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### Key Factors Influencing Customer Satisfaction in Korea's Mobile Service Sector

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### Abstract

Advances in wireless technology have expanded the existing internet environment and accelerated the rapid development of mobile service. Many previous studies were conducted on users' needs and satisfaction prior to the expansion of the mobile service.

Thus, the impact of mobile service factors on user satisfaction has important implications for both academics and practitioners. This study investigates the factors affecting user satisfaction related to mobile service. First, this study extracts key factors (antecedents and consequences) from reviewing the previous studies. Second, the study empirically examines the causal relationships among the factors. Data collected from 256 users in Korea were tested for the research model using the Visual PLS approach. The results reveal that the proposed model is significantly supported in the effect of perceived quality and self-efficacy on customer satisfaction via perceived ease of use and usefulness.

**Keywords: mobile service; technology acceptance model; perceived quality; self-efficacy**

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## INTRODUCTION

Advances in information and communication technology have expanded the existing internet environment and accelerated the rapid development of mobile service. Mobile service using mobile devices and wireless telecommunications network has become a hot topic in the information systems and marketing research community. Lately, the potentialities of mobile service applications are leading many organizations (Wang et al., 2006). Therefore, mobile devices from smart phones to netbooks have become portable tools for productivity, learning and communication, offering an increasing range of activities fully supported by applications designed particularly for mobile devices (Johnson et al., 2010).

Utilization via mobile devices has dramatically increased in mobile services. In Korea, the average wireless Internet usage per week is 11.7 hours, with 45.6% using the wireless Internet more than 10 hours a week. Further, more than 80% of wireless Internet users use mobile services at 'home (residence)' (89.6%) and in 'moving vehicles' (81.3%); more than 60% use it 'outdoors' and at 'commercial Internet access facilities', such as coffee shops, etc. (KISA, 2012).

Most previous studies have focused primarily on the users' needs and satisfaction before the development of mobile services and related information technology (Wang et al., 2006). Unlike in the past, many companies are enabling a direct connection and considering the factors of satisfaction with the changed environment through mobile services.

The purpose of this study is two-fold: first, to review the key factors affecting user satisfaction on the basis of previous studies of existing mobile services, and second, to test the causal relationship model and investigate the significant factors directly and indirectly influencing user satisfaction. Specifically, by adapting the American Customer Satisfaction Index (ACSI) model based on the perceived quality of the user experience and the perceived self-efficacy using the real satisfaction, the study attempts to investigate the impact of mobile services.

In addition, changes in mobile technology acceptance were measured by considering the well-known part of the Technology Acceptance Model (TAM) of the perceived usefulness and perceived ease of use by incorporating the impact on the user satisfaction degree of a population of young Korean subjects. Thus, the research model of the study (the combining model of ACSI and TAM) is expected to yield a more realistic depiction of the perceptions and behaviors of mobile service users and offer valuable insights for future research.

## THEORETICAL BACKGROUND

### American Customer Satisfaction Index

The American Customer Satisfaction Index model is a general, cross-industry model that provides market-based performance measures for firms, industries, sectors and nations. It measures the quality of goods and services as experienced by consumers (Fornell et al., 1996). Figure 1 presents the ACSI model as a multiple indicator approach to measure the overall customer satisfaction as a latent variable.

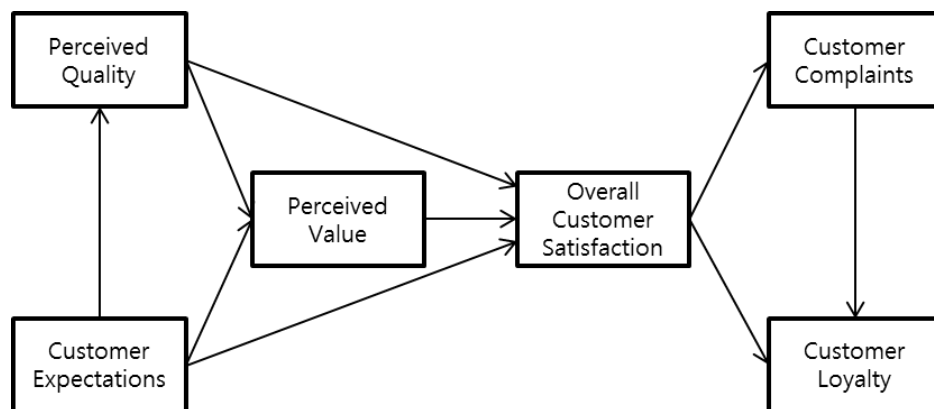


Figure 1. The ACSI Model (Fornell et al., 1996)

