

Exploring Determinants of Continued Usage Intention of Mobile TV - A Case of DMB in KOREA -

Bin-Fu

(Graduate School of Chungnam National University, fubin2006@hotmail.com)

Chul-Ho Jung

(Dept. of Technical MIS, Woosong University, cjung@wsu.ac.kr)

요약

최근 모바일 기술이 지속적으로 발전해 감에 따라 모바일 통신 네트워크를 통한 방송서비스인 모바일 TV가 급속한 확산을 보이고 있다. 기존 모바일 TV 서비스를 대상으로 수행한 선행연구는 주로 모바일 TV 서비스 관련 기술 탐색, 최신 시장동향 분석, 서비스 수용 영향요인 등을 중심으로 연구가 활발히 진행되어 온 반면 서비스 수용 후 행동에 관하여 체계적인 분석을 수행한 연구는 부족한 것이 현실이다.

이러한 배경 하에서, 본 연구는 모바일 TV 서비스 이용자를 대상으로 해당 서비스에 대한 지속적 이용의도 형성에 중요한 영향을 미칠 것으로 예상되는 요인을 파악해 보는 것을 주목적으로 하였다. 연구목적을 효과적으로 달성하기 위하여 본 연구에서는 관련 문헌에 관한 종합적 고찰을 통해 모바일 TV 서비스의 채택 후 행동을 체계적으로 파악해 보기 위하여 지각된 놀이성, 기대 일치, 지각된 사용용이성, 지각된 유용성, 만족, 지속 이용 의도 등 여섯 가지 차원을 포함한 연구모형을 제안하였다. 그리고 제안된 연구모델에 포함된 각 요인들 간의 영향관계에 관한 연구가설을 수립하였다. 향후 모바일 TV 이용자를 대상으로 설문조사를 수행하고, 제안된 모델 및 가설에 대한 실증적 분석을 실시해 보고자 한다.

본 연구의 결과를 토대로 최근 사용자 수가 급증하고 있으며, 높은 관심의 대상이 되고 있는 모바일 TV 분야의 연구자 및 실무자들에게 서비스 이용자를 장기적으로 유지하고, 이를 토대로 지속적인 수익을 창출하는데 도움을 줄 수 있는 시사점을 제공해 보고자 한다.

Key Words : Determinants of Continued Usage Intention, Mobile TV, DMB(Digital Multimedia Broadcasting)

I . Introduction

From last century, TV program has been a central role in people's life and been integrated into the daily routines. Nowadays, thanks to the Mobile TV emerged, people can choose to watch any TV program anytime, anywhere they like, no matter they are waiting for the buses, riding on a train or even during a break of lectures. In 2006, experts predicted that the global market of mobile TV subscribers would reach 120 million dollars and generate annual revenues of \$5 billion. There are sufficient reasons to believe that the launch of mobile TV will succeed in market and promote the development of mobile business.

In 2005, South Korea became the world's first country to start S-DMB and T-DMB service. Nowadays, just several years ago, 14 million DMB receivers were sold including T-DMB and S-DMB in South Korea, and 40% of the new cell phones have the capability to see DMB. As can be seen above, DMB service contains a huge potential of market in Korea.

Even though numerous researchers pay their attentions to new technology-acceptance and adoption(e.g. TAM), few literature or studies concerned about the continued usage of mobile technology over time, especially for DMB service. Therefore, it is imperative that analyses the factors which will influence the consumers' decisions and intention to continue using DMB service in Korea though this empirical study. Simultaneously,

we also puts forward some useful advices and strategies from the conclusion of this research for the correlative further study and terminal vendors, telecom service or TV operators in Korea.

At first, we review the conception of mobile TV service and discuss the theoretical background from previous related research. Secondly, the research models proposed based on the expectation-confirmation model and incorporated some important elements based upon related studies. Third, we serves round questionnaires and reclaim them. Thereafter, the statistical results will be tested by the covariance-based structural analysis after collect the data from participants. Then I will validate and discuss the research model according to the results from the statistical data. Finally, the implication, limitations and some directions of this paper will be indicated for the future research.

