

Exploring Factors Affecting the User Adoption of Call-taxi App

Lifang Peng, Huan Wang, Xuanfang He, Danxia Guo, Yuchuan Lin

School of Management

Xiamen University

Fujian, China

Email: lfpeng@xmu.edu.cn

Abstract

With the rapid development of mobile commerce, CTA (Call-taxi app) is experiencing a rapid growth. However, how to promote it effectively is a problem urgent to solve. This paper attempts to make some contribution to people's understanding of the adoption mechanism of CTA. We developed some hypothesis, and based on three "attitude-intention-behavior" models, we propose a research model about user adoption of CTA. Perceived Ease of Use, Perceived Usefulness, Compatibility, and Subjective Norm are included in the model. Besides, Perceived Risk, Perceived Playfulness and Perceived Price Level were also included. Questionnaire survey was conducted in China through internet. Results show that perceived ease of use, perceived usefulness and compatibility have an indirect positive impact on people's attitude toward using CTA; subjective norm has a positive influence on Behavioral Intention; perceived risk has a negative impact on behavioral intention; perceived price level has a negative impact on both behavioral intention and attitude toward using. The practical implications are discussed further.

Keywords

Call-taxi app, User Adoption, Mobile Commerce

1. INTRODUCTION

CTA is an intelligent mobile phone applications, passengers can conveniently released taxi information through mobile phone, and the information will be sent to all drivers who use the driver terminal of CTA, it helps to reduce the asymmetry between passengers and drivers, and it improves the efficiency of calling a taxi.

CTA started in the year of 2011 in China. "YaoYaoZhaoChe" is the first mobile phone taxi application in China. After first CTA appeared in China, the number of CTA increased sharply. The year from 2012 to the beginning of 2014 is the development stage of Chinese CTA, in this stage, the participant of internet enterprises changed the industry a lot— at the beginning of 2014, in many big cities in China, the use of Call-taxi app is at an all-time high. "Kuaidi" and "Didi" these two CTA companies carved up nearly 100% of the market share. The cause is "Kuaidi" and "Didi" offer high subsidies to their users. Under the high subsidies, short-range taxi became very cheap or even free, really let the users had a taxi addiction. The background player of this subsidy war is two internet firms "Alibaba" and "Tencent", they paid for all the subsidies, iResearch (2013).

CTA was born in the background of rapid development of mobile internet, and it meets the requirements of intelligent transportation, iResearch(2014). Besides, CTA's entrance value to O2O (online to offline) and the potential it possess of creating scenarios for mobile payments both indicate a development potential. But to explore the potential and further develop user's habit, we must make it clear that what lead consumers to use CTA? The subsidy war between "Ali" and "Tencent" will have an end sometime, when there is no subsidy, will people still willing to use CTA? Are there other factors influencing the adoption of CTA? In order to figure out these problems, we do this research, and hope that our research findings will shed some light on people's understanding of the adoption mechanism of CTA, and contribute to the CTA's promotion in China.

The framework of this paper is as follows: First, we integrate three existing "attitude-intention-behaviour" models and include some external variables beyond existing models according to our research object and propose our research model. Second, we propose the research hypothesis of this paper, third, we design the survey according to the model developed and then analyses data by using LISEREL8.70 and SPSS19.0; Forth, we test the model fitting by using structural equation modelling and generate analysis report. Finally, we make a conclusion of the research findings and discuss the implications and constrains of our research.

2. LITERATURE REVIEW

There is little specific research about user adoption of CTA, for our research, we can refer to existing literature for other mobile commerce applications because CTA is also a mobile commerce application. "Attitude-

intention-behavior” models for example Theory of Acceptance Model (TAM), Innovation Diffusion Theory (IDT), and Theory of Planned Behavior (TPB) etc. are most commonly used for user adoption research of information products and new technologies. Early research models were mainly based on TAM. Pagani(2004) studied the user adoption about 3G multi-media in Italy, results showed that perceived usefulness, perceived ease of use, price and connection speed are main influential factors. Cheong and Park (2005) made an empirical study about user adoption about mobile internet applications in Korea. Based on TAM, they introduced perceived price level, perceived playfulness, perceived quality of system, perceived quality of content, internet experience as external variables in. Findings showed that perceived usefulness, perceived playfulness, perceived price level have a significant impact on attitude toward using and behavioral intention. Based on TAM, and introduced perceived playfulness, Chun-Hsiung Liao etc (2007). Based on TAM, Lu etc. (2008) verified the impact of social impact, mobile trust, perceived usefulness and perceived ease of use on wireless mobile data service. Ren (2007) made a empirical study about user adoption for mobile commerce applications, and found that perceived usefulness, perceived ease of use, user's passion for new things and the capability user possessed to handle them, individual network environment and perceived price level all have an impact on user adoption. Deng etc. (2007) studied the short message service adoption in mobile environment, the research model was based on TAM model and theory of network externality, research findings showed that perceived playfulness, perceived ease of use, perceived usefulness, service fee, effective of communication, network externality will influence the user adoption of short message service.

