Analysis of College Students Adopting Mobile E-commerce

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Key words: mobile e-commerce, adopting behavior, application

Abstract. This paper is based on the the technology acceptance model (TAM), with reference to the theory of reasoned action (TRA) and theory of planned behavior(TPB). Subjective norm is added as intermediary variable, and the independent variables include perceived risk, perceived cost, external influence, social influence, innovation, affinity, compatibility. Meanwhile, test is applied to the theoretical model and hypothesis, thus the final updated model comes into being. According to the study, perceived usefulness, perceived ease of use, social influence, subjective norm, innovation and compatibility will positively influence consumers' intention to do mobile shopping, while perceived cost will affect consumers' intention to do mobile shopping in a negative way.

1 Introduction

With the development of mobile network infrastructure and mobile terminal devices, mobile commerce is emerging rapidly and infiltrate into every aspect of people's lives. The competition between mobile commerce business is also growing, whether it can gain favor of customers among competitors and maintain and improve customer loyalty has become the key to the success of mobile commerce enterprises. China`s mobile internet is deeply influencing people`s daily life. In 2014, the market size of China`s mobile internet is over 100 billion and the marker share of mobile e-commerce ranks first, reaching nearly 40%. It is estimated that the market scale of the whole mobile internet will rise to 600 billion, and the proportion of mobile e-commerce will increase as well. College students are of great significance on mobile e-commerce. Despite the limited consuming power, college students will become the main force in the use of mobile online shopping after stepping into society. If college students have developed the habit of doing mobile online shopping on campus, then they will become the stable customer group to mobile-commerce enterprises. Therefore, the main purpose of this paper is to analyze the factors affecting students` intention in their first mobile online shopping.

This paper takes the associated application of mobile e-commerce among students from a college in Xi`an as research subject, and builds theoretical model and hypothesis of this research towards college students in this area. The theoretical model is based on the technology acceptance model (TAM), with reference to the theory of reasoned action (TRA) and theory of planned behavior(TPB). Subjective norm is added as intermediary variable, and the independent variables include perceived risk, perceived cost, external influence, social influence, innovation, affinity, compatibility. It is the first time domestically that there has been research on individual innovation, intimacy and compatibility in the field of mobile shopping.

2. Building of the model and proposal of the hypothesis

2.1 Building of the model

Mobil e-commerce business is based on mobile and internet technology and it is a way of marketing towards the ultimate customers. A number of researches at home and abroad have demonstrated that the technology acceptance model (TAM) can also be applied to the research of the adoption behavior of mobile e-commerce. To investigate the main factors influencing consumers` adoption decisions and obtain a series of conclusions explaining consumer behavior is of great significance to study the mobile e-commerce among college students. For customers, the acceptance of mobile e-commerce is similar to that of computer information technology. Since the technology acceptance model is the most widely used model in research on factors affecting individual adopting information and technology, we can totally use this model to study the key

factors influencing consumers accepting mobile e-commerce model. Taking TAM as the basic model; introducing individual factors, internet experience, perceived usefulness, perceived ease of use, perceived risk and mobile commerce attitudes, in order to put forward a more comprehensive conceptual model of college students` adoption of mobile e-commerce. As shown in Figure 1.

