

Influencing Factors on Consumers' Smartphone Adoption

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Abstract

The purpose of this study is to investigate the research model attempting to explain factors influencing consumers' attitude towards Smartphone adoption and behavioral intention to use a Smartphone. The 357 sets of data are tested against the model using SEM (structural equation model). The research results reveal that organizational and social influences, consumers' self-actualization, and trust affect consumers' attitude towards Smartphone adoption, and behavioral control influences behavioral intention. Implications of the findings suggest that Smartphone should be approached with a holistic view, suggesting that Smartphone research should emphasize Smartphone as a convergent device including both hardware and software with services and applications. Research results are discussed, and limitations of the current study and future research are presented.

Keywords : Technology Adoption, TPB (Theory of Planned Behavior), Self Actualization, Organizational Support, Social Influence, Trust, Behavioral Control

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1. Introduction

Mobile wireless technology (MWT) has been used widely, and mobile phones are getting fully integrated in many individuals and organizational user's lifestyle [Dohmen, 2009]. Smartphone as a new type of mobile device can be used both as a traditional mobile telephone and as a hand-held computer, enabling users to use ubiquitous computing capabilities [Verkasalo, 2010].

Due to the customized lifestyle applications of Smartphone [Verkasalo, 2010], Smartphone revived a stagnated mobile phone market with the Smartphone boom becoming a phenomenon.

International Data Corporation (IDC) reveals that the total amounts of Smartphone shipments worldwide during the fourth quarter of 2010 have reached 302.6 million units and have increased by 74.4% from the same period of 2009.

Moreover, in the IDC's press the outlook for 2011 was also very promising as the worldwide Smartphone market was expected to grow by 49.2% in 2011, as more consumers and enterprise users have changed their traditional mobile telephone for Smartphone with more advanced features [IDC, 2011].

Smartphone offers customized utilization to meet diverse customer needs with providing various applications [Dohmen, 2009], including job search, navigation, shopping guide, social networking platforms, social networking communication tools, online banking, or games, among others. Smartphone may drive the creation of new business models in various industries to serve the lifestyles of their customers and provide customer centric services, for example,

banking services with Smartphone application [Dohmen, 2009].

Compared with the worldwide situation, South Korea took the first big step towards becoming a Smartphone wonderland in 2010. The existing studies investigate issues related to Smartphone [Lugano, 2008; Gribbins, 2007], however the history of Smartphone is not long. The previous studies focus primarily on the future social change, economic effect of Smartphone, Smartphone operating systems, or applications, among others.

Although some research on consumers' adoption of Smartphone exists [Kim, 2009; Kuem, 2011; Park and Chen, 2007; Putzer and Park, 2010; Verkasalo, 2010], we cannot find enough studies investigating factors that influence consumer attitude and intention to use Smartphone [Kim et al., 2011]. As Smartphone studies are at an early stage, more contributions may be necessary to understand Smartphone consumers' attitude and behavior in-depth.

Recent Smartphone studies have paid much attention to the Smartphone's technological characteristics such as Dohmen [2009]'s research on Customer Process Centric Smartphone Application. Some studies have focused on examining the components that increase acceptance of Smartphone [Chen et al., 2009; Kamran and Kim, 2009]. The adoption of consumers' Smartphone as a technological device may be influenced by not only its technological characteristics, but also consumers' characteristics, for example the tendency towards perceived behavioral control, and social influences. In particular, the consumer who perceives himself/herself as a person with a low ability of behavioral control might not tend

to adopt Smartphone with various technological features.

In addition, Smartphone can make consumers tend to consult with their social network about the uncertainty, because Smartphone is a new information technology mobile device which creates uncertainty about individual's expected consequences [Lopez-Nicolas et al., 2008]. In this sense, focusing on Smartphone's technological features can cause a research gap. However, only few studies have dealt with factors involving consumer characteristics and social influences together, and their combined effect on the adoption of Smartphone.

Thus, this study investigates whether the consumers' characteristics, trust, and subjective norms affect consumers' attitude towards the Smartphone based on the Ajzen [1985]'s TPB (Theory of Planned Behavior), and this study looks at behavioral control's influence on behavioral intention to use a Smartphone.

Additionally, this paper examines the possible effect of attitude towards consumers' behavioral intention to adopt Smartphone.

2. Theoretical Background

2.1 TRA / TPB / TAM

TRA (Theory of Reasoned Action), TPB (Theory of Planned Behavior), and TAM (Technology Adoption Model) have been used to investigate the natures and determinants of consumers' Smartphone acceptance and adoption.

TPB (Theory of Planned Behavior) is an extension of TRA. TPB incorporates perceived be-

havioral control as an additional construct proposing that behavioral intention which is jointly influenced by attitude, subjective norms, and perceived behavioral control can explain an individual's behavior [Ajzen, 1985].

