Understanding the Factors Influencing Consumer Adoption of N-Screen services in South Korea

Minhee Son[1], Moon-Yong Kim[2]

[1.] Department of Business Administration, Dongguk University-Gyeongju, Gyeongju, Gyeongbuk 780714, South Korea
[2.] College of Business Administration, Hankuk University of Foreign Studies, Seoul, 130791, South Korea
moonyong@hufs.ac.kr

Abstract: This research examines what factors affect the adoption of N-Screen services. Specifically, we identify the drivers that positively influence the adoption of N-Screen services as well as the inhibitors dissuading consumers from adopting the N-Screen services. An online survey was conducted under the context of Korean consumers. The results demonstrate that perceived usefulness of N-Screen services prompts consumers' intention to adopt N-Screen services, while the perceived (monetary and non-monetary) risks of N-Screen services are found to serve as barriers to adoption of N-Screen services. Moreover, consumer needs and traits, media and device ownership, and media usage behavior are found to have significant impact on the perceived usefulness of N-Screen services.

1. Introduction

N-Screen services (or Multi-Device services) are to provide the same content or services on a variety of devices across networks, meaning that one can flit between watching the same program on one's TV, tablet PC, PC, or smartphone. Along with the evolution of the ICT environment where consumers use multiple devices according to time and place, N-Screen services are gaining attention for enabling users to enjoy the same content or services seamlessly, irrespective of which device medium is used.

Previous literature on innovation adoption has focused on acceptance of a single service such as Internet, mobile, multi-channel pay TV, and mobile TV (Cooper and Tang, 2009; Lin, 2010; Shin, 2009; Taneja et al., 2012; Watson-Manheim and Belanger, 2007). Given that N-Screen services have all the features of various existing services in combination, however, it is expected that consumer's adoption behavior of N-Screen services will be quite different from that of existing distinct services (Yang, 2013). Therefore, it is important to understand what determines the adoption of N-Screen services. However, little research has examined the factors influencing consumer adoption of N-Screen services.

In the current research, we examine what factors affect the adoption of N-Screen services. Specifically, we identify the drivers that positively influence the adoption of N-Screen services as well as the inhibitors dissuading consumers from adopting the N-Screen services. This research proposes an integrated model of N-Screen services adoption that an individual's needs and personality, device and media usage behavior as drivers as well as monetary and non-monetary risks of N-Screen services as inhibitors affect the acceptance of N-Screen services.

2. Research Model and Hypotheses

When a consumer intends to adopt a new product such as N-Screen services, he/she will conduct a cost–benefit evaluation before making a purchase decision. Kim et al. (2007) suggested that extrinsic and intrinsic benefits positively influenced customers' intention, while monetary and non-monetary costs served as barriers. Therefore, it is important to identify consumer perceptions that influence behavioral intentions.

The perceived usefulness of a new technology refers to the consumer's overall assessment of the benefit based on the perceptions of what is obtained from the technology (Teng et al., 2009). It has also been suggested that customers' evaluation of a product includes both cognitive and affective elements (Dube-Rioux, 1990).

Consumer's progress through the adoption decision phases begins with the recognition of need. Individual needs affect the perceived usefulness (Brandyberry et al., 2010). A related theory of needs satisfaction suggests that all consumption events are capable of fulfilling needs at lower, more functional levels, as well as higher, more psychological levels (Oliver, 1997). Much technology adoption research indicates that audience needs are the primary determining factors (Jacobs, 1995; James et al., 1995; Neuendorf et al., 1998; Perse and Courtright, 1993). Needs can be categorized as utilitarian (solving consumption-related problems, efficiency, saving time), hedonic (fun, enjoyment, pleasure), and social (desire to connect and share with others) needs. Consumers can

enjoy music, video, and photos on a variety of devices seamlessly by using N-Screen services, which is related to consumers' hedonic needs. N-Screen services can also help consumers meet their utilitarian needs. That is, N-Screen services enable consumers to do more multi-tasking on various devices across networks and to minimize their transition costs of consuming contents across platforms. Moreover, consumers can satisfy their social needs by using N-Screen services. For example, a social TV enables consumers to communicate with each other and to share their collective contents using personal storage link-up with SNS. In the context of N-Screen services, consumer needs such as utilitarian, hedonic, and social needs would be the key drivers influencing the perceived usefulness of N-Screen services.