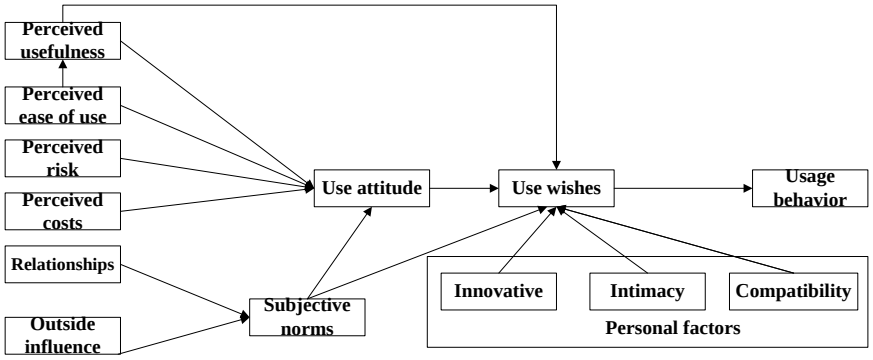

Figure 1 Model of college students` adoption of mobile e-commerce

This model follows the framework of technology acceptance model(TAM). Using attitude influences using intention which will also influence using behavior; perceived usefulness and perceived risk will influence using intention and behavior through influencing using intermediary variables, and at the same time they will also be influenced by perceived ease of use. Subjective norm is added as the second intermediary variable, the external influence and social influence are independent variables working on subjective norm. The perceived risk and perceived cost are added as independent variables of using attitude, together with three other independent variables, individual innovation associated with personal factors, affinity between mobile terminals and internet, and compatibility with the past online shopping habit, they will have direct impact on the dependent variable which is using intention.

2.2 Variable definition and proposal of hypothesis

According to the theoretical model built in this research, based on the analysis of the variables`s definition, the following 15 hypotheses on the interaction relation between different variables, as shown in Table 1.

Among them the dependent variable and intermediary variable are using attitude, using behavior and using intention(H1 and H2); using attitude, using behavior and using intention(H9 and H10); independent variable, perceived usefulness(H3 and H4); perceived ease of use(H5 and H6), perceived risk(H7), perceived cost(H8), external influence(H11), social influence(H12), individual innovation(H13), affinity(H14), compatibility(H15), these together build the theoretical model of factors influencing consumers adopting mobile shopping.

3. Research object and tools

3.1 Research object and questionnaire

The samples of this research are all taken from written questionnaire(200 people), and they were mainly conducted from February to March 2015. This questionnaire obtained data from a college in Xi`an in anonymous way. At last, 200 questionnaires were recovered, among them 197 were valid questionnaires after excluding the incomplete questionnaires, thus the actual utilization rate being 98.5% meets the basic principle of sampling.

The main measurement indexes referring to this research include individual factor, internet experience, perceived usefulness, perceived ease of use, attitude, intention, perceived innovation and risk, etc. Consulting to other survey questionnaires which have gone through verification, this questionnaire is divided into three parts, a total of 38 questions. The first part is inspection on individual factors and internet experience; the second part is basic view towards mobile e-commerce; the third part is factors influencing college students` intention of using mobile e-commerce. According to the variables related in the model, relevant measuring variables which include 19 questions are proposed. The internationally accepted five point scale(Likert Seale) is

adopted to conduct evaluation, ranging from "strongly agree", "relatively agree", "do not care(not clear)", "disagree" to "strongly disagree" and respectively giving points of 1,2,3,4,5. Based on their agreeing level, the tester can conduct measurement on the variables.

Table 1 Assumed number and content

Hypothesized number	Hypothesized content（Positive influence）
H1	Influence of promotion of using intention on using behavior of mobile shopping(+)（+）
H2	Influence of promotion of using attitude on using intention of mobile shopping（+）
H3	Influence of promotion of perceived usefulness on using intention of mobile shopping（+）
H4	Influence of promotion of perceived usefulness on using attitude of mobile shopping（+）
H5	Influence of promotion of perceived ease of use on using attitude of mobile shopping（+）
H6	Influence of promotion of perceived ease of use on perceived usefulness of mobile shopping（+）
H7	Influence of promotion of perceived risk on using attitude of mobile shopping（+）
H8	Influence of promotion of perceived cost on using attitude of mobile shopping（—）
H9	Influence of stronger cognition of subjective norms on using intention of mobile shopping（+）
H10	Influence of stronger cognition of subjective norms on using attitude of mobile shopping（+）
H11	Influence of more external effect on cognition of subjective norms of mobile shopping（+）
H12	Influence of more social influence on cognition of subjective norms of mobile shopping（+）
H13	Influence of positiveness of innovation on accepting intention of mobile shopping（+）
H14	Influence of affinity of mobile devices on accepting intention of mobile shopping（+）
H15	Influence of compatibility of mobile devices on accepting intention of mobile shopping（+）

