeep, 2003]. At the same time, it is also regarded to involve higher risk in trading than traditional B2C retailing because of the intrinsic limitation in the ways in which consumers can ascertain the reliability of unfamiliar sellers and the actual quality of the goods being offered [Chau *et al.*, 2007]. So the critical question arises: when the online auction service meets television, what will happen? If the interactivity of online shopping is coupled with the ability of TV platform to represent vivid information, the information quality will be improved, and users are more likely to be assured of the qualities of the products presented. In fact, this ideal scenario has become real as the convergence between broadcasting and telecommunication technologies has accelerated. Internet protocol based TV (IPTV) is an example. IPTV is designed to deliver broadcast programs through IP networks which enable users to interact with TV programs. TV shopping (t-shopping) is a common example that offers interactive functionalities for users to purchase products and services and to pay for them.

The emergence of this converged media can create both new business opportunities and threats to existing online retailers. Traditional online retailers can expand their business territory into the TV platform by taking advantage of the customer base and operational competencies. On the other side of the divide, home shopping companies can enter the online re-

tailing business with their ability to acquire customers using high-quality multimedia information. This kind of competition has already appeared in the Korean retailing market: Korean e-bay has recently launched seller-created contents (SCCs), which contain video clips of products. Because such presentation offers more vivid information about the products, online users will experience the products differently from the way they currently experience product information with simple text or image presentation. While conventional online retailers have enhanced the visual presentation of their information, home shopping program providers have been making web channels including multimedia-based product information.

In this study, we describe a converged service called T-auction and examine the factors that may influence the adoption of this converged service. The existing models, such as the technology acceptance model (TAM) and DeLone and McLean's IS success model, have some limitations in explaining the underlying factors behind users' adoption of converged services. Our proposed model overcomes the limitations by integrating both utilitarian and hedonic factors of a converged service into the research model. Based on TAM, we combined perceived enjoyment, which reflects the hedonic feature of the service, and trust, which is an important mediating factor of online commerce. We verify the proposed model through an empirical study by analyzing surveys on 970 IPTV users and discuss the results of our analyses and the theoretic and practical implications.

II. Theoretical Background and Hypotheses

2.1 Extending the Technology Acceptance Model

TAM is the most frequently cited theory that explains why people adopt new technology. Since this theory was first proposed by Davis [1989], it has been applied in numerous studies in the area of information systems. TAM provides two concrete beliefs that determine an individual's behavioral intention to use a system. Perceived usefulness was defined as the degree to which a person believes that using a particular system would enhance his or her job performance, and perceived ease of use was defined as the degree to which a person believes that using a particular system would be free of effort [Fishbein and Ajzen, 1975]. TAM theorizes the effect of external variables mediated by perceived usefulness (PU) and perceived ease of use (PEOU), e.g., system characteristics, training, demographic variables, and personality characteristics, on attitude towards the technology and intention to use [Venkatesh and Davis, 2000].

2.1.1 TAM in Online Shopping

Ahn, Ryu, and Han [2007] used TAM as the fundamental basis of their model to explain why online users adopt online retailing. They expanded the model by integrating service quality, system quality, and information quality as independent variables. They demonstrated the significance of the impact of PEOU on PU, the effect of perceived usefulness on consumers'

attitudes and the mediating role of perceived usefulness to attitude toward online retailing service. In a study by Shih [2004], PEOU and PU were used to explain user acceptance of Web-based shopping. PU was defined as a perceived value (or perceived benefit) by consumers that represents the effectiveness of e-shopping. The study showed a significant impact of PEOU and PU on user's attitude. Kim and Forsythe [2008] adapted TAM to explain the process of a user's adoption of virtual try-on technology for online apparel shopping. Positively significant causal relations among PEOU, PU, and attitude were found except in the direct relation between PEOU and attitude. They accounted the insignificant relation between PEOU and attitude for the fact that the influence of PEOU on attitude was mediated by PU. Even in electronic brokerage service, a study was done on adoption factors of the new medium [Bhattacharjee, 2000]. The results showed significant positive effects of PEOU and PU on attitude and positive attitude on intention to use. PU was measured by four indicators related to performance, productivity, effectiveness, and usefulness to managing investments, and PEOU was measured by asking how easy it is to learn, manage, become skillful, and use.

2.1.2 TAM and Adoption of Interactive Systems

TAM has been used in not only the online shopping industry but various areas of new technology and IS-based services. Brunner and Kumar [2005] built a model based on TAM to explain consumer acceptance of a handheld Internet device. Their study also found a sig-

nificant positive effect of ease of use and its usefulness on users' attitudes. TAM was also used to explain the adoption of interactive TV [Choi *et al.*, 2003]. Similarly, factors influencing user adoption of T-commerce were examined [Yu *et al.*, 2005]. They suggested trust and perceived enjoyment as important variables affecting users' attitudes toward T-commerce.

Considering previous studies, we define PU and PEOU for our study as follows: first, PU is regarded as a user's cognitive improvement of performance and effectiveness on shopping by using interactive TV-based auction, and PEOU is defined as a user's perceived effort needed to learn or to use T-auction service. We propose the following hypotheses.

Hypothesis 1: PEOU will positively affect the perceived usefulness of T-auction

Hypothesis 2: PEOU will positively affect the trust of the intermediary of T-auction

Hypothesis 3: PU will positively affect the user's attitude towards T-auction

2.2 Quality of Interactive TV Based Auction

2.2.1 Information Quality

According to a report in 2007, 23% and 13% of consumers' complaints were related to B2C shopping and Internet auction, respectively, and the average loss of a customer was about \$1,136 to \$1,371 [National Internet Fraud Information Center, 2007]. The main reasons for the complaints were related to goods that were

never delivered or misrepresented. These frauds were caused by either malicious intention of sellers or lack of information about for customers with which they can verify the quality of a product and the reliability of the sellers before making a purchase decision. As such, information quality is a primary factor in user acceptance of electronic shopping. In fact, many researches included this factor in their research models and demonstrated its impact and relations with other constructs. The literature of consumer behavior has also demonstrated that consumers need information and knowledge to reduce their uncertainty about products and sellers [Chen and Dhillon, 2003]. Information is indeed helpful in clarifying ambiguity and in assisting a consumer in making a better decision. Reviewing the literature revealed that information quality contributes to user acceptance of electronic shopping in mainly two ways: trust building and enhancement of the hedonic factor.

Information quality (IQ) plays a significant role in trust-building between buyers and sellers. In an online shopping context, consumers depend on the information provided by sellers or intermediaries [Clark and Lee, 1999]. Asymmetric information between sellers and customers make customers highly rely on the sellers [Gavish and Tucci, 2008]. In principle, reliable, accurate, complete, and sufficient information strengthens the interpersonal relation between the buyer and seller [Ba *et al.*, 2003]. When customers are unsure or feel the information is insufficient, they sometimes refer to others' opinions to obtain more information in order to make a more informed decision [Resnick and Zeckhauser, 2002].

