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MOBILE SERVICES IN HUBEI: ADOPTION MODEL AND EMPIRICAL ANALYSIS

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Abstract

Mobile Commerce has developed rapidly in China with the characters of ubiquity, location relevance, convenience and personalization. The researches on technology, value chain, business models, user adoption have become a hot topic among academics.

Based on the classical Davis' TAM theory and the expansions of it, and the predecessors' research on perceived enjoyment and perceived cost, this study builds an adoption model of Mobile value-added services in Hubei Province. In the variety of individual mobile value-added business, four most commonly used services are extracted in this study, including Mobile Instant Message, Multimedia Messaging Service, WAP Web browse and Multi-media Downloads to represent the overall situation.

According to the result of empirical analysis based on valid data of questionnaires, perceived enjoyment and perceived cost are the most influential factors. Six of the seven hypotheses in this study are verified.

Keywords: Mobile value-added services, User adoption, Mobile Commerce

Introduction

The research on user adoption has been a hot topic in the field of information systems and e-commerce. Similarly, in the research on mobile services, building an adoption model can extract the mainly influencing factors of users' acceptance, help to improve the degree and speed of acceptance of mobile services. This study, combines with the specific level of Hubei Province, builds an adoption model and makes an empirical analysis.

Mobile value-added services can be divided into four main categories [1]. There are mobile trades, mobile real-time communication, mobile entertainment and mobile information. Mobile trades include mobile payments, phone booking and so on; Real-time communication are the services that like mobile MSN, phone mail, etc.; Entertainment services contain ringtones, pictures, multimedia downloads; Information services provide kinds of information, including weather forecasts, mobile stock markets and so on.

Based on the survey on mobile services acceptance level in Hubei Province, some of the

services has been deeply penetrated into the daily lives of consumers, such as MMS; but some new services are still in the introduction period, such as mobile business street. So, in this study, four most commonly used services are extracted to represent the overall situation. The four mobile applications are mobile instant message, multimedia messaging service, WAP web browse and multi-media downloads.

Research model and hypotheses

TAM: In the research on user acceptance of information systems, Davis[2] put forward his technology acceptance model. Two main determining factors of user acceptance in TAM are perceived usefulness and perceived ease of use[2][3]. When customers use value-added services, if the users feel that the business will help improve their own efficiency, the actual frequency of use will be greater. In the other hand, if the service is easy to use for customers, the actual use will be more. Another view of TAM is that users' perceived ease of use has an effect on the perceived usefulness. So, this study gets following 3 hypotheses based on TAM.

H1a: Perceived ease of use is significantly related to adoption intention.

H1b: Perceived usefulness is significantly related to adoption intention.

H1c: Perceived ease of use significantly has an effect on perceived usefulness.

Perceived Enjoyment: Moon and Kim introduce perceived enjoyment use in TAM[4]. The result discovered that, added this variable the model had the higher explanation degree compared to the original model[4][5]. It explained that the perceived enjoyment also is an important influence factor of user acceptance. In this study, perceived enjoyment is defined as the degree that the mobile service can bring joyful to the user. It is similar with the TAM in a conclusion that perceived ease of use significantly affects perceived usefulness, perceived ease of use also has the influence to perceived enjoyment[1]. If the service operation is complex, the user possibly loses the interest to it, namely reduced user's perceived enjoyment. This article proposes following hypotheses based on the definition of perceived enjoyment.

H2a: Perceived enjoyment is significantly related to adoption intention.

H2b: Perceived ease of use significantly affects perceived enjoyment.

Perceived Cost: In predecessor's research, the negative price brought by using service usually is divided into the cost and the risk[1][6]. In this study, the cost and risk are combined into a general perceived cost which is another important influence factor of user acceptance. Then, on the other hand, if the user thought some service to oneself extremely useful, he/she may accept a higher cost. It is said that the perceived usefulness affects the customer's perception of price. Following hypotheses are proposed based on the definition of perceived cost.

H3a: Perceived cost is significantly related to adoption intention.

H3b : Perceived usefulness significantly affects perceived cost.

Based on the discussions above, an adoption model of Mobile value-added services in Hubei Province is proposed in Figure 1. In this model, which contains 7 hypotheses, there are four possible determinants of intended use of mobile value-added services: perceived usefulness, perceived ease of use, perceived enjoyment, and perceived cost.