Innovation Diffusion Theory (IDT)-related studies have considered inherent innovativeness as a significant factor for an adoption of new product or technology. Innovativeness often refers to a person's tendency to try out new things (Parasuraman, 2000). Consumers with high innovativeness levels feel comfortable using technology and require little proof of the outcomes of the technology (Agarwal and Prasad, 1998). Therefore, innovativeness as a consumer's personal trait would be an important factor influencing the perceived usefulness of N-Screen services.

Several IDT-related studies have shown that the adoption of telecommunication technologies and new media was powerfully predicted by the ownership and use of other similar technologies and media (e.g., Dutton et al., 1987; Kang, 2002; LaRose and Atkin, 1988, Reagan 1987). Consumers' expectations for future purchase behavior are affected by previous experiences. Past successful experiences would reduce the level of perceived risks involved while heightening expectation of possible benefits (Shih and Venkatesh, 2004). Bolton and Lemon (1999) show the strong relationship between service usage and satisfaction. In addition, considering the N-screen services which enable consumers to enjoy various contents and to do multi-tasking on a variety of devices across platforms seamlessly, N-Screen services are specially useful for people who own multiple devices and use multiple platforms to consume various contents actively. We therefore expect that ownership of media and digital devices (e.g., smartphones, table PCs, smart TVs, multi-channel pay TVs, and T-DMBs) will be positively related to the perceived usefulness of N-Screen services. Moreover, we expect that higher usage rates of similar services such as wired Internet, wireless Internet, TV, VOD, and smartphone apps will be positively related to the perceived usefulness of N-Screen services.

Individuals evaluate the consequences of their behavior in terms of perceived usefulness and base their choice of behavior on the desirability of the usefulness. The usefulness construct has been used extensively in information systems and technology research, and has strong empirical support as an important predictor of technology adoption (e.g., Mathieson, 1991; Szajna, 1996).

Perceived costs are both monetary and non-monetary risks. The concept of perceived risk is defined in terms of the consumer's perception of the uncertainty and adverse consequences of adopting a new product (Dowling and Staelin, 1994). Sarin et al. (2003) argued that consumers perceive the purchase of a new high-tech product to be risky because such products and industries exhibit pervasive technological and market uncertainties. Non-monetary risks usually include time costs, search/effort costs, convenience costs, and psychological costs (Zeithaml, 1988). Non-monetary costs of N-Screen services is determined by users' perceptions of ease of use (whether using the service is free of physical, mental, and learning effort), contents abundance (whether the service can afford ample contents), connectivity (whether multiple network connections are instant and stable), and maturity (whether the service is error-free, consistently available and secure). Since risk is an important factor that affects a consumer's adoption, researchers have discussed and tested that perceived risk exerts a strong inhibiting influence on the criterion variables in extended TAM studies (Teng et al., 2009). Thus, this study hypothesizes that consumers' perception of risk for N-Screen services will negatively affect their adoption behavior.

Another barrier that hinders consumer adoption is monetary risk. The operational definition of monetary risk is the monetary costs necessary to adopt N-Screen services. Because consumers need smart devices such as smartphones, smart TVs, and tablet PCs to use N-Screen services, the consumer's monetary costs for adopting N-Screen services will include two types of expenses: device acquisition cost and service charge. If he/she perceives that the monetary adoption cost of N-Screen services outweighs its benefits, the adoption intention may be reduced or postponed until the price is perceived as acceptable. Thus, perceived monetary risk is proposed to have a negative effect on adoption behavior.

