INTERNATIONAL JOURNAL OF ENTREPRENEURSHIP
MANAGEMENT INNOVATION AND DEVELOPMENT

Understanding Consumer's Motivation of Adopting Mobile Payment Systems for E-Business in China

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Abstract

The industry of mobile payment in China has developed rapidly within a decade. Specifically, it is reflected in the exponential development of its market size and popularizing rate (Peng, 2011). This research paper explores the connection between the development of mobile payment in China and the consumer's motivation, analyse the relationship between the development of China's mobile payment and people's intention to adopt. The data source of this paper is obtained through the questionnaire survey. The UTAUT model is used to establish the relationship between the components of the model and the obtained data, and then quantify the degree of motivation of the person, and the final result.

Key Words: Mobile payment, exponential development, market size, consumer's motivation, people's intention.

Introduction

This research paper aims at 'Understanding consumer's motivation of adopting mobile payment systems in China' and how and what aspects they interact and influence? Specifically, they are reflected in: what changes have been brought to people by mobile payment and online shopping, how would people consider the existence of mobile payment, and what factors have changed people's mind to adopt mobile payment.

The internet penetrations are at one of the highest rates in China. As per one data. in 222011, 3G users in China has reached 110 million with a total of 964 million mobile phone users in China. In June of this year, the central bank issued the first batch of third-party payment licenses, and third-party payment platforms such as UnionPay, Alipay and Ten pay were licensed (GOV.cn). In 2017, China's mobile payment utilization rate reached 82%, which was 17% higher than 65% in 2015 (Qian Zhan, 2017). In 2017, the number of provinces which over 90% of users choosing to use mobile payment was more than 11, compared to only one province in 2016. Among them, as of the end of 2017, Alibaba's Alipay and Tencent's online financial services (such as WeChat Pay) jointly monopolized more than 90% of the market share with 53.73% and 39.35% respectively (Qianzhan, 2017).

In 2017, the scale of online payment transactions reached 2075.1 trillion yuan, a slight decrease of 0.5% compared with 2016 (Qian Zhan, 2017). In 2017, the scale of mobile payment reached 202.9 trillion yuan, an increase of 28.8% compared with 2016 (iiMedia.com).In the first quarter of 2018, the netizen's mobile payment preferences used in the offline scenes accounted for 54.1% and 51.4% of the shopping and living contributions (iiMedia.com).

Therefore, a question can hereby be submitted: why is mobile payment occupying entire China's market with such rapid growth? And what has mobile payment driven at the same time? The objectives for the research are:

1. Critically review and apply model of technology adoption theory .
2. Develop and test an adoption model of how consumers adopt mobile payment systems in China.

Literature review

The literature shows a predominate use Technology Acceptance Model (TAM), Theory of Reasoned Action (TRA) and Theory of Planned Behaviour (TPB) models for behavioural analysis. (Li, 2010).

Technology Acceptance Model (TAM)

TAM is an information system theory that embodies the relationship between emerging technologies and users' acceptance of this technology. The model argues for a range of factors that drives technology adoptions (Davis, 1985). In the original model two main factors involved were; Perceived Usefulness (PU)- the subjective identification of the user's degree of performance improvement via this technology and Perceived Ease of Use (PEOU)-the subjective identification of the user's degree if it is available for users to save effort via this technology (Davis, 1985).

However, a large number of TAM expansion models have also proved that there are a lot of defects in the theory itself (Benbasat, 2007). The TAM model is based on Theory of Reasoned Action (TRA). TRA ar5gues that personal behaviour is based on the results that individuals expect when performing their actions. And that behaviours intentions to use something depends on personal attitudes of the user and the subjective norms However TRA ignores the connections between people, including their interpersonal role and social status, as well as the more macro social structure (Terry, 1993)(Montano, 2015). Thus, the theory was further enhanced into Theory of Planned Behaviour (TPB).TPB argues that that attitudes, subjective norm, and perceived behavioural control together constitute the individual's behaviours and intentions (Ajzen, 1991). Many previous reports have shown that individual perception and external environment factors cannot be ignored influencing users' acceptance of new technologies. (Venkatesh, 2000).