Attitude refers to an individual's positive or negative evaluation of the performance effect of a particular behavior [Ajzen, 1985]. Subjective norms can be defined as an individual's perceptions of other people's opinions about whether or not an individual should perform a particular behavior [Ajzen, 1985]. According to Ajzen [1985], perceived behavioral control involves perceptions of their ability to perform a given behavior.

Many studies investigating Smartphone adoption have used TAM (Technology Adoption Model) as an underlying theoretical framework [Kamran and Kim, 2009; Kim, 2009; Shin, 2010].

However, the current study tries to look at influencing factors that affect consumers' Smartphone adoption, and influencing factors include subjective norms such as organizational support and social influence, behavioral control, and consumers' characteristics.

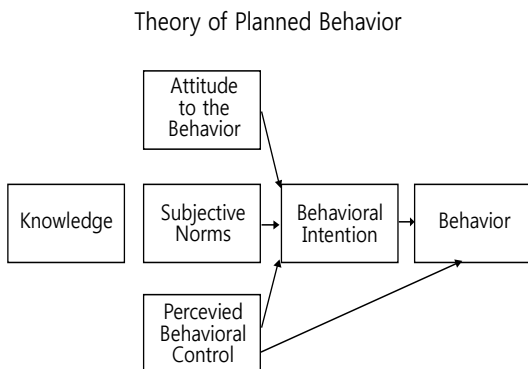
Taylor and Todd [1995] argue that decomposed TPB (decomposing the belief structures of TPB) has important factors including social influence, perceived ability and control, which are not incorporated into TAM. Additionally Verkasalo [2010] points out that as TAM is developed based on TRA, the role of control in TPB is not incorporated explicitly in TAM's theoretical development. As our study focuses on behavioral control and social influence, TAM may not work as an appropriate theoretical framework. Therefore, this study initially adopts

TPB as a theoretical framework.

According to Venkatesh and Davis [2000], behavioral intention is context sensitive because subjective norm in a mandatory usage context would show a different influence compared to voluntary contexts. Moreover, Liao et al. [2007] suggest the weak relationship between subjective norm and behavioral intention. Bhattacharjee [2000] also contends that the direct link between subjective norms or social norms and behavioral intention usually shows insignificant relationship.

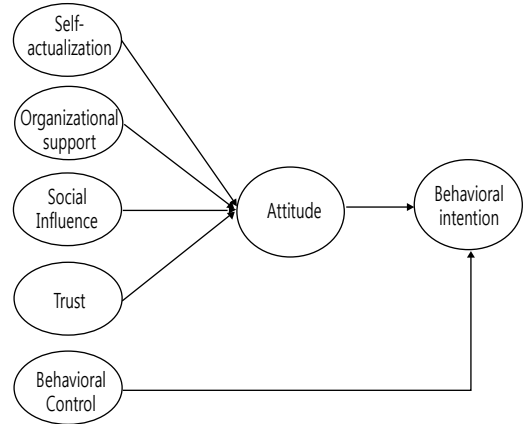
Putzer and Park [2010] demonstrate that internal and external organizational factors which could be included in subjective norms are significant predictors of attitude toward Smartphone.

Thus, our model revises the TPB model in that it links the social influence and organizational support to attitude. In other words, our model does not link social influence and organizational support to behavioral intention (TPB model), but links them to attitude (revised TPB model in this paper). The following figure 1 and 2 show the difference between TPB model and our proposed research model.



source: Ajzen, I.[1991], The Theory of Planned Behavior

<Figure 1> TPB Model



<Figure 2> Proposed Research Model

2.2 Self Actualization

Phang et al. [2006] indicate that self actualization refers to the intrinsic motivation to become everything that one is capable of becoming. Self actualization relates to achieving a sense of fulfillment of personal growth and personal potential. Higher motivation for self actualization could make people open to new experience and learn new ideas and skills [Heylighen, 1992; Phang et al., 2006]. Phang et al. [2006] find that senior citizen’s intention to use e-government information systems is not only driven by their perceived usefulness but also positively influenced by the self actualization. The self actualization has positive influence on the intention to accept the information technology [Phang et al., 2006].

Maslow [1954] states that technologies connecting individuals, colleagues, and organization groups hold great potential for learning, personal growth, and life improvement. Learning to use new Smartphone and its related applications such as GPS, App Store (software supply for

iPhone) could allow Smartphone users to share their information seek self development, and contribute to actualize the self.

For example, one of the most appealing applications of Smartphone seems to be game programs. The role playing games allow users to play roles of different alternative heroes through virtual world. The game players can thus fulfill the needs of self actualization [Wan and Chiou, 2006]. However, the relationship between self actualization and the adoption of Smartphone has not been examined.

