

What should the consumer care about 3G value-added services?

Hui-Ying Du

*School of Information Management, Beijing Information Science and Technology
University, Beijing, China
E-mail: huiyingdu@gmail.com*

As the market competition becomes increasingly intensive, and the profit from traditional voice services margins gradually declines. 3G telecom operators must provide various value-added services and enhance the ARPU (average revenue per user) depending on the consumer behavioral intentions. Therefore, this study uses the TAM (technology acceptance model) as the foundation to further understand consumer's behavioral intention to use 3G value-added services. After reviewing almost all the previous related papers, this study develops a conceptual model of customer adoption. The following conclusions can be reached from the research findings: (1) Twelve important factors are proposed, which are named perceived usefulness, perceived ease of use, perceived security, perceived price, use experience, perceived enjoyment, need for uniqueness, social influence, context and compatibility, gender, age and income; (2) The factors are separated to six types, including general perceptions, sacrifice perceptions, psychographics, applicability, social influence, demographics.

Keywords: Mobile Commerce; 3G Value-added Services; Technology Acceptance Model; Consumer Behavior Intention; Influence.

1. Introduction

Since the 1980s, the information industry in the world has been developed fast; telecom operators are stronger and stronger. Till Dec. 2011, the number of Chinese mobile users is reach 1 billion. However, the revenue of traditional voice is decreasing rapidly, accounting from 95% of the total revenue in 1999 to less than 50% in Dec. 2011. As the technology of mobile communication becomes more and more mature, Chinese communication has successfully leap from 2G to 3G, which means that the applications can no longer confined to the traditional voice service, but it need to supply more 3G value-added services in order to meet current consumers' need. The revenues of mobile communication accounting for the increasing proportion of GDP, Chinese mobile communication industry has made outstanding contributions to socio-economic development, while data services make an account for more than 50% of mobile communication business income.

Nowadays, there are many scholars researching on consumer behavior in mobile data services market, however, there are quite rare studies focused on the adoption of 3G services. This research focused on how to find the influence factors of the adoption of 3G value-added services in China.

2. Literature References

2.1. 3G value-added services

Third-generation (3G) wireless communication technology has faced China in 2008, which widened the bandwidth improved the speed and efficiency of data transmission. It brought people the high speed and convenient value-added services, such as higher wireless bandwidth and more diverse video and audio services, mobile payment, mobile blog, video call, video meeting, mobile internet access, mobile intranet/extranet access, customized infotainment, multimedia message service (MMS), location-based service, simple voice service and rich voice service.

2.2. IT adoption research

A variety of theoretical and empirical perspectives have been focus on the adoption of information technology innovations for the last two decades. Especially, as the prior study, Davis proposed the Technology Acceptance Model (TAM) and accumulated it by empirical analysis (Davis 1989)[1]. In TAM, Davis figured out that perceived usefulness and perceived ease of use are two significant factors to the intention infected by attitude.

Based on these models, considering more different factors, a lot of empirical analysis on all kinds of area were presented, such as www context (Heijden et al., 2004)[2], mobile booking service (Viswanath Venkatesh, 2003)[3], location-aware mobile guides (E. Kaasinen, 2005)[4], mobile internet (Hee-Woong Kim, 2005)[5], multipurpose information applications (Se-Joon Hong and Kar Yan Tam, 2006)[6], multimedia message service (MMS) (Chin-Lung Hsu, 2006)[7], mobile data usage (Timo Koivumäki, 2006)[8], mobile tickets (Niina Mallat et al., 2008)[9], e-banking (Wai-Ching Poon, 2008)[10], digital multimedia broadcasting (DMB) service (Kyung Hoon Kim, 2008)[11], short message service (SMS) (Brianna S. Fjeldsoe, 2009)[12], mobile shopping (His-Peng and Philip Yu-Jen Su, 2009)[13], web-based learning system (Wei-Tsong Wang, 2009)[14], mobile TV (Yoonhyuk Jung, 2009) et al [15], mobile data services (Huiying, 2010)[16].

