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Factors Influencing to M-Commerce Adoption in China

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Abstract:

This paper reports on the results of a study of factors influence mobile commerce adoption by Chinese people. This study conducted a quantitative approach and Survey questionnaires were used to collect data from Chinese consumers. This research compared theories applied in m-commerce adoption and made a research model with moderating and mediation variables which are tested by Smart-PLS 3.2.1 on a dataset of 334 samples in China. The findings from SEM indicate that a significant influence of attitude and innovation of adoption factors could affect the adoption of m-commerce by Chinese users. The results of this research also indicate no significant effect of moderation on latent variables. The study determined some key implications for mobile providers, organizations and management.

Keywords: Mobile commerce adoption, technology adoption, diffusion of innovations theory, theory reasoned action, theory planned behavior, technology acceptance model, unified theory of acceptance and use of technology, structural equation modeling.

1. Introduction

Commerce is an exchange, purchase and sale of goods and services of economic value especially on a large scale between producer and consumer. With the advancement in technologies, methods and consequently change in demand, commerce has taken many forms such as e-commerce which has more advantages as compared to traditional commerce; for example: reducing costs, providing opportunity to reach a much wider market, and brand awareness which meet customers' and organizations' needs that lead to moving people from offline to online transactions. This new form of e-commerce is m-commerce which includes the variety of activities on wireless electronic devices (laptops, mobile phones, handheld computers) such as buying and selling of an extensive range of products and services, mobile banking, bill pay, access to information and so on. Mainly, m-commerce refers to any monetary transaction that is conducted via a mobile telecommunications network. This includes both b2b and b2c. According to Chang-Tseh (2007), "M-Commerce is assumed to be driving basic changes in many industries, particularly in telecommunications, information technology, media and financial services."

China has the world's largest population (1,369,811,000) and as Figure 1 shows, it has the largest mobile markets in terms of the number of subscribers, so it has a huge potential to develop m-commerce technology.



Figure 1: Number of mobile cell phone subscribers in China from December 2013 to December 2014 (in millions). source: <http://www.statista.com/>

As reported in the International Monetary Fund (IMF), China just passed the US to become the world's largest economy. China has enormous possibilities for m-commerce development (Dai, Singh, & Iyer, 2007). Chen Lin (2015) highlights, China's online retail sales grew 49.7% to RMB 2.79 trillion in 2014. Based on the number of mobile cell phone subscribers in China as shown as figure 1, it can be demonstrated that Mobile commerce plays an important role in Chinese economy. This research is to investigate the factors affecting the adoption of M-commerce by consumer (User) in china.

2. Literature Review

With respect to the fast Changing World of Information and Communications Technology (ICT) and quick extension of mobile technology and the growing market, there has been very little research reported on the m-commerce adoption. This research investigates theories applied for m-commerce adoption and the pursuant important factors that affect the intention to adopt and the subsequent use of M-commerce in china. The following section describes theories that explain the relationship between user attitudes, intentions, and actual use and their variables that affect the adoption of M-commerce.

2.1. Theories Applied in M-Commerce Adoption, Relevant Variables

2.1.1. Diffusion of Innovations Theory (DOI) or Innovation Diffusion Theory (IDT)

As identified by Rogers, (2003), "Diffusion is the process by which an innovation is communicated through certain channels over time among the members of a social system" (Rogers, 1995, p10). According to Rogers (2003), diffusion is a particular type of connection concerned with the spread of messages that are considered as new ideas. He explained in his study how an idea or product disseminates among a specific population or social system. Among its' achievements, people are part of a social system; they choose a new idea, behavior, or product. This model is most suitable to products that possess potential usage in high technology applications (William and Keith, 1997). Accordingly, this model helps firms to perceive how a buyer adopts new products or technologies over time. Rogers (2003) claims that adoption is a decision of "full use of an innovation as the best course of action available" and rejection is a decision "not to adopt an innovation" (p.177). This means adoption must be supported by people's perception of innovation. Fife and Pereira (2003) highlights that Diffusion of Innovations is the most acceptable model to describe mobile commerce adoption between different societies and they assert that DOI is a good model to describe user behavior regarding mobile technology acceptance. Rogers classifies Diffusion of Innovations into five features of innovation: compatibility, complexity, trial ability, relative advantage and observability. According to his studies, individual's perceptions of these features estimate the frequency of adoption of innovations. Some constructs were identified by researchers beyond roger's classification such as image, cost and voluntariness and also some researchers (Tornatzky and Klein, 1982. Moore and Benbasat, 1991) extended some constructs for Rogers' classification.