High quality information also enhances the hedonic aspect of online shopping. Ahn, Ruy, and Han [2007] found that information quality significantly affected playfulness, PEOU, and PU in Web-based retailing service. They included completeness, detail, accuracy, timeliness, and reliability as measurement items of IQ. In their study, playfulness was regarded as an intrinsic or emotional reward. The study supported strong positive relation between IQ and playfulness. Koufaris [2002] also demonstrated that a high level of quality shopping information could be interesting and helpful to consumers while it can also improve online consumers' convenience and enjoyment for shopping. In our study, we define perceived information quality as a customer's overall belief on the extent to which information represented by the intermediary of T-auction is perceived to be reliable, accurate, and up-to-dated. Based on the findings in the previous studies, we suggest the following hypotheses:

Hypothesis 4: Information quality will positively affect the trust of the intermediary;

Hypothesis 5: Information quality will positively affect perceived enjoyment.

2.2.2 Service Quality

Perceived service quality has become a critical factor for the success of e-commerce [Chen *et al.*, 2004]. Quality of service can directly and indirectly enhance the trust of sellers and the usefulness of the services themselves. Yang *et al.* [2004] defined perceived service quality as a global judgment on the superiority of a serv-

ice compared to other competing alternatives. They suggested six dimensions to measure the service quality of an online shopping mall by developing instruments based on the SERVQUAL model, which was developed by Parasuraman, Zeithaml and Berry [1988] for a framework to measure the service quality of a specific business. However, they thought the measurement items in SERVQUAL were not appropriate in an online context where customers interact with a Web interface instead of human employees. They found that reliability, responsiveness, ease of use, and competence highly affected overall service quality. Among these antecedents of service quality, three factors were frequently mentioned in other studies of e-shopping. First, the reliability factor includes items related to accurate online transactions, correct performance, and fulfillment of promises [Ahn *et al.*, 2004]. Second, responsiveness refers to prompt responses to customers' requests and speed in resolving problems [DeLone and McLean, 2004]. Competence is relative to an employee's ability to answer customers' questions, resolve problems, and comply with customers' requests.

Service quality is more important in online auction where riskier factors are involved. Therefore, high quality of service can reduce customers' uncertainty and help build trust [Ribbink *et al.*, 2004]. Gefen and Devine [2001] suggested that perceived risk for online shopping could be reduced by perceived service quality, thereby attracting more loyal customers. Grabner-Kraüter and Kalusha [2003] also proposed that service quality was a determinant of trust online. Other studies have shown that perceived service quality affect perceived usefulness

of the service. Shih [2004] argued that service quality could encourage or discourage users' purchases on the Web, suggesting a model in which service quality affects perceived usefulness of Web-based retailing service. Ahn *et al.* [2004] included service quality as a determinant of perceived usefulness of an online shopping mall and found a significant causal relation between them.

In our study, we define perceived service quality as a customer's overall belief in the extent to which the T-auction service will be carried out correctly, promptly, and safely. Therefore, we expect that service quality of T-auction will affect the trust of an intermediary and its usefulness.

Hypothesis 6: Perceived service quality will positively affect the trust of the intermediary.

Hypothesis 7: Perceived service quality will positively affect the usefulness of T-auction service.

2.3 Perceived Enjoyment

Overby and Lee [2006] studied motivations of consumers for online shopping. They divided the universal value of online shoppers into two dimensions. One is the utilitarian value that represents an overall assessment of functional benefits and sacrifices of a service or product. The other is hedonic value which is defined as a consumer's perceived experiential benefits, such as entertainment and escapism. While utility-preferred consumers pursue economic savings, convenience, and efficient processing for shopping, consumers having he-

donic motivation expect recreational elements from shopping.

Perceived enjoyment is a representative construct which measures the hedonic value of online shopping [Heijden, 2004]. The concept is defined as "the extent to which the activity of using the computer is perceived to be enjoyable in its own right, apart from any performance consequences that may be anticipated" [Davis *et al.*, 1992]. Prior studies have shown empirical evidence of the effect of perceived enjoyment for adopting different types of information systems. Ahn *et al.* [2007] adopted playfulness as a factor affecting a user's acceptance of an online retailing service. Heijden [2004] demonstrated that perceived enjoyment strongly affected the intention to use a Dutch movie site. He adopted enjoyment, excitement, pleasure, and interest as the measurement items. Monsuwé *et al.* [2004] found enjoyment as a determinant of online shopping. Their studies mentioned that customers who pursue fun, fantasy, arousal, and enjoyment see online shopping as a way to gain potential entertainment and an enjoyable shopping experience. If customers enjoy their online shopping experience, they have a more positive attitude. Thus, they are more likely to adopt the Internet as a shopping medium [Childers *et al.*, 2002]. Shang *et al.* [2005] focused on intrinsic factors, such as entertainment, as another major reason for people to use the Internet. They suggested that intrinsic motivations may be more important than extrinsic ones, such as goal-oriented purchases and improvement of performance in online shopping. Some study used perceived enjoyment as a factor in the acceptance of inter-

active TV-based commerce [Yu *et al.*, 2005]. They argued that perceived enjoyment should be taken into account for the research model, because TV essentially contains hedonic and recreational characteristics. Their finding supported a significant and strong relationship between PE and users' attitudes toward T-commerce. To measure this factor, three variables were adopted: pleasure, enjoyment, and curiosity. Ideally, customers will benefit the best when their expectations for both functional features and hedonic values of T-commerce are met. In this study, perceived enjoyment is defined as the extent to which a customer feels the experience is enjoyable, fun, and interesting while using T-auction service. We suggest the following hypothesis:

Hypothesis 8: Perceived enjoyment will positively influence the perceived usefulness of T-auction.

Perceived enjoyment is also related to the users' trust in the system. Hwang and Kim [2007] investigated the causal relation between perceived enjoyment and trust. They suggested that positive relations exist between perceived enjoyment and three attributes of e-trust: integrity, benevolence, and the ability of the seller. Integrity and ability of the seller showed a strong relationship with perceived enjoyment of the web site. Thus, the following hypothesis is possible:

Hypothesis 9: Perceived enjoyment will positively influence the perceived trust of the intermediary.