II . Theoretical Background

1. Overview of Mobile TV and DMB

Mobile TV is used to describe a service to subscribers via mobile telecommunications networks, also could be understood as 'mobilization of TV', most probably the mobile phone carriers. It can provide same contents that are available on TV or could be custom programming for

mobile devices which are on-demand. Mobile TV brings personalized enjoyment to consumers via the mobile services. By a small display, consumers can conveniently watch the KBS news, acclaim for the NBA live, appreciate U2 vocal concert, hold the newest share analysis etc. Obviously, the mobile TV brings more brilliant life for people's life.

Table 1. Overview of Select Mobile Television Technology Platforms

	DVB-H	ISD B-T	Media FLO	S-DMB	T-DMB	TDtv
Standard	Open	Open	Proprietary	Proprietary	Open	Open
Primary Regions of Trails	Asia, Europe, US	Japan	US, Europe	Japan, South Korea	Asia, Europe	US, Europe
Sample Countries	Australia, Italy, Taiwan, China, US	Japan	US, UK	India	Australia, Brazil, UK	France
Availability Commercial Service	Mid 2006	2006	Late 2006	May 2005	December 2005	2007

Source: Company reports, Information Telecoms & Media, Lehman Brothers(2006)

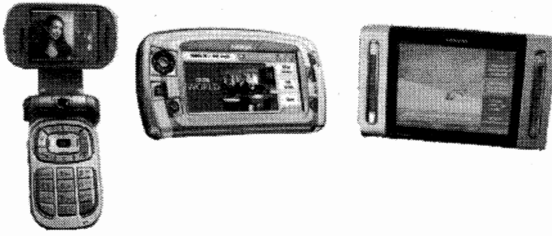
DMB – Digital Multimedia Broadcasting: This is an extension of the DAB(Digital Audio Broadcasting) standard. The Asia Pacific region is driving the development of this technology. This standard can be divided into two headline technologies:

satellite(S-DMB) and terrestrial(T-DMB). In 2005, SK Telecom launched the world's first commercial television based on the S-DMB standard with seven channels for a US\$13/month subscription fee. In Japan, satellite Mobile TV using DMB is provided by the Mobile Broadcasting Corporation(MBCO) in October 2004. They are using the same satellite that is used for Korean S-DMB—but the system in Japan requires specific portable television receivers, instead of cell phones.

The DAB/DMB standard is also adapted in some countries in Europe, particularly in the UK and the Bayern region of Germany. DMB has another advantage of having China on its bandwagon. With China are being the largest mobile services market in terms of the number of mobile subscribers, this is going to be a big boost to the DMB.

2. Korean DMB

South Korea introduced the an official handset-based mobile TV(Digital Multimedia Broadcasting(DMB)) service in May, 2005 under a national IT project(Lee, 2005). Profited the establishment of DMB technology, Korean became the first country in the world that converge mobile phone service and television service into a cell phones. Korean cell phone users can enjoy video, audio, and data services for the first time in the world without having to carry around another gadget that is not compatible with cell phones.



Source: Asia-Pacific Broadcasting Union (2006)

Figure 1. Korean DMB

In the cause of find a new channel of growth business beyond its stagnant mobile telephone business, SK Telecom launched the satellite-based mobile TV service(S-DMB) through its subsidiary, TU Media, in May 2005. In rapid sequence, the Ministry of Information and Communication (MIC) of Korea built T-DMB service for promote people support the IT industries of Korean.

A 'blue ocean' strategy of a leading mobile carrier and the government's industrial policy bring that the crown for the world's first commercialization of mobile television via cell phones when nationwide satellite S-DMB service are used in Korea. Meanwhile, T-DMB service is provided free of charge, but access is limited in selected regions.

Nowadays, described at the beginning of this report, the DMB service gets a rapid growth and reflects in a mass of profits. At school or bus stop, coffee-shop or restaurant, wherever, we can see people of assorted ages whom watching the interesting TV programs by handsets.

