



## Acceptance and rejection of mobile TV among young adults: A case of college students in South Korea

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### ABSTRACT

Employing the definition of “adopter types” as the continuum of adoption rate, this study attempts to examine the factors influencing young people’s mobile TV adoption behaviors ranging from non- and discontinuous to actual adoption. Demographic and innovative attributes were found to have a non-significant influence on the adoption likelihood. The findings also revealed that information needs and newspaper reading were negatively associated with mobile TV adoption, while entertainment needs were found to be a significant positive predictor of the adoption likelihood. The results imply that young adults tend to adopt and use mobile TV for entertainment purpose, rather than for informational purpose. Additionally, the results showed that perceived value predicted the adoption. On the other hand, perceived price as an available resource did not have an impact on the adoption. Inconsistent with the prior findings of people’s mobile TV adoption and use as both positive information and entertainment sources, the findings suggest that young adults are likely to adopt and use mobile TV for entertainment and portability. When considering the capabilities of the technology, the findings imply young adults’ perceptual and behavioral tendency toward the different use of the technology in the convergent media environment in which they have grown up.

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### 1. Introduction

Mobile TV, which is called Digital Multimedia Broadcasting (DMB)<sup>2</sup> in Korea, is representative of real-time broadcasting service intended to deliver multimedia content including data, radio, and TV to receivers via portable devices. In the current Korean context, two types of DMB services — terrestrial DMB (T-DMB) and satellite DMB (S-DMB) — are publicly being used. Users can watch regular TV programming or content-on-demand through various mobile and portable terminals<sup>3</sup> at any time and at any place. Mobile TV’s capability to deliver various types of media content increases a user’s opportunity not only to realize different levels of multimedia experience but also to utilize personalized media without any space and time restriction.

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<sup>2</sup> T-DMB and S-DMB were launched in Korea on December 1 and May 1, 2005, respectively, delivering contents of high-fidelity video, audio, and data in a moving vehicle. While T-DMB service is free of charge, S-DMB service is a charge of a monthly fee ranging from \$6 to \$11 depending on the channel or content options that they like to watch. As of June 2009, the distribution of the T-DMB device had reached about 20 million (accounting for 40% of the population) and that of the S-DMB device 2 million.

<sup>3</sup> Five types of DMB devices are currently used in Korea: USB and PMP-type DMB, DMB phone, laptop type DMB, and car navigation tuned to DMB channels.

Korean adolescents and young adults have grown up along with a rich user experience of ICTs (Information and Communication Technologies). Since the late 1990s, the Korean government initiative of a strong top-down telecommunication policy for the information society has fostered the convergent media environment built on Internet and mobile applications and platforms (Lee and Chan-Olmsted, 2004). The high use rate of digital communication technologies by young adults, as compared with that of older adults, explicitly shows their sensitivity to new communication technology adoption and use. According to the results of a survey on mobile phone Internet use conducted by Korea Internet and Security Agency (2009), teenagers (80.4%) and the 20-year-olds (85%) showed much higher use rate in comparison with people in their 30s (55.3%), 40s (33.5%), and 50s (14.9%).

The agency also reported that college students show the highest use rate of wireless Internet (92.2%), followed by high school students (84%), elementary/middle school students (74.7%), graduates with college or over (61.8%), and graduates with high school or under (35.5%). The data clearly demonstrates that college students are the most active mobile communication users in Korea. As these data show, observing their mobile TV adoption and usage behaviors as an extension of the general convergent media environment to multimedia service may be necessary.

Although Korean young adults are highly connected to Internet and mobile communication, there may be some factors that facilitate or delay their adoption of new communication technology. The present study aims to explore which factors influence young people's mobile TV acceptance and rejection behaviors reflecting their actual use rate. The meanings and implications of the findings will be discussed in terms of the theories of innovation adoption, uses and gratifications, and media effect.

## 2. Theoretical background

### 2.1. Innovations adoption

Innovations adoption theory has long been recognized as an important theoretical framework in technology/innovation diffusion research. Rogers (1995) argued that adopters perceive innovation's social and technical attributes which eventually lead to the decision-making process of whether or not they adopt it. He identified five perceived attributes of an innovation: relative advantage, compatibility, complexity, trialability, and observability (1995). Rogers' concepts of the innovation attributes, however, do not fully include technology-specific attributes due to encompassing general attributes of technology "ranging from consumer products to organizational reforms" (Zhu and He, 2002, p. 470). Thus, Rogers' concepts have been applied slightly differently by scholars investigating adoption studies of new communication technologies.

Extending Rogers' concepts, for example, Zhu and He (2002) proposed five modified attributes that influence individuals' decision-making on Internet adoption — relative advantage, compatibility, ease of use, results demonstrability, and image. They found that the more people perceive relative advantage, compatibility, ease of use, and results demonstrability, the more likely they are to adopt the Internet.

Similar efforts were made in Vishwanath and Goldhaber's study regarding innovation adoption attributes of late mobile phone adopters (2003). Relative advantage, observability, and compatibility appeared to be significant indicators in predicting late mobile phone adoption.

Despite the significance of perceived innovation attributes in technology adoption, some research revealed that there exist relatively influential differences among the attributes, depending on a type of new technology, its adoption stage, or the social context on the technology adoption (Busselle et al., 1999; Chan-Olmsted and Chang, 2006; Dupagne, 1999; Hsu and Lu, 2004; LaRose and Atkin, 1992; Leung and Wei, 1999; Lin, 1999, 2001).