2.4 Intermediary's Trust

Trust has become a crucial mediating factor in IS adoption models [Jarvenpaa and Todd, 1996]. It has been defined from several perspectives. From the psychological view point, it is defined as a personal tendency to believe others or as cognition about the trustee [Rotter, 1971]. Trust is often regarded as the belief that the trusted party will fulfill its commitments despite the trusting party's dependence and vulnerability. In general, it is defined as an expectation that a person chooses to trust that others will not act opportunistically [Rousseau *et al.*, 1998]. Gefen and Straub [2003] adopted this general concept of trust and studied how trust plays a role in online shopping. They argued that trust could be reflected in "feelings of confidence and security" in the caring response of the other party. They believe that trust is a set of specific beliefs dealing primarily with the perceived integrity, benevolence, and ability of another party. This view is consistent with Jarvenpaa *et al.* [2000]. They conceptualized trust as a combination of the trustworthiness, integrity, honesty, and benevolence of e-vendors that increases behavioral intentions through reduced risk among potential but inexperienced consumers. Trustworthy behavior of the online seller help to increase the likelihood that consumers will gain expected benefits from the web site. Thus, perceived usefulness of the web site is positively affected by a trusting relationship [Yu *et al.*, 2005]

Song and Zahedi [2007] studied the trust issue especially in a health-infomediary. By definition, an infomediary is an Internet business

that functions as a "third-party provider of unbiased information and as a business match-maker." Pavlou and Gefen [2004] defined the trust of an intermediary as the subjective belief that the intermediary will institute and enforce fair rules, procedures, and outcomes competently, reliably, and with integrity. In the study of Song and Zahedi [2007], by adopting sub-dimensions of e-trust, integrity, benevolence, and ability they proved their significant effects on users' intentions to use. An infomediary in principle can build trust by providing some mechanisms to protect buyers and sellers from opportunistic behaviors of their counterparts. E-auction is a typical example of such infomediary service, so the role of trust in interactive TV-based auction is expected to be similarly observed. Therefore, the following hypotheses are suggested:

- Hypothesis 10: Intermediary trust will positively affect the perceived usefulness of T-auction;
- Hypothesis 11: Intermediary trust will positively affect the user's attitude toward T-auction.

2.5 Attitude

We adopted attitude as a dependent variable of this study. Attitude is defined as a psychological state reflecting the affective or evaluative feelings concerning a new system or service [Barki *et al.*, 1994]. Attitude has been adopted as a dependent variable in other empirical studies in IS field. A strong causal relation between attitude and behavioral intention has been proved by various studies. Because

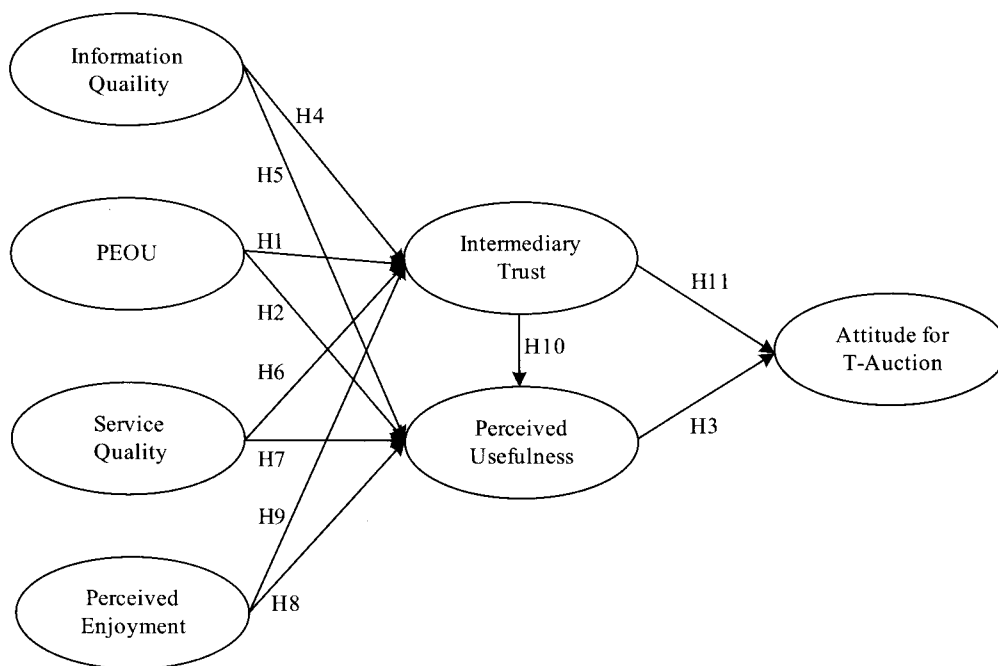
attitude is an emotional consequence that is formed after cognitive evaluation for the attributes of a product or service, it is critical for the user's purchasing decision. Many studies have found a strong relation between attitude and behavioral intention; thus, a more positive attitude is likely to lead to a higher possibility of use. Moreover, Bhattacharjee *et al.* [2004] used attitude as a dependent variable for IS adoption studies, especially when the system or service is in the pre-usage stage. They argued that actual behavioral intention can be measured after experiencing the system or service according to the expectation confirmation theory. Since T-auction has not been introduced in the market yet, people can perceive the service only on the basis of the usage scenario. In this situation, measuring the potential users' attitude towards the new system or service can be better than measuring a user's direct intention to use it.

<Figure 1> summarizes our research hypotheses in the proposed model. In the next section, we introduce the method of the empirical study and the results.

III. Data Collection and Analysis

3.1 Data Collection

To refine the measurement instruments a pretest was conducted with 70 university students. Once refined, the final questionnaire was distributed through a professional agency for online survey. A total of 970 usable responses were collected from all over the country. All the respondents had purchased something



<Figure 1> Proposed Research Model

through an electronic auction site. Before answering the questions, the respondents were supposed to read a brief description of an interactive TV-based auction service. All items used to measure the latent variables were constructed on a 7-Likert scale, ranging from "strongly disagree" to "strongly agree."

3.2 Descriptive Analysis

The respondents are highly educated in and experienced with the Internet; seventy-two percent of the respondents are college students or above. Almost sixty percent are male and half of the respondents are married. Sixty-nine percent had been using the Internet for more than five years.

The target customers of T-auction service are basically current online shoppers. According to

a report on the Korean Internet Usage [KISA, 2005], the majority of Internet shopping users are in their 20s and 30s. Among them, more than 71 percent are in their 20s and 54 percent in their 30s. We excluded teenagers because they have relatively less purchasing power. The report also revealed that the ratio of male and female users of the Internet is 54 and 46 percent, respectively. Our sample also showed a slightly larger portion of male respondents. We acknowledge that the sample may not be an accurate representation of the target population of online shoppers due to some limitations inherent in online surveys. Yet, the number of samples suffices the condition for an effective analysis of structural equation model that requires at least 200 cases for reliability of the results [Haenlein *et al.*, 2004].