2.1.1.1. Relative Advantage

As identified by Rogers (2003, p.212), relative advantage is "the degree to which an innovation is perceived as being better than the idea it supersedes". So, the rapid rate of adoption will be perceived relative to the advantage of new products. In the case of mobile commerce, potential to save time is the most visible determinant of relative advantage.

2.1.1.2. Compatibility

According to Rogers (2003), the degree which the new innovation goes along with previously values, attitudes, needs of potential adopters and experiences of using predecessors and the necessity of future adopters. The compatibility of the innovation has a strong impact on its' adoption (Kotler & Armstrong, 2006, as cited in Ozer& Acikdilli, 2012).

2.1.1.3. Complexity

Rogers (2003) states that complexity is the degree to which innovation is realized, and is very hard to perceive or use. New concepts that are easy with regard to perception are accepting more speedily innovations that need the user to expand understandings. Shon & Swatman (1998) asserts, ease of use has influence over consumer adoption of Internet payments; and, Siau, Sheng, Nah and Davis (2004) asserts that limitations in mobile device features will reduce the availability and user-friendliness of mobile technologies. This means complexity is perceived to be the level of difficulty by which the consumer perceives innovation.

2.1.1.4. Trial Ability

Trial ability is the degree to which innovations can be examined on a limited foundation (Rogers, 2003). An innovation that is trial able indicates less risk to the individual who is considering it. Trial ability may have a positive effect on the expectance of adoption (Tornatzky & Klein, 1982).

2.1.1.5. Observability

Rogers (2003) highlights observability as the degree to which results of the innovation are tangible to the participant. Tornatzky & Klein (1982) claim that the visible results of the innovation make possible the faster diffusion of the innovation in the applicable environment and the social system (Tornatzky & Klein, 1982).

According to Agarwal and Prasad (1999), only some factors such as relative advantages, complexity and compatibility of DOI have important influence on the adoption of innovation of new products or systems and these factors are closely related to the technology acceptance model that follows.

2.1.2. The Theory Reasoned Action (TRA)

The Theory of Reasoned Action (TRA) finds its origins in the field of social psychology. This theory proposed that people's performance is up to the individual control of his/her behavior that is driven by behavioral intentions. This intention is defined by the individual's attitudes and his/her subjective norms towards the behavior (Ajzen 1988; Fishbein & Ajzen 1975).

The TRA can be summarized as follows:

Behavioral Intention = Attitude + Subjective norms

As claimed by TRA, Fishbein and Ajzen (1975) state that attitude toward the expected result of a behavior are the individual's feelings, belief and intention about behavior weighted by evaluations of these beliefs. Based on the ideas of Fishbein and Ajzen (1975), it can be demonstrated that attitudes toward a specific behavior are influenced by a composition of two related factors: individual beliefs about the result of the behavior and individual evaluation of the possible result. Thus, if a person perceives that the result from acting a behavior is positive, then he or she will have a positive attitude towards acting the behavior. In the same way, if a person identifies that the outcome of behavior is negative, they will have negative attitudes toward that behavior.

TRA theorizes that subjective norms are determined by the individual's perceptions of the influence of significant others. This means, that most people who are important to individuals can impact his or her behavior (Fishbein & Ajzen, 1975). By paying more attention to attitudes and norms, TRA prepares a framework for identifying and examining the basic reasons for a person's intention to behave in a definite way or not ("Essays, UK," 2013).

2.1.3. The Theory of Planned Behavior (TPB)

The theory of planned behavior is an extension of the theory of reasoned action (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975) by including perceived behavioral control (Ajzen, 1991). Based on the ideas of Ajzen (1975) and Ajzen & Fishbein (1980), the theory of planned behavior can be defined a theory which forecasts intentional behavior, because behavior can be consultative and planned. The additional form of perceived behavioral control considers conditions where barriers exist that are outside of an individual's capability to control them and to cover non-volitional behaviors for predicting behavioral intentions and actual behavior. In other words, TPB attempts to resolve limitations and improve on the predictive power of the theory of reasoned action. According to the TPB, Ajzen (1991) asserts that the combination of motivational factors, attitudes toward a behavior, perceived behavioral control and subjective norms can influence the intention of a behavior.