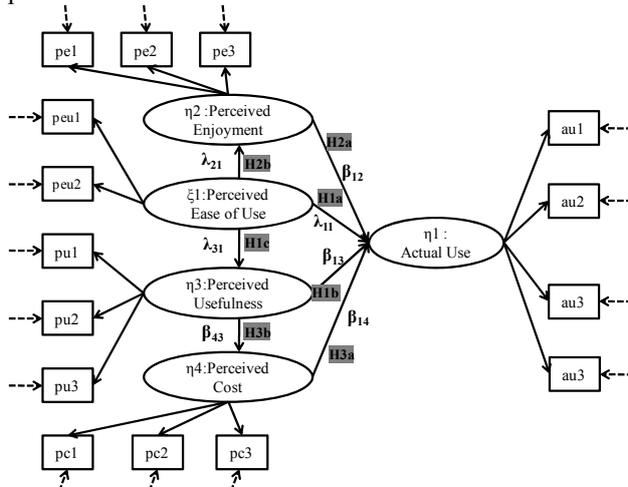


Figure 1 Adoption Model of Mobile Value-added Services

Data analysis and results

This study is a questionnaire-based empirical study. According to the research model, a questionnaire was designed, which contained the statements using a five-point Likert-scale with 1 as “disagree” and 5 as “agree”. In the survey of EMBA, MBA, PhD, Masters of management school of HUST and other social personnel, 334 questionnaires were received. Excluding incomplete and inconsistent questionnaires, we had 188 final useful samples. Out of the 188 useful samples, 83% was male and 17% was female. With respect to age groups, the highest percentage of the respondents was 20-25 and 36 - 40 age groups. The

background of respondents is summarized in Table1.

Table1 Background of research samples

Variable	Classification	Number of samples	Percentage (%)	Cumulative (%)
Gender	Male	156	83	83
	Female	32	17	100
Age	<=25	40	21.3	21.3
	26-30	27	14.3	35.6
	31-35	34	18.1	53.7
	36-40	47	25	78.7
	>=41	40	21.3	100
Education	Associate degree	91	48.4	48.4
	Bachelor	39	20.7	69.1
	Master or greater	31	16.5	85.6
	Other	27	14.4	100
Monthly income	RMB<=2000	35	18.6	18.6
	RMB2000-4000	51	27.1	45.7
	RMB4000-6000	31	16.5	62.2
	RMB6000-8000	27	14.4	76.6
	RMB>=8000	44	23.4	100
Monthly phone charge	RMB<=50	16	8.5	8.5
	RMB50-100	37	19.7	28.2
	RMB100-300	49	26.1	54.3
	RMB300-1000	69	36.7	91
	RMB>=1000	17	9	100

Put the useful data into computer, we conducted principal component factor analysis on the five independent latent variables with VARIMAX rotation as in table 2[7].

Table2 Rotated Factor Loading Matrix

Component	Factor				
	1	2	3	4	5
au1	0.89	0.11	0.10	0.15	0.10
au2	0.87	0.26	0.07	0.10	0.11
au3	0.89	0.25	0.01	0.14	0.06
au4	0.88	0.06	0.01	0.06	0.11
pc1	0.06	-0.04	0.84	0.03	-0.08
pc2	0.05	0.03	0.80	-0.12	-0.11
pc3	0.04	-0.19	0.77	-0.11	0.12
pe1	0.27	0.46	-0.20	0.62	0.10
pe2	0.19	0.25	-0.12	0.79	-0.04
pe3	0.03	-0.16	0.00	0.73	0.05
peu1	0.24	0.31	-0.22	0.11	0.73
peu2	0.09	-0.04	0.06	-0.01	0.91
pu1	0.28	0.81	-0.19	0.09	-0.02
pu2	0.14	0.90	0.00	0.07	0.06
pu3	0.14	0.89	-0.03	0.01	0.12
eigenvalue	3.43	2.84	2.10	1.64	1.46
% of Variance	23%	19%	14%	11%	10%
Cumulative %	23%	42%	56%	67%	76%
Cronbach's α	.920	.885	.735	.633	.617

The results showed that a total of five factors with eigenvalue greater than 1.0 were identified. All items of the variables loaded on each distinct

factor and explained 76% of the total variance. All variables showed convergent validity with factor loadings above 0.6. It shows that the sample has a good validity.