### 2.2. Individual innovativeness

Individual innovativeness has also been understood as an indicator to predict the likelihood of new technology adoption (Lu et al., 2005). There have been numerous definitions and conceptualizations of innovativeness (e.g., Flynn and Goldsmith, 1993; Midgley and Dowling, 1978; Rogers and Shoemaker, 1971). In the context of diffusion of innovations, Rogers and Shoemaker (1971) defined innovativeness as the degree of speed in adopting an innovation by an individual. On the other hand, from a relatively different angle, Midgley and Dowling (1978, p. 236) defined innovativeness as "the degree to which an individual is receptive to new ideas and makes innovation decisions independently of the communicated experience of others". Despite the different definitions of the innovativeness concept, the main idea is that the dimensions of the concept deal with a challengeable attitude toward a new idea and technology which adopters can afford to take the risk of adopting.

A number of studies (e.g., Chan-Olmsted and Chang (2006) for digital television; Hung et al. (2003) for wireless application protocol in the Taiwan context; Lu et al. (2005) for mobile Internet service in the US context) have consistently found that people with high levels of the personal trait of innovativeness are more likely to be early adopters of new technologies. In the case of mobile TV, it was also found that early adopters of mobile TV in Korea have high levels of innovativeness (Kang and Lee, 2005).

### 2.3. Demographic attributes

Previous studies found that socio-economic factors can affect a new technology adoption (Chan-Olmsted et al., 2005; Dupagne, 1999; Dutton et al., 1987; James et al., 1995; O'Keefe and Sulanowski, 1995; Reagan, 1987; Rogers, 1995). However,

the impact of socio-economic factors on a new technology adoption may vary with the adoption stage (Busselle et al., 1999). For instance, Leung and Wei's (1999) investigation of the late mobile phone adoption discovered that age is the most influential factor in the hierarchical modeling, indicating the younger the participants, the more they adopt this technology while other demographic variables are not significant.

Normally, the body of literature provides a similar profile of early adopters – they are male, younger, well-educated and have high income. Similarly, early mobile TV adopters are usually those aged between 20 and 39, most of whom have at least a college education and average household incomes around \$30,000–\$40,000. Also, the majority of occupations usually include students, office workers, and professionals (Chon and Kim, 2006; Nam, 2007; Sung and Lim, 2005). Regarding gender, Chon and Kim (2006) indicated that male mobile TV users outnumber female users, whereas other studies (Nam, 2007; Sung and Lim, 2005) pointed out that women are not far behind men in adopting mobile TV. Kwon and Chon (2009) also found that age and gender are the critical factors of social influence on mobile TV adoption. Females were found to be more susceptible to perceiving observable popularity of mobile TV adoption and use than males.

## 2.4. Media use

Pre-existing media use patterns have played the role of antecedents in predicting the likelihood of a new medium technology. However, the influence of traditional media use on the new medium adoption was not the most influential or was relatively weaker than other factors such as demographics (Dupagne, 1999; James et al., 1995), individual motivational needs (Lin, 2001), or adoption attributes (Leung and Wei, 1999; Vishwanath and Goldhaber, 2003).

The reason behind a weaker or no influence is that adopting the new medium technology depends on the extent of functional similarity and familiar experience juxtaposed with the extant media (Atkin, 1993; Vishwanath and Chen, 2006). In addition, despite the development of convergent media, adopters or users tend to utilize the available media by correlating their own media use to the needs gratified by specific media, habitually or purposely. Thus, the rise of new media neither completely displaces nor supplements traditional media use patterns. Rather, the twofold effect of displacement and supplementation may appear along with the introduction of a new medium (Lee and Lee, forthcoming; Sung et al., 2005). For example, studies dealing with the role of traditional media use patterns in mobile TV adoption and use revealed that TV or cable viewing and Internet use (Cho, 2005; Park, 2005) were positive predictors, while newspaper reading was a negative predictor (Cho, 2005). The use time of portable media such as mp3 player, PMP, and PSP tended to decrease (Park, 2005) due to the introduction of mobile TV, and the early adopters' preference for music listening on satellite DMB tended to replace radio listening (Cho, 2005).

With regard to communication mode via media, the present study considered the rich user experience of ICTs in that young adults have grown up along with ICTs (Cho, 2006). Young adults are the generation who have received benefits from ICT development in the Korean context and who also have been relatively more active users of ICTs rather than older generations (Cho, 2006). It is assumed, therefore, that their familiarity with the use of ICTs can expand the rich user experience of digital communication media to mobile TV. In this respect, other media use patterns can be seen as predicting the direction of use patterns of mobile TV among young adults.

## 2.5. Motivational needs for uses and gratifications

The uses and gratifications theory has been most widely employed in identifying individuals' motivations for technology adoption (Blumler, 1979; Katz et al., 1974; Lin, 1996; Rubin, 1983). According to the uses and gratifications theory, people use and practice the fixed media to meet such psychological and sociological needs as information, entertainment, personal identity, surveillance, and social integration/interaction.

In comparison with gratification opportunities provided by the fixed media, additional gratification opportunities of portable media are embedded in their own characteristics – portability and mobility – which demarcate motivations of the fixed and traditional media. In particular, mobile TV is providing information and entertainment-oriented content without giving up personal communication over a portable device. In this sense, the realization of mobile TV ubiquity free from time and space limitations allows users to enjoy all the available sources of data, audio, and video content at any time and at any place.

Chon and Kim (2006) found that people have a willingness to adopt mobile TV primarily to meet their entertainment needs, followed by information needs, mobility, and portability. Sung and Lim (2005) also demonstrated that portability is clustered as an important need for adopting mobile TV services along with the needs of entertainment, instrument, and surveillance. These findings suggest that people perceive mobile TV as a type of convergent media capable of providing users with a greater opportunity of enjoying multimedia contents and services on a ubiquitous basis.

