

Roles of User Resistance and Social Influence in Continued Use of Smartphone

Saesol Choi *, Jaeheung Yoo**

* Electronics and Telecommunications Research Institute (ETRI), South Korea

**Software Policy Research Institute (SPRI), South Korea

saesol.choi@etri.re.kr , jayoo@spri.kr (corresponding author)

Abstract— Resistance is considered to be a primary factor that prevents users from adopting innovative systems. However, few studies have examined the existence of user resistance and its impact on user's behavior in the post-adoption stage and in the voluntary use context.

In this study, we propose an integrative model that explains users' continued use of an innovative system (smartphone) by incorporating user resistance and social influence (subjective norm) on the basis of an expectation confirmation model. We conducted an empirical study with 210 smartphone users in Korea using Structural Equation Model (SEM). The results show the significant roles of user resistance and social influence on continuance of smartphone use. This finding contributes to understanding the relationship between user resistance and social influences and how their interactions eventually affect the continued use of innovative systems.

Keywords—User resistance, Expectation confirmation model, Social influence, Continuance, Smartphone

I. INTRODUCTION

Resistance is considered to be a primary factor that prevents users from adopting innovative systems [14]. Previous studies concentrate the inhibiting role of user resistance on the successful implementation of new information systems in organizations [10] [11]. In general, user resistance is not significantly considered, because it is believed that adoption results from the resolution of user resistance.

However, resistance exists across the lifecycle of a new product or innovation and that non-adoption is one way for users to express their resistance [23]. Although individuals may adopt an innovative service or product through their own free will, their resistance can still exist and potentially influence continued use [24].

The resistance tends to be revealed during the actual use of a system or product, and the changed level of user resistance determines switching behavior or discontinuance of use. Therefore, it is necessary to understand the influence of user resistance for innovative system after initial adoption.

In this study, we proposed an integrative model that combines user resistance into expectation conformation model

(ECM) to understand the role of user resistance on the sustainable use of an innovative system [2]. We conducted an empirical test with Smartphone users in Korea. The Smartphone is considered to be an innovative IT artifact equipped with distinguished features from existing alternative, feature phones. Thus, the Smartphone is an appropriate example for this study in that it has innovative characteristics. The results of this study would contribute to understanding the relationship between user resistance and social influences and how their interactions eventually affect the continued use of innovative systems after initial adoption.

II. THEORETICAL BACKGROUND AND HYPOTHESES

A. Expectation Confirmation Model(ECM)

The expectation (dis)confirmation model (ECM) proposed by Bhattacharjee has been popularly adopted as a basis for extended models explaining the continued use of IS (Information Systems)[2]. The ECM proposes five hypotheses. First, a user's satisfaction has a positive influence on his/her intention of continuous usage of an IS. Next, a user's level of confirmation and perceived usefulness are two key determinants of satisfaction. Third, the perceived usefulness (PU) is a salient factor for user satisfaction and continuance intention. Finally, the confirmation resulting from the usage experience is hypothesized to positively affect perceived usefulness. This path reflects an individual's desire to avoid cognitive dissonance.

We hypothesize that significant effects of all paths in the ECM would be observed in this study. The relative advantages of smartphones compared to existing feature-phones will directly affect a user's continuance intention. Satisfaction is also a salient factor of continued behavior. The confirmation positively influences post-adoption beliefs, such as perceived relative advantages and satisfaction. Bhattacharjee explains the causal relationships between confirmation and other post-adoption beliefs with cognitive dissonance theory. According to the cognitive dissonance theory, a user adjusts the level of a post-adoption belief in order to resolve cognitive dissonance formed after actual use. This cognitive adjusting process occurs particularly when a user's initial expectation of the performance of a new system is not concrete, because he/she

is not sure what to expect from the usage of an IS[2][19]. Hence, we adopted the following hypotheses:

- ✓ H1: Confirmation will positively influence the perceived benefits of Smartphones
- ✓ H2: Confirmation will positively influence satisfaction
- ✓ H3: Perceived relative advantages of Smartphones will positively influence satisfaction
- ✓ H4: Perceived relative advantages of Smartphones will positively influence the intention to continue use
- H5: Satisfaction will positively influence the intention to continue use of Smartphones

B. Extending the ECM with User Resistance

User resistance has been defined resistance as opposition by a user to change associated with a new IS implementation. Other studies explain user resistance as a psychological response to maintain the status quo in the face of pressure to adopt a subsequent status quo. In accordance, user resistance can be defined as either the psychological state or behaviors opposing innovations.