This study suggests those new technologies and Smartphone applications present consumers an opportunity to communicate and explore more and more of the world in order to actualize the self. Hence, this study develops the following hypothesis;

Hypothesis 1 : Self-actualization positively affects the attitude towards adopting Smartphone.

2.3 Organizational Support

Iacovou et al. [1995] indicate that the organizational readiness to support its organizational members to adopt new technologies positively influences the adoption of technology. Moreover, in response to the 2010 Korea government report on promoting smart work, the Korea Telecom Corporation has been actively promoting innovative work style called smart work [Lee and Kwun, 2011].

Many organizations (e.g., IBM, KT, Siemens, Samsung) are trying to encourage their employ-

ees to implement the smart work application into Smartphone to achieve high flexibility and effectiveness of work [Lee and Kwon, 2011; Ye and Jin, 2011; Park, 2011]. Thus, organizational support may significantly affect individual employees' attitudes toward Smartphone adoption. Therefore, organizational support on consumer's attitude toward Smartphone adoption should be examined. Bhattacharjee [2000] indicates that much research finds that managerial support within organizations has been a significant determinant of organization members' IT adoption.

Kim [2008] emphasizes the role of organizational support by saying that without adequate funding, it is practically impossible for individuals, employees, or organizations to adopt and use new technologies. Company's willingness to provide funding is defined here as the degree to which a company believes that funding would enhance an individual's adoption of mobile wireless technology.

However and Kim [2008] also argues that individuals with a high economic status might not worry about costs making the funding unimportant in adopting a new technology. If individuals were familiar with an older technology, they would possibly resist the change to accept the new technology.

Organizations usually encourage staff to adopt and use new technologies by providing not only the funding but also the management support [Kim, 2008]. In terms of the management support, Leonard-Barton and Deschamps [1988] believe that immediate supervisors become important influencers of technology adoption, due to their position to evaluate employee performance.

Putzer and Park [2010] categorize organizational factors into internal and external organizational environments. The internal organizational environment includes support from senior management, the size of the organization, the quality of operation, and the user's involvement, while the external environment includes competitor pressure, the availability of external support, and current trends of Smartphone use.

Putzer and Park [2010] conclude that internal environment, especially management support facilitating the Smartphone adoption encourages positive attitudes toward Smartphone adoption among healthcare organization members. Chen et al. [2009] also state that the organizational factors could influence employees' attitude towards Smartphone adoption, thus this study develops the following hypothesis;

Hypothesis 2 : Organizational support has a positive effect on the attitude to adopt the Smartphone.

2.4 Social Influence

In the Unified Theory of Acceptance and Use of Technology (UTAUT) model indicate three direct determinants of intention to use (performance expectancy, effort expectancy, and social influence) and two direct determinants of actual use (intention and facilitating conditions) [Venkatesh et al., 2003]. Social influence among the three direct factors of behavioral intention to use technologies is recognized as an important factor [Bhattacharjee, 2000]. Social influence in-

cludes not only mass media reports and expert opinions (external factors) but also word of mouth from friends, colleagues, and superiors (interpersonal factors) [Bhattacharjee, 2000].

Verkasalo's [2010] defines social influence as the degree to which people have the impression that important others ensure they would better use a new system. We consider the interpersonal factors as social influencers in this paper because Smartphone is regarded as a new information technology mobile device which creates uncertainty about individual's expected consequences. Additionally, consumers tend to consult with their social network about this uncertainty rather than consulting the external factors such as media and expert opinions before making a decision to use Smartphone [Lopez-Nicolas et al., 2008].

Our study focuses on the interpersonal factor of social influence. An extensive research in social psychology regards social influence as an independent predictor of attitude [Lopez-Nicolas et al., 2008] and behavioral intention [Hong et al., 2008].

Lopez-Nicolas et al. [2008] show that social influence has a positive influence on the attitude towards mobile innovations. In the TPB model subjective norms influence behavioral intention directly.

However, Verkasalo [2010] suggests that the social norm influences intention to use a Smartphone indirectly through influencing the perceived enjoyment. Kim [2009] states that social influence could affect the intention to use a Smartphone via influencing the perceived usefulness. Shin [2010] also indicates that social in-

fluence has a positive influence on the attitude towards Smartphone adoption.

Thus, we revise the TPB model, and organizational support and social influences link to attitude rather than behavioral intention. Pavlou and Chai [2002] state that cultural differences are found to be a significant moderator in the proposed e-commerce adoption model. Kuem et al. [2011] explain the influence of Korean culture on technology adoption by saying once a technology gains in popularity, people in Korea will adopt it more quickly because they are more susceptible to the influence of social factors, such as significant others and social groups. Thus, this study establishes the following hypothesis;

Hypothesis 3 : Social influence has a positive effect on the attitude towards adopting Smartphone.