Many scholars merged TAM with other models to optimize the interpretation level of their research models. Based on TAM, TPB and IDT Luarn and Lin (2005) established a model of user adoption about mobile bank in Taiwan. Based on TAM and refers to TPB, TRA, Lin et al. (2008) studied the user adoption of content-delivery mobile commerce application, and extracted 10 main variables: perceived usefulness, perceived ease of use, perceived risk, cost, subjective norm, peer influence, external influence, individual innovation, attitude and the motivation of use. The empirical results showed that attitude and perceived usefulness have a positive impact on the motivation of use, perceived usefulness, perceived ease of use and individual innovation have a positive impact on people's using attitude, perceived ease of use has a positive impact on perceived usefulness, peer influence and external influence have a positive impact on using behavior.

As we can see from the review, most existing research models were integrated ones, and not only did they integrated the variables of classical theory of reasoned action models, but also they added some variables beyond existing models according to the specific situations, for example introduced perceived risk(Xiang et al. 2008; Lin et. al. 2008; Wu and Wang 2005), perceived playfulness(Deng et al. 2007; Nysveen 2005) and perceived price level(Ren 2007 Hung), or introduced moderator variable to study the impact of demographic characteristics, for example, Yang, K.C. (2005) studied the user attitude of mobile commerce in Singapore, and verified that the demographic and personal characteristics can influence user attitude toward it trough the impact of perceived ease of use and perceived usefulness.

3. RESEARCH MODEL AND HYPOTHESIS

There is extensive research which provides evidence of the significant effect that perceived usefulness has on usage intention (Agarwal & Prasad, 1999; Davis et al., 1989; Venkatesh and Morris, 2000). The ultimate reason people use CTA is that they find it can help to take a taxi more conveniently. Therefore, we proposed the following hypothesis:

- H1: Perceived usefulness is positively associated with people's attitude toward using;
- H2: Perceived usefulness is positively associated with people's behavioral intention;

Existing research also provides evidence of the significant effect that perceived ease of use has on usage intention whether affecting perceived usefulness directly or not (Agarwal and Prasad, 1999; Davis et al., 1989; Venkatesh and Morris, 2000). CTA is a tool application, it must be designed very easy to use so that people may have an attitude toward trying it whether it is good or not. So we proposed the following hypothesis.

- H3: Perceived ease of use is positively associated with perceived usefulness;
- H4: Perceived ease of use is positively associated with attitude toward using;

Compatibility refers to the consistent extend user's sense of worth, past experience and need is with CTA. If people feel that CTA matches their sense of worth and their past experience, they may be more willing to use it. Because of a use of inertia and a low switching cost. Therefore we test the following hypothesis.

- H5: Compatibility is positively associated with attitude toward using;

With the arrival of the era of big data, the information which consumer accepted is growing explosively, which leads to a decrease in ability of self judgment. People relies more on others to make decisions. There is existing evidence of the effect that subjective norm have on usage intention Lin et al.(2008). So we proposed the following hypothesis.

- H6: Subjective norm is positively associated with behavioral intention;

In the theory of TRA, TPB, TAM, using attitude directly influence the behavioral intention. Thus, we proposed the following hypothesis.

- H7: Attitude toward using is positively associated with behavioral intention;

We also included perceived risk, perceived playfulness, perceived price level in our model.

Moon and Kim(2001) put forward that TAM model can not well explain information technology user adoption today, they introduced perceived playfulness into TAM, regard perceived playfulness as internal belief of using information technology, results showed that extended model can better explain user adoption than TAM, and perceived playfulness have a direct positive impact on usage intention. CTA may make people feel some kind of entertainment and contribute to people's using behavior. So we proposed the following hypothesis.