In addition, a number of studies have explicated individual adoption behaviors of a new communication technology from the viewpoint of symbolic motivations. This approach assumes that the social meaning of the new technology adoption may be able to enhance and manage the favorability of the self-concept in the social settings. In the context of mobile phone use, for example, impression-related motives to convey a particular impression to others (e.g., "The way a mobile phone looks would be an important consideration to me if I were to purchase a new one", Xia, 2006, p. 67) were found to be predictors to affect mobile usage (Campbell and Russo, 2003; Ling and Yttri, 2002; Xia, 2006). In the context of mobile TV use, Kwon and

Chon (2009) argued that the older adopters tended to adopt this technology to maintain their social status in a group affiliation, while younger adopters did so to ensure their keeping up with trends in new technology.

## 2.6. Perceived value/perceived price

The value-based adoption model posits that when buying or subscribing to a product/service, customers, or users take a first step into the decision-making process by comparing the benefit from the product/service with the cost that they are willing to pay for the service/product (Chang and Wildt, 1994; Dodds, 1991; Zeitzmal, 1988). In this model, the cost does not simply mean the level of actual objective price of a device or fee of relevant services, but the level of perceived cost, summing monetary aspects of value like actual fees for purchase of a device and subscription of relevant services and non-monetary aspects such as efforts and time to use the service/product together. In this regard, Zeitzmal (1988) defined 'perceived value' as a user's overall assessment of the utility of a product/service based on perceptions of what is received and what is given. In this value-based adoption model, the relation between perceived value and price can be considered as a trade-off in a relative contrast of the total benefit received with the total sacrifice made in adopting a product/service.

However, some scholars studying media adoption, particularly in marketing research, have made efforts to investigate the direct relationships between perceived monetary price (individual customers' perception of an actual price) and their media adoption behaviors. In regard to the perceived price, Zeitzmal (1988) argued that customers encode prices in their own ways that are meaningful to them. He further argued that consumers tend to perceive the price of a product/service as "cheap", "moderate", or "expensive" through comparing it with its reference price or their income level rather than remember its exact price. This approach assumes that in decision-making for product/service adoption, customers' perception of the actual price may be a more essential and direct indicator than other variables such as time and efforts associated with purchase and use of media.

Studies have revealed that there is a positive relationship between perceived value and mobile TV adoption and a negative relationship between perceived price and mobile TV adoption. For example, Shin (2009) found that when consumers perceived that the price was high, it appeared to be a barrier to the adoption intention in both user and non-user groups, but the non-user group showed a higher cost barrier to the adoption intention than the user-group. Shim et al. (2006) also argued that the perceived price of a mobile TV handset and related service fee is an important factor in selecting a mobile TV-enabled cell phone. More important, they found that, compared with the older generation, the younger generation is more willing to pay the cost associated with mobile TV watching, as long as they perceive that the program content is worthwhile to watch. The findings of these two studies imply that the way that people perceive the value may differ by age and adoption rate and thus result in different mobile TV adoption behaviors.

## 2.7. Adoption intention

Adoption intention, which means "the plan to adopt and use a certain new medium technology" to predict the actual adoption behavior, was typically employed as the dependent variable in the frameworks of the diffusion of innovations and the Technology Acceptance Model (TAM) (Chan-Olmsted et al., 2005; Davis, 1989; Hsu and Lu, 2004; Kim et al., 2007). However, this approach is limited because the actual adoption behavior (i.e., whether people really adopt or reject mobile TV) was ignored. To overcome this limitation, adoption intention is used as the independent variable in the current study. The actual use rate, which can be understood as the actual adoption behavior, is employed as the dependent variable. The relationship between adoption intention and the actual use rate, therefore, is explored.

## 3. Research questions and hypotheses

Based on the theoretical support and empirical findings discussed above, it is assumed that demographic and innovative attributes, media use levels, motivational needs, value-based adoption attributes, and adoption intention will predict young adults' mobile TV adoption. Following the logic of the diffusion of adoption (Zhu and He, 2002), value-based adoption (Kim et al., 2007), media effect model (Lee and Lee, forthcoming), and uses and gratifications theory (Blumler, 1979; Katz et al., 1974), the research questions and hypotheses below guide this study:

- RQ<sub>1</sub>: Do adoption attributes of relative advantage, ease of use, results demonstrability and compatibility differ across the current, potential, discontinuous and non-user groups of young adults?
- RQ<sub>2</sub>: In which ways do socio-economic and innovative attributes influence young adults' mobile TV adoption behaviors?
- RQ<sub>3</sub>: In which ways does traditional media use influence young adults' mobile TV adoption behaviors?
- H<sub>3.1</sub>: Mobile phone use with just calling, newspaper reading, video gaming, TV viewing, and Internet use will be associated with young adults' mobile TV adoption behaviors.
- RQ<sub>4</sub>: In which ways do motivational needs of information, entertainment/mobility, and social symbol influence young adults' mobile TV adoption behaviors?
- H<sub>4.1</sub>: Information needs will be associated with young adults' mobile TV adoption behaviors.
- H<sub>4.2</sub>: Entertainment/portability needs will be positively associated with young adults' mobile TV adoption behaviors.

- H<sub>4,3</sub>: Symbolic needs will be positively associated with young adults' mobile TV adoption behaviors.
- RQ<sub>5</sub>: In which ways do value-based adoption attributes influence young adults' mobile TV adoption behaviors?
- H<sub>5,1</sub>: Perceived value will be positively associated with young adults' mobile TV adoption behaviors.
- H<sub>5,2</sub>: Perceived price will be negatively associated with young adults' mobile TV adoption behaviors.
- RQ<sub>6</sub>: In which ways does the adoption intention influence young adults' mobile TV adoption behaviors?
- H<sub>6,1</sub>: The adoption intention will be positively associated with adults' mobile TV adoption behaviors.