3.2 Reliability and validity

SPSS software was utilized to analyze the data of each variation scale acquired from research, thus obtaining the Cronbach' s Alpha coefficient. The Cronbach' s Alpha coefficient of the six variation scale involved in this study are all over 0.7, this shows that scale of the variables in this research are reliable. After deleting three measurement items, statistically calculation was made on the Cronbach' s Alpha coefficient of the whole measured items in the questionnaire, as is shown in Table 2. Generally speaking, the overall Cronbach' s Alpha of the questionnaire is 0.893, and it demonstrates that the inner reliability of the measured items in the questionnaire is acceptable. Meanwhile, the whole questionnaire is made up of 13 latent variables and 38 explicit variables. The Cronbach' s Alpha coefficient of each latent variable is over 0.7, in particular, the coefficient of subjective norms, innovation and compatibility are all over 0.9. Therefore, the analysis of reliability proves that the reliability of the whole questionnaire has reached required level after deleting three measurement items.

Table 2 Analysis of the overall reliability

Latent variable	Measured items	Cronbach' S Alph coefficient
Using attitude (AI)	3	0.818
Perceived usefulness (PU)	3	0.759
Perceived ease of use (PEOU)	3	0.760
Perceived risk (PK)	3	0.762
Perceived cost (PC)	3	0.815
Subjective norm (SN)	3	0.945
External influence (EI)	3	0.721
Social influence (SI)	3	0.859
Innovation (INNOV)	4	0.908
Affinity (AFFIN)	3	0.886
Compatibility (COMPA)	2	0.902
Using intention (BI)	2	0.789
Using behavior (AU)	3	0.767
Over reliability	38	0.893

The most common method to check the structure reliability is the use of exploratory factor analysis, finding out the latent factor relation structure of the data in the questionnaire, and distinguishing the structure of the measured items. The analysis of exploratory factor does not need to extend to the whole questionnaire, instead each factor should be analyzed as an independent unit. Principle component analysis is adopted in the factor analysis, and factor conducts orthogonal shaft in varimax rotation, the standards to eliminate invalid measurement items are as follow.

1) No measurement items can work as a factor itself, otherwise being eliminated

2) If the factor loading is less than 0.5, then that measurement item is eliminated.

4. Empirical analysis and test of model

4.1 Cross-type examination of structural equation

LISREL is adopted in this research to conduct model analysis and test. According to the theoretical model of factors influencing consumers adopting mobile shopping, and the 15 hypotheses which were respectively shown in Table 1 and Table 2. In the confirmatory factor analysis and the structural equation model analysis, there are 38 factors in total corresponding to 13 latent variables, and the factor loading of these 38 variables are all over than 0.5, this has meet the minimum need. As shown in Figure 2, the minimum is EI3, the factor loading of measurement item on external influence is 0.5. Meanwhile, the maximum is 0.94 from SN2.

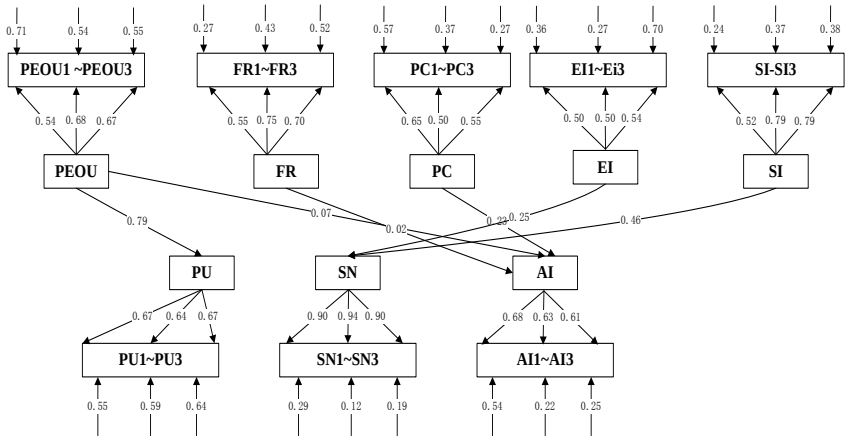

Figure 2 Path analysis of model SEM

4.2 Estimation and evaluation of model parameter

From the statistics we can observe the standardized coefficient and T value of each latent variable, as shown in Table 3.