2.5 Trust

Trust refers to a positive belief about the perceived reliability of, dependability of, and confidence in a person, object, or process [Rotter, 1980; Rempel et al., 1985; Fogg and Tseng, 1999]. Smartphone's mobile services, such as Internet, mobile banking, and online purchase, are attracting consumers and organizational users [Hassinen et al., 2007]. Therefore, it is necessary to account for the perceived trust as the important component affecting attitude toward Smartphone adoption. According to Wu and Chen [2005], trust can be perceived as a common predictor of attitude, perceived behav-

ioral control, and subjective norm in TPB.

Davis et al. [1989] argue that trust could directly influence people's attitude toward behavioral intention within the cost benefit framework. In other words, people will calculate the cost of risk and benefit of trust, and the result of the calculation may affect their attitude towards behavioral intention. Wu and Chen [2005] show that trust is a salient antecedent of attitude toward on-line services.

Regarding the Internet use, the level of user's trust in the Internet [Gefen et al., 2003; Keat and Mohan, 2004; Ruppel et al., 2003] is one of the factors affecting the willingness to use the system [Nandy and Vaidya, 2005]. Heijden et al. [2003] observe that potential online shopper's perceived trust influences directly the attitude towards purchasing online. It appears that attitude and perceived trust affect purchase intention of mobile coupons, one of the Smartphone's mobile services [Jayasingh and Eze, 2009].

So far the perceived trust has only been applied in Lee et al. [2010] Smartphone adoption research. It is necessary to study the effect of perceived trust on the Smart phone adoption; therefore this study establishes the following hypothesis;

Hypothesis 4 : Perceived trust has a positive effect on the attitude towards adopting Smartphone.

2.6 Behavioral control

Ajzen [1991] views perceived behavioral con-

trol as an important variable of TPB (Theory of Planned Behavior), and assumes that the perceived behavioral control could reflect people's perception of ease or difficulty towards carrying out the behavior of interest. The behavioral control concerns the beliefs about the presence of control factors that may promote or obstruct the engagement in the behavior. As a result, control beliefs pertaining to knowledge, resources, and opportunities are the underlying determinants of perceived behavioral control [Ajzen, 1991].

Various researchers in many fields demonstrate that the perceived control influences the behavioral intention [Ajzen, 1991; Bhattacharjee, 2000]. Nysveen et al. [2005] indicate that behavioral control has a positive relation with the intention to use goal directed services (e.g., text messaging and payment) rather than experiential services (contact and gaming). Khalifa and Cheng [2002] argue that if the individual's perceived behavioral control improved, exposure to mobile commerce would affect behavioral intention formation indirectly.

On the contrary, Pedersen [2005] finds that the behavioral control does not have a significant influence on people's intention to adopt a mobile parking service. These inconsistencies reveal the need for further research into the effect of behavioral control on the adoption of Smartphone and advanced mobile services [Verkasla, 2010].

Based on this literature review, this study assumes that the Smartphone users have constant human cognitive resources available to process the information about the adoption of a Smartphone. Therefore, the following hypothesis can

be proposed:

Hypothesis 5 : A user's behavioral control to use Smartphone positively influences behavior intention towards adopting Smartphone.

2.7 Attitude and Behavioral Intention

Regarding the construct of attitude, Fishbein and Ajzen [1975] suggest that attitude is a learned tendency of human beings based on which a person would respond to an object or an opinion. Kotler [2000] claims that an attitude reflects a person's sustained favorable or unfavorable evaluations, emotional feelings and action tendencies toward some object or idea. Ajzen [1991] believes that an individual with positive attitude towards a behavior could possibly develop an intention to implement the behavior.

Attitude is an important construct for models related to technology adoption and information systems. Numerous studies have showed that user's attitude towards the adoption of a mobile phone and its services positively influences their intention to adopt the mobile phone and its services [Hong et al., 2008; Lopez-Nicolas et al., 2008].

Smartphone research has used attitude as a mediating variable [Chen et al., 2009; Kim, 2008]. This study proposes the following hypothesis:

Hypothesis 6 : User attitudes positively influence the user's behavioral intention to adopt the Smartphone.

3. Research Methodology

The empirical model of this research examines whether characteristics of consumer, trust, and social norms affect consumers' attitude towards Smartphone purchase as well as behavioral intention indirectly via attitudes, and whether behavioral control influences behavioral intention.

In order to be suitable for the research, we performed the pretest and focus group interview with 7 graduate students. The focus group interview was designed to check whether survey questionnaire items were appropriate and easy to respond.