The following figure summarizes TPB factors and variables:

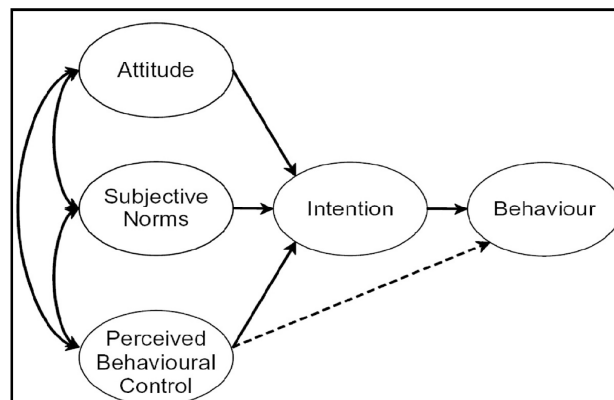


Figure 2: The theory of planned behavior (Ajzen, 1991) Willems et al. BMC Health Services Research

As shown in figure 2, the theory of planned behavior assumes three conceptually independent factors of intention. The first is the attitude represent in a person's beliefs about the behavior compared with the value the person places on the outcome of the behavior (Rosalind &Templin, 2010). The second predictor of intention is subjective norm; it is a person perception regarding particular behavior that is influenced by a person's normative beliefs compared with the person's motivation to comply. The third predictor of intention is perceived behavioral control; it demonstrates a person's perception of difficulty or how easy it is that will impact the ability to perform the behavior. Pedersen (2005) states that perceived behavioral control specifies the internal and external restriction on behavior, and it is exactly related to the intent to use mobile commerce services.

2.1.4. The Technology Acceptance Model (TAM)

Davis (1986) expands the Technology Acceptance Model based on the Theory of Reasoned Action (TRA). While TRA used to predict and explain human behavior in general, TAM is specific to information system usage. Based on the ideas of Davis (1986), and Davis, Bagozzi, and Warshaw (1989), it can be argued that TAM attempts to test and predict why people accept or reject information technology and examine the factors that have an effect on their attitude toward using new information technology. A key purpose of TAM is to predict information system acceptance and make a foundation for tracing the impact of external factors on attitude, internal opinions, and intentions (Rouibah, Ramayah & Sook May, 2009). As shown in figure 3, the original TAM hypothesizes two cognitive assumptions in explaining system usage: perceived ease of use and perceived usefulness were two main determinants of technology acceptance.

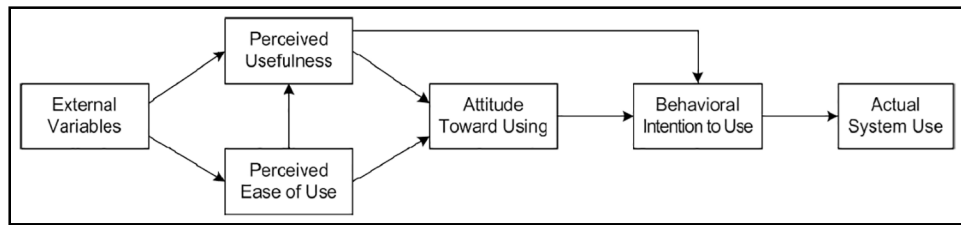


Figure 3: TAM version 1, Davis, Bagozzi & Warshaw (1989) p 985

Davis (1986) highlights the Perceived usefulness (PU) that a person believes a particular system will improve individual job performance. In m-commerce, it improves attitudes regarding getting more information from sellers for using mobile devices and enables users to think that using m-commerce would improve his/her performance. Perceiving ease of use (PEOU), as identified by (Davis 1989), is the degree to which a person imagines that using a special system would be a free form attempt. Extended to m-commerce, perceiving ease of use is a key element for the m-commerce adoption because of the comfort level of using mobile devices such as resolution, screen size, color depth, and keypad size which makes it effortless for the user to accomplish m-commerce. According to Bhatti (2007), TAM could be applicable in forecasting user's intentions of accepting new services and applications. This gives strength to the claim that TAM can be influenced by different factors with regard to the customers' intentions of using mobile services.

2.1.5. The Technology Acceptance Model 2 (TAM 2)

As highlighted by Davis (1989), concentration of an external variable (as shown in figure 3) influences the Perceived ease of use (PEOU) and Perceived usefulness (PU); it is crucial for the future study of technology adoption. Therefore, various studies conducted by researchers have attempted to extend and modify TAM by including extra variables that can influence it.

Venkatesh and Davis (2000) developed The Technology Acceptance Model 2 (TAM 2) on the basis of TAM. According to Venkatesh et al. (2000), TAM2, as shown as figure 4, involves influences of social factors (subjective norm, voluntariness, and image), besides cognitive instrumental factors (job relevance, ease of use and usefulness, output quality, and result demonstrability). These were studied to overlook the restriction of the original TAM.