The survey asked two main questions: the

<Table 1> Profile of the Respondents(N = 970)

	Category	Percent (frequency)
Age	15 to 19	3.4% (33)
	20 to 30	41.4% (402)
	31 to 40	35.8% (347)
	41 to 49	15.6% (151)
	Over 50	3.8% (37)
Gender	Male	59.7% (579)
	Female	40.3% (391)
Marital status	Single	50.4% (489)
	Marriage	49.4% (479)
Education-level	High school graduated	21.9% (212)
	College students	14.1% (137)
	College graduated	59.0% (572)
	Finished Graduate School	5.1% (49)
Monthly Income level	Less than 1,000 (thousand KRW)	9.2% (89)
	1,000 to 2,000	26.7% (259)
	2,000 to 3,000	30.2% (293)
	3,000 to 4,000	19.2% (186)
	Over 4,000	14.7% (143)
Internet experience	Less than 1 year	4.6% (45)
	1 to 3 years	10.7% (104)
	3 to 5 years	15.3% (148)
	More than 5 years	69.4% (673)

reasons when they had hesitated to decide in an online auction. The most common reason was uncertainty about the product quality (53.4%, $n = 518$), and the second was the lack of reliable information (17.9%, $n = 174$), followed by doubt about the seller (13.8%, $n = 142$) and about the system (11.4%, $n = 111$) being the least. In addition, we asked some questions about their experiences on TV home shopping. First, more than 82 percent of the respondents had experienced in purchasing items through TV home shopping. Almost 60 percent of those who had experienced TV home shopping answered that uncertainty about product quality made them hesitate before making a decision to purchase.

The other question was the reason for their potential use of T-auction. The biggest group expected sufficient and realistic representation of information through TV (32.1%, $n = 311$). The second reason is the expected convenience in purchasing goods through T-auction. Trustworthiness of the broadcasting program (16.9%, $n = 164$) is the third.

3.3 Measurement Model Analysis

3.3.1 Measurement development

Based on the literature review, we defined each concept and measurement items of the constructs in the proposed model. The opera-

<Table 3> Internal Reliability and Correlation of Constructs

	Cronbach α	CR	AVE	IQ	PEOU	ENJY	SRVQ	TRUST	PU	ATT
IQ	.882	0.914	0.679	0.824						
PEOU	.894	0.927	0.760	0.383	0.872					
ENJY	.811	0.888	0.727	0.559	0.461	0.853				
SRVQ	.810	0.888	0.725	0.566	0.341	0.481	0.851			
TRUST	.879	0.926	0.806	0.542	0.386	0.502	0.630	0.898		
PU	.837	0.893	0.677	0.522	0.571	0.578	0.549	0.609	0.823	
ATT	.917	0.948	0.858	0.502	0.474	0.590	0.515	0.586	0.693	0.926

Note) Cronbach alpha and the CR should be higher than 0.7 and AVE should be higher than 0.5 for convergent validity. Diagonal elements are the square roots of AVE and should be larger than off-diagonal for discriminant validity.

CR = composite reliability, AVE = Average Variance Extracted.

IQ = Perceived information quality, ENJY = Perceived enjoyment, SRVQ = Perceived service quality,

TRUST = Intermediary trust, PU = Perceived usefulness, ATT = Attitude for T-auction.

<Table 4> Factor Structure of Loadings and Cross-loadings

	INFOQ	PEOU	ENJY	SERVQ	TRUST	PU	ATT
IQ_reliable	0.835	0.327	0.487	0.508	0.491	0.449	0.457
IQ_accurate	0.843	0.301	0.437	0.512	0.541	0.447	0.442
IQ_vivid	0.843	0.311	0.495	0.440	0.381	0.415	0.392
IQ_recent	0.796	0.332	0.441	0.411	0.372	0.418	0.381
IQ_detail	0.803	0.311	0.447	0.445	0.418	0.415	0.386
SQ_correct fulfillment	0.531	0.250	0.431	0.844	0.545	0.438	0.441
SQ_prompt response	0.466	0.330	0.435	0.865	0.495	0.500	0.437
SQ_have safeguard	0.451	0.291	0.366	0.846	0.568	0.466	0.438
PE_enjoyable	0.517	0.409	0.887	0.457	0.486	0.559	0.576
PE_have fun	0.471	0.408	0.916	0.413	0.442	0.510	0.533
PE_curios	0.440	0.362	0.746	0.352	0.340	0.391	0.375
TRUST_verifiable	0.519	0.338	0.463	0.562	0.880	0.533	0.506
TRUST_honesty	0.449	0.340	0.412	0.550	0.913	0.531	0.501
TRUST_trustworthy	0.490	0.360	0.475	0.583	0.900	0.574	0.568
PEOU_remote controller	0.298	0.854	0.380	0.248	0.280	0.444	0.371
PEOU_menu selection	0.364	0.885	0.413	0.302	0.344	0.490	0.418
PEOU_communication thru TV	0.369	0.865	0.405	0.317	0.349	0.495	0.426
PEOU_overally easy	0.304	0.883	0.408	0.316	0.364	0.551	0.433
PU_save time and effort	0.351	0.553	0.438	0.352	0.415	0.731	0.505
PU_for safe shopping	0.437	0.409	0.416	0.500	0.559	0.833	0.579
PU_for enjoyable shopping	0.470	0.449	0.513	0.473	0.511	0.869	0.562
PU_overally useful	0.451	0.475	0.531	0.474	0.513	0.851	0.627
ATT_positive	0.453	0.422	0.520	0.453	0.541	0.635	0.916
ATT_favorable	0.475	0.425	0.566	0.496	0.539	0.638	0.936
ATT_overally good	0.468	0.470	0.554	0.482	0.550	0.653	0.927

Note) The cross-loadings and their respective constructs are in bold and more than 0.7.

tional definitions of the constructs are summarized in <Table 2>, and the measurement items of each construct are shown in the Appendix.

For the test of validity of each construct, a confirmatory factor analysis was examined using PLS-Graph version 3.0. First of all, the Cronbach alpha and composite reliability (CR) were used to assess the reliability of the items of each construct. The minimum value of Cronbach alpha and CR was .810 and 0.888, respectively, and these are higher than the recommended value of 0.7. Second, for the test of convergent validity, Gefen and Straub [2005] suggested that T-statistic of outer model loadings should be above 1.96 for convergent validity. In our model, the minimum value was 30.762, thus surpassing the threshold for the convergent validity. The value of average variance extracted (AVE) is another criterion for convergent validity. The minimum value of AVE was 0.677 while the minimum should be

greater than 0.5.; the convergent validity of each construct was supported. Finally, the discriminant validity can be tested using cross-loadings of each indicator and square root of the average variance extracted (AVE) of each latent variable. The item loadings belonging to a construct should be higher than correlations between the construct and other items. The square root of AVE of a construct should also be higher than the correlations between the construct and all the other constructs. If these two conditions are satisfied, the measurement model is judged to hold discriminant validity which is also supported by this measurement model. The following table summarizes the results.