Perceived quality is the market evaluation of recent service usage experience. It is derived from the degrees of customization experience and reliability of the service. The customer expectation construct represents both previous service experience and forward-looking beliefs regarding a provider's ability to offer the desired quality. Perceived value adds the price dimension to perceived quality; that is, it addresses the perception of the quality for money.

In the field of information systems, satisfaction and quality often have been differentiated by the utilized method in an organizational environment as well as the standard of comparison used in the disconfirmation of expectations. For example, several researches for organizational environment are probably reaching their limits in terms of explaining the usage behavior of individual devices (Baron et al., 2006). However, in marketing works, Parasuraman et al. (1985) distinguished between the two constructs by defining quality as a gestalt attitude towards a service that was acquired over a period

of time after multiple experiences with it, whereas satisfaction was seen to relate to a specific service transaction. In adopting this distinction, they were building on the conceptualization provided by Oliver who defined satisfaction as “a function of an initial standard and some perceived discrepancy from the initial reference point.” Oliver also stated, “satisfaction soon decays into one’s overall attitude toward purchasing products.... or quality.” Further, satisfaction is the user’s reaction to their judgment of the state of fulfillment (Oliver, 2010).

The ACSI Model and its adaptation have been utilized in many studies in various industries. For example, customer satisfaction was used to examine banking services (Mukherjee et al., 2003), conferences (Gorst et al., 1999), transportation and communications sectors (Grigoroudis et al., 2004), retailing industries (Arnett et al., 2003) and mobile phone service (Lee, 2010; 2013). Such studies demonstrate the viability of this model to investigate the behaviors and perceptions of mobile service users.

### Technology Acceptance Model

Technology Acceptance Model is a representative model which attempted to predict the behavior of users. The TAM adapted from the theory of reasoned action (TRA) (Ajzen et al., 1980), posits that user adoption of a new information system is determined by the users’ intention to use the system, which in turn is determined by the users’ beliefs about the system. Users’ beliefs consist of perceived usefulness and perceived ease of use and they are instrumental in explaining the variance in the intention of users (Davis, 1989; Davis et al., 1989; Davis et al., 1992).

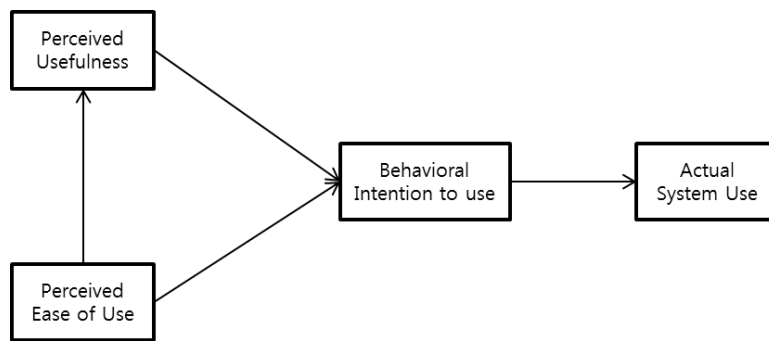


Figure 2. The adapted TAM (Davis, 1989)

In the TAM, perceived usefulness is defined as “the extent to which a person believes that using a particular system will enhance his or her job performance,” and perceived ease of use is defined as “the extent to which a person believes that using a particular system will be free of effort.” Perceived ease of use is also hypothesized to be a predictor of perceived usefulness. Information system researchers have investigated and replicated the TAM in various application fields related to IT, and agreed that it is valid in predicting an individual’s acceptance of various corporate IT (Adams et al., 1992; Chin et al., 1995; Doll et al., 1998; Segars et al., 1993).