User resistance can be reduced by confirming positive performance and advantages of an innovation, which eliminates uncertainty and potential risk involved in using the innovation[6][15]. According to Rogers'(1995) diffusion of innovation theory, a user is likely to adopt innovations when the user's uncertainty in relative advantages of innovation, complexity, compatibility, observability, and trialability are resolved[25].

In contrast, resistance can be amplified if fears or worries are realized during actual use[27]. Therefore, post-adoption beliefs such as perceived relative advantages, confirmation, and satisfaction in this study will affect user resistance. Thus, we suggest the following hypotheses:

- ✓ H6: Confirmation will negatively affect user resistance
- ✓ H7: Perceived relative advantages of Smartphone will negatively affect user resistance
- ✓ H8: Satisfaction will negatively affect user resistances
- ✓ H9: User resistance will negatively affect the intention to continue use of Smartphones

C. Role of Social Influence

According to the theory of planned behavior, subjective norms are an external factor that directly affects a user's intention[18]. Though the influence of subjective norms tends to attenuate across time, researchers found that it significantly influences a user's intention to use in the early stage of diffusion[28]. Furthermore, its effect appears when the system is based on social connections or network effects such as communication systems. In addition, social identity theory explains that subjective norms influence a user's behaviors because individuals have a general tendency to comply with the normative values of society to secure their identity in the

society or to build a positive social image[26]. Thus, we suggest the following hypothesis:

- ✓ H10: Subjective norms positively affect a user's intention to continue use

On the other hand, a subjective norm can increase user resistance. A subjective norm is generally defined as the perceived social pressure to perform or not to perform a behavior[18]. Although a subjective norm can be separated into informational and normative influences, typical applications of TPB regard subjective norms as including only the normative influence. The psychological burden or implicit and explicit pressure from a subjective norm often conflict with the user's free will to choose alternative behaviors, which in turn raises psychological or behavioral resistance[4]. As a result, the following hypothesis is proposed:

- ✓ H11: subjective norm can increase user's resistance

Figure 1 illustrates the proposed model of this study.

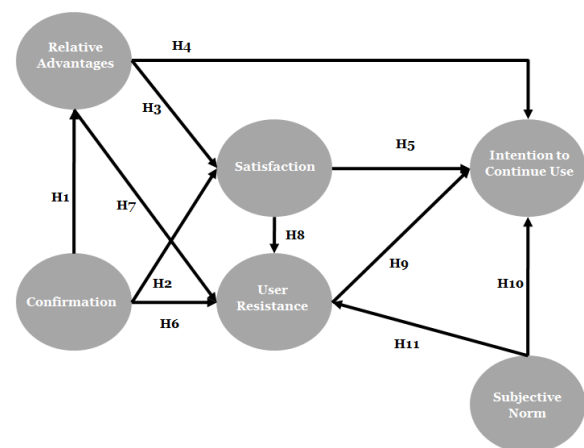


Figure 1. Proposed Research Model

III. RESEARCH METHOD

In order to test the proposed model, an online survey was conducted with a professional survey agency that has the largest panel in Korea. The survey continued for one week in January 2011, and a total of 210 usable samples were collected. Among respondents, 67.6% are male, and 32.4% are female, and the average age is 30.9.

Our research model consists of constructs including four ECM related constructs, user resistance, and subjective norms. We selected measurement items from previous research studies, and adapted them to the context of our study. All items were measured on 7-point Likert scales ranging from 1 (strongly disagree) to 7 (strongly agree). Table 2 summarizes the operational definition of each construct in the research model.

TABLE 1. OPERATIONAL DEFINITION OF CONSTRUCTS

Construct	Operational definition	Ref.
Relative Advantages (RA)	The degree to which a user perceives that using a Smartphone results in more benefits than its precursor (feature phone) does	[20][25]
Confirmation (CF)	User's perception of the congruence between the expectations of Smartphone use and its actual performance	[2]
Satisfaction (SAT)	User's positive affective state resulting from Smartphone use	[2][16]
Intention to Continue Use (INT)	User's intention to continue using Smartphones	[2]
User Resistance (UR)	User's negative cognition and opposition to Smartphone use	[5][11] [13][21]
Subjective Norms (SN)	User's perception that most people who are important to him think he should or should not perform the behavior in question	[7][28]

IV. ANALYSIS RESULTS

In order to check the reliability and validity of our measurement model, we conducted a confirmatory factor analysis (CFA). First, the reliability of each construct was verified with composite reliability (CR) and Cronbach's alpha. For each construct, if the CR or Cronbach's alpha is higher than 0.7, reliability is considered to be acceptable[8]. As shown in Table 2, all constructs satisfied these criteria.