- H8: Perceived playfulness is positively associated with attitude toward using;
- H9: Perceived playfulness is positively associated with behavioral intention

Price is one of the main factors influencing people's consuming behavior, if people feel that it is affordable to use CTA, their demand for CTA will increase according to the demand curve. In order to foster consumer mobile payment habits, "Tencent" and "Ali" these two internet firms cooperate with "Didi" and "Kuaidi" and give consumers a certain subsidy, so this may also be a factor influencing the attitude toward using CTA and the usage intention of CTA. Thus we proposed the following hypothesis.

- H10: Perceived price level is negatively associated with attitude toward using;
- H11: Perceived price level is negatively associated with behavioral intention;

When people using CTA, they will facing risks from many aspects, such as pay the taxi fee through mobile phone, information disclosure when register through telephone number and long time waiting and so on, especially the risk from mobile payment, the safety of it has not yet been solved perfectly, so perceived risk may also influence the attitude and behavioral intention of using CTA and we take perceived risk as another external variable. So it leads to the remaining two hypotheses.

- H12: Perceived risk is negatively associated with attitude toward using;
- H13: Perceived risk is negatively associated with behavioral intention;

To sum up, the model of this paper is as follows:

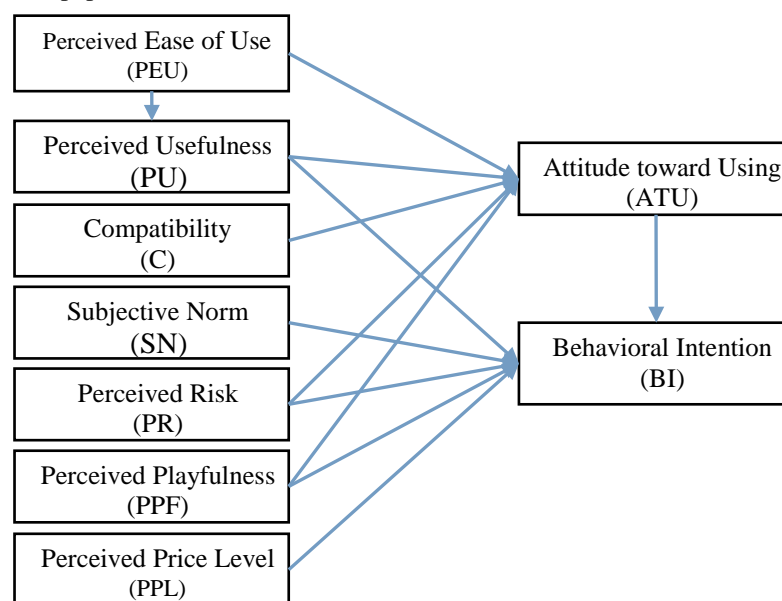


Figure 1: Usage Intention of Call-taxi app

Our research model includes 9 constructs, and the definition of each construct is presented in Table 1.

Table 1. Definitions of Variables

Variable	Definition of Variables	References
Perceived risk	Subjective estimation of the loss need to bear when using CTA	Carlsson etc(2005)
Perceived playfulness	The entertainment user perceived when using CTA	Moon(2001), Davis(1992)
Perceived price level	The cost user perceived when using CTA	Moore(1991)
Subjective norm	The influence from salient individuals or groups about whether to use CTA	Moore(1991)
Compatibility	The consistency extent user's sense of worth, past experience is with CTA	Rogers(2002)
Perceived ease of use	The level people think CTA is easy to use	Davis(1989); Agarwal(1999)
Perceived usefulness	The level people think CTA is useful	Davis(1989); Agarwal(1999)
Attitude toward using	The attitude people wants to use CTA	Davis(1975)
Behavioral intention	People's judgment of subjective probability for using CTA	Davis(1975)

4. RESEARCH METHODOLOGY

4.1 Questionnaire Development

Based on the research model, we used a questionnaire survey to collect data. The questionnaire was developed as follows: we first reviewed the literature extensively, and list the candidate constructs and measures that were used in previous research. An initial draft scale was developed as presented in Table 2. Each item was measured in a 5-point Likert scale. The reason why we did not choose 7-point Likert scale is that "when there are more than five options, the majority of respondents would lack the ability to distinguish the options" Wu (2003), and a scale with fewer points actually reduces the amount of variation possible in the model. So 5-point Likert scale is more reliable.