This led to development of a Unified Technology Acceptance and Use Theory (UTAUT).The UTAUT is a technology adoption theory that unifies theories about users accepting emerging technology. The model considers four broad frameworks: Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions that leads to intentions to use or adopt a technology (Venkatesh, 2003).

The four drivers under UTAUT model are (Venkatesh, 2003):

- Performance Expectancy (PE): The recognition of the extent to which individuals use this technology to increase efficiency. In another word, this is also the perceived usefulness of the individual to technology.
- Effort Expectancy (EE): The ease of use of the technology.
- Social Influence (SI): The extent to which individuals consider others to be inclined to use this technology.
- Facilitating Conditions (FC): The extent to which the infrastructure of the organization and technology carried by the applying technology exists.

Mobile payment and Models

Mobile devices have a wide range of applications and can be used in many scenarios with mobile payment, such as online shopping, booking airline tickets, paying fees, paying for public transportation and so on. Mobile payment is a substitute for payment methods such as goods, services and bills or invoices. The carrier of mobile payment is generally a combination of mobile devices and wireless communication technologies (Schierz, 2010). The process of mobile payment is that the consumer makes a request to the server through the mobile device when using the mobile payment, then the server authenticates and authorizes, and finally confirms the completion of the transaction (Kim, 2010).

The types of payment methods for mobile payment are broadly divided into two: payment of purchases and payment of bills or invoices (Karnouskos, 2004). In terms of payment of purchases, cash, checks, bank cards, etc. are in a competitive or complementary relationship with mobile payment. In terms of paying bills or invoices, mobile payment typically provides services that directly access and use personal accounts, including transfers, exchanges, and online banking transactions (Karnouskos, 2004).

In mobile payment, the efficiency, shortcuts and application scope established by many technologies determine the intention of people to a large extent. The UTAUT model comprehensively covers those drivers. For example, mobile payments eliminate the number of items that need to be carried around, eliminating the inconvenience of different payment methods, which is in line with performance expectations and efforts to expect. As efficiency increases, acceptance is also reflected in individuals with different social roles, especially in the high-pressure industry where the rhythm is relatively compact, which is reflected in social factors and promotion conditions.

Research hypotheses

The relationship between each variable is shown as figure 3. Hypotheses will be established upon the arrows in the figure which stand for the impacting/moderating relationship from one component to another component.

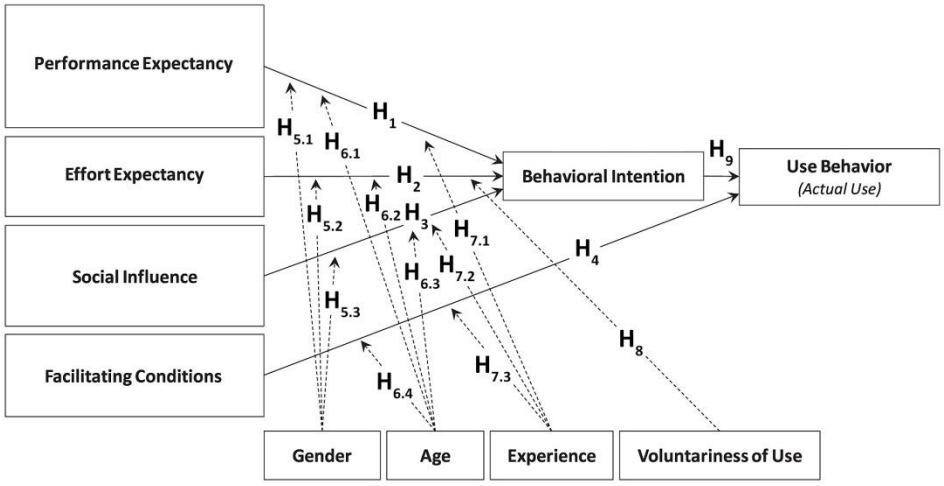

Figure 1: UTAUT for research model hypotheses

Performance Expectancy (PE)

The main meaning of this factor is how much efficiency users get when they adopt new technologies. A series of mobile and e-commerce studies have shown that PE is an important factor in interpreting consumer behaviour (Hong, 2008). On the other hand, an individual's overall perception of usefulness can be thought of as the user's perception of the extent to which the acceptance of new technology will improve overall performance (Davis, 1989). Therefore, it can be concluded that the users' perception affects the users' intention to adopt mobile payment hence mobile payments improve the performance of users' goals, namely efficiency and effectiveness (Wei, 2009). Thus, it could be assumed that:

H_1: Performance Expectancy has a significant impact on the intention in use of mobile payments.