We borrowed question items (as measurement of variables in our proposed model) used in existing studies. Some minor wording changes

were made to fit the Smartphone context. The operational definition of each variable in the research model is presented in <Table 1>.

The questionnaire survey was administered from February 21st to March 21st in 2011. We distributed our questionnaires to 500 consumers living in Seoul, and used the convenient sample. 463 questionnaires were returned and 92.6% of response rate was confirmed. 357 out of 463 responses were valid for the analysis. The average age of group was between 20 and 30 years of age. 53.5% (n = 191) of the respondents were male and 46.5%(n = 166) were female. Demographic features of the respondents are shown in <Table 2>.

Participants rated self actualization, behavioral control, social influence, organizational support, trust, attitude, and behavioral intention on a seven point Likert scale ranging from (1)

<Table 1> Operational Constructs

Variable and operational the definition	Reference
Self Actualization The new technologies, which are related to Smartphones, present people an opportunity to increasingly communicate and explore the world, contributing to actualize the self	[Phang et al., 2006]
Organizational support Organizations usually encourage staffs to adopt and use Smartphones by providing not only funding assistance, but also management support	[Iacovou et al., 1995]
Social Influence The degree to which individuals believe that others thought they should use Smartphone	[Venkatesh et al., 2003]
Trust Positive belief about the perceived reliability of, dependability of, and confidence in using a Smartphone	[Rotter, 1980]
Behavioral Control Constant human cognitive resources available for the information processing about the adoption of a Smartphone. They act to control the effect of behavior on the perception to Smartphone.	[Ajzen, 1991]
Attitude A person's sustained favorable or unfavorable evaluations, emotional feelings and action tendencies towards some object or idea.	[Ajzen, 1985]
Behavioral Intention The degree to which individuals would like to use and adopt the Smartphone in the future	[Ajzen, 1991]

〈Table 2〉 Demographic Characteristics

Demographic Categories	Frequency	Percentage(%)
Gender		
Male	191	53.5
Female	166	46.5
Age (years)		
20~29	233	65.3
30~39	97	27.2
40~49	14	3.9
50 +	13	3.6
Educational level		
Graduate high school or less	36	10.1
College/University	258	72.3
Post-graduate study	63	17.6
Occupation (27% student vs 73% non-student)		
Office worker	165	46.2
Production worker	3	0.9
Student	95	27
Public official	8	2.2
Specialized job	39	10.5
Private business	6	1.7
Others	41	11.5
Company funding to Smartphone		
YES	43	12.0
NO	253	70.9
Department funding	57	16.0
Ready for support	4	1.1
Smartphone's attractive service		
Official or business	7	2.1
Private	251	70.2
Both official and private	99	27.7

strongly disagree to (7) strongly agree. To test the reliability, Cronbach's alpha value was used. The acceptance value of Cronbach's alpha value is over 0.7 [Kim, 2008]. 〈Table 3〉 shows the results of the reliability analysis with the Cronbach's alpha ranging from .713 to .932 across all measures which is within the acceptable range.

Exploratory factor analyses were conducted within each of the variables in order to explore the structure of the data and construct new representative variables. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy KMO = .940 and Bartlett's Test of ($\chi^2 = 13,070$, $df = 990$, $p < .001$) confirmed that factor analysis was

〈Table 3〉 Measurement and Cronbach's Alpha Value

Construct	Measurement		Cronbach's alpha
Self Actualization	SA1	Personal growth	.926
	SA2	Personal development	
	SA3	Self development	
	SA4	Person achievement improvement	
	SA5	Value realization	
Organization Support	OI1	Purchase cost support	.884
	OI2	Adoption ratio according to the organizational size	
	OI3	Work efficiency improvement	
	OI4	Business participation is improved	
	OI5	Dedicated application whether need or not the availability	
	OI6	Application demands the skill as it is high.	
	OI7	Usability change according to the business Organization form	
Social Influence	SI1	Social recognition effect	.873
	SI2	Surrounding peoples' right-foot shoot	
	SI3	Social accounting effect	
	SI4	Effect of the fashion	
Trust	Trust1	Provided advertisement content	.713
	Trust3	Information confidence	
	Trust4	Head of the department of information and falsehood	
Behavioral Control	BC1	Necessary knowledge and capability holding	.883
	BC2	Capability to be used well enough	
	BC3	Effective use	
Attitude	ATT1	Smart phone performance and contents satisfaction	.858
	ATT2	Smart phone service satisfaction	
	ATT3	Enjoyment of the use of the Smart phone	
	ATT4*	Overall quality of the use of the Smart phone	
	ATT5*	Use of Smart phone choice wise	
Behavioral Intention	BI1	Extent that the Smart phone is needed to oneself	.932
	BI2	Smart phone adoption intention	
	BI3	Positive invitation about the Smart phone adoption	
	BI4	Smart phone adoption recommendation	
	BI5	Smart phone adoption	

Note) * : The deleted items after factor analysis.

appropriate. The results of the factor analysis are presented in <Table 4>. However, we deleted two attitude factors which related to behavioral intention factors.