## 4. Method

### 4.1. Sampling

The survey was conducted at Sungkyun Kwan University in Seoul, Kyonggi University in Seoul, and Hanshin University in Kyonggido in South Korea in October and November 2007. Undergraduate students in the Department of Communication were the subjects. The final survey yielded 217 valid samples.

### 4.2. Measurement

#### 4.2.1. Actual use rate

The dependent variable was the actual use rate that reflects Zhu and He's (2002) concepts of adopter types — *continuous adopters*, *discontinued adopters*, *potential adopters* and *continuous non-adopters*. It was operationalized as a four-point scale: (1) non-adoption (i.e., subjects have no willingness to use DMB service at all within the next 12 months), (2) discontinuous adoption (i.e., subjects used to use DMB service, but stopped using it), (3) likely potential adoption (i.e., subjects have willingness to use DMB service in the next 12 months), and (4) actual adoption (i.e., subjects currently use DMB service).

#### 4.2.2. Demographic variables

Socio-economic characteristics were measured in the conventional dimensions such as gender, age, and yearly house income. Questions about education level and ethnicity were excluded in the sample because the sampling included only college students and Korea has a high homogeneity in terms of ethnic background.

The sample consisted of 49.8% females, 47.9% males, and the remainder with the response of “no answer”. Gender tended to make a difference across mobile TV adoption groups. Female participants were more likely to be potential users, while their male counterparts were more likely to be classified as discontinued users ( $\chi^2 (8, N = 217) = 17.2, p = 0.028$ ). The age ( $M = 21.5, SD = 2.34$ ) of the participants ranged from 17 to 30 years. The average annual household income was ₩47,198,600 (\$42,551.93) ( $SD = 24,033,400$ ). Age ( $F (3, 213) = 1.00, p = 0.39$ ) and income ( $F (3, 213) = 0.18, p = 0.91$ ) did not make a statistically significant difference across the four adoption groups.

#### 4.2.3. Media use levels

Open-ended items on a ratio scale were used to ask about traditional media use time on a weekly basis. Respondents were asked to report the number of hours they spent per week using mobile phones without mobile TV use ( $M = 134.4, SD = 148.2$ ), reading newspapers ( $M = 90.9, SD = 136.4$ ), using video games ( $M = 83.7, SD = 158.8$ ), watching TV ( $M = 459.7, SD = 579.0$ ), using the Internet ( $M = 718.5, SD = 660.4$ ), and listening to the radio ( $M = 66.4, SD = 149.8$ ).

#### 4.2.4. Motivational needs for use and gratification

Employing a five-point Likert scale, 15 items of mobile TV viewing motivations, ranging from “not at all” to “highly motivated,” were measured. All items were factor analyzed using a principal component extraction and varimax rotation. From the results of the factor analysis, the interpretation of the components revealed a strong factor loading on information (20.3%), entertainment/portability (21.1%), and social symbol (20.6%) (see Table 1).

#### 4.2.5. Adoption attributes

A five-point Likert scale of general adoption variables consisted of relative advantage, ease of use, results demonstrability, and compatibility (Zhu and He, 2002). In addition, 10 items on a five-point Likert scale which asked about innovative attitude toward new technology adoption (Chan-Olmsted and Chang, 2006; Lin, 2001) and attitude toward value-based adoption attributes (Kim et al., 2007) were factor analyzed (see Table 2). One item in the wrongful cluster loading from varimax rotation of factor analysis was eliminated. The items were clustered as three components indicating higher scores than Eigenvalue 1. The three clusters were composed of four items of innovative attributes (21.6% of variance explained), four items of perceived value (36.1%), and two items of perceived price (12.6%).

#### 4.2.6. Adoption intention

Respondents were asked how likely it was that they would intend to adopt mobile TV within 12 months on a scale of 1–5, with 1 = unlikely and 5 = likely.

**Table 1**

Factor analysis of uses and gratifications for mobile TV viewing.

Variables	Factor loadings		
	1	2	3
<i>Information</i>			
To learn how to do things	0.820		
To provide others with information	0.753		
To get to know others	0.749		
To get information	0.735		
To have something to do with others	0.575		
<i>Entertainment/portability</i>			
To play		0.804	
To be entertained		0.788	
To be lonely		0.764	
To get service on the move		0.649	
To relax		0.660	
To be easy to carry		0.433	
<i>Social symbol</i>			
To elevate my standing within my age group			0.887
To enhance my image within my age group			0.883
To feel important for what the DMB device stands for			0.804
To give good impressions to others			0.739
Variance explained	20.3%	21.1%	20.6%
Eigenvalue	1.7	5.1	2.5
Cronbach's alpha	0.83	0.81	0.89

**Table 2**

Factor analysis of innovativeness and value-based adoption attributes.