3. Reviews of Relevant Literatures

Expectation Confirmation Model(ECM) is introduced by Oliver(1980) to widely research consumer satisfaction and repurchase intention. The ECT framework proposed that: consumers firstly come into being an initial expectation of purchase service, and then form some perceptions about its performance after initial consumption. In this stage, consumers may decide the satisfaction level based on the expectation of theirs is confirmed through evaluating the perceived performance by their original expectation. And then, the consumers form repurchasing intentions after they satisfied.

Bhattacharjee(2001) built a new ECM to examine the cognitive beliefs and affect influencing consumers' intention on continuance of IS domain. The research assessed that consumer's continuance intention is influenced by the satisfaction and perceived usefulness. User's satisfaction in affected the confirmation of expectation from prior IS use and perceived usefulness. Post-acceptance perceived usefulness is determined by confirmation level.

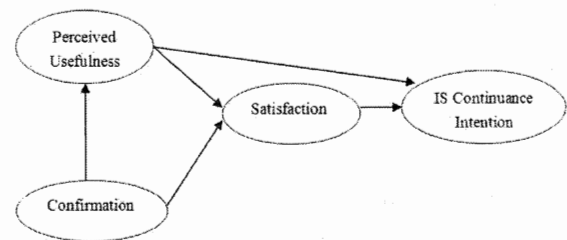


Figure 2. ECM Model of IS Continuance

Lin et al.(2004) investigated the value of

'playfulness' in expectation-confirmation model when studying continued usage of website. The results illustrated relationship between confirmation and perceived playfulness is positive. Simultaneously, perceived playfulness, perceived usefulness, satisfaction all contributed significantly to the continuance intention of a web site. Sophea and Luo(2008) suggested a conceptual model on the basis of ECM for testing the elements affecting the continuance intention of e-service and found there are positive relationships among the variables of ECT. In the meantime, the three additional variables: negative effect, complaint and recommendation are also verified in the research. Despite ECM and TAM focus on different aspects of user perceptions, Recker(2007) developed a hybrid research model to evaluate the determinants of continuance of process modeling technique. The result of study indicated perceived ease of use has significant impact on perceived usefulness.

III. Empirical Research Design

1. Research Model

Based the theoretical background above, ECM has emerged as a strong theoretical perspectives on the continued acceptance intention. In this study, the ECM model is chosen as the foundation of our developed model to evaluate the consumers' continued usage intention on the DMB services.

The research model is indicated in figure 3.

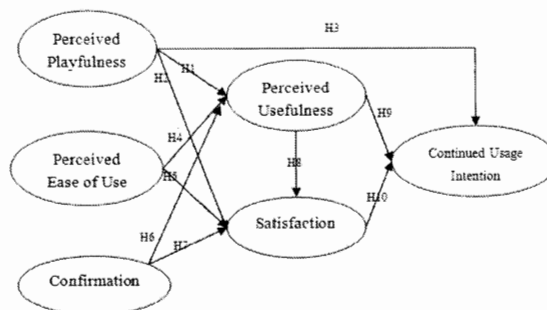


Figure 3. Research Model

2. Hypotheses

Chen et al.(2002) defined that playfulness is an important factor to motivate users to utilise a system. In addition, Moon and Kim(2001) regarded perceived playfulness as: 'The extent to which the individual Perceives that his or her attention is focused on the interaction with the World Wide Web; Is curious during the interaction; and Finds the interaction intrinsically enjoyable or interesting'. In this research, we adapt the perceived playfulness of as an independent variable, because DMB would bring enjoyment to people who watch mobile TV.

Li et al.(2005) confirmed perceived playfulness has positive influence on perceived usefulness by his empirical investigation of understanding individual adoption of instant messaging. Lin et al.(2004) and Thong et al.(2006) introduced a study for integrating perceived playfulness into expectation-confirmation model for web portal context and Information Technology. The result proved the perceived playfulness is positively associated with consumer's

satisfaction and continuance intention.