Effort Expectancy (EE)

Effort Expectation (EE) is defined as the ease of use of a new technology system(Davis, 1989). Perceived ease of use is considered an important factor in mobile payment application(Khalifa, 2008; Wei, 2009).

H_2: Effort Expectancy has a significant impact on the intention of use in mobile payments.

Social Influence (SI)

The interpretation of the concept of Social Influence (SI) is "the degree to how individuals consider others to accept the use of the new system" (Venkatesh, 2003). SI is like an individual's subjective criteria, meaning to be an individual's belief that other people believe that an individual should participate in the activity (Lu, 2008). Invariably, both the TPB and TRA models include subjective criteria. Moreover, the Diffusion of Innovation theory also argues for social influence (Rogers, 2010). This is to emphasize that users who are more satisfied with a technology will be more inclined to recommend this technology to others(Khalifa, 2002). Hence, the hypothesis of this aspect will be:

H_3: Social Influence has a significant impact on the intention of use in mobile payments.

Facilitating Conditions (FC)

Facilitating Conditions (FC)defined as the degree to which individuals can recognize the application of new technologies and their frameworks to support technical systems (Venkatesh, 2003). The purpose of implementing simplified conditions is to influence the actual use of technology rather than behavioural intentions (Schaper, 2007). About UTAUT, the compatibility, facilitating conditions and perceived behavioural control are contained by the Facilitating Conditions which are sourced from technology adoption models such as TPB, TAM, IDT, etc. (Janzen, 1991; Venkatesh, 2003). Moreover, many technical studies have found that facilitating conditions have a positive impact on the actual use of technology by individuals (Surendran, 2012; Venkatesh, 2003).

H_4: Facilitating Conditions has a significant impact on the intention of use in mobile payments.

Gender

Early scientific research papers also studied gender factors and found that males have more willingness in using mobile payments than females (Nysveen, 2005). The reason given by the respondents is that men are more concerned about the efficiency of completing tasks, that is, the ability to achieve goals determines the intention of men to use mobile payments (Cruz, 2010). and, a comparative view to take risk (Garbarino, 2004), and the opinions of others have a significant impact on women's service usage intentions (Nysveen, 2005 (Laukkanen, 2008; Koenig-Lewis, 2010) and men are more concerned about network communication quality and service costs than women during service use (Cruz, 2010). Consequently, the following assumption will be:

H_5: The impact of gender will moderate towards the effect of drivers on the intention of use in mobile payments.

Age

The literature on mobile technology found that most users who accept mobile payments are relatively young. In other words, the elders are more resistant to technological change, that is, they have negative intention towards the use of innovative technology services (Laukkanen, 2007). However, other literature studies have shown that respondents at a larger age or above are more willing to adopt the service (Suoranta, 2004). there are other reports argue that the main users of mobile payments are neither necessarily young nor have received higher educations (Laukkanen, 2007). In addition, a set of survey data in China also shows that the attitudes towards mobile payment in the three groups of young, middle-aged and elder people are not the same (Li, 2014). Based on the above information, we could presume that:

$H_{6.}$: The impact of age will moderate the relationship of the drivers on the intention of use in mobile payments.

Experience

Because of the novelty of mobile commerce, the influence of personal experience factors on consumers' acceptance of mobile payment has yet to be demonstrated (Min, 2008

$H_{7.}$ The impact of experience will moderate effect of drivers on the intention of use in mobile payments.