Table 2 The initial scale

Construct	Items	Description of Items	References
Perceived risk	PR1	I think there is risk in private protection when using CTA	Wu(2005)
	PR2	I think there is risk in mobile payment when using CTA	Wu(2005)
	PR3	The location function of CTA makes me feel unsafe	Wu(2005)
	PR4	The possibility of duped by unlicensed taxi makes me feel unsafe	Self-developed
	PR5	I think there is risk from other aspects when using CTA	Self-developed
Perceived playfulness	PPF1	The use of CTA brings me a lot of fun	Wu(2005)
	PPF2	The use of CTA makes my life more interesting	Self-developed
	PPF3	In general CTA is a interesting App	Wu(2005)
Perceived price level	PPL1	The use of CTA makes me suffer a high data flow consumption	Wu(2005)
	PPL2	The use of CTA makes me to pay more telephone fare	Wu(2005)
	PPL3	I think it's reasonable to charge extra for using CTA	Self-developed
	PPL4	CTA is cheaper compared with traditional way of take a Taxi	Wu(2005)
	PPL5	In general it's cost more expensive to use CTA	Wu(2005)
Subjective norm	SN1	A lot people around me think that I should use CTA	Lin etc.(2008), Liu (2010)
	SN2	Many of my friends and fellows are using CTA	Lin etc.(2008), Liu (2010)
	SN3	People who I respect and valued is using CTA	Lin etc.(2008), Liu (2010)
	SN4	I care if other people think I am a person with taste	Lin etc.(2008), Liu (2010)
	SN5	The environment makes me feel that using CTA is a future trend	Lin etc.(2008), Liu (2010)
Compatibility	C1	I use CTA habitually	Liu (2010)
	C2	The service of CTA consists with my life style	Liu (2010)
	C3	It's convenient to use CTA	Liu (2010)
	C4	CTA is in line with my sense of value	Liu (2010)
	C5	CTA can meets my needs for taking taxi more conveniently	Self-developed
Perceived ease of use	PEU1	It's easy for me to use CTA	Davis (1989)
	PEU2	It doesn't need to spend too much effort learning to use CTA	Davis (1989)
	PEU3	The process to use CTA is simple.	Davis (1989)
	PEU4	In general, it's easy for me to use CTA	Davis (1989)
Perceived usefulness	PU1	I think CTA is a useful tool	Davis (1989)
	PU2	It's can help me to take a taxi easier	Davis (1989)
	PU3	I think it's necessary to use CTA	Davis (1989)
	PU4	CTA is more convenience for taking a taxi	Self-developed

Attitude toward using	ATU1	For me CTA is attractive	Davis (1989)
	ATU2	I think it's worth to use CTA	Davis (1989)
	ATU3	I think it's a wise choice to use CTA	Davis (1989)
Behavioral intention	BI1	I will use CTA in the near future	Davis (1989)
	BI2	I will use CTA frequently later	Davis (1989)
	BI3	I will recommend others to use CTA	Davis (1989)

4.2 Preliminary pilot Study

In order to ensure the reliability of the questionnaire, the pilot test was conducted. 100 initial questionnaires were distributed randomly, and 91 copies were returned. Excluding 12 invalid ones, there are 79 validly returned copies. An examination was conducted to test the credibility and effectiveness of the questionnaire. The principle to decide whether to retain a certain item are "Cronbach's Alpha >0.7 and the total correlation of the corrected item >0.5". The total correlation value of the corrected item of PR5 is 0.488 which is less than 0.5. And the value of PPL3 is -0.054 which is also less than 0.5. When we removed PPL3 from the scale, Cronbach's Alpha rose sharply. The total correlation value of the corrected item of SN4 and SN5 are 0.264 and 0.344 respectively, both are less than 0.5, and Cronbach's Alpha rose sharply when the two items was removed. So, PR5, PPL3, SN4, SN5 are all removed after the pilot test.

4.3 Data Collection and Analysis

4.3.1 Data Collection

In the main study, 250 questionnaires were issued through Internet, through this way we can collect data from a broader geographical scope, and avoid the regional bias and ensure the generalization of our study. 238 copies were returned excluded 38 invalid ones, so the valid respond rate was 84%. Statistic information of the questionnaires is presented in Table 3.