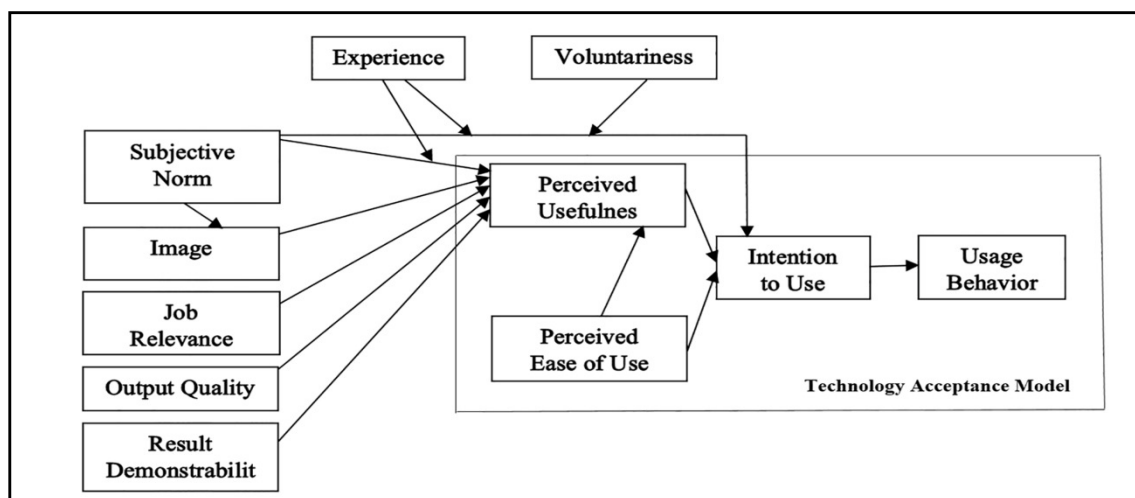


Figure 4: Technology Acceptance Model 2 (TAM 2) Source: Venkatesh and Davis (2000)

2.1.5.1. Social Influence Factors

Malhotra and Galletta (1999) found that social influences play a critical role in verifying the acceptance and usage behavior of new adopters of new information technologies. Subjective norm is the same form that has been studied in TRA and TPB and it also has indirect impact on intention via perceived usefulness.

According to the TAM2, voluntariness, based on the findings of Venkatesh et al. (2000), Hartwick & Barki (1994), is a moderator factor and can be described as the extent to which individuals in an organization are free to adopt or not adopt new information technology and as a moderating variable has effect on the subjective norm or intention and behavior to use a system such as mobile devices.

According to Moore and Benbasat (1991, p. 195), "image is the use of an innovation and is perceived to enhance one's status in one's social system." Rogers (1983) claims that one of the people's main motivations to accept an innovation is his/her wish to obtain social status. A central feature underlying this concept is this innovation that is perceived to intensify customer status in his/her social system.

2.1.5.2. Cognitive Instrumental Factors

In this classification, along with the perceived ease of use, factors also include job relevance, output quality and result demonstrability. According to TAM2, Venkatesh and Davis claimed that job relevance is an individual's recognition of the degree to which the target is applicable to his or her job. This means job relevance is a key factor in judging the impact of using a specific system on his/her job. Output quality is a person's belief that the system allows him or her to perform his or her tasks well. Result demonstrability is the tangibility of the results of using the innovation. Basically, the technology should visibly enhance the value of the processes.

2.1.6. The Technology Acceptance Model 3 (TAM3)

Venkatesh & Bala (2008) fill the gap about limited research in interventions that can lead to more acceptance and effective utilization of IT and managerial decision making. Because previous researcher's focus on making decisions by employees in selecting and using information technologies in the workplace, Venkatesh & Davis (2000) incorporate TAM2 and the model of the perceived ease of use with its factors (Venkatesh, 2000), and introduce a new model, namely the technology acceptance model 3 (TAM3) as shown in figure 5. As highlighted by Venkatesh & Bala (2008), the technology acceptance model 3 has significant implications for managerial decision making on IT implementation in organizations. The researchers defined determinants of perceived ease of use as summarized in Table1.