Voluntariness of Use

Many studies, regarding Voluntariness of Use, have found that this is also a controversial factor. First, the only factor regulated is Social Influence, which does not generate a decisive influence on the whole structure (Venkatesh, 2011). Secondly, Voluntariness of Use is also affected by additional objective factors such as society, custom, culture and other factors in different regions and hard to unify the concept (Venkatesh, 2011). A case study in Japan pointed out that the demographic characteristics of local people have a very divergent and subdivided influence on the voluntariness of use, and the gap between the differences is large, which is difficult to indicate the relationship with limited elements (Okazaki, 2006). Accordingly, the impact of Voluntariness of Use could be hypothesized as:

H_8: The impact of Voluntariness of Use will moderate towards Effort Expectancy on the intention of use in mobile payments.

Behaviour Intention (BI)

Like all theoretical models belonging to the category of psychology, individual behaviour can be predicted and accepted by the individual's intention. One of UTAUT's central ideas is to prove that the individual's behavioural intention has a significant impact on the adoption of technology (Venkatesh, 2003). In view of the final goal of mobile payment platform is to attract consumers to the usage of their services rather than merely staying in the level of usage intention of the consumers, a wide range of studies have confirmed the connection between behavioural intentions and actual adoption. For example, most new technology adoption studies use behaviour intention as a measure of adoption rate when applying theoretical models (Irani, 2008). Not only that, but there is also a theoretical statement argues that behaviour intention has a direct impact on the actual use of users (Ajzen, 1991). The actual usage behaviour of the user is affected by personal intention (Gao, 2012). In consequence, the prediction of BI could be:

H_9: Behaviour Intention has a significant impact on the intention in use of mobile payments.

Based upon the above discussions the adapted UTAUT model could be as given below:

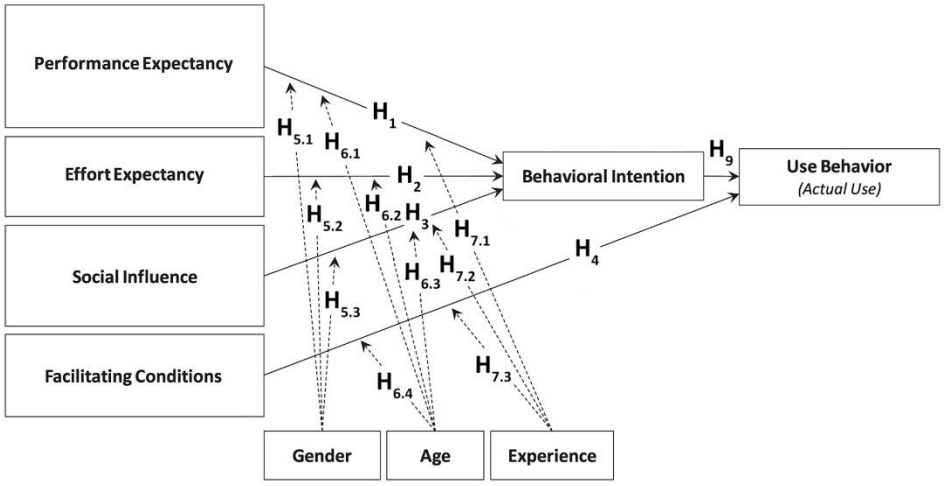

Figure 2: Final revised UTAUT for research model hypotheses

Research Methodology

In line with the previous established research methods, a deductive research approach with quantitative methods of data collection and analysis has been used to test the theoretical hypotheses (Burney, 2008; Sternberg, 2009).

Research instrument and measurements of the concepts

A survey-based data collection method has been used here (Cummings, 2006).The questionnaire consists of a set of questions that are sent to respondents to answer and collect the information they need (Quinlan, 2019). The research instrument has been adapted from the previous research papers. SPSS has been used to analyse the data and test the hypothesis. (Yu, 2012; Alkhunaizan, 2012; Min, 2008; AbuShanab, 2007; Kim, 2010; etc.)

Data analysis and findings

The final statistics result, the number of valid questionnaires was 141. The detailed statistics information is shown in table 1.