To test convergent validity, we assessed the T-statistic of outer model loadings of each construct. For convergent validity, the value should be above 1.96[9]. In our model, the minimum value was 17.001, satisfying the requirement for convergent validity.

Discriminant validity can be tested using cross-loadings of each indicator and the square root of the average variance extracted (AVE) of each latent variable. For the measurement model to have discriminant validity, the item loadings belonging to a construct should be higher than the correlations between the construct and other items, and the square root of AVE of a construct should be higher than the correlations between the construct and all the other constructs (see Table 3). The results support the discriminant validity of this measurement model.

TABLE 2. INDICATORS AND CONSTRUCT RELIABILITY

Construct	MEAN	S.D.	CR	Cronbach's α	AVE
CF	5.152	1.118	0.963	0.942	0.896
INT	5.201	1.152	0.872	0.708	0.773
RA	5.628	1.057	0.935	0.895	0.827

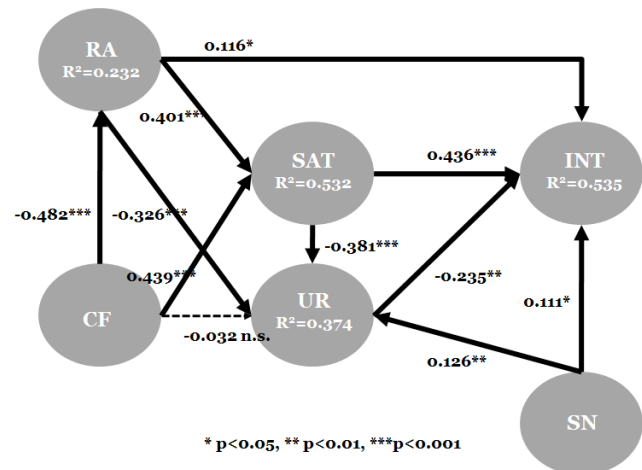
UR	2.726	1.183	0.947	0.914	0.855
SAT	5.277	1.113	0.956	0.907	0.915
SN	4.270	1.517	0.981	0.962	0.963

TABLE 3. CORRELATIONS OF LATENT VARIABLES

	CF	INT	RA	IR	SAT	SN
CF	0.947					
INT	0.520	0.879				
RA	0.482	0.541	0.909			
UR	-0.384	-0.551	-0.540	0.925		
SAT	0.533	0.587	0.612	-0.541	0.957	
SN	0.364	0.388	0.281	-0.159	0.476	0.981

Note : Values on the diagonal are the square root of the average variance extracted (AVE) for each construct.

Figure 2 shows the results of all hypotheses proposed in this study.

**Figure 2.** The result of Hypotheses Testing

First, all hypotheses in the ECM were significant. There is a significant relationship between confirmation and perceived relative advantages ($t=8.492$, $p < 0.001$). Hence, H1 was supported. H2, which suggested a positive relationship between confirmation and satisfaction, was supported ($t=5.877$, $p < 0.001$). H3 claims that perceived relative advantages will have a positive effect on satisfaction. Perceived relative advantages were positively and significantly related to satisfaction ($t=5.912$, $p < 0.001$). Thus, H3 was supported. H4, which posited that perceived relative advantages have a positive effect on intention of continuance, was supported ($t=1.656$, $p < 0.05$). In support of H5, the path from satisfaction to intention of continuance was significant ($t=5.715$, $p < 0.001$).

Next, the results of hypotheses corresponding to user resistance are follows. First, no significant relationship between confirmation and user resistance ($t=0.454$) was found.

Thus, H6 was not supported. H7 to H9 focused on negative relationships between: perceived relative advantages and innovation resistance; satisfaction and user resistance; and innovation resistance and intention of continuance. All three hypotheses were supported (H7: $t=5.730$, $p<0.001$; H8: $t=6.357$, $p<0.001$; H9: $t=2.836$, $p<0.01$).

Finally, the results of hypotheses related to subjective norms were as follows; subjective norms positively influence the intention of continuance ($t=2.232$, $p<0.05$), thus H10 was supported. Also, we confirmed the positive influence of subjective norms on user resistance, so H11 was supported.