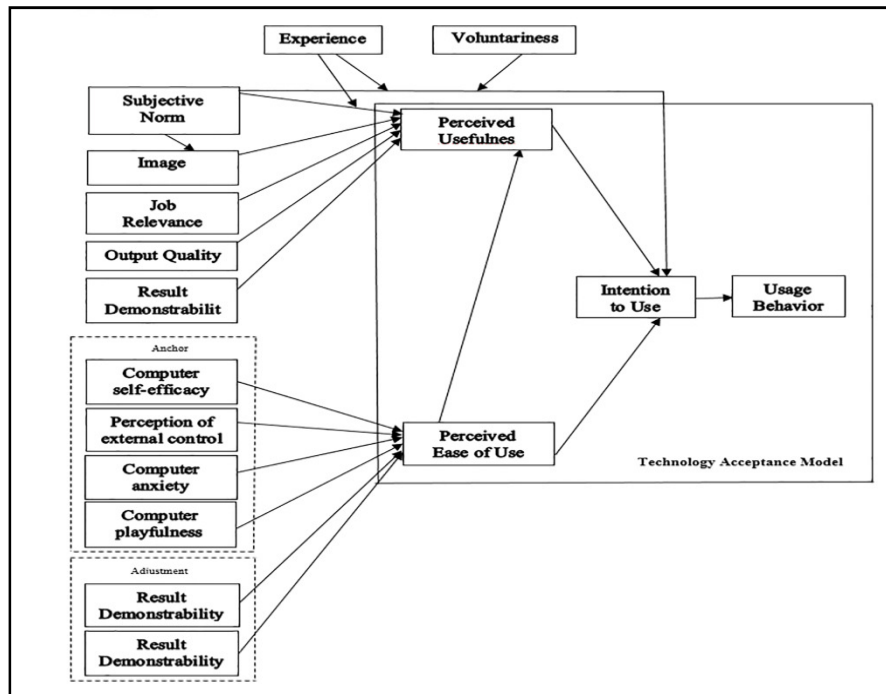


Figure 5: Technology Acceptance Model 3 (TAM3). Source: Venkatesh, V. and Bala, H. "TAM 3: Advancing the Technology Acceptance Model with a Focus on Interventions," Manuscript in-preparation.

Determinants	Definitions
Computer Self-Efficacy	Computer self-efficacy refers to a belief of one's capability to use a computer (Compeau & Higgins, 1995 as cited in Qin, Qiang & Kanliang, 2011)
Perception of External Control	The degree to which an individual believes that organizational and technical resources exist to support the use of the system (Venkatesh et al., 2003).
Computer Anxiety	The degree of "an individual's apprehension, or even fear, when she/he is faced with the possibility of using computers" (Venkatesh, 2000, p. 349).
Computer Playfulness	". . . the degree of cognitive spontaneity in microcomputer interactions" (Venkatesh & Bala, 2008)
Perceived Enjoyment	The extent to which "the activity of using a specific system is perceived to be enjoyable in its own right, aside from any performance consequences resulting from system use" (Venkatesh, 2000, p. 351).
Objective Usability	A "comparison of systems based on the actual level (rather than perceptions) of effort required to completing specific tasks" (Venkatesh, 2000, pp. 350-351).

Table 1: Determinants of perceived ease of use. Source: Venkatesh, V. and Bala, H. (2008)

Venkatesh classified the Perceived Ease of Use factors into two categories: Anchor determinants and Adjustment determinants. Anchor determinants are related to an individual's beliefs about technology, computers and usage. Adjustment determinants have to do with the user's prior life experiences; Venkatesh (2000) states that adjustments are beliefs held by an individual that change as the individual is faced with new experiences and information.

2.1.6.1. Anchor Determinants

According to Bandura (1977), individuals who have high self-efficacy will find the use of m-commerce to be manageable, and easy to use due to the impact of computer self-efficacy on the degree of performance, the determination and the level of learning, and will be less resistant to changes. So, self-efficacy will influence individual's attitudes and behavior in m-commerce adoption through usage factors. As identified by Venkatesh (2000), behavioral control is divided into internal control (self-efficacy) and external control (facilitating conditions), which have an important role in the users 'experience with a system'. Perception of external controls (Facilitating conditions) refers to organizational and technical substructure to help users use the systems and dominate any technological barriers (Venkatesh, 2000), and support from mobile operators (Teo and Pok, 2003). Park et al. (2007) highlights that the perception of external controls (facilitating condition) are one of the major factors that have an impact on mobile commerce adoption in China. According to Howard and Smith (1986), computer anxiety results from an attitude of a person that experiences a level of disquiet in his or her imminent use of a computer." Based on the ideas of Ayersman & Reed (1995) and Igarria & Chakrabarti (1990), it can be argued that factors such as self-efficacy and attitudes towards computer usage are influencing computer anxiety. Davis, Bagozzi and Warshaw (1992) claim that perceived playfulness represents the amount of effort that people put into the use of computers, and that that is affected by both the native and external motivations in their culture. Cheong and Park (2005) substantiate their research by pointing out that perceived playfulness helps to forecast people's intentions to use mobile internet, while Fang, Chan, Brzezinski and Xu (2006) state that playfulness is the factor that can be influential on the use of technology such as mobile games, more than mobile internet services.