Table 1: Respondents data

Demographic characteristics			Number of respondents	Percentage (%)
Gender	Male		76	53.90
	Female		65	46.10
	Other		0	0.00
Age	Under 18		27	19.15
	18-30		41	29.08
	31-40		47	33.33
	Over 40		26	18.44
Experience	Academic background	Primary school or lower	4	2.84
		Middle school	57	40.43
		Undergraduate	75	53.19
		Postgraduate or higher	5	3.55
	Occupation	Government agency/public institution	11	7.80
		Science & Technology	20	14.18
		Business/related service industry	25	17.73
		Art & culture	5	3.55
		Agriculture	13	9.22
		Industry	30	21.28
		Military	6	4.26
		Current student	27	19.15
		Other	4	2.84
	Usage experience of	Never	0	0.00
		Occasionally	11	7.80

	mobile payment	1-3 times per month	42	29.79
		1-5 times per week	67	47.52
		Every day	21	14.89
	Consumption amount via mobile payment per month	Under £50	33	23.40
		£50-200	60	42.55
		£200-500	39	27.66
		£500-1000	6	4.26
		Over £1000	3	2.13

The scales were tested for reliability and validity. As shown in Table 2 , all factors in the measurement model have enough reliability and convergence validity because all factor loads are greater than 0.7in all cases, indicating that the construct was reliable (Straub, 1989).

Table 2: Reliability & validity index of factors

Compositions	Relevant items	Cronbach's alpha	Factor loadings
Performance Expectancy (PE)	PE1	0.871	0.882
	PE2		0.874
	PE3		0.859
	PE4		0.876
Effort Expectancy (EE)	EE1	0.863	0.903
	EE2		0.844
	EE3		0.896
	EE4		0.861
Social Influence (SI)	SI1	0.861	0.828
	SI2		0.783
	SI3		0.740
Facilitating Conditions (FC)	FC1	0.869	0.839
	FC2		0.871
	FC3		0.894
Behaviour Intention (BI)	BI1	0.874	0.932
	BI2		0.895
	BI3		0.887

Hypotheses test

For testing the hypotheses, regression was used for calculating the relationship and effect of drivers on behaviour intentions factors. Linear regression is a linear analytical equation commonly used in statistics to explore the connection between dependent variables and several independent variables (Pedhazur, 1973,(Cohen, 2014; Keith, 2015),

Table 3: Simple liner regression model of BI with other variables.

Dependent / Independent	Behaviour Intention (BI)
Performance Expectancy (PE)	0.910*** (25.861)
Effort Expectancy (EE)	0.912*** (26.169)
Social Influence (SI)	0.887*** (22.642)
Facilitating Conditions (FC)	0.032 (0.533)
Gender	-0.034 (-0.758)
Age	0.030 (0.865)
Academic	0.073 (0.363)
N	141
r2	0.828

F	668.792***

Table 4: Multiple Simple liner regression model of BI with other variables

Dependent / Independent	BI	BI	BI	BI	BI	BI
PE	0.911*** (16.692)			0.427*** (5.113)		
Gender	0.012 (0.163)	0.028 (0.410)	0.041 (0.519)			
PE*Gender	0.001*** (5.014)					
EE		0.855*** (17.508)			0.471*** (5.626)	
EE*Gender		0.117 (0.681)				
SI			0.865*** (14.773)			0.304*** (4.160)
SI*Gender			0.042 (0.527)			
Age				0.169*** (3.626)	0.181*** (4.299)	0.229*** (5.272)

PE*Age				-0.355*** (-6.055)		
EE*Age					-0.302*** (-4.752)	
SI*Age						-0.423*** (-8.045)
N	141	141	141	141	141	141
r2	0.828	0.835	0.788	0.867	0.866	0.864
F	219.775***	230.911***	169.293***	296.519***	293.907***	290.695***

The tables 3 and table 4 of the regression equation evidenced that that EE and SI to BI are not as significantly affected by gender as expected, with gender involvement. Conversely, gender significantly affects the impacting effect of PE on BI. It can be seen from many questionnaire samples that the performance expectation of men using mobile payment is slightly higher than that of women, which is like the previous research conclusions (Yang, 2012; Liébana-Cabanillas, 2014).