In sum, the intention of continuance was predicted by perceived benefits ($\beta=0.116$), satisfaction ($\beta=0.436$), innovation resistance ($\beta=-0.235$), and subjective norms ($\beta=0.111$), which accounted for 53.5% of the variance in intention of continuance. As prior researchers have found, satisfaction had the strongest effect. However, this study not only confirms the hypotheses in the ECM but also unveils the significant impact of user resistance and the relationship between user resistance and other factors including subjective norms, and factors in the ECM.

V. DISCUSSION

A. Theoretical Implications

The results of this study provide several theoretical implications.

Ram (1989) pointed out that user resistance coexists not only in the pre-adoption stage, but also in the post-adoption phase[24], and our study examined the significant role of user resistance in the post-adoption stage. This is the primary contribution of this study. Prior studies in IS have mainly focused on user resistance as a barrier to adoption of innovative systems or products. Moreover, most research studies have tackled the role of resistance in IS implementation in an organizational context where the use of the system is mandatory[3][5] [10][22]. However, this study demonstrates the significant role of user resistance on IS continuance in a more general environment where the use is voluntary.

Secondly, our findings confirmed that social influences still play an important role in user's post-adoption behavior. Although many studies present the insignificant effects of subjective norms in most cases in voluntary systems usage, our results support the important role of subjective norms in the post-adoption stage. We believe that the normative influence of a subjective norm directly influences the user's continuance intention and resistance. According to social identity theory, individuals have the desire to be accepted and recognized as a member of a society or group, so they tend to avoid behaviors against the group norms. This public compliance for social acceptance leads the continuous usage of Smartphones, the use of which is positively recognized by the society. However, public compliance can be a factor that increases user resistance by imposing a psychological burden on individuals to comply with the normative values. The positive relationship between user resistance and subjective

norms implies that the normative influence of subjective norms directly increases the user's intention of continuance, and it indirectly reduces the intention of continuance by increasing user resistance. This finding contributes to understanding the relationship between user resistance and social influences and how their interactions eventually affect the continued use of information systems.

B. Managerial Implications

The empirical results contain some implications that practitioners should carefully consider.

First, managers are recommended to pay more attention to user resistance in the post-adoption phase, which tends to be neglected after initial adoption. Basically, managers have to make endeavors to increase user satisfaction and to offer more benefits from using the system. Once users resolve uncertainty or potential risks associated with a new system, an effective way to keep users from discontinuing the use of system may be by leveraging a positive word-of-mouth effect. The positive message from the collective is an important reference for the individual's decision for continued use.

Second, managers need to take advantage of the different influences of the subjective norm. Subjective norm has both positive and negative effects on the user's intention of continuance. The subjective norm directly affects the continuance intention, and it indirectly decreases the continuance intention through user resistance as well. Our empirical results showed that the indirect effect is far less than the direct effect. However, the strength of normative and informational influences of subjective norms will appear differently according to the culture of the society[12]. For example, countries in eastern Asia have a collectivism-oriented nature where people tend to avoid conflicts with others while western countries like the US and European countries are more oriented to individualism where individuals tend to seek information from others and to take advantage of information for their own decisions[17]. Therefore, managers should carefully understand the culture of the society where they operate, the business and the strengths of the different influence of subjective norms, and their overall influences on user's continued behaviors.

REFERENCES

- [1] Bagozzi, R. P., and Lee, K.-hyun, "Consumer Resistance to, and Acceptance of, Innovations," *Advances in Consumer Research*, Vol.26, pp. 218-225, 1999.
- [2] Bhattacharjee, A., "Understanding Information Systems Continuance: An Expectation Confirmation Model," *MIS Quarterly*, Vol.25, No.3, pp. 351-370, 2001.
- [3] Bovey, W. H., and Hede, A., "Resistance to organisational change: the role of defence mechanisms," *Journal of Managerial Psychology*, Vol.16, No.7, pp. 534-548, 2001.
- [4] Burnkrant, R. E., and Cousineau, A., "Informational and Normative Social Influence in Buyer Behavior," *The Journal of Consumer Research* Vol.2, No.3, pp. 206-215, 1975.
- [5] Cho, S., and Chang, D., "Salesperson's innovation resistance and job satisfaction in intra-organizational diffusion of sales force automation technologies: The case of South Korea," *Industrial Marketing Management*, Vol.37, No.7, pp. 841-847, 2008.