Mathias (2007) pointed out that risk would be the most important in 3G market in Finland [17]. Gil Son Kim (2008) adopted TAM to the factors influencing consumer adoption of short message service in Korea. They found that perceived enjoyment, perceived monetary value, interface convenience and context controllability had significant impact on the SMS adoption, including perceived usefulness and perceived ease of use [18]. Hsi-Peng and Philip Yu-Jen Su (2009) took their interesting on the factors affecting purchase intention on mobile shopping web site in Taiwan based on the TAM [13]. The results demonstrate that anxiety, which is an affective barrier against using innovative systems, is a key negative predictor of a customer's intentions to use mobile phones. Also, enjoyment, usefulness, and compatibility have an impact on a customer's behavioral intentions. Huiying (2010) slowed her step on the behavioral intention to use mobile data services [16]. She found that the most important factor in increasing consumer's behavioral intention to use mobile data services is social influence, but security is demonstrated to not be significant in China.

3. Conceptual Framework and Hypothesis

3.1. General perceptions

General perceptions are including perceived usefulness and perceived ease of use. These two factors were studied the most frequently in this area of information system. From TAM(Davis, 1989), perceived usefulness is defined as the degree to which a person believes that using a particular system would enhance his or her job performance and perceived ease of use refers to the degree to which a person believes that using a particular system would be free of effort[1].

Heijden (2004) reported that perceived ease of use(PEU) has both a direct and an indirect impact through perceived usefulness (PU) on a respondent's intention to use hedonic information systems such as entertainment Web sites[2].Kim and Chan (2005) found PU had indirect impact on BI through perceived value on the model of VAM[5].Hong and Tam (2006) did big construction as following: PU didn't play a very important role of BI in mobile data services (MDS)[6]. Kim and Park (2008) presented that PU and PEOU affect consumer adoption of short message service directly, they also demonstrated the indirect effect of PEOU to BI through PU [18]. Kuo and Yen (2008) pointed out that perceived usefulness had no directly significant effect on behavioral intention to 3G value-added services [19]. Niina Mallat and Matti Rossi (2009) figured out that PU only impact on use intention indirectly through

use context on mobile ticketing [9]. Huiying(2010) pointed that perceived usefulness had important impact on behavior intention while ease of use were not quite significant in Chinese mobile data services[16]. So the following is proposed:

Hypothesis1: PU has a positive effect on the 3G value-added services adoption intention.

Hypothesis2: PEU has a positive effect on the 3G value-added services adoption intention.

Hypothesis3: PEU has a positive effect on perceived usefulness.

3.2. Sacrifice perceptions

Sacrifice perceptions are including many factors in previous research, such as money cost, time spending, economics, private, trust and security and so on. In this research, we focus on perceived price (PP) and perceived security (PS).

Cheung and Lee (2000) proposed a theoretical model of trust in Internet shopping [20]. Chellappa and Pavlou (2002) showed that the future of electronic commerce depended on controlling information security threats, enhancing consumer security perceptions, and building trust [21]. Gefen et al. (2003) showed that consumer trust was as important to online commerce [22]. Wu and Wang (2005) showed that perceived risk have been found to have a significant negative effect on mobile commerce and technology adoption [23]. Hong and Tam (2006) pointed out that PP played the third important role of BI [6]. Niina Mallat and Matti Rossi (2006) showed that PS strongly effected on use intention. However, PP was not a significant determinant of mobile ticking adoption [9]. Kim and Chan (2007) found PP played most important role of impact on BI through perceived value on the model of VAM[24]. In Poon's study (2008) on the e-banking services, he revealed that privacy and security played the most important roles in determining the users' acceptance. As well as, the other result revealed that user's perceived price had an impact on the adoption of e-banking services [6]. Shin (2009) showed that users' attitudes and intentions were influenced by perceived security and trust [25]. Huiying (2010) pointed that PP played the second important role in behavior intention on MDS in China, while PS had no significant effect on BI [16]. So the following hypothesis was proposed:

Hypothesis4: PP has a negative effect on the 3G value-added services adoption intention.