In addition, the results also found that the difference in age also has a moderating effect on FC. The table 3, and table 4 also shows that, experience has significant moderation on the relationship of PE and SI on BI. Many previous studies have also stated that the impact of PE on BI is affected by age and gender (Yang, 2012; Tsu, 2009; Swinyard, 2003; etc.), but the results of this test only prove the significant regulation of gender, not both. At the same time, previous literature also shows that the impact of EE on BI is also affected by age and gender, and the impact of FC on usage behaviour is affected by age (Oliveira, 2016; Li, 2014). And the moderation of experience from PE and SI towards BI significantly exists. (AbuShanab, 2007).

Conclusion and implications

This research study found some phenomena and practical significance worth exploring. First, these results can be used in mobile services and e-commerce to understand how individual

characteristics, behavioural intentions, and external influences affect and interact with users. Based on the analysis, behavioural intentions and external influences have an important influence on the individual's intention to adopt technology. In terms of social impact, it was discovered that it had an important impact on the intention to adopt mobile payments. Not only that, age, gender and personal experience have also played a different role in the regulation of use. The results show that accepting mobile payments and subsequent actions is not determined by a single factor. For example, in terms of social impact, the user's willingness to use will be adjusted after the intervention of social influence. Among potential users, the richer the personal experience, the more people will be adopted. During the research, we found that the factors of social influence and personal experience are more complicated and cannot be generalized based on the only data.

The findings of this paper also apply to other areas in mobile finance and e-commerce. Relevant factors affecting customer intent are important for the strategy development and decision-making process of the relevant company platform. After mastering the customer's psychology, the company can maximize the market and gain more benefits the service providers need to make consumers feel the compatibility of the payment platform and the advantages of the platform, eliminate consumers' doubts about the security of the payment platform, and do not think that the cost of learning to use the platform will be great. Moreover, the impact of social influence on behavioural intentions is significant; it not only directly affects behavioural intentions but also because it can also indirectly enhance the applicant's intentions by in a similar way of promoting the service provider's publicity.

The service providers should also note that depending on the audience of different traits, they should consider different targeted promotions for different groups or launch different targeted services to dig out as many potential customers as possible, to maximize the audience. For long-term users, service providers need to do more to ensure that long-term users are not lost. Specifically, they should let them feel the unique advantages of the platform and the relatively low risk of use. After the adoption of mobile payment, whether the organization or individual has received benefit improvement. For example, study whether a company brings more revenue after co-operating with a mobile payment platform.

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Appendix. Questionnaire

Compositions	Relevant items	Reference materials
Performance Expectancy	PE1: Mobile payment could allow me to better achieve my goals. PE2: Mobile payment could improve the efficiency of my tasks. PE3: Mobile payment could enhance my productivity. PE4: Mobile payment could increase my efficiency.	Venkatesh, 2010; Oliveira, 2016
Effort Expectance	EE1: The operation interface of mobile payment could be simple and clear for me. EE2: Mobile payment operations could be easy for me to master quickly. EE3: Mobile payment could be easy for me to use. EE4: The learning cost of mobile payment is low for me.	Venkatesh, 2010; Oliveira, 2016
Social Influence	SI1: People affect my behaviour think I would use mobile payment. SI2: The important people for me think I would use mobile payment. SI3: People whose opinion I am likely to adopt think I would use mobile payment.	Oliveira, 2016; Yu, 2012
Facilitating Conditions	FC1: I think I have resources/knowledge that supports mobile payment. FC2: The service provider could provide preferential policy while using. FC3: The platform of mobile payment could be compatible with other platform(s) I consistently use.	Venkatesh, 2010; Finstad, 2010; Yu, 2012
Behaviour Intention	BI1: I think I would prefer to adopt mobile payment. BI2: I think I would continue to use mobile payment. BI3: I think I would use mobile payment in the future.	Venkatesh, 2010; Oliveira, 2016; Kujala, 2017; Yang, 2015

P.S.: All the options of the questions in the table are divided into 5 scale options, which respectively are: strongly agree (attractive), agree, neutral, disagree (unattractive), and strongly disagree