However, the TAM's fundamental constructs do not fully reflect the specific influences of technological and usage-context factors which may alter user acceptance (Davis et al., 1989). Thus, post-TAM researchers have extended the TAM with constructs such as perceived playfulness (Moon et al., 2001), compatibility (Chen et al., 2002) and relevance (Shih, 2004).

## EMPIRICAL ANALYSIS

### Research Model and Hypotheses

The ACSI model in previous studies was provided as a solid model, which illustrates customer satisfaction in constructs of the perceived perspective. The TAM was suggested to verify the factors affecting the intentions of use for customers. This study presents a mixture of the two models for analyzing the influencing factors to customer satisfaction in the mobile service environment. The research model, based on the perceived quality of the user experience in the ACSI model (Fornell et al., 1996) and the perceived self-efficacy using the real satisfaction, is to investigate the impact in mobile service. Thus, on the basis of the earlier model discussed above, the research model for this study is proposed as follows (Figure 3).

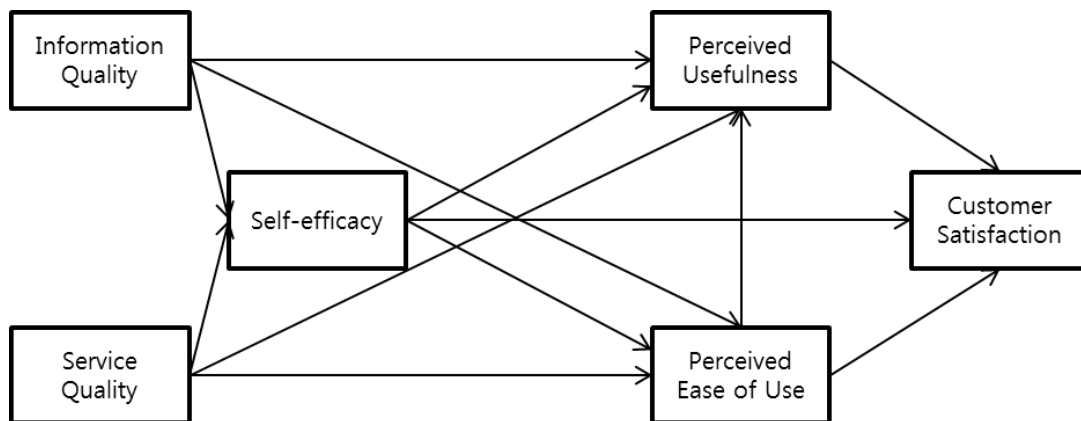


Figure 3. Research Model

To operationalize the concept mentioned above, the perceived quality, adopted from the ACSI model, is served as a market evaluation of recent service usage. The construct of perceived quality consists of perceived information quality (Bailey et al., 1983) and perceived service quality (Pitt et al., 1995). In addition, the research model is considered as a self-efficacy construct that plays a role in understanding individual responses to IT. The construct presents more satisfaction than the perceived value of a comparison of price and quality and perceived expectation based on the pre-purchase of the ACSI model. These three constructs lead to customer satisfaction, labeled as the ACSI. We also modify the construct of perceived value, which explains between the quality and price perspective to TAM's perceived ease of use and perceived usefulness. These constructs can be recognized as an important variable because it leads to customers' subjective difference as well as the perceived quality effect on customer satisfaction.

The proposed constructs are all supported by prior studies in IS researches and marketing literatures. To explore the aforementioned arguments, this study adapts the research model to address the following research hypotheses.

In previous research, information quality is measured as currency, relevancy and efficiency of the yielded product of the information system. Because information quality is very much subjective from the user's perspective, it is also factored in as part of user satisfaction (Bailey et al., 1983). Pitt et al. (1995) developed an instrument for measuring service quality, which they utilized the SERVQUAL measure as the component factor of IS success. In this model, subsequently emphasizing the importance of SERVQUAL as the foundation for service quality of information systems is needed, which describes the applications of service quality. Based on the social cognitive theory, self-efficacy is the belief that one has the ability to perform a specific behavior (Compeau et al., 1995). Self-efficacy in this study is defined as the judgment of one's ability to use mobile service (Wang et al., 2006). Thus, as a customer perceives the higher quality of mobile service, his/her self-efficacy of mobile service usage is increased. More specifically, the perceived quality will lead to higher self-efficacy. Thus, the following hypotheses are proposed:

- H1a: Service quality has a significant effect on self-efficacy.
- H1b: Service quality has a significant effect on perceived ease of use.
- H1c: Service quality has a significant effect on higher perceived usefulness.