Hypothesis5: PS has a negative effect on the 3G value-added services adoption intention.

3.3. Psychographics

There are various determinants as the role of psychographics to discuss behaviors in information systems, psychology, and consumer behavior research. In this study, we focus on two applicability beliefs, named perceived enjoyment (PE) and need for unique (NU).

Venkatesh (2000) found that PE might have an indirect impact on intention via PEOU. Kim and Chan (2005) found PE had indirect impact on BI through perceived value [5]. Hong and Tam (2006) found PE played the most important role of BI. It also had a strong impact on PU and PEOU [6]. Meanwhile, they had a result that NU had an impact on BI but had no indirect impact through PU. In 2007, Chu and Lu suggested that perceived enjoyment affected the loyalty of online game and online music customers [26]. They demonstrated that PE had a direct impact on online adoption and indirect impact through PU and PEOU. Kim and Park (2008) presented that PE played a most important role of the influence of consumer adoption [18]. Kim and Ko(2008) resulted that perceived enjoyment had significant impact on the adoption across respondents in all three countries including Japan, Korea and Germany[11]. Lu and Su (2009) found that PE was the most important role on the impact of consumer's behavioral intention on mobile shopping web site [13]. So the following is proposed:

Hypothesis6: PE has a positive effect on the 3G value-added services adoption intention.

Hypothesis7: PE has a positive effect on PU.

Hypothesis8: PE has a positive effect on PEOU.

Hypothesis9: NU has a positive effect on the 3G value-added services adoption intention.

Hypothesis10NU has a positive effect on PU.

3.4. Applicability

In this study, we focus on two applicability beliefs, named network context compatibility (CC) and use experience (UE). Compatibility refers to the degree to which an innovation is perceived to be consistent with the values, past experiences, and needs of potential adopters (Roger, 1995) [27].

Lin (2003) found that compatibility had a positive effect on the diffusion of online games. He presented that user experience had both direct impact on behavior adoption and indirect influence though PEOU [28].Tan and Chou (2007) found that perceived technology compatibility to influence users' perceived playfulness and PU. Furthermore, perceived technology compatibility significantly mediated the relationship between perceived service quality and

perceived playfulness [29]. Poon (2008) figured out that using context and network speed became as important as the perceived usefulness in TAM [6]. Kim and Park (2008) presented that the impact of network context was no significant on continued intention to use short message services [18]. Lu and Su (2009) found that compatibility played an important role of behavioral intention on mobile shopping [13]. So the following is proposed:

Hypothesis11: CC has a positive effect on the 3G value-added services adoption intention.

Hypothesis12: CC has a positive effect on perceived usefulness.

Hypothesis13: UE has a positive effect on the 3G value-added services adoption intention.

Hypothesis14: UE has a positive effect on perceived ease of use.

3.5. Social influence

Social influence (SI) was defined as the extent to which users believe that “important others” would approve or disapprove of their performing a given behavior (Ajzen 1991) [30]. Niina Mallat and Matti Rossi (2005) pointed out that social influence, in terms of other peoples’ recommendations and perception of approved behavioral patterns was a strong determinant of adoption [9]. As Nysveen et al. (2005) showed, people uses mobile services in a public social context in which they observes others’ activities and in which they must adapt to others’ interactions[31].

Hong and Tam (2006) found that SI was strongly impact on BI, whose effect was just lower than PE. As well as it had a significant influence on PU [6]. In addition, previous studies consistently showed that social influence could determine individuals’ behaviors (Venkatesh & Morris, 2003) [3]. Specifically, Shin (2007) found that social influence (subjective norm) was a determinant in the unique feature of mobile Internet via mobile devices [25]. Kim and Ko (2008) proposed that social interaction also positively influenced attitude toward using DMB service [11]. Timo and Annu (2008) demonstrated that the impact of social influence toward on mobile services was significant [8]. Huiying (2010) pointed that social influence played the most important role in behavior intention on MDS in China [16]. It is notable that social influence was found to have no significant effect on the mobile payment purchasing intention in Shin’s (2009) study [25]. Thus, we propose the following:

Hypothesis15: SI has a positive effect on the 3G value-added services adoption intention.