We obtained fit indices of the measurement model using AMOS18. They all satisfied the recommended values (CMIN/df = 4.826 ≤ 5, GFI = .914 ≥ 0.9, AGFI = .886 > 0.9, NFI = .933 ≥ 0.9, CFI = .946 ≥ 0.9, RMSEA = .063 ≤ 0.08)

<Table 2> Operational Definitions of the Constructs

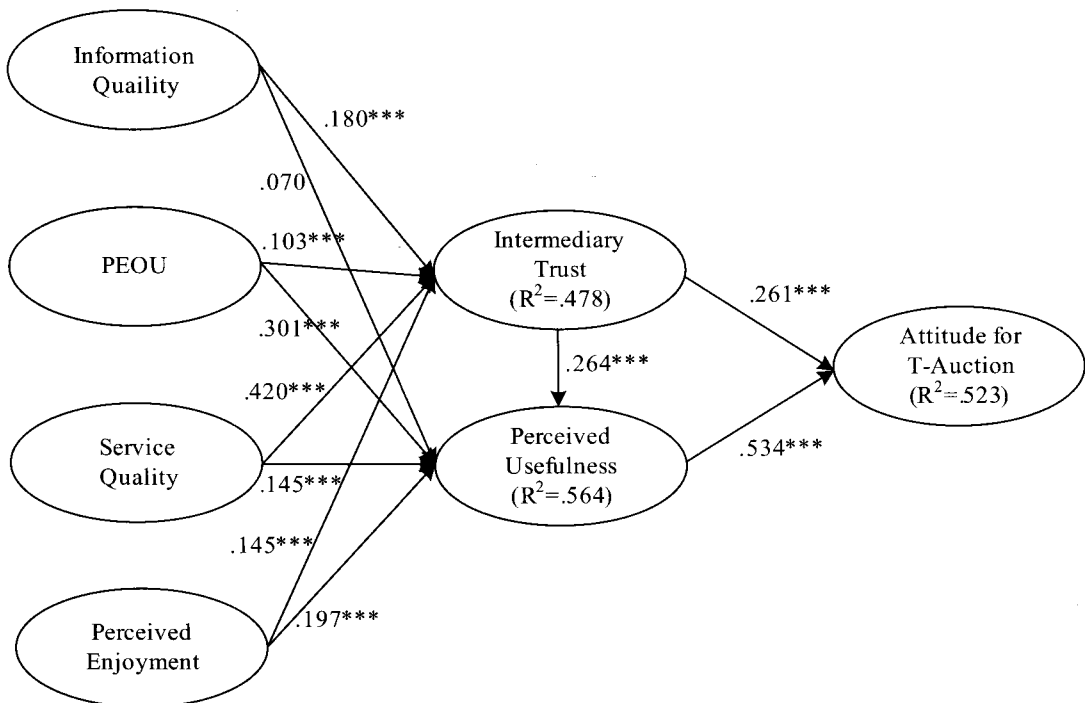
Construct	Operational definition
Perceived Usefulness (PU)	The degree to which a person believes that using the T-auction would enhance his or her shopping performance
Perceived Ease of Use (PEOU)	The degree to which a person believes that using the T-auction would be free of effort
Perceived Information Quality (IQ)	A person's overall belief in the extent to which information represented by the intermediary of T-auction is perceived to be reliable, accurate, and up-to-date
Perceived Enjoyment (ENJY)	The extent to which a customer feels the experience is enjoyable, fun, and interesting while using T-auction
Perceived Service Quality (SRVQ)	A customer's overall belief that the T-auction will be carried out correctly, promptly, and safely
Trust on the Intermediary (TRUST)	The belief that the intermediary of the T-auction service will fulfill its commitments despite the customers' dependence and vulnerability
Attitude (ATT)	A psychological state reflecting the affective or evaluative feelings concerning the T-auction

3.4 Structural Model and Hypotheses Testing

We tested the hypothesized relationships in our theoretical model using PLS-Graph version 3.0. The reason we used PLS for the structural model analysis is that the PLS is known as more suitable tool when the objective is causal predictive testing rather than testing an entire model [Yoo *et al.*, 2001]. Additionally, AMOS18, a covariance-based SEM tool, was used to obtain fit indices of the proposed model. The result of PLS analysis is presented in the following figure. The path coefficients were not different from the results using AMOS.

All hypotheses were supported except for the effect of perceived information quality on perceived usefulness. Supporting H1 and H2,

perceived ease of use had a significant impact on trust of the intermediary and perceived usefulness. Supporting H3, perceived usefulness had a strong effect on attitude toward the service ($\beta = .534, p < .001$). Supporting H4, perceived information quality showed a significant effect on the trust of the intermediary. However, H5 was not supported. Supporting H6 and H7, perceived service quality had a significant effect on the trust of intermediary ($\beta = .420, p < .001$), and it also had a significant impact on perceived usefulness. Supporting, H8 and H9, perceived enjoyment showed significant effects on both trust of the intermediary and perceived usefulness. Perceived enjoyment had a higher impact on perceived usefulness ($\beta = .197, p < .001$) than the impact on the intermediary trust ($\beta = .145, p < .001$). Sup-



<Figure 2> PLS Test of the Proposed Model

porting H10 and H11, trust of the intermediary affected perceived usefulness of the service, and attitude was significantly influenced by the perceived level of trust.

Additionally, we analyzed the direct effect of IQ, PEOU, SQ, and PE on attitude. For this analysis, we added four direct paths to the proposed model and ran a PLS-graph. The path from PEOU on attitude, which was included in the original TAM, was not hypothesized in the proposed model because of its inconsistent results in other studies [Bhattacharjee, 2001]. As a result, we found an insignificant effect of PEOU on attitude. The perceived information quality and service quality also showed no direct effect on attitude. However, a strong influence of perceived enjoyment on attitude was found ($\beta = .207, p < .001$).

The variance explained of the perceived usefulness was 56.4 percent. The strongest impact was from the perceived ease of use and followed by perceived enjoyment. The R-square value of intermediary trust was 47.8 percent, and the strongest impact was from information quality. The dependent latent variable, attitude towards T-auction, was explained with the R-square value of 52.3 percent. While the intermediary trust and perceived usefulness of T-auction played significant roles, perceived usefulness had contribution more to enhancing users' positive attitude towards the new convergent service.

In addition, we tested the overall model fit of the proposed model using a covariance-based structural equation modeling tool, AMOS18. According to the results, the fit indices of the proposed model are as follows: CMIN/df = 5.05, GFI = .909, AGFI = .991, NFI = .929, CFI = .942,

and RMSEA = .065. This result indicates that the proposed model is acceptable and able to generalize for explaining the adoption of a convergent system.

IV. Discussion

4.1 Theoretic Implications

We proposed a technology adoption model that reflects both the utilitarian and hedonic characteristics of the converged system. Trust, which is a key factor of online commerce, was integrated into the model as a critical mediating factor. The overall model fits proved that the proposed model is acceptable, and all hypotheses except one were significantly supported. We discuss the findings and the theoretic implications as follows.