2.1.6.2. Adjustment Determinants

In the study by Davis, Bagozzi and Warshaw (1989) perceived enjoyment is an intrinsic motivation factor for user acceptance of computers in workplaces; according to Koufaris (2002), perceived web skills have positive relations with native beliefs such as shopping enjoyment, and concentration of online consumers. This means that an enjoyable shopping experience is enough to make online shoppers return. Nysveen, Pedersen and Thorbjørnsen (2005), in their study of four mobile services, found one of the crucial factors in determining intention of use is perceived enjoyment. As identified by Nielsen (1994), usability should have some features such as user friendliness, integration of consequence, ease of navigation, intelligibility, and design stability. Therefore, based on the idea of Nielsen (1994), it can be demonstrated that in the case of mobile commerce, screen display, the use of context, resolution, color and wireless handheld devices affect usability. Shim, Bekkering, & Hall, (2002), assert in their study that difficulty of usability discourages users from m-commerce. According to the literature reviewing usability in m-commerce, it is one of the considerable demanding points during the implementation of the m-commerce.

2.1.7. The Unified Theory of Acceptance and Use of Technology (UTAUT)

Venkatesh, Morris, Davis, G. B., & Davis, F. D. (2003) developed the Unified Theory of Acceptance and Use of Technology (UTAUT) based on social cognitive theory; the theories of individual technology acceptance include: Theory of Reasoned Action (TRA), Theory of Planned Behavior (TPB), Technology Acceptance Model (TAM), the model combining the Technology Acceptance Model and Theory of Planned Behavior (C-TAM-TPB), the Model of PC Utilization (MPCU), the Motivational Model (MM), Innovation Diffusion Theory (IDT), and Social Cognitive Theory (SCT) for the purpose of achieving user acceptance of information technology and adoption using a more unified view of the technology acceptance, as shown in figure 6, the UTAUT model contains four key intention constructs; namely, performance expectancy (PE), effort expectancy (EE), social influence (SI), and facilitating conditions (FC). According to Venkatesh et al. (2003), the first three constructs are direct determinants of usage, intention and behavior, and the fourth construct is a direct determinant of use behavior. There are also four moderators: gender, age, experience, and voluntariness of use which moderates the impact of independent variables on dependent variables. Chang (2012) points out that the strength of the UTAUT Model is the intention of users to use the information system and to understand use behavior. Most of the previous studies used the technology acceptance model (TAM) and also a lot of the research was conducted in developed countries, so there are limited studies in UTAUT and especially in developing countries such as China. In the study by Straub and Brenner (1997), they found that culture has an important impact on IT acceptance, and based on this, it is necessary to investigate the IT acceptance models in different cultural settings such as China.

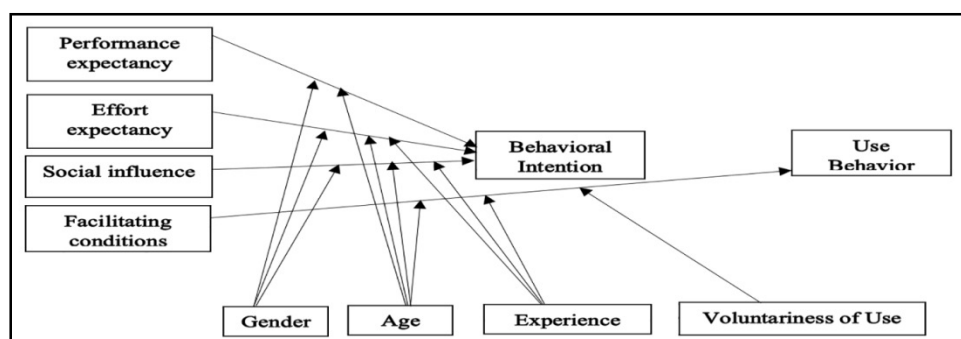


Figure 6: The unified theory of acceptance and use of technology (UTAUT), source: Venkatesh, Morris, Davis, G. B., & Davis, F. D. (2003)

The UTAUT model has been used in many research studies regarding Mobile Technologies such as Park et al. (2007). They state that Performance Expectancy, Effort Expectancy, Social Influence, and Facilitating Conditions are major factors that affect the adoption of m-commerce.

2.1.7.1. Performance Expectancy

As identified by Venkatesh et al. (2003), performance expectancy involves individual beliefs that using the system will help him or her to excel in job performance. They mentioned that new information systems such as m-commerce are hard to use and less applicable for the older end-users.

2.1.7.2. Effort Expectancy

Effort Expectancy is the individual belief that the utilizing of specific technology will be simple and easy, as identified by Cohen (1988). Venkatesh and Morris (2000) claim that Effort Expectancy has a powerful effect over a sustained period of time for the user utilizing systems such as m-commerce; there is a belief that the use of a particular technology will be easy and effortless.

2.1.7.3. Social Influence

As identified by Venkatesh et al. (2003), social influence is the degree to which important people have an impact on his or her decision to use the new system.