Therefore, we have following hypotheses.

H1 : Consumers' perceived playfulness will positively influence on perceived usefulness of DMB service

H2 : Consumers' perceived playfulness will positively influence on satisfaction of DMB service

H3 : Consumers' perceived playfulness will positively influence on continued usage intention of DMB service

Perceive ease of use is defined as 'the degree to which a person believes that using a particular system would be free of physical and mental effort'(Davis et al., 1989). Lippert and Forman(2005) employed a model for examining cognitive and experiential factors of post-adoption behavior of utilization of information technology and validated the relationship between PEOU and PU is positively.

Two hypotheses will be developed based on these related studies.

H4 : Consumers' perceived ease of use will positively influence on perceived usefulness of DMB service

H5 : Consumers' perceived ease of use will positively influence on satisfaction of DMB service

Bhattacharjee(2001) employed the ECM and TAM to evaluate customer satisfaction and continuance in the domain of IS research firstly. The model argued four key

elements: confirmation, perceived usefulness, satisfaction and users' continuance intention. It furnished an important and available tool for researching information systems continuance. We conducted the ECM and TAM as the foundation of research model in this empirical study.

The related hypotheses are therefore suggested as shown below based on the model such as ECM and TAM.

H6 : Consumers' level of confirmation will positively influence on perceived usefulness of DMB service.

H7 : Consumers' level of confirmation will positively influence on satisfaction of DMB service.

H8 : Consumers' perceived usefulness will positively influence on satisfaction of DMB service.

H9 : Consumers' perceived usefulness will positively influence on continued usage intention of DMB service.

H10 : Consumers' satisfaction will positively influence on continued usage intention of DMB service.

3. Measurement

In order to assess the post adoption behavior of mobile TV users and clarify the influencing factors of user's continued usage intention, all research variables are defined as follows in Table 1. Deriving from existing literature, although each variable demonstrates appropriate validity and reliability, it is also modified and

supplemented so as to fit the actual state of mobile TV in this study. All of the constructs used in our study are followed by a seven point scale anchored by '1 = very low' to '7 = very high' likert-scales.

Table 2. Operational Definition

Construct	Operational Definition	Item Code	Source
Perceived playfulness	The strength of one's belief that interacting with DMB service will fulfill user' intrinsic motives	PP 1-3	Moon and Kim(2001)
Perceived ease of use	The degree to which an individual believes that the DMB service is effortless to use	PE OU 1-3	Lippert and Forman(2005) Kim and Malhotra(2005)
Confirmation	Users' perception of the congruence between expectation of DMB service use and its actual performance	CON 1-3	Bhattacharjee (2001)
Perceived usefulness	User's perception of expected benefits of DMB service use	PU 1-3	Bhattacharjee (2001)
Satisfaction	Users' affect with (feelings about) prior DMB service use	SAT 1-3	Oliver (1980), Bhattacharjee (2001)
Continued Usage intention	Users' intention to continue using DMB service	CUI 1-3	Bhattacharjee (2001)

4. Data Collection

In the section of collecting sample, I build a survey for this study through distribute questionnaire in a variety of public spaces. Above all, a pre-test of the survey will be conducted for some small-samples from

DMB users. The pilot study issued to pre-test potential tasks and check the experimental protocol, which included survey items and interview questions. After the pre-test, the wording of some questions need be modified in order to non-response bias was tested and no statistically significant differences were found for the study variables between early and late respondents.

IV. Conclusion

Due to mobile technology's rapid development and the speedy diffusion of users, the mobile TV is becoming a major business model of entertainment industry. Likewise, 'How to maintain consumers repurchase or continue to use mobile TV service' has also been a necessary topic for companies and researchers. Although some related researches about mobile TV discussed the acceptant determinants of leading technology, market trends and service, few studies focused on continued usage after users adopted the mobile TV. Consequently, we considered the factors affecting continued usage as the essential elements of this study subsequent established research model and hypothesis.