First of all, unlike our initial expectation, there was no significant impact of perceived information quality on perceived usefulness of T-auction service. Rather, perceived information quality directly affected intermediary trust. Similar results were found by Shih [2004]. Perceived information quality did not explain the perceived usefulness of Web-based shopping. Only PEOU and the security factor had a significant effect on perceived usefulness. However, Ahn *et al.* [2007] found a significant relationship between perceived information quality and usefulness. This inconsistent result can be partially explained by customers' different perceptions on the importance of information. Li *et al.* [1999] argued that online buyers perceive the Internet to have higher utilities in communication and information distribution than non-buyers do. Cai and Jun [2003] also

explained that mere information searchers have less confidence in online sellers' service quality, while online shoppers give more weight to the elements related to service quality. E-auction users may give more weight to shopping itself rather than information provided by the intermediary; thus, the influence of perceived information quality on the perceived usefulness might not be significant. Therefore, at least theoretically, we concluded that perceived information quality could be strongly mediated by trust rather than perceived usefulness in communications-mediated shopping.

Second, a strong impact of PU on attitude was confirmed. In other TAM-based theories, perceived usefulness showed a strong effect on users' attitudes and intentions [Lu *et al.*, 2005; Vijayasarathy, 2004]. This result indicates that emerging services should focus on the essential purpose and functions of a shopping method. Previous studies found that most online shoppers constantly in search for more efficient ways for shopping, though some researchers argued for hedonic motivations being more critical for shopping. Therefore, a new method of shopping on a theoretical basis for now should focus on providing customers with more efficient and economic mechanisms so as to enable them to easily recognize the advantages of using the new medium for shopping. Interactive TV based auction service is expected to provide two enhanced qualities to customers. One is enriched information and the other is more convenience in shopping [Vesa and van Heck, 2005]. These values especially appeal to shoppers (especially older female users, we suppose) who might be more reluctant to use personal computers as a way

of purchasing goods and prone to stay home rather than to go out shopping, offline that is. In the process of making decisions on the items to be included in a T-auction program, the providers need to target this type of customers among others as their potentially steady customers.

Third, perceived enjoyment enhances the perceived usefulness of the service. This was consistent with findings not only in web-based shopping, but TV-based services as well. Although the basic purpose of shopping is to purchase high quality products or services at reasonable prices while saving time and effort, recreational motivation of shopping cannot be ignored. In fact, the role of perceived enjoyment can be more important than information quality itself in T-auction, because it shows a significant impact both on trust and perceived usefulness. In other words, perceived enjoyment contributes to increasing the overall usefulness of T-auction. TV is basically a "lean-back" media, so people usually expect refreshment and relaxation from watching TV [Buhalis and Licata, 2002]. This can be another reason why contents of T-auction should be equipped with recreational elements that can, for instance, arouse curiosity by including enticing contents such as antique items, celebrities, and vivid graphics so as to maximize the advantages of the unique features of the TV platform that no other media can offer to shoppers. In fact, home-shopping programs have been already exploring these entertainment elements. For example, home shopping programs increasingly cast famous entertainers and celebrities appear as their shopping hosts.

Finally, perceived service quality has turned

out to be the most critical factor affecting trust building. This finding supports the notion that communications-mediated shopping essentially functions as a way of commerce. The service quality can be measured with more diverse dimensions. In our study, only three measurement items were adopted: responsiveness, fulfillment, and customer cares with assurance. Most literature related to service quality mainly refers to SERVQUAL dimensions. Some studies refined the diverse dimension of SERVQUAL and fitted them to an online context. Those fitted dimensions of perceived service quality can be added to this model.

4.2 Practical Implications

Practitioners should note that the primary reason for using online shopping is its usefulness, and the core issue here is efficiency in ways of searching and purchasing a product. Currently, another important challenge for the new service providers to overcome is for them to find a mechanism to filter out good quality information from the flood of noisy information as a way to promote user-friendliness and to bring out their trustful image. Certainly, visualizing the salient information about products and sellers can be an effective way to increase its trustworthiness. In this way, providers can not only gain stronger customer confidence in their products and sites all together but also can offer a new hedonic value to the users at the same time. In fact, perceived enjoyment, which has been proven to have a direct and significant effect on a user's attitude, can also contribute to forming a positive attitude towards the service by maximizing on the he-

donic aspect of T-auction. As such, the service providers should highlight the fun and exciting aspects of watching visual representation of shopping information and processes in their marketing strategies when launching the service.

The other important issue for any potential T-auction service provider to take into deep consideration is a way to make the service as user-friendly as possible. Although perceived ease of use did not show a direct effect on users' attitudes, it can be indirectly effective through perceived usefulness and trust. For instance, it has been recommended that T-auction sites should be compatible with many types of gadgets that are already familiar to the users for the input device of interactive TV, ranging from something as simple as a remote-control to more advanced one like a motion-recognition camera. In this way, new users may find the new type of auction service less intimidating and, therefore, find it easily approachable. Because the high cost and psychological burden to adopt the new service can build a critical barrier inhibiting potential users, providing tools that are compatible with the habits of the current TV viewers is important for the successful diffusion of the service.

V. Conclusion

With accelerating convergence between the Internet and broadcasting business, diverse interactive TV-based services are emerging. T-auction, an interactive TV-based auction service, is one of these potential business models. When an interactive TV service provider can successfully implement an auction service model, current e-auction users are most likely to use the

service in complement to the existing medium or even possibly switch to the new service. If so, as can be expected of a new innovation in any market, T-auction can generate both a potential threat and an opportunity among the competitors. Therefore, instead of adopting the converged service too hastily to merely beat the competition, it is critical for both incumbent and potential service providers to fully understand all the influential factors that can help attract new users to adopt the new shopping option.

Our empirical results show that the information quality and service quality of t-auction service significantly affect trust in the intermediary. Also, intermediary trust significantly mediates other salient determinants of a shopping service, such as ease of use and enjoyment. In addition, the hedonic value of T-auction service also significantly increases its both trustworthiness and usefulness.

Of course, there were some limitations in conducting this study. First, this is a cross-sectional study based on the data collected in November of 2005 in Korea. This was a transitional period for the leading telecom and cable companies in Korea as they were preparing and promoting IPTV (Internet Protocol TV) and digital cable TV, which were to provide

interactivity as in the Internet shopping. Therefore, the empirical findings are rather limited for generalization. Second, the survey was conducted not on customers' actual use of the service, but on their perception of the description of the service. Because most of the respondents had sufficient experience with online auction and home-shopping (82.5%), we had assumed that these respondents are able to recognize the combined values of an auction service based on interactive TV. Despite these limitations, the empirical results contribute theoretically and practically to finding critical factors affecting the adoption of T-auction, which is expected to help potential service providers better prepare the service by promoting with their clear awareness of some critical factors articulated in our study. Still, future studies can include additional antecedents of intermediary trust and perceived usefulness by taking into account social or cultural or both factors. We also recommend a comparison study on home-shopping oriented users. In addition, the heterogeneity of products and preference of shopping channels can be an interesting topic for the future research. Any empirical findings in those suggested areas are expected to enhance our understanding of customers' behaviors vis-à-vis interactive TV mediated shopping.