- H2a: Information quality has a significant effect on self-efficacy.
- H2b: Information quality has a significant effect on perceived ease of use.
- H2c: Information quality has a significant effect on perceived usefulness.

The proposed relationship between self-efficacy and perceived ease of use is based on the theoretical argument by Davis (1989) and Mathieson (1991). Further, customer's self-efficacy is the belief that s/he has the ability to perform a specific behavior. This indicates that self-efficacy can be a significant antecedent of customer satisfaction with the presence of perceived ease of use and perceived usefulness. Therefore, this study tests the following hypotheses:

- H3a: Self-efficacy has a significant effect on customer satisfaction.
- H3b: Self-efficacy has a significant effect on perceived ease of use.
- H3c: Self-efficacy has a significant effect on perceived usefulness.

Most studies on technology acceptance indicated that perceived ease of use directly influenced perceived usefulness and attitude toward use (Davis et al., 1989). In particular, Davis (1989) stated that through perceived usefulness, perceived ease of use indirectly influences the attitude to use and acceptance intention, which in turn clearly shows that perceived ease of use is the antecedent of the perceived usefulness. However, perceived usefulness does not directly influence perceived ease of use. Thus, the following hypotheses are proposed:

- H4a: Perceived ease of use has a significant influence on customer satisfaction.
- H4b: Perceived ease of use has a significant influence on perceived usefulness.
- H5 : Perceived usefulness has a significant influence on customer satisfaction.

**Research Design**

Items for perceived quality dimension (i.e., information quality, service quality), perceived ease of use, perceived usefulness and customer satisfaction were measured on a five-point Likert scale, ranging from “strong disagree” to “strong agree”. Specifically, self-efficacy was measured on a five-point scale ranging from “not at all confident” to “totally confident”. In addition, the definition of experience of mobile service in the questionnaire refers to the extent to which the customer will apply for getting offered mobile services from a telecommunication company in order to conduct specific mobile transactions such as send/receive news, play online games, stock trading, book tickets, friend finding and mobile banking, etc. Pre-testing of the measures was conducted by mobile service users as well as experts related to the mobile service research. To confirm the content validity, the measures for almost all constructs were taken from the existing literatures. Several items were modified relevantly in the context of mobile service.

As shown in Table 1, the information quality construct was measured by three items (Bailey et al., 1983; Kim et al., 2008) and the service quality construct was composed of three items (Kim et al., 2008; Parasuraman et al., 1985). Five items for the self-efficacy construct were adapted from the original instrument of computer self-efficacy, developed by Compeau and Higgins (1995). Each items for the perceived ease of use and perceived usefulness were adapted from the previously validated TAM model (Davis, 1989; Davis et al., 1989). Finally, customer satisfaction were adapted from the ASCI model (Fornell et al., 1996).

Table 1. Construct measurement

Construct	Item	Researcher (year)
Information quality	Mobile service environment offers up-to-date information. Mobile service environment offers relevant and necessary information. Mobile service environment offers information in a useful format.	Bailey and Pearson (1983) Kim et al. (2008)
Service quality	Mobile service provider is always helpful when there is a problem. Mobile service provider is very cooperative. User training on using mobile service has been well established. Mobile service provider provides new and practical applications for the IT.	Kim et al. (2008) Parasuraman et al. (1985)
Self-efficacy	I could conduct my transactions using the mobile service... ...if I had just the built-in help facility for assistance. ...if I had a lot of time to complete the job for which the service was provided. ...if I had only the service manuals for reference. ...if I had seen someone else using it before trying it myself. ...if someone showed me how to do it first.	Compeau and Higgins (1995) Mathieson (1991)
Perceived ease of use	Learning to use mobile services is easy for me. It would be easy for me to become skillful at using mobile services. It would find mobile services easy to use.	Davis (1989) Davis et al. (1989)
Perceived usefulness	Using mobile services would improve my performance in conducting transactions. Using mobile services would make it easier for me to	Davis (1989) Davis et al. (1989)

	conduct transactions.	
Customer satisfaction	Overall satisfaction. Expectancy disconfirmation (performance that falls short of or exceeds expectation). Performance versus the customer's idea product or service in the category.	Fornell et al. (1996) Parasuraman et al. (1985)

The partial least squares (PLS) was chosen for this study because it fits both the exploratory and confirmatory research, places less restriction on the data distribution, and requires smaller sample sizes (Chin, 1998). In addition, because the prior ASCI-based studies utilized PLS, the usage of this technique allows a useful evaluation of the theoretical structure models (Gefen et al., 2000).