Table 3 Analyzing result of the path relationship of theoretical model SEM

Assumption	Path	T	Standardized coefficient	Hypothesis
H1	Using intention→using behavior	10.26	0. 88***	Yes
H2	Using attitude→using intention	8.33	0. 62***	Yes
H3	Perceived usefulness → using intention	5.90	0. 49***	Yes
H4	Perceived usefulness→using attitude	3.71	0.46***	Yes
H5	Perceived ease of use→using attitude	3.10	0.37**	Yes
H6	Perceived ease of use → perceived usefulness	9.65	0. 79***	Yes
H7	Perceived risk→using attitude	0.35	0.02	No
H8	Perceived cost→using attitude	-4.09	0.23***	Yes
H9	Subjective norm→using intention	4.42	0.23***	Yes
H10	Subjective norm→using attitude	2.10	0.10*	Yes
H11	External influence→subjective norm	1.85	0.15	No
H12	Social influence→subjective norm	5.38	0.44***	Yes
H13	innovation→using intention	2.94	0.19**	Yes
H14	Affinity→using intention	0.66	0.04	No
H15	compatibility→using intention	3.06	0.22**	Yes
PS:*p<0. 05; p<0. 01; ***p〈0. 001;				

The T test was performed on the path coefficient, it must meet the two-sided test of lTlM.96, if the significance level of the path coefficients in this research is above 0.05, then the hypothesis is tenable. However, if the significance level of the path coefficient is less than 0.05, then the hypothesis does not hold. The test results shows that the hypotheses are all tenable except H7、H11, H14.

4.3 Model updating

After deleting the insignificant path H7, H11 and H14, LIS1REL was reused to conduct fitting evaluation on the updated model, the result is shown in Figure 3, the |T| of all paths are over 1.96, which means the path coefficients have all reached significant level.

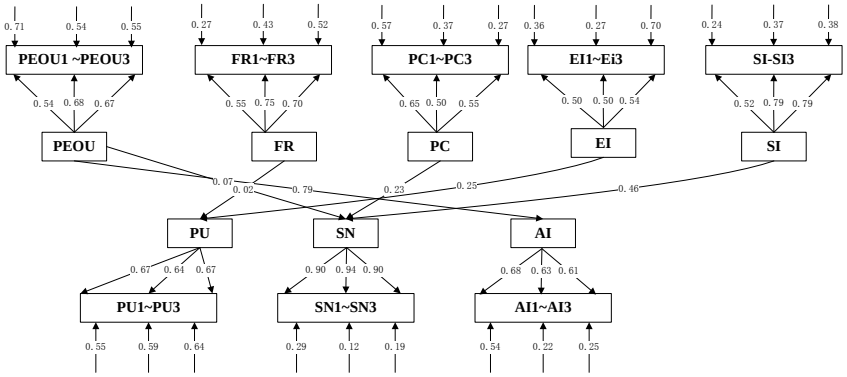

Figure 3 Path analysis of the updated model SEM

4.4 Model fitting degree test

The overall model fitting degree includes absolute fitting degree, simple fitting degree and value-added fitting degree. The evaluation index mainly includes chi-square fitting index number, the ratio of chi-square value to the degree of freedom, the residual root mean square(RMR), root mean square error of approximation(RMSEA), PNFI, comparative fitting index (CFI) and so on, the specific test results are shown in Table 4.

Table 4 Analysis of fitting index of the updated model

Index	Absolute fitting degree				Simple fitting degree		value-added fitting degree		
	X2/df	GFI	RMR	RMSEA	PNFI	PGFI	NFI	IFI	CFI
Accepting standard	〈3	>0.9	<0.08	<0.1	>0.5	>0.5	>0.9	>0.9	>0.9
This model	2.64	0.92	0.07	0.075	0.80	0.81	0.88	0.91	0.91

According to Table 4, seen from the overall model fitting degree, the chi-square fitting index=2247.98, the degree of freedom(df)=835, the ratio of chi-square value to the degree of freedom(x /df)=2.64, P<0.05, this has reached significant level. Besides, the goodness of fitting index(GFI)=0.92, this is a little above 0.90 which is the accepting standard; the residual root mean square(RMR)=0.07, less than acceptable number of 0.08; the root mean square error of approximation(RMSEA)=0.075, less than acceptable number of 0.1, so the absolute fitting effect of the model is good. Observing from the perspective of simple fitting degree and value-added fitting degree, PNFI=0.80 and PGFI=0.81, both of them above the acceptable value of 0.50 and close to 1, this shows the fitting effect is relatively good. The norm fitting index(NFI)=0.88, the increase fitting index(IFI)=0.91, the comparing fitting index(CFI)=0.91, these are all above the acceptable value of 0.90 and very close to 1. After analyzing the important fitting index above, it can be concluded that the fitting effect of the overall model is quite good and the updated model is ideal.