Variables	Factor loadings		
	1	2	3
<i>Innovativeness</i>			
I like to explore new technologies	0.851		
I have intention to purchase or use new technologies even though I take risk	0.802		
I like to keep up with new technologies	0.767		
I like to learn about new ideas	0.677		
<i>Perceived value adoption attributes</i>			
Value comparable to the time to spend		0.895	
Overall value		0.890	
Benefit comparable to the effort to make		0.846	
Value comparable to the fee to pay		0.783	
<i>Perceived price adoption attributes</i>			
Too high to pay the DMB device for use			–0.892
Reasonable to pay the DMB device for use (reversed)			0.660
Variance explained	21.6%	36.1%	12.6%
Eigenvalue	2.2	3.6	1.3
Cronbach's alpha	0.79	0.89	0.52

#### 4.3. Data analyses

First, one-way analysis of variance and post hoc analyses (Scheffe's pairwise comparison) among estimated marginal means were conducted to test adoption attribute differences across groups of different actual use rate. Hierarchical regression analyses were then conducted to test the extent to which demographic variables, innovativeness, media use levels, uses and gratifications, value-based adoption attributes, and adoption intention predict the actual use rate.

**Table 3**

The mean ratings for adoption attributes across four groups based on the actual use rate.

	Current adoption (N = 45)	Likely potential adoption (N = 33)	Non-adoption (N = 101)	Discontinuous adoption (N = 38)
Relative advantage	2.43 <sub>ab</sub>	2.52 <sub>b</sub>	2.11 <sub>ab</sub>	1.97 <sub>a</sub>
Ease of use	3.55 <sub>b</sub>	3.53 <sub>b</sub>	2.92 <sub>a</sub>	2.96 <sub>a</sub>
Results demonstrability	2.83 <sub>c</sub>	3.03 <sub>bc</sub>	2.42 <sub>a</sub>	2.31 <sub>ab</sub>
Compatibility	2.62 <sub>ab</sub>	2.85 <sub>b</sub>	2.30 <sub>a</sub>	2.21 <sub>a</sub>

Note: Scheffe's procedures were used to conduct these post hoc comparisons. Means with the same matching subscripts within the same row are not significantly different from one another. Significant differences are at  $p < 0.05$ .

**Table 4**

Zero-order correlations for relationships among variables used.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Actual use rate	–	0.06	–0.02	–0.01	0.04	–0.03	–0.11	–0.04	–0.05	0.08	0.14*	0.03	0.29***	0.10	0.24***	–0.11	0.36***
2. Gender (0 = male)		–	–0.38***	0.02	–0.09	0.14*	–0.14*	–0.32***	0.17**	0.09	0.16**	0.08	0.21***	0.07	0.14*	–0.01	0.21***
3. Age			–	0.00	0.07	0.14*	0.32***	0.08	–0.24***	–0.02	0.02	–0.05	–0.10	0.02	0.04	–0.10	–0.11
4. Income				–	0.00	–0.04	0.15*	–0.00	0.01	0.13	0.08	–0.09	–0.08	–0.03	–0.11	–0.02	0.10
5. Innovativeness					–	0.05	–0.01	0.17**	–0.07	0.05	–0.04	0.08	0.05	0.13*	0.21**	–0.10	0.09
6. Mobile phone						–	0.17**	0.00	–0.04	0.18**	0.11	0.05	0.05	0.11	0.05	0.03	–0.03
7. Newspaper							–	0.10	0.04	0.31***	0.10	0.12*	–0.08	0.07	0.09	–0.13*	0.08
8. Video game								–	0.01	0.12*	0.00	–0.05	–0.04	0.13*	–0.02	–0.01	–0.13*
9. TV									–	0.24***	0.09	–0.02	0.13*	0.10	–0.01	–0.02	–0.02
10. Internet										–	0.15*	–0.02	0.07	0.07	0.04	–0.06	0.15**
11. Radio											–	0.04	0.08	0.07	0.08	–0.02	0.08
12. Information												–	0.31***	0.47***	0.62***	–0.26***	0.35***
13. Entertainment and portability													–	0.25***	0.38***	–0.05	0.33***
14. Symbol														–	0.41***	–0.25***	0.22***
15. Value															–	–0.43***	0.43***
16. Price																–	–0.17**
17. Intention																	–

Note: N = 217, \* $p \leq 0.05$ , \*\* $p \leq 0.01$ , \*\*\* $p \leq 0.001$ .



## 5. Results

Table 3 lists the results of the one-way ANOVA on the differences of adoption attributes across groups of different actual use rate for testing RQ<sub>1</sub>. The results showed that there were significant differences across adoption dimensions among the four groups (relative advantage,  $F(3, 213) = 4.20, p \leq 0.007$ , ease of use,  $F(3, 213) = 8.40, p = 0.000$ , results demonstrability,  $F(3, 213) = 8.04, p = 0.000$ , and compatibility,  $F(3, 213) = 5.47, p = 0.001$ ). Scheffe's follow-up procedures showed the results: (1) the group of likely potential adoption ( $M = 2.52, SD = 0.84$ ) tended to have an attitude of higher relative advantage than did the group of discontinuous adoption ( $M = 1.97, SD = 0.80$ ); (2) the groups of actual adoption ( $M = 3.55, SD = 0.99$ ) and likely potential adoption ( $M = 3.53, SD = 0.66$ ) were likely to have an attitude of higher ease of use than the groups of non-adoption ( $M = 2.92, SD = 0.85$ ) and discontinuous adoption ( $M = 2.96, SD = 0.89$ ); (3) the group of actual adoption ( $M = 2.83, SD = 0.86$ ) was likely to have an attitude of higher results demonstrability than the groups of discontinuous adoption ( $M = 2.31, SD = 0.79$ ) and non-adoption ( $M = 2.42, SD = 0.72$ ), and the group of likely adoption ( $M = 3.03, SD = 0.82$ ) tended to have an attitude of higher results demonstrability than did that of non-adoption; and (4) the group of potential adoption ( $M = 2.85, SD = 0.82$ ) was also likely to have an attitude of higher compatibility than the groups of discontinuous adoption ( $M = 2.21, SD = 0.71$ ) and non-adoption ( $M = 2.30, SD = 0.76$ ).