**Data Collection**

The sample used to test the research model was collected from the present mobile service users. Table 2 presents the descriptive statistics of the respondents' demographic characteristics. Of the 256 respondents, 58.2% were male, and 41.8% were female; 40.6% were between the age of 15 and 24, 43.4% were between the age of 25 and 29, 12.1% were between the age of 30 and 39, 3.1% were between the age of 40 and 49, and 0.8% were 50 over. The daily usage of mobile service of a majority of respondents (91.8%) was over 5 times. 75.8% were Android platform users, and 22.7% were Apple iOS users. The result of the ANOVA test indicated there was no difference by gender, age, frequency of usage, and platform of all respondents.

Table 2. Demographic characteristics of the respondents

Variables	Item	Frequency (%)
Gender	Male	149 (58.2)
	Female	107 (41.8)
Age	Under 25	104 (40.6)
	25 to under 30	111 (43.4)
	30 to under 40	31 (12.1)
	40 to under 50	8 (3.1)
	Over 50	2 (0.8)
Frequency of usage	Over 10 times per day	174 (68.0)
	5 to under 10 times per day	61 (23.8)
	3 to under 5 times per day	13 (5.1)
	2 to under 3 times per day	6 (2.3)
	Under 1	2 (0.8)
Platform	Android	194 (75.8)
	iOS	58 (22.7)
	Blackberry	1 (0.4)
	Bada 2.0	3 (1.2)

**Reliability and Validity Assessment**

To assess the reliability of the measures for each construct, we examined internal consistency. Cronbach's alpha coefficients ranged from 0.608 to 0.876, which were greater than the minimum acceptable level of 0.6 for all the items (Nunnally, 1978). The alpha coefficients of the measurement items for each construct are presented in Table 3.

Table 3. Reliability of the measurement items

	Infor.Q	Serv.Q	EOU	USE	Satis	Self
Cronbach's α	0.774	0.808	0.796	0.699	0.608	0.876



For examining the factor structure of the measures, this study employed an exploratory factor analysis. The result of KMO (Kaiser-Meyer-Olkin measure) of sampling adequacy indicated that the observed data set is meritorious to perform the factor analysis. Also, Bartlett test of sphericity is statistically significant ( $p < 0.01$ ), based on the guidelines by Kaiser (1970). The results demonstrate that the loadings of all items exceeded the required threshold of 0.5, and, therefore, explain over 50% of the variance in an observed item (Hair et al., 1998).

In order to assess the discriminant validity, two steps were taken. First, by using a matrix of loadings and cross-loadings, the loadings of an item with its associated construct to its cross-loadings were compared (see Table 4). Second, a comparison of the average variance extracted (AVE) from each of the constructs with the square of the correlations between constructs is conducted (Chin, 1998; Fornell et al., 1981).