4.5 Test result and preliminary conclusion

After using LISREL to conduct model analysis of the hypothesized model,the test result and updated model path coefficient are shown in Table 5 and Figure 4.

Table 5 Test result of research hypotheses

Assumed number	Assumed content（Positive influence）	Test result
H1	Influence of promotion of using intention on using behavior of mobile shopping（+）（+）	Yes
H2	Influence of promotion of using attitude on using intention of mobile shopping（+）	Yes
H3	Influence of promotion of perceived usefulness on using intention of mobile shopping（+）	Yes
H4	Influence of promotion of perceived usefulness on using attitude of mobile shopping（+）	Yes
H5	Influence of promotion of perceived ease of use on using attitude of mobile shopping（+）	Yes
H6	Influence of promotion of perceived ease of use on perceived usefulness of mobile shopping（+）	Yes
H7	Influence of promotion of perceived risk on using attitude of mobile shopping（+）	No
H8	Influence of promotion of perceived cost on using attitude of mobile shopping（—）	Yes
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H14	Influence of affinity of mobile devices on accepting intention of mobile shopping（+）	No
H15	Influence of compatibility of mobile devices on accepting intention of mobile shopping（+）	Yes

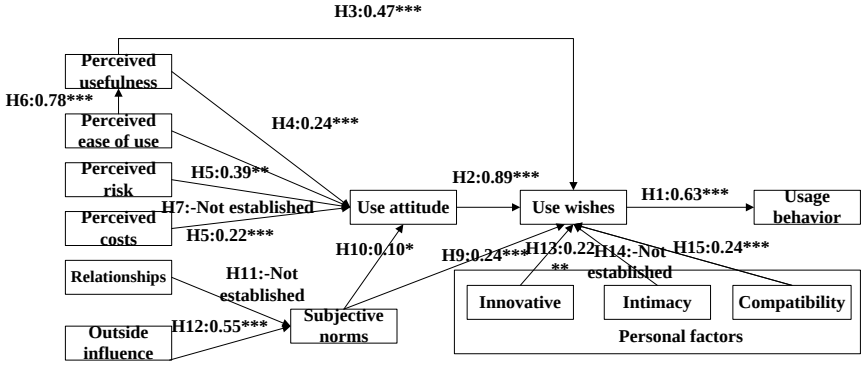

Figure 4 Test result of research theoretical model

From the test result of research hypotheses, it can be seen that the hypotheses are all tenable except H7、H11, H14. This means that the perceived usefulness, perceived ease of use, using attitude and using behavior interact on each other. Besides, perceived cost has negative influence on using attitude and therefore will negatively influence using intention and behavior; social influence positively influences subjective norm and subjective norm positively influences using attitude and

using intention; individual innovation and compatibility with mobile shopping will both influence using intention and indirectly influence using behavior.

5 Conclusion

In the user groups of mobile online shopping, college students are of special and great significance, since to some extent college students can be regarded as the core user group of mobile online shopping in the future. Considering this, this paper is based on the the technology acceptance model (TAM), with reference to the theory of reasoned action (TRA) and theory of planned behavior(TPB). Subjective norm is added as intermediary variable, and the independent variables include perceived risk, perceived cost, external influence, social influence, innovation, affinity, compatibility. Meanwhile, test is applied to the theoretical models and assumptions, thus the final modified model comes into being. According to the study, perceived usefulness, perceived ease of use, social influence, subjective norms, innovation and compatibility will positively influence consumers' intention to do mobile shopping, while perceived cost will affect consumers' intention to do mobile shopping in a negative way.

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