In this study, on the basis of relevant literatures such as TAM and ECM, we adopt six variables (the perceived playfulness, perceived ease of use, confirmation, perceived usefulness, satisfaction, and continued usage intention)

in the research model. For investigating the model and hypotheses, we will perform an experiential survey to collect examples from DMB users in South Korea. And then, we will analysis the data though covariance-based structural equation modeling and the results will be discussed.

The major implications of this study are summarized as follows.

In this paper, we developed a empirical research model that composites considerable elements of related researches and contains the characteristics of post-acceptance mobile TV. In addition, most previous studies related to mobile TV focused on the aspects of technology or system. However, in contrast, we considered the user's cognitive aspects as our points of view for claimed research model in this study. After conscientious reviewed theories and literatures, the issued research model can be used in empirical research directly.

Even though we do not conduct an empirical test for supporting the issues, we proposed the conceptual model and hypotheses, and will be examined through empirical analysis in future research. Furthermore, with the purpose of adjusting to the domestic mobile TV market situation, the purposed model of this study will be modified or supplemented in order to provide a guideline to mobile TV service operators for maintaining users in a long-term, thereby getting sustaining profits.

References

- Bhattacharjee, A. and G. Premkumar, "Understanding Changes in Belief and Attitude Toward Information Technology Usage: A Theoretical Model and Longitudinal Test," *MIS Quarterly*, Vol.28, No.2, 2004, 229-254.
- Davis, F.D., R.P. Bagozzi, and P.R. Warshaw, "User Acceptance Of Computer Technology: A Comparison Of Two Theoretical Models," *Management Science*, Vol.35, 1989, 982-1003.
- Kim, S.S. and N.K. Malhotra, "A Longitudinal Model of Continued IS Use: An Integrative View of Four Mechanisms Underlying Postadoption Phenomena," *Management Science*, Vol.51, No.5, 2005, 741-755.
- Oliver, R. L. "A Cognitive Model of the Antecedents and Consequences of Satisfaction Decisions," *Journal of Marketing Research*, Vol.17, 1980, 460-469.
- Straub, D.W., M. Limayem, and E. Karahanna, "Measuring system usage: implications for IS theory testing," *Management Science*, Vol.41, 1995, 186-204.
- Chen, L.D., M. Gillenson, and D. Sherrell, "Enticing online consumers: An extended technology acceptance perspective," *Information and Management*, Vol.39, 2002, 705-719.
- Moon, J. W., and Y.G. Kim, "Extending the TAM for a World-Wide-Web context," *Information & Management*, Vol.38, No.4, 2001, 217-230.
- Lin, C.S., S. Wu, and R.J. Tsai, "Integrating perceived playfulness into expectation-confirmation model for web portal context," *Information and Management*, Vol.42, 2005, 683-693.
- Chea, S. and M.M. Luo, "Post-Adoption Behaviors of E-Service Customers: The Interplay of Cognition and Emotion,"

International Journal of Electronic Commerce,
Vol.12, No.3, 2008, 29-56.

Li, D., P.Y.K. Chau, and H. Lou,
"Understanding Individual Adoption of Instant
Messaging: An Empirical Investigation," Journal
of the Association for Information Systems,
Vol.6, No.4, 2005, 102-129.

Lippert, S.K. and H. Forman, "Utilization of
Information Technology: Examining Cognitive
and Experiential Factors of Post-Adoption
Behavior," IEEE Transactions on Engineering
Management, Vol.52, No.3, 2005, 513-523.

Kim, S.S and N.K. Malhotra, "A Longitudinal
Model of Continued IS Use: An Integrative
View of Four Mechanisms Underlying
Postadoption Phenomena," Management
Science Vol.51, No.5, 2005, 741-755.

Thong, J.Y.L., S. Hong, and K.Y. Tam, "The
Effects of Post-Adoption Beliefs on the
Expectation-Confirmation Model for
Information Technology Continuance,"
International Journal of Human-Computer
Studies, Vol.64, 2006, 799-810.