Therefore, this study proposes an integrated model of N-Screen services adoption (see Figure 1). Specifically,

H1a-H1d: A consumer's a) *hedonic needs*; b) *social needs*; c) *utilitarian needs*; d) *innovativeness* is positively related to his/her perceived usefulness of N-Screen services.

H2a-H2e: A consumer's use of a) *smartphone*; b) *tablet PC*; c) *smart TV*; d) *multi-channel pay TV*; e) *T-DMB* is positively related to his/her perceived usefulness of N-Screen services.

H3a-H3e: A consumer's usage volume of a) *wired Internet*; b) *wireless Internet*; c) *TV*; d) *VOD*; e) *smartphone apps* is positively related to his/her perceived usefulness of N-Screen services.

H4: A consumer's *perceived usefulness of N-Screen services* is positively related to his/her intention to adopt N-Screen services.

H5a-H5b: A consumer's a) *perceived non-monetary* and b) *perceived monetary risk of N-Screen services* is negatively related to his/her intention to adopt N-Screen services.
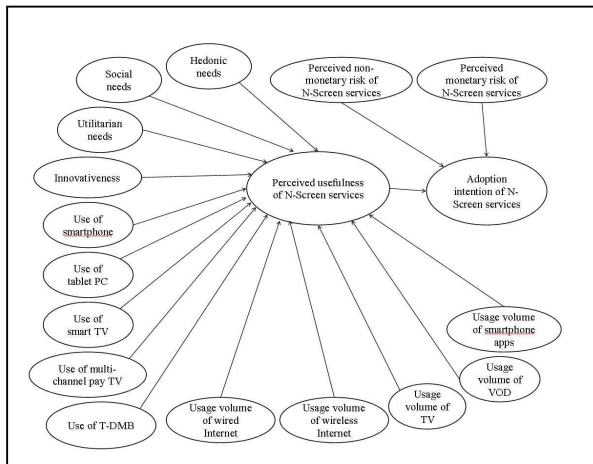

Figure 1. Research model

3. Methods and Results

Our survey items were derived from MIS and marketing literature to ensure their content validity. To collect our data, an online survey was conducted under the context of Korean consumers. Finally, we collected 2,619 complete respondents (male: 50.3%, female: 49.7%; age 20-29: 25.7%, age 30-39: 28.7%, age 40-49: 30.4%, age 50-59: 15.1%). All reflective constructs in this study, except for a single-measure constructs and formative constructs, fulfilled reliability, convergent validity, and discriminant validity. Reliability is irrelevant for formative measures because the items examine different facets of a construct; thus the items are not necessarily interrelated. Construct validity (convergent validity and discriminant validity) can hardly be achieved for formative construct because the correlations among items within a construct do not need to be higher than the correlation between items of different constructs (MacCallum and Browne, 1993). Content validity, which assesses whether the measures capture the full

domain of the construct, is more important than construct validity for the formative construct. To ensure the content validity of monetary/non-monetary risk (MOR, NMR), several N-screen service experts confirmed that these could be major perceived risk in N-screen service usage.

Table 1. Results of hypothesis testing

Hypothesis	Path coefficient	t-value	Supported?
H1a: HN → PU	0.061	2.615***	Yes
H1b: SN → PU	0.142	5.569****	Yes
H1c: UN → PU	0.028	1.631	No
H1d: IN → PU	0.111	4.703****	Yes
H2a: USP → PU	0.066	2.914***	Yes
H2b: UTP → PU	0.015	0.711	No
H2c: UST → PU	0.604	2.685***	Yes
H2d: UMT → PU	0.208	3.873****	Yes
H2e: UDM → PU	0.055	3.064***	Yes
H3a: TWI → PU	-0.025	1.389	No
H3b: TWLI → PU	0.037	1.770*	No
H3c: TVT → PU	0.610	2.721***	Yes
H3d: VOT → PU	-0.161	2.970***	Yes
H3e: NNFSA → PU	-0.010	0.249	No
H3e: NSA → PU	0.008	0.205	No
H4: PU → AI	0.835	89.571****	Yes
H5a: NMR → AI	-0.026	2.415**	Yes
H5b: MOR → AI	-0.076	6.503****	Yes
GE → PU	-0.033	1.750*	
AG → PU	0.119	6.085****	
ALL → PU	0.016	0.838	