⟨References⟩

- [1] Ahn, T., Ryu, S., and Han, I., "The impact of the online and offline features on the user acceptance of Internet shopping mall," *Electronic Commerce Research and Applications*, Vol. 3, 2004, pp. 405-420.
- [2] Ahn, T., Ryu, S., and Han, I., "The impact of Web quality and playfulness on user acceptance of online retailing," *Information and Management*, Vol. 44, 2007, pp. 263-275.
- [3] Ba, S., Whinston, A.B., and Zhang, H., "Building trust in online auction markets through an economic incentive mecha-

- nism," *Decision Support Systems*, Vol. 35, 2003, pp. 273-286.
- [4] Barki, H. and Hartwick, J., "Measuring user participation, user involvement, and user attitude," *MIS Quarterly*, Vol. 18, No. 1, 1994, pp. 59-82.
- [5] Bhattacharjee, A., "Acceptance of e-commerce services: the case of electronic brokerages," *IEEE transaction on systems, man, and cybernetics-Part A: systems and humans*, Vol. 30, No. 4, 2000, pp. 411-420.
- [6] Bhattacharjee, A., "Understanding Information Systems Continuance: An Expectation-Confirmation Model," *MIS Quarterly*, Vol. 25, No. 3, 2001, pp. 351-370.
- [7] Bhattacharjee, A. and Premkumar, G., "Understanding changes in belief and attitude toward information technology usage: a theoretical model and longitudinal test," *MIS Quarterly*, Vol. 28, No. 2, 2004, pp. 229-254.
- [8] Brunner II, G.C. and Kumar, A., "Explaining consumer acceptance of handheld Internet devices," *Journal of Business Research*, Vol. 58, 2005, pp. 553-558.
- [9] Buhalis, D. and Licata, M.C., "The future of eTourism intermediaries," *Tourism Management*, Vol. 23, 2002, pp. 207-220.
- [10] Cai, S. and Jun, M., "Internet user's perceptions of online service quality: a comparison of online buyers and information searchers," *Managing Service Quality*, Vol. 13, No. 6, 2003, pp. 504-519.
- [11] Chen, S.C. and Dhillon, G.S., "Interpreting dimensions of consumer trust in e-commerce," *Information Technology and Management*, Vol. 4, No. 2-3, 2003, pp. 303-318.
- [12] Chen, L., Gillenson, M.L., and Sherrell, D. L., "Consumer Acceptance of Virtual Stores: A theoretical model and critical success factors for virtual stores," *ACM Sigma Database*, Vol. 35, No. 2, 2004, pp. 8-31.
- [13] Chua, C.E.H., Wareham, J., and Robey, D., "The role of online trading communities in managing Internet auction fraud," *MIS Quarterly*, Vol. 31, No. 44, 2007, pp. 759-781.
- [14] Childers, T.L., Carr, C.L., Peck, J., and Carson, S., "Hedonic and utilitarian motivations for online retail shopping behavior," *Journal of Retailing*, Vol. 77, No. 4, 2002, pp. 511-535.
- [15] Choi, H., Choi, M.S., Kim, J.W., and Yu, H.S., "An empirical study on the adoption of information appliances with a focus on interactive TV," *Telematics and Informatics*, Vol. 20, No. 2, 2003, pp. 161-183.
- [16] Clark, T.H. and Lee, H.G., "Electronic Intermediaries: Trust building and market differentiation," *Proceedings of the 32nd Hawaii International Conference on System Sciences*, 1999, pp. 1-10.
- [17] Davis, F.D., "Perceived usefulness, perceived ease of use and user acceptance of information technology," *MIS Quarterly*, Vol. 13, No. 3, 1989, pp. 319-340.
- [18] Davis, F.D., Bagozzi, R.P., and Warshaw, P.R., "Extrinsic and intrinsic motivation to use computers in the workplace," *Journal of Applied Social Psychology*, Vol. 22, No. 14, 1992, pp. 1111-1132.
- [19] DeLone, W.H. and McLean, E.R., "Measuring e-Commerce Success: Applying DeLone and McLean Information Systems Success Model," *International Journal of Electronic Commerce*, Vol. 9, No. 1, 2004, pp. 31-47.

- [20] Fishbein, M. and Ajzen, I., "Belief, attitude, intention, and behavior: an introduction to theory and research. Addison-Wesley, Boston, 1975.
- [21] Gavish, B. and Tucci, C.L., "Reducing Internet auction fraud," *Communications of the ACM*, Vol. 51, No. 5, 2008, pp. 89-97.
- [22] Gefen, D. and Devine, P., "Customer loyalty to an online store: the meaning of online service quality," *Proceedings of the Twenty-Second International Conference on Information Systems*, 2001, pp. 613-617.
- [23] Gefen, D. and Straub, D.W., "Trust and TAM in online shopping: an integrative model," *MIS Quarterly*, Vol. 27, No. 1, 2003, pp. 51-90.
- [24] Gefen, D. and Straub, D.W., "A practical guide to factorial validity using PLS-Graph: Tutorial and Annotated Example," *Communications of the Association for Information Systems*, Vol. 16, 2005, pp. 91-109.
- [25] Grabner-Kräuter, S. and Kalusha, E.A., "Empirical research in on-line trust: a review and critical assessment," *International Journal of Human-Computer Studies*, Vol. 58, No. 6, 2003, pp. 783-812.
- [26] Ha, I., Yoon, Y., and Choi, M., "Determinants of adoption of mobile games under mobile broadband wireless access environment," *Information and Management*, Vol. 44, 2007, pp. 276-286.
- [27] Haenlein, M. and Kaplan, A.M., "A beginner's guide to partial least squares analysis," *Understanding statistics*, Vol. 3, No. 4, 2004, pp. 283-297.
- [28] Heijden, H., "User acceptance of hedonic information systems," *MIS Quarterly*, Vol. 28, No. 4, 2004, pp. 695-704.
- [29] Hwang, Y. and Kim, D.J., "Customer self-service systems: the effects of perceived Web quality with service contents on enjoyment, anxiety, and e-trust," *Decision Support Systems*, Vol. 43, 2007, pp. 746-760.
- [30] Jarvenpaa, S.L. and Todd, P.A., "Consumer reactions to Electronic shopping on the World Wide Web," *International Journal of Electronic Commerce*, Vol. 1, No. 2, 1996, pp. 59-88.
- [31] Jarvenpaa, S.L., Tractinsky, N., and Vitale, M., "Consumer trust in Internet store," *Information Technology and Management*, Vol. 1, No. 1-2, 2000, pp. 45-71.
- [32] Kim, J. and Forsythe, S., "Adoption of virtual try-on technology for online apparel shopping," *Journal of Interactive Marketing*, Vol. 22, No. 2, 2008, pp. 45-59.
- [33] KISA, *Korea Internet White Paper*, 2005 available at <http://www.kisa.or.kr>.
- [34] Koufaris, M., "Applying the technology acceptance model and flow theory to on-line consumer behavior," *Information Systems Research*, Vol. 13, No. 2, 2002, pp. 205-233.
- [35] Li, H., Kuo, C., and Russell, M.G., "The impact of perceived channel utilities, shopping orientations, and demographics on consumer's online buying behavior," *Journal of Computer-Mediated Communication*, Vol. 5, No. 2, 1999, available at <http://www3.interscience.wiley.com/cgi-bin/fulltext/120837782/HTMLSTART> (accessed January 6, 2009).
- [36] Lu, J., Yao, J.E., and Yu, C.S., "Personal innovativeness, social influences and adoption of wireless Internet service via mobile