2.1.7.4. Facilitating Conditions

As identified by Venkatesh et al. (2003) Facilitating conditions (FC) represent the degree to which an individual believes there are some conditions such as technical infrastructure to support using a system in organization. They found FC has a direct impact on behavior and behavior intention. In the case of mobile technology, technical infrastructure such as network and accesses, computer hardware, and software are required for the adoption of mobile technology.

2.1.7.5. Behavioral Intention

As identified by Fishbein & Ajzen (1980), behavioral intention includes attitude and subjective norms which lead to actual behavior; so, actual behavior can be forecast by behavioral intention. As noted by Agarwal and Prasad (1999), behavioral intention is used as a relevant substitute for behavior in mobile communication technology in China. Four moderators inclusive of age, gender, experience, and voluntariness affect the relationship in UTAUT. As highlighted by Venkatesh and Morris (2000), "gender" is a moderator on the effects of performance expectancy, social influence, and effort expectancy on behavioral intention. He states that "age" is a moderator between factors such as effort expectancy, performance expectancy, and social influence on behavioral intention; age also affects facilitating conditions on use behavior. While Venkatesh et al. (2003) declared in their study that, "experience" is the moderator on the effects of effort expectancy and social influence on behavioral intention, it also effects facilitating conditions on use behavior; and the impact of social influence on behavioral intention are moderated by "voluntariness of use".

3. Research Methodology

According to statistics, as shown in figure 7, in June 2013, internet users in China were the highest ranked between selected countries; also as demonstrated in figure 8, China had the second highest ranking of internet users in Asian countries according to the sales of mobile phones in the fourth quarter of 2014. According to technasia, Chinese people spent \$51.62 billion spent via mobile commerce in 2014. That's nearly double the m-commerce tally in 2013. Also, China would become the world's largest economy, and thus this study aims to provide a better understanding of a situation of mobile commerce adopted by Chinese people and which factors are most effective in consumer intentions to adopt m-commerce in China. Structural equation modeling (SEM) with the Partial Least Squares (PLS) approach is used in this research to create and test the research model and describe specific Chinese people's intentions as they occur in m-commerce adoption. Therefore, the questionnaire was converted into Chinese language based on literature review and questions were formulated to capture demographic information, frequency of use, and factors that have significant impact on the intention of use and mobile commerce adoption such as: perceived usefulness, performance expectancy, perceived ease of use, effort expectancy, complexity, subjective norm, attitude, perceived behavioral control, perceived enjoyment, computer playfulness, self-efficiency, computer anxiety, objective usability, perception of external control, facilitating conditions, result demonstrability, job relevance, output quality, voluntariness, image, social Influence, relative advantage, trial ability, individual innovation, risk and cost. In total, there were 28 variables with 44 main questions from 7 theories collected. To capture the strength of the respondent's perception, there was a 5-point Likert scale used in the Questionnaires, where 1 was strongly disagree, 2 was disagree, 3 was neutral, 4 was agree, and 5 was strongly agree, and they were distributed to the random Chinese people in Nanjing who had mobile phone users and have used mobile services.

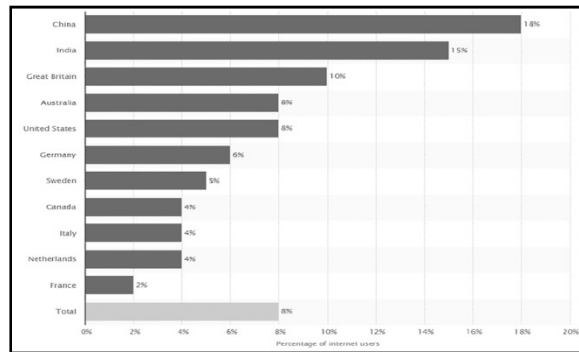


Figure 5: Internet users in selected countries who have made a purchase via mobile device in June 2013, source: <http://www.statista.com>

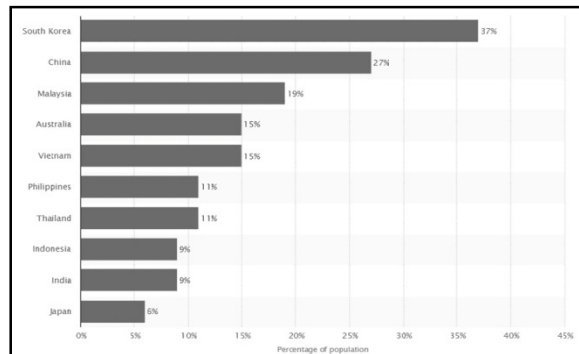


Figure 8: Internet users in Asia Pacific countries who have made a purchase via mobile phone in 4th quarter 2014, Source: <http://www.statista.com/statistics/255214/mobile-commerce-penetration-in-asia-pacific-countries/>