Additionally, we conducted Confirmatory Factor Analysis (CFA) with AMOS 18.0 to test for convergent factor validity of the conceptual model. The initial confirmatory factor analysis

<Table 4> The Exploratory Factor Analysis

	Factor						
	1	2	3	4	5	6	7
bi4	.824	.228	.106	.158	.114	.139	.034
bi5	.788	.160	.096	.199	.205	-.068	.150
bi3	.777	.256	.133	.105	.187	.110	.139
bi2	.776	.232	.108	.169	.180	-.046	.217
bi1	.772	.172	.217	.085	.225	.088	.167
att5	.671	.166	.189	.136	.047	.325	.198
att4	.616	.065	.242	.185	.066	.302	.152
org5	.135	.756	.124	.122	.082	.067	.190
org7	.068	.723	.137	.090	.101	-.016	.137
org4	.173	.713	.233	.155	.046	.231	.000
org3	.274	.712	.179	.008	.144	.247	.060
org6	.205	.703	.170	.173	-.061	-.112	.099
org2	.136	.702	.078	.211	.132	.023	-.020
org1	.240	.619	.109	.178	.271	-.057	.165
act4	.115	.193	.851	.072	.105	.113	.137
act3	.154	.178	.848	.087	.089	.120	.044
act2	.186	.166	.838	.071	.122	.074	.101
act5	.118	.096	.811	.136	.024	.207	.054
act1	.193	.239	.766	.065	.175	.033	.145
social2	.111	.122	.098	.857	-.018	.112	.071
social3	.172	.216	.144	.816	.078	.148	.012
social4	.218	.142	.057	.787	.076	.170	-.007
social1	.221	.329	.101	.696	.073	-.049	.166
bc1	.163	.138	.165	.015	.845	.048	.161
bc2	.262	.125	.091	.095	.839	.028	.110
bc3	.259	.189	.169	.060	.786	.115	.135
trust4	.118	-.086	.136	.071	.048	.781	.008
trust1	.094	.135	.089	.145	-.027	.743	.121
trust3	.181	.160	.272	.133	.223	.605	.191
att1	.247	.171	.151	.042	.197	.104	.807
att2	.291	.154	.225	.078	.193	.143	.769
att3	.453	.235	.108	.132	.117	.152	.620

revealed that the model fit the data reasonably well. The examination of the standardized path coefficients summarized in <Table 5> indicate that all factor loadings show over 0.5, which indicates good convergent factor validity. The average variance extracted (AVE) scores (shown in <Table 5>) of five constructs out of seven construct were higher than 0.5, which presents

good convergent and discriminant validity [Gefen et al., 2000]. The AVE and correlation analyses (in <Table 6>) indicate that discriminant validity is reasonably acceptable, though they are not perfectly satisfactory.

SPSS 18.0 and AMOS 18.0 were used to conduct the analyses. The Structural Equation Model(SEM) tests simultaneously an entire sys-

<Table 5> Factor Loading and AVE value

Construct	Items	S.E	C.R	P value	Standardized β	AVE
self actualization	S.A.1			***	.952	.767
	S.A.2	.060	14.463	***	.824	
	S.A.3	.066	14.070	***	.884	
	S.A.4	.069	14.100	***	.914	
	S.A.5	.069	12.554	***	.798	
organizational support	O.I.1			***	.715	.506
	O.I.2	.071	13.468	***	.675	
	O.I.3	.091	12.684	***	.754	
	O.I.4	.099	11.476	***	.768	
	O.I.5	.086	12.588	***	.743	
	O.I.6	.075	11.178	***	.662	
	O.I.7	.079	11.248	***	.654	
social influence	S.I.1			***	1.121	.875
	S.I.2	.080	8.568	***	.755	
	S.I.3	.082	10.757	***	.977	
	S.I.4	.093	9.067	***	.849	
Trust	Trust4			***	.396	.412
	Trust3	.404	5.181	***	.898	
	Trust1	.244	4.970	***	.524	
Behavioral control	B.C.3			***	.893	.645
	B.C.2	.070	11.696	***	.741	
	B.C.1	.080	11.307	***	.769	
Attitude	Att.1			***	.635	.452
	Att.2	.071	14.283	***	.667	
	Att.3	.094	11.843	***	.714	
Behavioral Intention	B.I.1			***	.892	.736
	B.I.2	.045	20.776	***	.906	
	B.I.3	.050	18.474	***	.859	
	B.I.4	.054	15.305	***	.772	
	B.I.5	.055	17.183	***	.857	

〈Table 6〉 Inter Correlation Analysis

	1	2	3	4	5	6	7
self actualization	1						
organizational support	.456**	1					
social influence	.312**	.470**	1				
Trust	.395**	.269**	.324**	1			
Behavioral control	.361**	.398**	.243**	.254**	1		
Attitude	.482**	.505**	.410**	.448**	.491**	1	
Behavioral intention	.408**	.520**	.442**	.342**	.502**	.710**	1

Note : * $p < .05$, ** $< .01$ (two-tailed).