Table 4. Matrix of loadings and cross-loadings

Item	Infor.Q	Serv.Q	EOU	USE	Satis	Self
infor1	<b>0.8143</b>	0.4933	0.2998	0.2693	0.1883	0.1992
infor2	<b>0.8755</b>	0.5069	0.3168	0.2856	0.2933	0.3059
infor3	<b>0.8005</b>	0.5014	0.3582	0.3849	0.2972	0.3027
service1	0.4772	<b>0.7580</b>	0.4369	0.3068	0.3040	0.3832
service2	0.4389	<b>0.8299</b>	0.3601	0.2648	0.2907	0.3148
service3	0.4971	<b>0.7946</b>	0.3158	0.1746	0.2997	0.2912
service4	0.5123	<b>0.8077</b>	0.3526	0.2822	0.3462	0.3227
ease1	0.1710	0.3004	<b>0.6936</b>	0.3400	0.2709	0.4970
ease2	0.3695	0.3248	<b>0.7428</b>	0.4574	0.3034	0.4546
ease3	0.1713	0.2736	<b>0.6777</b>	0.4362	0.3096	0.4290
ease4	0.2949	0.3680	<b>0.6071</b>	0.2286	0.3039	0.3793
ease5	0.2713	0.3641	<b>0.7913</b>	0.3074	0.2017	0.6155
ease6	0.4017	0.3729	<b>0.7480</b>	0.3173	0.3603	0.4840
useful1	0.1597	0.1163	0.3432	<b>0.7003</b>	0.2179	0.3793
useful2	0.2286	0.1918	0.2334	<b>0.6086</b>	0.2636	0.2128
useful3	0.3638	0.2807	0.4198	<b>0.7899</b>	0.3659	0.3289
useful4	0.3402	0.3428	0.4217	<b>0.8273</b>	0.3422	0.3327
satis1	0.1545	0.2514	0.3470	0.3590	<b>0.7279</b>	0.3044
satis2	0.2947	0.3102	0.1980	0.1972	<b>0.6885</b>	0.1610
satis3	0.2973	0.3237	0.3239	0.3189	<b>0.8032</b>	0.2451
self1	0.1972	0.2528	0.4832	0.2803	0.2072	<b>0.7481</b>
self2	0.2855	0.3708	0.5578	0.3534	0.2810	<b>0.8819</b>
self3	0.3823	0.4068	0.6019	0.4558	0.3413	<b>0.8352</b>
self4	0.1535	0.2730	0.5451	0.2941	0.2155	<b>0.8093</b>
self5	0.3011	0.3839	0.5661	0.3412	0.3082	<b>0.8407</b>

Table 4 revealed that all items had higher loadings with their corresponding constructs in comparison to their cross-loadings. The result of the factor analysis confirmed the discriminant validity of the measures and their corresponding constructs. A similar pattern of high inter-construct correlations is observed in Table 5.

Table 5. Correlations

	CR	Infor.Q	Serv.Q	EOU	USE	Satis	Self
Infor.Q	0.8667	<b>0.684</b>					
Serv.Q	0.8727	0.604	<b>0.630</b>				
EOU	0.8581	0.395	0.467	<b>0.503</b>			
USE	0.8213	0.385	0.330	0.493	<b>0.537</b>		
Satis	0.7818	0.320	0.390	0.408	0.412	<b>0.545</b>	

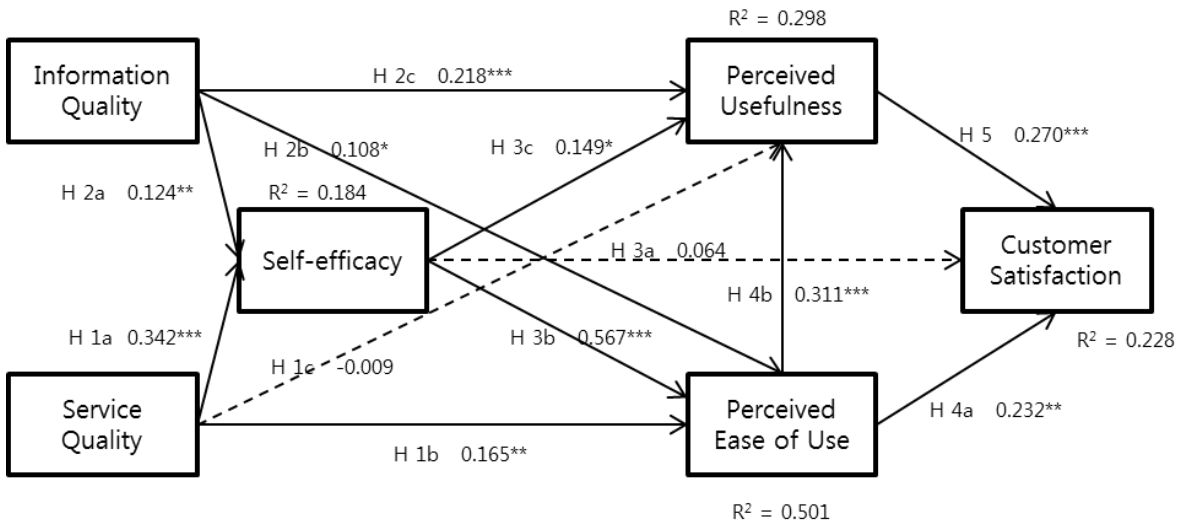
Self	0.9115	0.331	0.417	0.672	0.426	0.335	<b>0.672</b>
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All correlations are significant at the 0.01 level. AVE is shown on the diagonal elements. CR means composite reliability.