Table 3 The Statistic Information of Questionnaire

Basic Characteristics	Classification	Population Statistics	Percentage
Sex	Man	76	38
	Woman	124	62
	Total	200	100
Age	18-24 years old	143	71.5
	25-30 years old	47	23.5
	31-35 years old	9	4.5
	More than 18	1	0.5
	Total	200	100
Occupation	Student	165	82.5
	Enterprise Staff	31	15.5
	Civil Servants	2	1
	Others	2	1
	Total	200	100
Education	High School and above	2	1
	Junior College	8	1
	Bachelors degree	117	58.5
	Master degree or above	73	36.5
	Total	200	100

As we can see from Table 3, they are college students mainly, account for 82.5% of the proportion. The age group and the occupation distribution of our research object are in line with the statistic data from "China Mobile Call-Taxi App Report of 2013" issued by iResearch(2013) . The data consistency indicates a high reliability of our data.

4.3.2 Reliability and Validity Analysis

Reliability analysis

In this paper, we examine the reliability of constructs using SPSS19.0, The results are shown in Table 4.

Table 4 Results of Reliability analysis

Construct	Cronbach's Alpha	Items	Total Correlation Value Of Corrected Item	Cronbach's Alpha When Item was removed
Total	.859	33	—	—
Perceived risk	.786	PR1	.653	.707
		PR2	.587	.737
		PR3	.605	.728
		PR4	.539	.764
Perceived playfulness	.898	PPF1	.809	.845
		PPF2	.830	.826
		PPF3	.757	.888
Perceived price level	.824	PPL1	.631	.787
		PPL2	.658	.778
		PPL4	.631	.759
		PPL5	.692	.799
Subjective norm	.797	SN1	.689	.669
		SN2	.638	.729
		SN3	.601	.766
Compatibility	.869	C1	.614	.861
		C2	.746	.829
		C3	.639	.854
		C4	.722	.834
		C5	.748	.827
Perceived ease of use	.882	PEU1	.739	.851
		PEU2	.777	.836
		PEU3	.747	.848
		PEU4	.714	.860
Perceived usefulness	.770	PU1	.603	.697
		PU2	.514	.744
		PU3	.543	.729
		PU4	.625	.685
Attitude toward using	.831	A1	.675	.787
		A2	.699	.758
		A3	.704	.756
Behavioral intention	.890	BI1	.794	.836
		BI2	.814	.823
		BI3	.752	.83

It is visible that total correlations of the corrected items are above 0.5, and all Cronbach's alpha are above 0.7. Thus the result suggests that our constructs have a good reliability.

Convergent Validity Analysis

We test the convergent validity using confirmatory factor analysis by LISREL8.7, The criteria of good convergent validity are: factor loading > 0.7, the average variance extracted (AVE) > 0.5 and the combination validity (CR) > 0.6. The analysis result is presented in Table 5.

Table 5 Convergent Validity

Construct	Items	Factor loading	AVE	CR
Perceived usefulness	PU1	0.76	0.5205	0.8122
	PU2	0.67		
	PU3	0.68		
	PU4	0.77		

Attitude toward using	A1	0.79	0.6898	0.8695
	A2	0.86		
	A3	0.84		
Behavioral intention	BI1	0.90	0.7930	0.9199
	BI2	0.92		
	BI3	0.85		
Perceived ease of use	PEU1	0.85	0.7233	0.9126
	PEU2	0.89		
	PEU3	0.85		
	PEU4	0.81		
Perceived risk	PR1	0.85	0.5436	0.8236
	PR2	0.81		
	PR3	0.66		
	PR4	0.60		
Perceived playfulness	PPF1	0.91	0.8052	0.9253
	PPF2	0.93		
	PPF3	0.85		
Perceived price level	PPL1	0.80	0.6118	0.8624
	PPL2	0.85		
	PPL4	0.69		
	PPL5	0.78		
Compatibility	C1	0.75	0.6426	0.8995
	C2	0.86		
	C3	0.73		
	C4	0.82		
	C5	0.84		
Subjective norm	SN1	0.85	0.6270	0.8339
	SN2	0.80		
	SN3	0.72		

According to the result, the AVE and CR of all the constructs meet the standards. The factor loading of PU2, PU3, PR3, PR4 and PPL4 are less than 0.7. So we tried to adjust the model through the process as follows: First we tried to delete PR4. Result shown that the factor loading of PR3 decrease from 0.66 to 0.60, and AVE have not improved, but CR was decreased from 0.8236 to 0.7984. If we delete PR3 and PR4 at the same time, the explanatory level decreased. Consider PR4 is self-develop measure item and its factor loading is above 0.6 which is in an acceptable level, so we remained it. For PU2 and PU3, deleted respectively or deleted them at the same time led to a decrease in the factor loading of other measure items of the construct it correspond, and a decrease in the convergent validity and explanatory level of the construct. The factor loading of PU2 and PU3 are approximate to 0.7, so we did not remove these two measures, for the same reason we retained PPL4 in the model. So we can say that the scales have a acceptable convergent validity.