〈Table 7〉 Research Model Fit

	CFI	TLI	GFI	AGFI	$\chi^2/\text{d.f}$	RMSEA	SRMR
Research Model	0.965	0.954	0.900	0.859	1.759	0.046	0.0481
Recommended Value	≥ 0.9	≥ 0.9	≥ 0.9	≥ 0.8	≤ 3.0	≤ 0.10	≤ 0.05

tem of variables in a hypothesized model and enables the assessment of the extent to which the model is consistent with the data [Bentler 1990] to demonstrate a reasonable goodness of model fit.

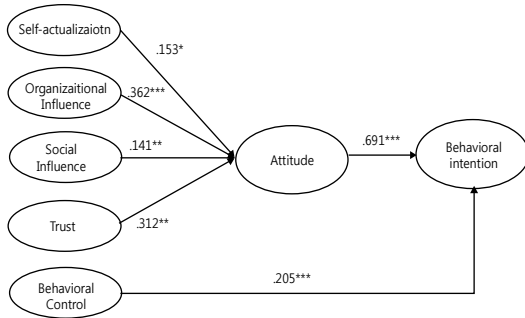
Several fit indices were computed; including Comparative Fit Index (CFI), Goodness of fit Index (GFI), Adjusted Goodness of fit Index (AGFI), Chi-square/degrees of freedom, and Root Mean Square of Approximation (RMSEA). Regarding χ^2/df values, smaller than 5 indicates an acceptable fit [Carmines and McIver, 1981] and smaller than 2 indicates an excellent fit. Hu and Bentler [1999] suggest a two index presentation format including the SRMR and the TLI. A reasonable model fit is indicated when $\text{GFI} > .90$, $\text{CFI} > .90$ and $\text{SRMR} < .10$ [Kline, 2005]. RMSEA is around .08 [Dholakia and Bagozzi, 2002], and AGFI is greater than 0.8.

Our research model fit the data well with the values of all indices falling within a reasonable range; $\text{CFI} = 0.942$, $\text{TLI} = 0.931$, $\text{GFI} = 0.836$, $\text{AGFI} = 0.798$, $\chi^2/\text{d.f} = 1.881$, $\text{RMSEA} = 0.050$, $\text{SRMR} = 0.0542$. The inter correlation analysis was also performed to check correlation. it had the meaningful relation as the 〈Table 6〉 demonstrates.

4. Results and Discussion

In order to verify the hypotheses of the proposed research model, we examined the structural paths between the measured variables. This model estimated the regression paths from self actualization, organizational support, social influence and trust to attitude. The regression path from attitude to behavioral intention was also estimated.

In addition, we tested direct relationships between behavioral control and behavioral intention. The hypothesized structural model provided a good fit to the data in our sample.



<Figure 3> Result of Research Model

<Figure 3> summarizes the results concerning the structural paths between each construct. The results of this study showed that all six hypotheses were supported.

The first hypothesis proposed that a higher self-actualization would increase the possibility of using the Smartphone by improving the attitude towards using a Smartphone ($\beta = .204$, $p < .05$). This hypothesis was supported. No Smartphone studies have investigated the influence of self-actualization. As portable devices similar to computers, Smartphone is a vehicle for using various application services.

The result is consistent with Lopez-Nicolas et al. [2008] study, which suggests that mobile services cannot be regarded as standardized services; instead, customized mobile services should be emphasized. This point can be highlighted in the case of Smartphone due to its advanced technology based services, such as GPS portable Internet access and applications controlled by users.

Additionally and Dohmen [2009] argues that it could be very difficult to add emotional value which elicits emotions for users to bank services, but could be provided by offering the Smartphone applications as a new lifestyle product for the bank's customers. To some extent, the emotional value may relate to self-actualization, since interest, one function of discrete emotions, has interrelationship with competence, self-actualization and relatedness [Izard and Ackerman, 1997].

The accepted first hypothesis possibly implies that consumers may perceive that Smartphone has potential of learning, personal growth and life improvement [Maslow, 1954], which are kernels of self-actualization. In this case, Smartphone services and applications might be more important than a Smartphone as hardware. Therefore, Smartphones should be approached with a holistic view, suggesting that Smartphone research should emphasize Smartphone as a convergent device including both hardware and software with services and applications.