- [6] Featherman, M., "Predicting e-services adoption: a perceived risk facets perspective," *International Journal of Human-Computer Studies* Vol.59, No.4, pp. 451-474, 2003.
- [7] Fishbein, M., and Ajzen, I., *Belief, Attitude, Intention and Behavior: An Introduction to Theory and Research*, Reading, MA: Addison-Wesley, 1975.
- [8] Fornell, C., and Larcker, D. F., "Evaluating Structural Equation Models with Unobservable Variables and Measurement Error," *Journal of Marketing*, Vol.18, No.1, pp. 39-50, 1981.
- [9] Gefen, D., and Straub, D., "A Practical Guide to Factorial Validity Using PLS-Graph: Tutorial and Annotated Example," *Communications of the Association for Information Systems*, Vol.16, pp. 91-109, 2005.
- [10] Hirschheim, R., and Newman, M., "Information Systems and User Resistance: Theory and Practice," *The Computer Journal*, Vol.31, No.5, pp. 398-408, 1988.
- [11] Kim, H. W., and Kankanhalli, A., "Investigating User Resistance to Information Systems Implementation: A Status Quo Bias Perspective," *MIS Quarterly*, Vol.33, No.3, pp. 567-582, 2009.
- [12] Kim, Y., Sohn, D., and Choi, S. M., "Cultural difference in motivations for using social network sites: A comparative study of American and Korean college students," *Computers in Human Behavior*, Vol.27, No.1, pp. 365-372, 2011.
- [13] Knowles, E. S., and Linn, J. A., *Resistance and Persuasion*, Mahwah, New Jersey: Lawrence Erlbaum Associates Inc., 2004.
- [14] Lapointe, L., and Rivard, S., "A Multilevel Model of Resistance to Information Technology Implementation," *MIS Quarterly*, Vol.29, No.3, pp. 461-491, 2005.
- [15] Laukkanen, T., Sinkkonen, S., and Laukkanen, P., "Communication strategies to overcome functional and psychological resistance to Internet banking," *International Journal of Information Management*, Vol.29, No.2, pp. 111-118, 2009.
- [16] Lee, Y., and Kwon, O., "Intimacy, familiarity and continuance intention: An extended expectation-confirmation model in web-based services," *Electronic Commerce Research and Applications*, Vol.10, No.3, pp. 342-357, 2011.
- [17] Lewis, C., and George, J., "Cross-cultural deception in social networking sites and face-to-face communication," *Computers in Human Behavior*, Vol.24, No.6, pp. 2945-2964, 2008.
- [18] Liao, C., Chen, J., and Yen, D., "Theory of planning behavior (TPB) and customer satisfaction in the continued use of e-service: An integrated model," *Computers in Human Behavior*, Vol.23, No.6, pp. 2804-2822, 2007.
- [19] Liao, C., Palvia, P., and Chen, J.-L., "Information technology adoption behavior life cycle: Toward a Technology Continuance Theory (TCT)," *International Journal of Information Management*, Vol.29, No.4, pp. 309-320, 2009.
- [20] Moore, G. C., and Benbasat, I., "Development of an Instrument to Measure the Perceptions of Adopting an Information Technology Innovation," *Information Systems Research*, Vol.2, No.3, pp. 192-222, 1991.
- [21] Piderit, S. K., "Rethinking Resistance and Recognizing Ambivalence: A Multidimensional View of Attitudes toward an Organizational Change," *The Academy of Management Review*, Vol.25, No.4, pp. 783-794, 2000.
- [22] Ram, S., and Jung, H.-S., "'Forced' Adoption of Innovations in Organizations: Consequences and Implications," *Journal of Product Innovation Management*, Vol.8, No.2, pp. 117-126, 1991.
- [23] Ram, S., "Innovation Using Strategies to Consumer: An Empirical Test," *Journal of Product Innovation Management*, No.6, pp. 20-34, 1989.
- [24] Ram, S., and Sheth, J. N. 1989, "Consumer resistance to innovations: The marketing problem and its solutions," *The Journal of Consumer Marketing*, Vol.6, No.2, pp. 6-14, 1989.
- [25] Rogers, E. M., *Diffusion of Innovations*, New York: The Free Press., 1995.
- [26] Sanford, C., and Oh, H., "The role of user resistance in the adoption of a mobile data service," *Cyberpsychology, behavior and social networking*, Vol.13, No.6, pp. 663-72, 2010.
- [27] Thong, J., Hong, S., and Tam, K., "The effects of post-adoption beliefs on the expectation-confirmation model for information technology continuance," *International Journal of Human-Computer Studies*, Vol.64, No.9, pp. 799-810, 2006.
- [28] Venkatesh, V., Morris, M. G., Davis, G. B., and Davis, F. D., "User Acceptance of Information Technology: Toward a Unified View," *MIS Quarterly*, Vol.27, No.3, pp. 425-478, 2003.