Hypothesis16: SI has a positive effect on PU.

3.6. Demographics

Zmud(1979) said that demographics are important during the study of IT adoption, especially gender and age[32]. Brancheau and Wetherbe (1990), Rogers (1995) all demonstrated that age played a significant role in choosing whether to use new products or not [27]. Areni and Kiecker(1993) presented that male were more interesting in IT products, they were more positive and risk appetite[33].Whitley(1997) and Venkatesh(2000) concluded that age and gender could impact BI significantly[34][35]. Morris (2000) said that male was more preferred to use new IT products [36]. At the same time, he pointed out that age had an important impact on behavior intention. Gefen and Straub (2003) proposed that there was a big difference between male and female while adoption IT and using perceived [22]. In Schiffman and Kanuk' s (2004)study, we know that people with higher income are more positive to select new IT products, including mobile data services [37]. Hong and Tam (2006) told us that the behavior on purchasing MDS was quite different between male and female, while people in different age might have the same behavior [6]. In Poon's study (2008) on the e-banking services, he revealed that privacy, security and other factors play an important role in determining the users' acceptance with respect to different segmentation of age group, education level and income level [10]. Huiying (2010) figured out that age and income played important roles in behavior intention of mobile data services, while there was no significant difference between men and women [16]. So the following hypothesis was proposed:

Hypothesis17: Men are more likely than women to adopt the 3G value-added services.

Hypothesis18: Younger persons are more likely than older persons to adopt 3G value-added services.

Hypothesis19: Higher income persons are more likely to adopt 3G value-added services.

3.7. Creating the conceptual model

Based on the review of the prior studied, we proposed the 19 hypothesis and established the conceptual model showed on Fig. 1.

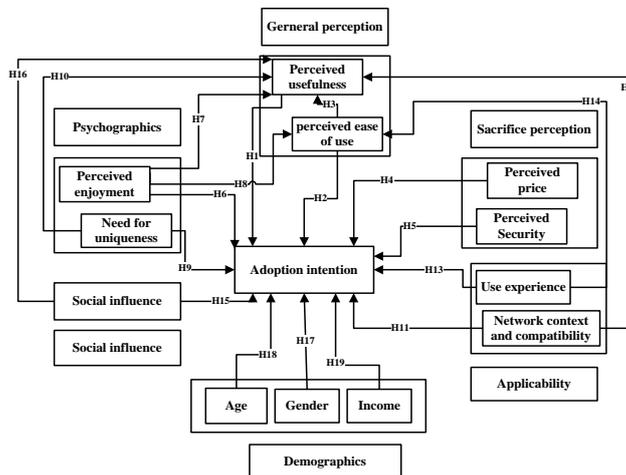


Fig. 1 Value-added services adoption intention model

4. Conclusion

For here, this research demonstrated most of the studies on the consumer intention of 3G value-added services, developed conceptual model based on TAM and the conclusions of current studies. This model proposed twelve important factors impacted on consumer adoption, including perceived usefulness, perceived ease of use, perceived security, perceived price, use experience, perceived enjoyment, need for uniqueness, social influence, context and compatibility, gender, age and income. Then the factors are separated to six types, including general perceptions, sacrifice perceptions, psychographics, applicability, social influence, demographics.

The model of consumer adoption on 3G value-added services in China constructed in this paper has a great significant meaning for the development and promotion of 3G value-added services. For operators and service providers, they can better understand the user's needs and expectations through the influence factors of purchasing behavior to improve the business service and launch the business that consumers prefer to use with developing a more reasonable price.