- technology," *Journal of Strategic Information Systems*, Vol. 14, 2005, pp. 245-268.
- [37] Monsuwé, T.P., Dellaert, B.G., and Ruyter, K., "What drives consumers to shop on-line? A literature review," *International Journal of Service Industry Management*, Vol. 15, No. 1, 2004, pp. 102-121.
- [38] National Internet Fraud Information Center, Online Auctions: 2007 Survey. <http://www.fraud.org>.
- [39] Overby, J.W. and Lee, E.J., "The effects of utilitarian and hedonic online shopping value on consumer preference and intentions," *Journal of Business Research*, Vol. 59, 2006, pp. 1160-1166.
- [40] Parasuraman, A., Zeithaml, V.A., and Berry, L.L., "SERVQUAL: A multiple item scale for measuring consumer perceptions of service quality," *Journal of Retailing*, Vol. 64, No. 1, 1988, pp. 12-40.
- [41] Pavlou, P.A. and Gefen, D., "Building effective online marketplace with institution-based trust," *Information Systems Research*, Vol. 15, No. 1, 2004, pp. 37-59.
- [42] Resnick, P. and Zeckhauser, R., "Trust among strangers in Internet transactions: Empirical analysis of eBay's reputation system," *The Economics of the Internet and E-Commerce*, Vol. 11, 2002, pp. 127-157.
- [43] Ribbink, D., van Liljander, A.C.R., and Streukens, S., "Comfort your online customer: quality, trust, loyalty on the Internet," *Managing Service Quality*, Vol. 14, No. 6, 2004, pp. 446-456.
- [44] Rotter, J.B., "Generalized expectancies for interpersonal trust," *American Psychologist*, Vol. 26, No. 5, 1971, pp. 443-452.
- [45] Rousseau, D.M., Sitkin, S.B., Burt, R.S., and Camerer, C., "Not so different at all: a cross-discipline view of trust," *Academy of Management Review*, Vol. 23, No. 3, 1998, pp. 393-404.
- [46] Sandeep, K., *E-Commerce Management*, South-Western College Publisher, 2003.
- [47] Shang, R.A., Chen, Y.C., and Shen, L., "Extrinsic versus intrinsic motivations for consumers to shop on-line," *Information and Management*, Vol. 42, No. 3, 2005, pp. 401-413.
- [48] Shih, H.P., "An empirical study on predicting user acceptance of e-shopping on the Web," *Information and Management*, Vol. 41, 2004, pp. 351-368.
- [49] Song, J. and Zahedi, F.M., "Trust in health infomediaries," *Decision Support Systems*, Vol. 43, 2007, pp. 390-407.
- [50] Venkatesh, V. and Davis, F.D., "A theoretical extension of the technology acceptance model: four longitudinal field studies," *Management Science*, Vol. 46, No. 2, 2000, pp. 186-204.
- [51] Vesa, J. and van Heck, E., "Factors in adopting multi-access technologies in online consumer auction markets in Finland," *European Management Journal*, Vol. 23, No. 2, 2005, pp. 182-194.
- [52] Vijayasathy, L.R., "Predicting consumer intention to use on-line shopping: the case for an augmented technology acceptance model," *Information and Management*, Vol. 41, 2004, pp. 747-762.
- [53] Yang, Z., Jun, M., and Peterson, R., "Measuring customer perceived online service quality: scale development and managerial implications," *International Journal of Operations and Production Management*, Vol.

24, No. 11, 2004, pp. 1149-1174.

[54] Yoo, Y. and Alavi. M., "Media and group cohesion: relative influences on social presence, task participation, and group consensus," *MIS Quarterly*, Vol. 25, No. 3,

2001, pp. 371-390.

[55] Yu, J., Ha, I., Choi, M., and Rho, J., "Extending the TAM for a t-commerce," *Information and Management*, Vol. 42, 2005, pp. 965-976.

〈Appendix〉 Measurement Items

Perceived Information Quality

- IQ1: T-auction will provide reliable information
- IQ2: T-auction will provide accurate information
- IQ3: T-auction will provide vivid information
- IQ4: T-auction will provide up-to-dated information
- IQ5: T-auction will provide information in detail

Perceived Service Quality

- SQ1: The intermediary will correctly fulfill the promised service.
- SQ2: The intermediary will promptly respond to customers' requests
- SQ3: The intermediary will have safeguards to protect customers from unexpected damage or loss

Intermediary Trust

- TR1: The intermediary will exhibit products/services throughout a verifiable process
- TR2: The intermediary will honestly promote transactions
- TR3: Overall, the intermediary is trustworthy

Perceived Enjoyment

- PE1: Using T-auction will be enjoyable
- PE2: Using T-auction will be fun
- PE3: T-auction will make people curious

Perceived Ease of Use

- PEOU1: Using remote controller to input data will be easy
- PEOU2: Selecting menu on TV display will be easy
- PEOU3: Communicating through TV is not easy (reverse)
- PEOU4: Overall, it is not difficult to use T-auction service

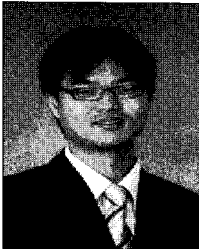
Perceived Usefulness

- PU1: T-auction will save time and effort for shopping
- PU2: T-auction will be useful for safe shopping
- PU3: T-auction will be useful for enjoyable shopping
- PU4: Overall, T-auction is a useful service

Attitude

- ATT1: I positively think of T-auction service
- ATT2: I am favorable for T-auction service
- ATT3: Overall, I think T-auction is good service

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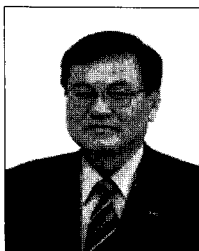
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