Discrimination Validity analysis

We use square root of AVE and the correlation coefficient matrix to test the discrimination validity of constructs. Table 6 shows the analysis result of discrimination validity. The values in the diagonal line present the square root of AVE of constructs, other data present the correlation coefficient of the row construct and the column construct of the data.

Table 6 Analysis Results of Discrimination Validity

	PU	ATU	BI	PEU	PR	PPF	PPL	C	SN
PU	0.72								
ATU	0.65	0.83							
BI	0.46	0.79	0.89						
PEU	0.66	0.80	0.60	0.85					
PR	-0.08	-0.22	-0.33	-0.12	0.74				
PPF	0.24	0.45	0.57	0.37	-0.27	0.90			
PPL	-0.26	-0.57	-0.74	-0.36	0.26	-0.44	0.79		
C	0.51	0.80	0.70	0.77	-0.18	0.59	-0.52	0.80	
SN	0.26	0.44	0.55	0.40	-0.03	0.63	-0.41	0.54	0.79

Each construct's square root of AVE is greater than its correlation coefficient with other construct, so we can say that the scales have good discrimination validity.

5.MODEL FITTING ANALYSIS AND HYPOTHESIS TESTING

5.1 Model Fitting Analysis

We must ensure the fitting of our model before it can be used and any conclusions can be drawn for hypothesis testing, so we analyzed the fitting of the model by LISREL8.7. The analysis result is presented in Table 7.

Table 7 Model fitting indices

Fitting indices	Criterion		Actual Indice value	Fitting effect
	Acceptable	Good		
CMIN/DF	2-3	<2	2.527	Acceptable
RMSEA	0.05-0.10	≤0.05	0.088	Acceptable
NFI	0.7-0.9	≥0.9	0.920	Good
NNFI	0.7-0.9	≥0.9	0.930	Good
CFI	0.7-0.9	≥0.9	0.940	Good
IFI	0.7-0.9	≥0.9	0.940	Good
RFI	0.7-0.9	≥0.9	0.900	Good

As we can see from the analysis results, all the actual indice values are above the threshold, among them 5 have a good fitting and 2 are acceptable(CMIN/DF=2.527,RMSEA=0.088,NFI=0.920,NNFI=0.930, CFI=0.940, IFI=0.940, RFI=0.900).The analysis results indicate that our model have a good model fitting.

5.2 Hypotheses Testing

After the structure equation model was constructed, we use LISREL8.7 to analyze the hypothesis, and after the analysis we obtained the influence coefficient of variables and its significant level. Table 8 shows the path validation results of our model.

Table 8 Path Validation Results

Path	Coefficient	Type of Correlation	T-Value	Support the Hypothesis?
PEU→PU	0.65	Positive Correlation	7.87	Yes
PEU→A	0.32	Positive Correlation	3.19	Yes
PU→A	0.22	Positive Correlation	3.08	Yes
PU→BI	0.01	Positive Correlation	0.12	No
A→BI	0.46	Positive Correlation	5.04	Yes
PR→A	-0.06	Negative Correlation	-1.12	No
PR→BI	-0.11	Negative Correlation	-2.15	Yes
PPF→A	-0.04	Negative Correlation	-0.64	No
PPF→BI	0.08	Positive Correlation	1.25	No
PPL→A	-0.23	Negative Correlation	-3.80	Yes
PPL→BI	-0.34	Negative Correlation	-5.19	Yes
C→A	0.33	Positive Correlation	3.16	Yes
SN→BI	0.15	Positive Correlation	2.19	Yes

As we can see from the above table, hypothesis H2 (PU→BI), H8 (PPF→A), H9 (PPF→BI) and H12 (PR→A) were rejected, and the remaining 9 hypotheses were supported.