Before testing the hierarchical models, zero-order correlations among all the variables considered were analyzed for descriptive statistics, as shown in Table 4. The actual use rate was correlated with radio listening ( $r = 0.14, p = 0.05$ ), entertainment/portability needs ( $r = 0.29, p = 0.000$ ), perceived value ( $r = 0.24, p = 0.000$ ) and adoption intention ( $r = 0.36, p = 0.000$ ). Adoption intention was also correlated with gender ( $r = 0.21, p = 0.001$ ), video game use ( $r = -0.13, p < 0.05$ ), Internet use ( $r = 0.15, p = 0.01$ ), information needs ( $r = 0.35, p = 0.000$ ), entertainment/portability needs ( $r = 0.33, p = 0.000$ ), symbolic needs ( $r = 0.22, p = 0.000$ ), perceived value ( $r = 0.43, p = 0.000$ ), and perceived price ( $r = -0.17, p = 0.000$ ). In addition, the results showed that motivational needs were strongly correlated with value-based adoption attitudes. Information needs ( $r = 0.62, p = 0.000$ ), entertainment/portability needs ( $r = 0.38, p = 0.000$ ), and symbolic needs ( $r = 0.41, p = 0.000$ ) were positively correlated with perceived value attitude toward the adoption. Conversely, perceived price attitude toward the adoption was negatively associated with information needs ( $r = -0.26, p = 0.000$ ). It was also inversely related with newspaper reading ( $r = -0.13, p < 0.05$ ) and perceived value ( $r = -0.43, p = 0.000$ ).

Hierarchical regression analyses were conducted to examine the relative influence of predictor effects on the actual use rate. As displayed in Table 5, the hierarchical regression analyses provided a significant model fit in predicting mobile TV

**Table 5**  
Hierarchical regression analysis of the likelihood of mobile TV adoption.

Predictor variables	Mean	SD	Standardized $\beta$ (t value)	Significance
<i>Block 1: socio-economics and innovativeness</i>				
Gender	0.51	0.50	-0.092 (0.086)	0.220
Age	21.45	2.34	0.006 (-0.300)	0.931
Income	47198600	24033400	-0.019 (-0.426)	0.764
Innovativeness	3.33	0.81	-0.027 (-0.276)	0.671
Incremental adjusted $R^2$			-0.01	
<i>Block 2: weekly media use levels</i>				
Mobile phone	134.37	148.23	-0.018 (-0.276)	0.783
Newspaper	90.94	136.41	-0.146 (-2.02)	0.045*
Video game	83.71	158.87	-0.027 (-0.391)	0.696
TV	459.67	579.01	-0.081 (-1.21)	0.229
Internet	718.52	660.45	0.071 (1.02)	0.310
Radio	66.36	149.82	0.121 (1.90)	0.059#
Incremental adjusted $R^2$			0.01	
Change in $R^2$			0.02	
<i>Block 3: motivational needs</i>				
Information	2.50	0.78	-0.264 (-3.10)	0.002**
Entertainment and portability	3.72	0.80	0.195 (2.77)	0.006**
Symbol	2.08	0.89	0.040 (0.542)	0.589
Incremental adjusted $R^2$			0.09	
Change in $R^2$			0.08	
<i>Block 4: value-based adoption attributes</i>				
Perceived value	2.64	0.87	0.176 (1.91)	0.057#
Perceived price	3.75	0.74	-0.048 (-0.689)	0.491
Incremental adjusted $R^2$			0.12	
Change in $R^2$			0.03	
<i>Block 5: adoption intention</i>				
Intention	2.30	1.02	0.309 (4.21)	0.000***
Incremental adjusted $R^2$			0.19	
Change in $R^2$			0.07	
N			217	

Note: Dependent variable is actual use rate. # $p < 0.10$ , \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .



adoption, indicating that  $F(16, 200) = 4.18, p = 0.000$ , adjusted  $R^2 = 0.19$ . The first block of demographics and the personality trait of innovativeness were entered into an equation. The results showed that there were no significant predictors in this block, indicating that this block explained  $-0.1\%$  of the variance. Therefore,  $RQ_2$  was not supported.

When traditional media use levels were entered into the equation next, newspaper reading ( $\beta = -0.15, p < 0.05$ ) and listening to the radio ( $\beta = 0.12, p < 0.06$ ) alone were significant in predicting mobile TV adoption behaviors. This means that the less respondents read the newspaper and the more they listened to the radio, the more likely they were to adopt the mobile TV. Accordingly, traditional media use levels partially predicted mobile TV adoption, partly supporting  $H_{3,1}$ . This block contributed an additional 2% in explaining the variance.

When motivational needs were entered into the equation as the next block, information needs ( $\beta = -0.26, p = 0.002$ ) and entertainment/portability needs ( $\beta = 0.20, p = 0.006$ ) were strong predictors of mobile TV adoption behaviors. The results revealed that the less respondents perceived information needs and the more they perceived entertainment/portability needs, the more likely they were to adopt mobile TV.  $H_{4,1}$  and  $H_{4,2}$  were supported while  $H_{4,3}$  was not. This block also contributed an additional 8% in explaining the variance.

Next, value-based adoption attributes were entered in the equation. Perceived value ( $\beta = 0.18, p < 0.06$ ) was statistically significant while perceived price was not. The more valuable respondents perceived mobile TV, the more likely they were to adopt it. Consequently,  $H_{5,1}$  was supported but  $H_{5,2}$  was rejected. This block contributed to the explanation of an additional 3% of the variance.