We use Cronbach's α to measure the reliability of our research instrument. It has been recommended that "the internal consistency, as measured by the Cronbach's α , should be at least 0.60 for a self-report instrument to be reliable and at least 0.8 when used as a screening instrument"[8][9]As shown in table 2 the Cronbach's α of our instrument ranges from 0.617 to 0.920, indicating a medium high to high reliability.

The Structural Equation of this study is:

$$\begin{cases} \eta_1 = \beta_{12}\eta_2 + \beta_{13}\eta_3 + \beta_{14}\eta_4 + \lambda_{11}\xi_1 + \zeta_1 \\ \eta_2 = \lambda_{21}\xi_1 + \zeta_2 \\ \eta_3 = \lambda_{31}\xi_1 + \zeta_3 \\ \eta_4 = \beta_{43}\eta_3 + \zeta_4 \end{cases} \quad (1)$$

In this equation, $\eta_1, \eta_2, \eta_3, \eta_4$ represent the four endogenous variables Actual Use, Perceived Enjoyment, Perceived Usefulness and Perceived Cost; ξ_1 represents the exogenous variable Perceived Ease of Use; γ, β is the path coefficient, ζ is the errors.

Further analysis then will be made in path analysis software LISREL8.7 to determine the every coefficient. Put the code into computer, we got following result:

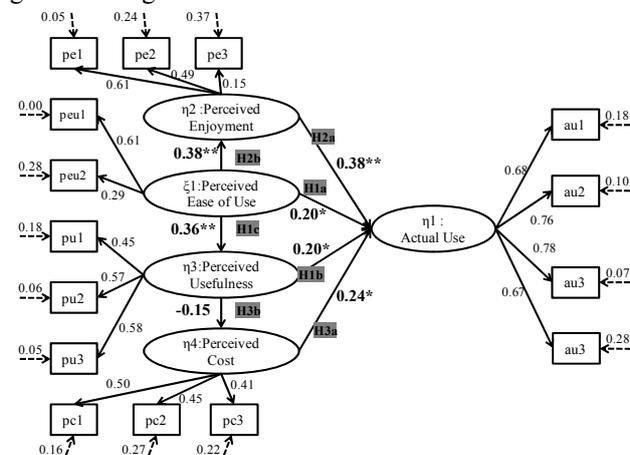


Figure2 Path Analysis Results

Figure2 shows the results of the Path Analysis. First, Perceived ease of use is significantly related to perceived enjoyment and perceived usefulness. Thus, H2b and H1c are supported. Next, the four factors are found to be significantly related to adoption intention: Perceived Enjoyment, Perceived Ease of Use, Perceived Usefulness and Perceived Cost .Thus, H2a, H1a, H1b and H3a are supported. It is also can be find that the relation between Perceived Usefulness and Perceived Cost is not significant. Table 3 shows that six of seven hypotheses in the model are supported.

Table3 Hypothesis testing results.

Hypothesis	Coefficient	Supported
H2a: Perceived enjoyment is significantly related to adoption intention.	.38	✓
H2b: Perceived ease of use significantly affects perceived enjoyment.	.38	✓
H1c: Perceived ease of use significantly have an effect on perceived usefulness.	.36	✓
H3a: Perceived cost is significantly related to adoption intention.	.24	✓
H1b: Perceived usefulness is significantly related to adoption intention.	.20	✓
H1a: Perceived ease of use is significantly related to adoption intention.	.20	✓
H3b: Perceived usefulness significantly affects perceived cost.	<.20	

Conclusions

In this paper, the empirical research results show that Perceived enjoyment, Perceived cost, perceived ease of use and Perceived usefulness are all significantly related to the adoption Of mobile value-added services, while Perceived enjoyment and Perceived cost are the two most important factor.

This is because, First, general mobile value-added services are closer to entertainment systems rather than practical systems. Perceived enjoyment has a more significant impact on users' adoption than perceived usefulness. Second, to college students as the main consumer groups, cost and safety must be important considerations.