Why hypothesis 2, 8, 9, 12 were rejected? The reason may be as follows:

For hypothesis 2, we think it may be that although PU is positively associated with consumer's attitude toward using CTA, it does not mean that it will positively influence BI, that is because besides PU, there are many other factors influence user's behavioral intention. For example, a high perceived risk may prevent consumer from using CTA even if the application is useful, just PU is not enough for consumer's final adoption of it.

For hypothesis 8 and 9, the rejected reason may be as follows: on the one hand, compared with the economical efficiency and convenience characteristics, whether the application is playful is less important for consumer it is a tool application but not a entertainment app after all; on the other hand, among numerous playful applications today, CTA is less prominent in this aspect.

As for hypothesis 12, the rejected reason may be that when user perceived risk from CTA, he or she might avoid using it directly rather than influence behavioral intention indirectly, in other words, perceived risk is a fatal sufficient condition of consumer's not accepting the application, but not just a necessary condition.

6. DISCUSSIONS and IMPLICATIONS

6.1 Conclusion and Implications

In conclusion, this study sought to advance our understanding of the mechanisms underlying user adoption of CTA. By reviewing literature and an empirical study, we take a step to achieving this goal. As an innovative mobile commerce application, the adoption behavior of CTA depends on many factors. Results showed, that perceived ease of use, perceived usefulness, compatibility, subjective norm, and perceived risk are key factors which affects user adoption toward CTA, besides, results showed that perceived playfulness is not a consistent and powerful predictor of user's adoption behavior.

Our study provided some managerial implications for operators of CTA. First, since perceived price level of CTA have a positive impact on behavioral intention, so for the operators of CTA, we suggested that, it would be a good idea to continue the price advantage by using multiple marking strategy such as use score to represent the cumulative taxi fee, and allows user pay the taxi fee by using score or allows user to exchange goods by using their score. Second, it can be seen from the results, that perceived ease of use has a positive impact on both attitude toward using and behavioral intention. The current CTA isn't simple enough for the elderly, so there are few elderly who willing to use CTA. To better serve the elderly, operators can consider to diversify the realization form of CTA, improve the ease of use of CTA, for example, diversify the way of payment. Third, according to the results, perceived risk will negatively influence user adoption. so, it is necessary for operators of CTA to set up a sound risk control system, so as to enhance user's trust for CTA. Except for managerial implications, our findings of factors facilitating CTA adoption can help predict future adoption behavior of other emerging mobile-commerce applications in China.

6.3 Limitations and Future Research

There are still some limitations in our research. We note them as follows:

First, we choose external variables from the perspective of user's perception of CTA, and did not consider the influence of demographic characteristics as moderator variable. With the constant promotion of CTA, it is inevitable that the user group will be enriched, so the follow-up research will be good to include the discussion of the moderator variable of Demographic characteristics. Second, we only see passengers as the user of CTA in our research, and the drivers were considered the service providers of the system, but consider things from a different perspective, taxi drivers can also be seen as user of CTA, so it could be interesting for future research. Third, for why hypothesis 2, 8, 9, 12 were rejected, we just present our conjecture but did not do further research, so it may be interesting to investigate it in more detail, perhaps with qualitative research or focus groups.

ACKNOWLEDGMENTS

This research was supported by the Fundamental Research Funds for the Central Universities under Grant 2013221028.

REFERENCES

- Agarwal, R. J. Prasad. 1999. "Are Individual Differences Germane to the Acceptance of New information Technologies," *Decision sciences* (30:2), March, pp 361-391.
- Carlsson, C., Hyvönen, K., Repo, P., and Walden, P. 2005. "Asynchronous Adoption Patterns of Mobile Services," *Proceedings of the 38th Hawaii International Conference on System Sciences*
- Cheong, J., H., M.-C.Park. 2005. "Mobile Internet Acceptance in Korea," *Internet Research* (15:2), pp 125-140.
- Davis, F.D. 1989. "Perceived Usefulness, Perceived Ease of Use, and User Acceptance of Information Technology," *MIS Quarterly* (13:3) , September, pp 319-340.
- Davis, F.D., Bagozzi, R.P., Warshaw, P.R. 1989. "User Acceptance of Computer Technology: A Comparison of Two Theoretical Models," *Management science* (35:8), August, pp 82-1003.
- Davis, F.D., Bagozzi, R.P., Warshaw, P.R. 1992. "Extrinsic and Intrinsic Motivation to Use Computers in the Workplace1," *Journal of applied social psychology* (22:14), July, pp 1111-1132.