The 3G telecom service market in Taiwan is still under development. Sampling all the practical users of 3G value-added services was not feasible. Due to time constraints, this study couldn't take an empirical study. Future studies could make an in-depth investigation when consumers have a higher level of involvement in 3G value-added services to acquire more objective

arguments. Thus, follow-up studies could compare the differences in behavioral intention between different user groups, as well as compare the factors between 2G mobile data services and 3G value-added services.

Acknowledgments

The paper is supported by scientific research project of Beijing Municipal Education Commission (NO.SM201511232004), Key project of science and technology program of Beijing Municipal Education Commission (NO.KZ201411232036) and The National Natural Science Fund (NO.71571021).

References

1. Davis, D. Perceived usefulness, perceived ease of use, and acceptance of Information technology [J]. *MIS Quarterly*, 1989, 319-340.
2. Van der Heijden, H. User acceptance of hedonic information systems. *MIS Quart.* 2004. 28(4) 695–704.
3. Viswanath Venkatesh, Michael G. Morris, Gordon B. Davis, Fred D. Davis. User acceptance of information technology: toward a unified view, *MIS Quarterly*, 2003, 27 (3). 425-47.
4. E. Kaasinen. User acceptance of location-aware mobile guides based on seven field studies *Behaviour & Information Technology*, 2005, 24(1), 37-49.
5. Hee-Woong Kim, Hock Chuan Chan. Value-based Adoption of Mobile Internet: An empirical investigation [J]. *Decision Support Systems*. 2005. (14):111–126.
6. Se-Joon Hong, Kar Yan Tam, Understanding the Adoption of Multipurpose Information Appliances: The Case of Mobile Data Services [J]. *Information Systems Research*, 2006, 17(2):162-179.
7. Chin-Lung Hsu, Hsi-Peng Lu, Huei-Hsia Hsu. Adoption of the mobile Internet: An empirical study of multimedia message service (MMS). *The international journal of management science* 2007; 35:715–726.
8. Timo Koivumäki, Annu Ristola, Manne Kesti. The perceptions towards mobile services: an empirical analysis of the role of use facilitators. *Pers Ubiquit Comput* (2008) 12:67–75.
9. Niina Mallat, Matti Rossi, Virpi Kristiina Tuunainen, Anssi Oksanen. An empirical investigation of mobile ticketing service adoption in public transportation. *Pers Ubiquit Comput* (2008) 12:57–65.
10. Wai-Ching Poon. Users' adoption of e-banking services: the Malaysian

- perspective. *Journal of Business & Industrial Marketing* 23/1 (2008) 59–69.
11. Kyung Hoon Kim, Eunju Ko, Ikuo Takahashi, Ralf Schellhase, Myung Soo Kim, Chang Han Lee. A Model of Adoption of Digital Multimedia Broadcasting (DMB) Service: Comparisons in Korea, Japan, and Germany. *Psychology & Marketing* 2008; 25(8): 806–820.
 12. Brianna S. Fjeldsoe, Alison L. Marshall, Yvette D. Miller. Behavior change interventions delivered by mobile telephone short-message service. *American Journal of Preventive Medicine* 2009;36(2):165–173.
 13. Hsi-Peng Lu and Philip Yu-Jen Su. Factors affecting purchase intention on mobile shopping web sites[J]. *Internet Research*. 2009.19 (4):442-458.
 14. Wei-Tsong Wang, Chun-Chieh Wang. An empirical study of instructor adoption of web-based learning systems. *Computers & Education*. 2009, 53:761–774.
 15. Yoonhyuk Jung, Begona Perez-Mira, Sonja Wiley-Patton. Consumer adoption of mobile TV: Examining psychological flow and media content. *Computers in Human Behavior* 25 (2009) 123–129.
 16. Huiying Du. An empirical study of consumer adoption on mobile data services(MDS) in China, MMIT2010, Jan. 2010.
 17. Mathias Tallberg, Heikki Ha 'inma ' inen, Juuso Toyli, Sauli Kamppari, Antero Kivi. Impacts of handset bundling on mobile data usage: The case of Finland. *Telecommunications Policy* 31 (2007) 648–659.
 18. Gil Son Kim and Se-Bum Park. An examination of factors influencing consumer adoption of short message service (SMS). *Psychology & Marketing*. 2008. Vol. 25(8): 769–786.
 19. Ying-Feng Kuo , Shieh-Neng Yen. Towards an understanding of the behavioral intention to use 3G mobile value-added services. *Computers in Human Behavior*. 2009:103-110.
 20. Cheung, C., and Lee, M.K.O. Trust in Internet shopping: A proposed model and measurement instrument. In H.M. Chung (ed.), *Proceedings of the Sixth Americas Conference on Information Systems*. Atlanta: Association for Information Systems, 2000, pp. 681–689.
 21. Chellappa, R.K., and Pavlou, P.A. Perceived information security, financial liability and consumer trust in electronic commerce transactions. *Logistics Information Management*, 15, 5–6 (2002), 358–368.
 22. Gefen, D.; Karahanna, E.; and Straub, D. Trust and TAM in online shopping: An integrated model. *MIS Quarterly*, 27, 1 (2003), 51–90.
 23. Wu J-H, Wang S-C (2005) What drives mobile commerce? An empirical evaluation of the revised technology acceptance model. *Inf Manage* 42:719–729.