When entered into the equation as the final step, adoption intention ( $\beta = 0.31, p = 0.000$ ) was the strongest predictor of the actual mobile TV use rate, indicating that  $H_{6,1}$  was supported. The greater the respondents' intention to adopt mobile TV, the more likely they were to adopt it. The additional 7% of the variance was explained from this block.

The equation explained 19% of the variance in total. Based on the changes of  $R^2$ , the relative influences of predictors on mobile TV adoption behaviors can be summarized as follows: adoption intention was the most influential, followed by information needs, entertainment/portability needs, newspaper reading, perceived value attribute, and listening to the radio. In addition, it is worth noting that information needs and newspaper reading were negatively associated with the adoption, while other variables were found to be significantly positive predictors of the adoption likelihood.

## 6. Discussion

### 6.1. Influence of general innovation attributes and value-based attributes

Consistent with the findings of prior research (Vishwanath and Goldhaber, 2003; Zhu and He, 2002), the current study implies the worth of general innovation attributes — relative advantage, ease of use, results demonstrability, and compatibility — in predicting mobile TV adoption. It was found that, overall, both current and potential adoption groups show higher scores of attitude toward general innovation attributes than do the discontinuous and non-adoption groups. The findings also suggest that the differences across the four adoption groups offer more predictable likelihood estimation of a dynamic from adoption to rejection of the technology than that of traditional dichotomous adoption and non-adoption groups.

Turning to the influence of value-based attributes, the results reveal that while perceived value was a predictor of adopting the technology, perceived price was not. The effect of perceived price on the adoption likelihood was inconsistent with that in previous studies (Shim et al., 2006; Shin, 2009). The sharp competition among mobile TV device and service providers for more market share could be one of the possible reasons for these results. For example, mobile TV service providers charge a relatively cheaper cost for purchasing the device along with imposing a variety of types of contract options. It seemed what they provide a user, with such a mobile TV-enabled cell phone, tends to make her/him consider the technology as value-added rather than feel a sense of burden in paying for the device. It can be inferred, therefore, that at least young adults think of the valuable attribute as the more primary factor influencing their decision to purchase the DMB device.

### 6.2. Influence of demographics and innovativeness

Several past studies postulated that demographic variables have influenced the adoption of new technology (Chan-Olmsted et al., 2005; Chon and Kim, 2006; Dupagne, 1999; Kwon and Chon, 2009; Reagan, 1987; Rogers, 1995). However, the present study provides contrasting results with those in previous studies. Significant influence of demographic attributes on the adoption process was not found. A plausible explanation for this may be attributed to two reasons: early adopter characteristics and relative homogeneity of the sample. Early adopter profiles are true of this study. Young adults' tendency to show more sensitivity of a new medium than older adults (Korea Internet and Security Agency, 2009) had no significant effect on the adoption likelihood. Nevertheless, respondents were college students, whose ages were limited to a narrow range, from 17 to 30 years. This narrow range of age with equivalent education levels may result in minimization of the demographic effect of age or income on the adoption process.

While previous literature dealing with mobile TV adoption has provided mixed results in gender difference (Chon and Kim, 2006; Kwon and Chon, 2009; Nam, 2007; Sung and Lim, 2005), the finding of the present study suggests that gender difference was insignificant. In order to draw inference from this finding, it is necessary for us to pay attention to the demographic variation of the sample. Bimber (2000) argued that a difference between males and females in adopting a

new communication technology, if any, is more likely the product of several socio-economic factors than gender itself as a single decisive factor. In this regard, the limited variations of other demographic attributes in the selected sample may contribute to the attenuated influence of gender on mobile TV adoption.

Innovativeness has also been believed to be associated with the adoption of a new communication technology (Flynn and Goldsmith, 1993; Midgley and Dowling, 1978; Rogers and Shoemaker, 1971). However, the result indicates that innovativeness was not an important predictor of young adults' mobile TV acceptance and rejection. This inconsistency can be explained in part by the relatively homogenous characteristics of college students. Despite that, as stated earlier (Korean Internet and Security Agency, 2009), high innovative scores across adoption groups reflect the obvious characteristics of college students as early adopters and a technology-savvy group.

### 6.3. Influence of traditional media use

The influence of a new communication technology on pre-existing media use showed the dual effects of displacement and supplementation (Lee and Lee, *forthcoming*; Sung et al., 2005). In the present study, the overall use of traditional media in relation to the adoption likelihood was also found not to be fully displaced or supplemented by mobile TV. While the actual adoption rate was positively correlated with radio listening but negatively correlated with newspaper reading, it was not related to mobile phone calling, TV viewing, video gaming, and Internet use at all. The extent of the functional similarity and dissimilarity between traditional media and mobile TV will have an effect on whether or not to adopt it. As a result, such media use patterns are expected to continue for a long time due to the dual effect. However, as all media use levels were positively associated with Internet use, as shown in Table 4, the supplementation effect of Internet use on other media only provides a clue for the future direction of mobile TV use due to its ability to perform multimedia functionality.

Unexpectedly, the association of radio listening with the adoption likelihood was found to be different from that of Cho's study (2005) revealing the substitutable relationship between the two. Park (2005) showed that mobile TV users used the mp3 player to listen to music more than performing other activities (e.g., reading books and newspaper, text messaging, and doing nothing) when they were on the move before the advent of mobile TV. She suggested that the increase of mobile TV use led to the decrease of other portable media use. She also pointed out that young adults' preferred media use patterns, specifically in the cases of portable and mobile media, are already integrated with their day-to-day social lives. It seems that the contrasting result of the present study derives from the functional similarity of mobile TV to other portable media. The familiarity of portable media may enhance the functional similarity to mobile TV, influencing the supplementation effect. The advantage of mobile TV's high quality of sound and specified music channels may also contribute to stimulating the adoption for heavy radio listeners.