In previous studies, perceived cost and perceived risk (or perceived security) are the two factors which are negatively related to adoption. In this study, the cost and risk are combined into a general perceived cost. In this way, users do not have to identify the negative impact is from the price or security. This point still needs a number of examples and theory to support, it calls for future research on exploring more accurate classification of the influence factors.

This study extracts four most commonly used services, which are mobile instant message, multimedia messaging service, WAP web browse and multi-media downloads, to represent the overall situation of mobile services. Future research could also find a more accurate representation of the actual use.

Acknowledgement. This paper is supported by the Chinese National Science Foundation Important Program (No. 70731001).

References

[1] Fang, X. W., Chan, S., Brzezinski, J., et al. Moderating effects of task type on wireless technology acceptance [J]. *Journal o*

- f Management Information Systems*, 2005, 22 (3): 123-157.
- [2] Davis, F. D. Perceived usefulness, perceived ease of use, and user acceptance of information technology [J]. *MIS Quarterly*, 1989, 13 (3): 319-340.
- [3] Davis, F.D., Bagozzi, R., Warshaw, P. User Acceptance of Computer Technology: A Comparison of Two theoretical Models [J]. *Management Science*, 1989, 35 (8): 982-1003.
- [4] Moon, J., Kim, Y. Extending the TAM for a world-wide-web context [J]. *Information & Management*, 2001.
- [5] Tsang, M. M., Ho, S. C., Liang, T. P. Consumer attitudes toward mobile advertising: An empirical study [J]. *International Journal of Electronic Commerce*, 2004, 8 (3): 65-78.
- [6] Amberg, M., Hirschmeier, M., Wehrmann, J. The Compass Acceptance Model for the Analysis and Evaluation of Mobile Services [J]. *International Journal of Mobile Communications*, 2004, 2 (3): 248-259.
- [7] Kaiser, H. F. An index of factorial simplicity. *Psychometrika* [J]. 1974.
- [8] J.C. Nunnally, I.H. Bernstein, *Psychometric Theory*, 3rd ed., McGraw Hill Book Co, New York, 1994.
- [9] Lee, C.-C., Cheng, H. K., Cheng, H.-H. An empirical study of mobile commerce in insurance industry: Task-technology fit and individual differences [J]. *Decision Support Systems*, 2007, 43 (1): 95-110.
- [10] Klopping, I. M., McKinney, E. Extending the Technology Acceptance Model and the Task-Technology fit Model to Consumer E-Commerce [J]. *Information Technology, Learning, and Performance Journal*, 2004, 22 (1): 36-47.
- [11] Dahlberg, T., Mallat, N., ?rni, A. Trust enhanced technology acceptance model- consumer acceptance of mobile payment solutions [C]. *Proceedings of the Stockholm Mobility Roundtable*, Stockholm, 2003.
- [12] Lu, J., Yu, C.-S., Liu, C., et al. Technology acceptance model for wireless Internet [J]. *Internet Research*, 2003, 13 (3): 206-222.
- [13] Kleijnen, M. H. P., Wetzels, M., Ruyter, K. d. Consumer acceptance of wireless finance [J]. *Journal of Financial Services Marketing*, 2004, 8 (3): 206-217.
- [14] Pavlou, P. A., Lie, T. What Drives Mobile Commerce? A Model of Mobile Commerce Adoption. [C]. *Proceedings of the "Twenty Seventh International Conference on Information Systems"* (ICIS 2006), Milwaukee, Wisconsin, U.S.A, 2006.
- [15] Bedford, D. W. Empirical investigation of the acceptance and intended use of mobile commerce: location, personal privacy and trust [D]. *College of Business and Industry, Mississippi State University, Doctoral Dissertation*, 2005.
- [16] Seo, J. H., Moon, H. C., Oh, H. J. An empirical study on the determinants affecting the adoption of the next-generation mobile services in Korea [J]. *Journal of Korea Trade*, 2007, 11 (3): 1-22.
- [17] Mallat, N., Rossi, M., Tuunainen, V. K., et al. An empirical investigation of mobile ticketing service adoption in public transportation [J]. *Personal and Ubiquitous Computing*, 2008, 12 (1): 57-65.
- [18] Okazaki, S., Taylor, C. R. What is SMS advertising and why do multinationals adopt it? Answers from an empirical study in European markets [J]. *Journal of Business Research*, 2008, 61 (1): 4-1