24. Hee-Woong Kim, Hock Chuan Chan, Sumeet Gupta. Value-based Adoption of Mobile Internet: An empirical investigation. *Decision Support Systems* 43 (2007) 111–126.
25. Dong-Hee Shin. Towards an understanding of the consumer acceptance of mobile wallet. *Computers in Human Behavior* 25 (2009) 1343–1354.
26. Chu, C.W. and Lu, H.P. (2007), “Factors influencing online music purchase intention in Taiwan: an empirical study based on the value-intention framework”, *Internet Research*, Vol. 17 No. 2, pp. 139-55.
27. Rogers, E. *Diffusion of Innovations*, 4th ed. Free Press, New York, 1995.
28. Wang, Y.S., Wang, Y.M., Lin, H.H. and Tang, T.I., “Determinants of user acceptance of internet banking: an empirical study”, *International Journal of Service Industry Management*, 2003, 14 (5), 501-19.
29. Felix B. Tan and Jacky P.C. Chou. The Effects of Mobile Service Quality and Technology Compatibility on Users’ Perceived Playfulness. *Human-Computer Interaction*, 2007, 5(4553), 1029–1038.
30. Ajzen, The theory of planned behavior. *Organ. Behavior Human Decision Processes*, 1991, 50 179–211.
31. Nysveen, H., Pedersen, H., Thorbjornsen, H., & Berthon, P. Mobilizing the brand. *Journal of Service Research*, 2005, 7(3), 257–276.
32. Zmud, R. Individual differences and MIS success[J]. *Management Sci*, 1979, 25(10):966–979.
33. Areni, C. S., P. Kiecker. Gender differences in motivation. J. A. Costa, ed. *Gender and Consumer Behavior*[J]. University of Utah Printing Service, Salt Lake City, UT, 1993, 30–43.
34. Whitley, B. Gender differences in computer related attitudes and behaviour: A meta-analysis. *Comput. Human Behav*, 1997, 13(1):1–22.
35. Venkatesh V, Davis F D. A theoretical extension of the technology acceptance model: Four longitudinal field studies[J]. *Management Science*, 2000, 46 (2) : 186 - 204.
36. Venkatesh, V., & Morris, M. G. Why don’t men ever stop to ask for directions? Gender, social influence, and their role in technology acceptance and usage behavior. *MIS Quarterly*, 2000, 24(1), 115–139.
37. Schiffman, L., L. Kanuk. *Consumer Behavior*, 8th ed. Pearson Education, Upper Saddle River, NJ. 2004.