- Deng Huachao, Lu Yaowu. 2007. "Study of Individual Consumer Behaviors in SMS by Using TAM and Network Externality Theory." *Chinese Journal of Management* (4:2), March. pp 216-221.
- Hung, S.Y., Ku, C. Y., Chang, C. M. 2003. "Critical Factors of WAP Services adoption: An Empirical Study(in Chinese)," *Electronic Commerce Research and Applications* (2:1), pp 42-60.
- Iresearch 2013. "China Mobile Call-Taxi App Report of 2013(in Chinese)" Retrieved 5 May 2014 from <http://report.iresearch.cn/2058.html>.
- Iresearch. 2014. "Scale Data of Chinese Intelligent Terminal of 2013 (in Chinese)," Retrieved 2 June 2014 from <http://news.iresearch.cn/zt/192594.shtml>
- Liao, C. H., Tsou, C. W., Huang, M, F. 2007. "Factors Influencing the Usage of 3G Mobile Services in Taiwan," *Online Information Review* (31:6), pp 759-774.
- Lin Hong, Xia Li, Zeng Fenghuan. 2008. "Research on the Acceptance Model of Content Delivery Model of Mobile Commerce (in Chinese)," *Shanghai Management Science*, Vol.1, pp 31-35.
- Liu Bing. 2010. "Factor Analysis and Empirical Research on Consumer Adoption of Mobile Commerce(in Chinese)," *Beijing, Library of Beijing University of Posts and Telecommunications*.
- June, L., Chang, L., Chun-Sheng, Y. Kanliang W. 2008. "Determinants of Accepting Wireless Mobile Data Services in China," *Information & Management* (45:1), January, pp 52-64.
- Luarn, P., Lin, H.-H. 2005. "Toward An Understanding of the Behavioral Intention to Use Mobile Banking," *Computers in human behavior* 21(6), January, pp 873-891.
- Moon, J.-W., Kim, Y.-G. 2001. "Extending the TAM for A World-Wide-Web Context," *Information & Management* 38(4), February, pp 217-230.
- Moore, G.C., Benbasat, I. 1991. "Development of An Instrument to Measure the Perceptions of Adopting An Information Technology Innovation," *Information systems research* (2:3), September, pp 192-222.
- Nysveen, H., Pedersen, P.E., Thorbjørnsen, H. 2005. "Explaining Intention to Use Mobile Chat Services: Moderating Effects of Gender," *Journal of Consumer Marketing* (22:5), pp.247-256.
- Pagani, M. 2004. "Determinants of Adoption of Third Generation Mobile Multimedia Services," *Journal of interactive marketing* (18:3), pp 46-59.
- Ren Hongjuan. 2007. "Analysis of China's Mobile Commerce User Behavior Factors(in Chinese)," *Journal of Modern Information* (27:9), pp 222-225.
- Jen-Her, W., Shu-Ching, W. 2005. "What Drives Mobile Commerce? An Empirical Evaluation of the Revised Technology Acceptance Model," *Information & management* (42:5), July, pp 719-729.
- Venkatesh, V., Morris, M. G. 2000. "Why don't men ever stop to ask for directions? Gender, social influence, and their role in technology acceptance and usage behavior." *MIS Quarterly*, 24(1), pp 115-139.
- Wu Minglong. 2003. "SPSS Statistical Applications Practice - Questionnaire Analysis and Applied Statistics." Beijing, Science Press.
- Xin Yinyi. 2002. "Diffusion of innovation"/Rogers, Everett. Beijing, Center Chinese Compilation & Translation Press.
- Yang, K. C. 2005. "Exploring Factors Affecting the Adoption of Mobile Commerce in Singapore," *Telemetric and Informatics* (22:3), 257-277.

COPYRIGHT

Lifang Peng, Huan Wang, Xuanfang He, Danxia Guo, and Yuchuan Lin © 2014. The authors assign to ACIS and educational and non-profit institutions a non-exclusive licence to use this document for personal use and in courses of instruction provided that the article is used in full and this copyright statement is reproduced. The authors also grant a non-exclusive licence to ACIS to publish this document in full in the Conference Papers and Proceedings. Those documents may be published on the World Wide Web, CD-ROM, in printed form, and on mirror sites on the World Wide Web. Any other usage is prohibited without the express permission of the authors.