The second and third hypotheses discuss the relationship between social influence and organizational supports, and consumer attitudes towards Smartphone adoption.

Regarding the hypothesis three, the organizational support affected the attitude toward a Smartphone adoption ($\beta = .266$, $p < .001$), which supported the hypothesis. This result corresponds to the result of Chen et al. [2009] study.

The social influence has a significant positive effect on the attitude toward adopting a Smartphone ($\beta = .145$, $p < .05$), thus supporting hypothesis 3. Social influence does not show the

predictive power as an independent variable influencing behavioral intention in Verkasalo's [2010] study, which concludes that social norms need further examination.

Therefore, our study contributes to Smartphone research by investigating social influence and organizational support which will be further discussed in the Conclusion section.

The analysis results provided support to the fourth hypothesis, which proposed that trust influences consumers' attitude towards Smartphone adoption ($\beta = .355$, $p < .001$).

Hypothesis fifth looking at the relationship between user's behavioral control and behavioral intention to use a Smartphone showed that behavioral control significantly affected behavioral intention ($\beta = .191$, $p < .001$). Thus, the fifth hypothesis was also supported.

Finally the attitude towards a Smartphone was shown to positively influence the behavioral intention to use a Smartphone [$\beta = .710$, $p < .001$], which supported the hypothesis 6. This result is consistent with previous studies [Chen et al., 2009; Kim, 2008].

5. Conclusion, Limitations and Further Studies

As Smartphone is a relatively new technology [Chen et al., 2009] and Smartphone studies are at an infant stage, more studies with various variables and hypotheses may be expected. This study examined factors affecting consumers' attitudes towards Smartphone adoption and behavioral intention to use Smartphones.

The results of the current study supported the

premise that consumers' attitude towards Smartphone adoption leads to behavioral intention and that consumers' characteristics and social influence and organizational support may be important factors influencing the consumers' attitudes. We tried a novel approach to study consumers' Smartphone adoption by using revised TPB model.

The first contribution of this study is that we can show the importance of social influence and organizational support related to consumers' attitudes. Previous studies have looked at the influence of subjective norms or social influence on mediating variables, such as perceived usefulness in TAM [Verkasalo, 2010] or focused on the organizational support only [Chen et al., 2009; Putzer and Park, 2010].

However, very few studies have investigated both social influence and organizational support together. Organizations tend to support their members' Smartphone use because Smartphones enable organizational members to communicate efficiently and build a work-network [Lee and Kwon, 2011; Lee, 2011; Park, 2011].

Additionally, the collective culture, like Korea [Park, 2003], may be more susceptible to social influence on Smartphone adoption compared to the individual culture. Thus, differences between an organizational context and a social context in terms of organizational and social influence should be emphasized. Further comparative studies addressing how cultural differences shape the factors that influence Smartphone adoption may be needed to investigate the relationship between cultures and social influences.

Regarding organizational support, further stud-

ies looking at the utility of Smartphones in various kinds of occupations and functions may be interesting. Additionally, further research on how Smartphones change work environments and work styles might more profoundly elucidate organizational roles, functions, and potential of Smartphones.

Next, the current study suggests a direct influence of behavioral control on behavioral intention to use a Smartphone. Smartphones can be distinguished from traditional mobile phones in that consumers need to have resources and knowledge about obtaining applications and using them efficiently and effectively. Otherwise, Smartphones may be used as another type of luxury mobile phone.

In particular, in terms of organizational use, organizations may provide technical supports, but people with less behavioral control to use Smartphones may feel excluded by organizational communities and work-network. In this case, behavioral control may be an important determinant of whether or not to advocate organizations' support for Smartphones. Behavioral control, therefore, can be regarded as an important construct in Smartphone adoption.

In the case of the Korean Internet environment, Korean consumers in general evaluate themselves as IT and Internet savvy computer users, as South Korea ranks first among OECD countries for mobile broadband adoption on a per capita basis, and fixed (DSL or cable) broadband on a per household basis [FCC, 2011].

However, behavioral control still affects Korean consumers' behavioral intention, which can be an important finding. In other words,

Smartphone adoption can be a challenge even for IT and Internet savvy consumers. Managerial implications may include that Smartphone providers should provide not only technical hardware support, but also information on how to obtain and use services and applications.

The current study has some limitations that should be noted. A self-reporting bias in surveys is quite common, and it could have affected the results of this study. Finally, most participants (87.4%) in this study were 20 to 39 years old. Early technology adopters and people with behavioral control are likely to fall in a 20-39-years-old age group. However, many organization members are over 40; therefore, the findings in this study cannot be generalized to other populations.

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