According to Fornell and Larcker (1981), AVE should be greater than the square of the correlations between constructs. As shown in Table 5, the values of the square of the correlations between the construct and any other construct in the model were all smaller than the AVE values, which indicated that discriminant validity was satisfied. In addition, as CR values were higher than 0.7, the convergent validity was satisfied.

**Hypothesis Testing**

Bootstrapping was employed to derive t-statistics in order to assess the significance level of the model's coefficients as well as to test the hypotheses (Turel et al., 2006). Sub-samples were generated, which is twice as high as the default resampling option of Visual PLS. Figure 5 presents the structural model.



\* p<0.1, \*\* p<0.05, \*\*\* p<0.01

Figure 4. PLS analysis for hypothesis test

As shown in Figure 4, ten hypotheses were supported (H1a, H1b, H2a, H2b, H2c, H3b, H3c, H4a, H4b, H5) and two hypotheses were rejected (H1c, H3a). The interpretation of such findings implies that the information quality had a significant positive effect on perceived ease of use and perceived usefulness. However, service quality significantly affected only perceived ease of use. Information quality and service quality positively and significantly influenced self-efficacy, respectively. In addition, self-efficacy had a significant positive effect on perceived usefulness and perceived ease of use. The results indicated that self-efficacy had an indirect influence on customer satisfaction via perceived usefulness and perceived ease of use. However, self-efficacy was not directly associated with customer satisfaction. In mature mobile service, self-efficacy is meaningless toward customer satisfaction, without relating them with the experienced quality of the mobile service.

As demonstrated in most studies on technology acceptance, perceived ease of use directly influenced perceived usefulness and customer satisfaction. Thus, mobile service providers need to form reasonable customer expectations which are aligned with the information quality and the quality for the service in order to foster customer satisfaction. This notion may be particularly important with regard to innovative mobile services. For example, in terms of newly launched mobile services, mobile service providers may be considered as a better solution of reporting problems with brief pictures of the actual service, rather than over characterization. Another example would be that with respect to using mobile service, it does not consider adjusting the difference in the use of mobile services platform and interfaces. In this case, customers will be able to reasonably a priori approximate the usefulness of using a service, and develop expectations which are aligned with the value of the service.

## **CONCLUSION AND FURTHER RESEARCH**

This study presents and validates a comprehensive model to explain and predict customer satisfaction with mobile service based on the ASCI and TAM. The findings of the study suggest that what factors affect customer satisfaction in mature mobile service. Perceived usefulness, perceived ease of use, self-efficacy and perceived quality were found to have a significant effect on customer satisfaction. In particular, in mature mobile service, self-efficacy indirectly affected customer satisfaction with the experienced quality of the mobile service. These results provide several important implications for practitioners.

Most Korean respondents, as shown in this survey, did not appear from the platform differences. Therefore, mobile service providers need to consider which customers will begin to use and get used to the mobile service. On the other hand, prior research indicates that those who have adopted the Internet and transaction-based service are much more willing to embrace mobile service. They may be inclined to continue using it and will begin to adopt other mobile services provided by the same company because of their habit or switching cost.

It is worth to note that the direct effect of perceived ease of use and indirect effect of self-efficacy on customer satisfaction are meaningful. These findings may occur as the result of the great popularity of mobile service usage and the relatively high user-perceived ease of use and self-efficacy towards the satisfaction of mature mobile service. The relatively young respondent sample could have contributed to this result due to their expertise toward IT devices. In this regard, this study has an important limitation and thus, any generalization of the findings should be implemented with caution. Therefore, further research should use larger data sets across a wider range of nations in order to generalize the results of this study.

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