Note1: HN (hedonic needs); SN (social needs); UN (utilitarian needs); IN (innovativeness); USP (use of smartphone); UTP (use of tablet PC); UST (use of smart TV); UMT (use of multi-channel pay TV (i.e., IPTV or digital cable TV)); UDM (use of T-DMB); TWI (the average daily time of wired Internet use); TWLI (the average daily time of wireless Internet use); TVT (the average daily TV viewing time); VOT (the average daily VOD viewing time); NNFSA (the total number of non-free smartphone apps used); NSA (the average number of smartphone apps used per day); NMR (non-monetary risk); MOR (monetary risk); PU (perceived usefulness of N-Screen services); AI (adoption intention of N-Screen services); GE (gender); AG (age); ALL (the average monthly allowance)
Note2: USP, UTP, UST, UDT, UDM (1 = Non-user, 2 = User); Gender (1 = Male, 2 = Female)
Note3: ****$p < 0.001$; ***$p < 0.01$; **$p < 0.05$; *$p < 0.10$.

The data analysis in this study was performed using Partial Least Squares (PLS). PLS is well suited for highly complex predictive models having a large number of constructs (Chin, 1998). The current study uses PLS rather than other SEM methods for the following reasons. The PLS approach places minimal restrictions on sample size and residual distribution (Phang et al., 2006). In addition, Wold (1985) advised that PLS was not suitable for confirmatory testing, but rather should be used for exploration of plausible causality. Given that this study represents an initial

attempt to explore the factors affecting the telecom user's adoption of N-Screen services, PLS was deemed appropriate. Finally, the constructs used in this study contain both reflective and formative types. To deal with both constructs simultaneously, PLS is the most adequate method.

Table 1 presents the results of the hypotheses testing. Based on the analysis, twelve out of eighteen hypotheses (i.e., H1b, H1c, H1d, H2a, H2c, H2d, H2e, H3c, H3d, H5, H6a, and H6b) in the model were supported. Additionally, age (AG) had a significant positive relationship with perceived usefulness of N-Screen services (PU), while gender (GE) and the average monthly allowance (ALL) were not significant ($p > .05$).

4. Discussions

This study suggested a theoretical framework which presents independent constructs affecting N-Screen services adoption. The results demonstrate that perceived usefulness of N-Screen services prompts consumers' intention to adopt N-Screen services, while the perceived (monetary and non-monetary) risks of N-Screen services are found to serve as barriers to adoption of N-Screen services.

Specifically, the perceived usefulness (vs. perceived risk) of N-Screen services seems to have greater impact on adoption of N-Screen services. The adoption of N-Screen services is mainly determined by the perceived benefit of new services. In line with previous studies (Chang et al., 2006; Kim et al., 2005), our finding suggests that perceived monetary risks exerts a strongly significant effect on consumers' intention to adopt N-Screen services. Investing money in an unfamiliar technology entails risk such as performance failure, and the higher the perceived fee and hence risk, the more reluctant customers are to adopt the technology (Kim et al., 2007). Monetary cost therefore reduces consumers' intention to adopt N-Screen services. In addition, new users are concerned about the non-monetary risk of N-Screen services because it translates into the amount of time and effort required to learn and use the services. The major advantage offered by N-Screen services is convenience, creation of new freedom, and ubiquity. However, if its use involves complex manipulation, navigation, slow response, elaborate connection procedures and/or, inconsistent availability, then its advantage would be weakened.

Moreover, consumer needs and traits, media and device ownership, and media usage behavior are found to have greater impact on the perceived usefulness of N-Screen services, as compared with the demographic variables.

Corresponding Author:
Dr. Moon-Yong Kim
College of Business Administration
Hankuk University of Foreign Studies
Seoul, 130791, South Korea
E-mail: moonyong@hufs.ac.kr

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