### 6.4. Influence of motivational needs

Among the main findings, the negative impacts of information needs and newspaper reading on the adoption likelihood deserve attention. Inconsistent with previous studies revealing the positive influence of information and entertainment motivations on mobile TV adoption (Chon and Kim, 2006; Shin, 2008; Sung and Lim, 2005), the results clearly provide evidence that young adult participants perceived entertainment and portability as stimulating for mobile TV adoption while they did not perceive information as such. The findings propose that young adults tended to have entertainment needs rather than information needs for adopting and using mobile TV. This is further supported by analyzing which media are preferred for which sources and the relationship with age. Information needs were correlated with newspaper reading ( $r = 0.12$ ,  $p < 0.05$ ), while entertainment needs were related to TV viewing ( $r = 0.13$ ,  $p < 0.05$ ). In addition, similar to Lin's (2001) finding that infrequent newspaper readers are normally younger, the finding of this study supports that, although there was relatively little variance in the age characteristics of this sample, older participants had more tendency to read the newspaper ( $r = 0.32$ ,  $p = 0.000$ ) but less tendency to watch TV ( $r = -0.24$ ,  $p = 0.000$ ) than did their younger counterparts. Young adult information seekers using the newspaper as a main media source were not likely to adopt mobile TV. On the contrary, young adult entertainment seekers using TV as a main media source were more likely to move forward to the adoption of mobile TV.

Moreover, entertainment and portability motivations were clustered as one factor. One possible reason for young people's perception on the relationship between the two motivations can be explained by observing the use patterns of mobile TV users. Mobile TV users used the service mostly during public transportation (32.8%), followed by in restaurants or cafés (20.6%) and at home (19.1%). When asked about the use in specific situations, they reported that they normally used the service in transportation situations (27%), when waiting for someone (18.3%), when bored at home (16.7%), and whenever they had free time regardless of any situation (14.3%). The users employed this technology in both mobile and fixed places and situations due to the more flexible availability. The users actively employed this technology as portable media to kill time on the move as well as indoors. Considering the findings, the public space on the move or the family-shared place in housing situations tended to be privatized by using this technology. Hence, the results show that young adults' gratification opportunities for entertainment-oriented needs extended to portable media, and thus visual-centered viewing was integrated with such portable attributes. This suggests that for young adults mobile TV tended to be seen as the portable medium for entertainment and killing time.

### 6.5. Influence of adoption intention

Finally, adoption intention was found to be positively correlated with perceived value, while negatively correlated with perceived price (see Table 4). This reflects that because of accompanying the expectancy value of the technology, adoption intention could be a strong predictor which is able to overcome the barrier such as attitudes toward the burden in the purchase of the device and lead to the adoption. More importantly, adoption intention was positively correlated with three motivational needs as well as perceived value. But the actual adoption rate was positively correlated with only entertainment/portability motivational needs among three motivational needs as well as perceived value. It is suggested that in their actual adoption behaviors, young adults evaluate only entertainment/portable motivational needs as corresponding to their expectancy value of the technology, while they do not evaluate informational and symbolic motivational needs as such. These results imply that adoption intention is interwoven with an aspect of reflecting the expectancy value, whereas the actual adoption rate is interlinked with an aspect of reflecting the evaluation value.

This study is of importance, therefore, in focusing more on the relationship between adoption intention and actual adoption behaviors in the modeling. It was found that adoption intention is the most important predictor of the actual adoption rate. This implies that the present modeling advances previous studies employing TAM and adoption models (Chan-Olmsted et al., 2005; Davis, 1989; Hsu and Lu, 2004; Kim et al., 2007) and at the same time reveals the high correlation between adoption intention and the actual adoption rate.

## 7. Conclusion and limitations

The current study investigated the actual mobile TV adoption behaviors of college students. This segment of the population showed the characteristics of the continuum from mobile TV adoption to discontinuous- or non-adoption. Inconsistent with the prior findings of people's mobile TV adoption and use as both positive information and entertainment sources (Chon and Kim, 2006; Shin, 2008; Sung and Lim, 2005), the findings suggest that when considering capabilities of the technology, young adults are likely to adopt and use the technology in a relatively different manner than older adults. The exploratory results present neither uniformly positive nor negative predictors of whether or not to adopt mobile TV, but help make an expectation of the future trend of mobile TV adoption and use patterns in this segmented population.

However, there may be some flaws in terms of generalization due to the relatively small and skewed sampling with the high education levels and a relative homogeneous age. University students of this sample showed no difference based on gender, income, and innovative trait in predicting the adoption likelihood. However, as Hargittai (2008) revealed the effect of demographics on social networking use of college students, parental educational or occupational status may be influential factors on the adoption likelihood of young adults. In addition, the degrees of education attainment or payable monthly fee as an available resource, may be different in the sampling reflecting a wider range of age groups. Other possible predictors of the adoption likelihood may be day-to-day social activities involved in leisure or lifestyle. It seems that because people carry this technology with them, these activities can contribute to explaining the variance which is not explained in this study. Therefore, representative sampling on a larger scale is needed to explain mobile TV adoption behaviors of young adults more closely and precisely. On this point, further modifications of the study need to be developed and tested by conducting systematic sampling.

Future studies may focus on revisiting how the relative influence of the predictors changes when the mobile TV adoption rate levels out. Comparison of mobile TV adoption attitude and usage patterns of young adults with those of older adults may also be desirable. In this way, the meaningful difference of the characteristics of young people in adopting mobile TV will be further supported.

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