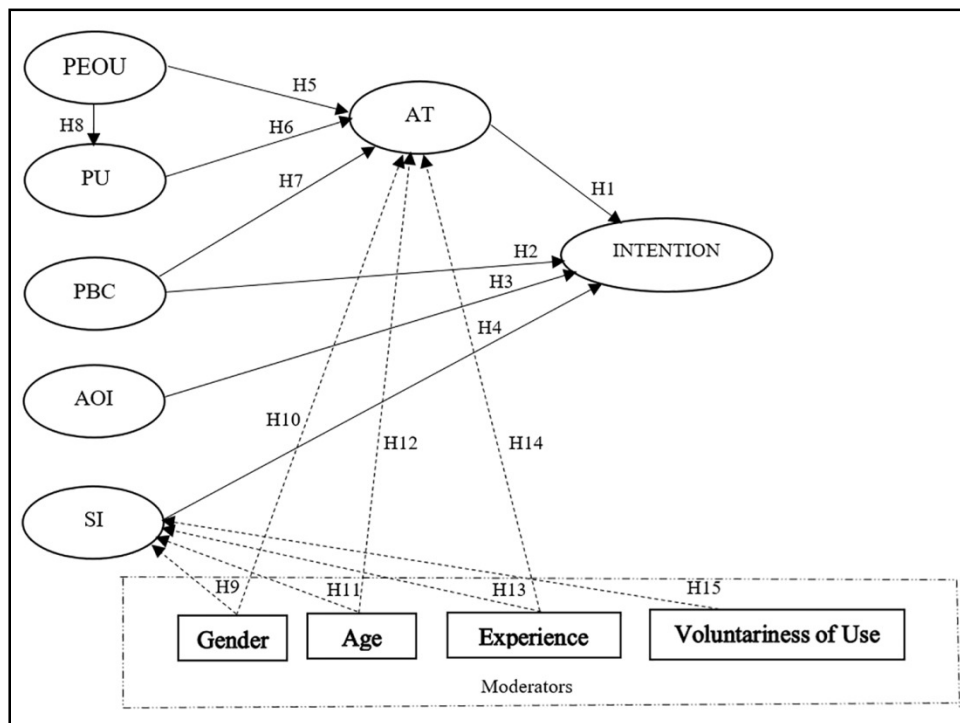


Figure 9: Research Model

In the foregoing literature review and research studies in mobile commerce adoption, in this research, I integrated seven theories and their factors which had the same performance in mobile commerce adoption together and put factors with the same performance in one category. The final proposed research models of this research with various assumptions are shown in figure 9. In this model, there are two m variables, perceived usefulness (PU) between perceived ease of use (PEOU) and attitude (AT), and attitude (AT) between perceived behavioral control (PBC) and intention which acts as a neutral third party and moderators.

3.1.1. Moderator Variables

According to literature reviews of some papers, some individually different variables have moderating impact. In this research, I used demographic variables in individual differences such as age, gender, and experience for moderating variables. Other moderating variables used in this research were voluntariness which is recognized as an organizational factor; their relationship to other variables and their effect is shown in figure 10.

3.2. Demographic Profile of the Respondents

A total of 360 questionnaires were distributed among Chinese people, and 346 of them were returned; and, after checking the validity of data and removing data from respondents that their mobile couldn't connect to internet, 334 were accepted as valid data. This represented a participation rate of 93%. The sample is composed of 40.7% women and 59.3% men, with ages between 15 and 45 years. Table 2 illustrates the demographic characteristics of the respondents.

Variable	N	Percent
Gender		
Female	136	40.7
Male	198	59.3
Age		
Bellow 15	2	.6
15-25	236	70.7
25-35	76	22.8
35-45	17	5.1
45-55	3	.9
Education		
Under diploma	7	2.1
Diploma	18	5.4
Bachelor	135	40.4
Master	146	43.7
PhD and more	28	8.4
Are you internet user?		
yes	330	98.8
no	4	1.2
Occupation		
Student	6	1.8
University student	246	73.7
Teacher	31	9.3
Employee	40	12.0
Manager	7	2.1
Housewife	1	.3
Engineer	3	.9
Marital status		
Single	291	87.1
Married	43	12.9
Do you own a mobile phone?		
Yes	334	100.0
Years of use of mobile devices		
1-2 years	19	5.7
2-3years	70	21.0
3-4 years	245	73.4

Table 2: Respondent's demographic characteristics

3.3. Measurement of Internal Consistency

In this research, Cronbach's alpha was conducted in order to examine internal consistency. The total Cronbach's alpha was 0.89 and for each construct, the Cronbach's alpha exceeded the required 0.7 (Nunnally & Bernstein, 1994). It can be confirmed that all data are reliable.

3.3.1. Constructs' Descriptive Statistics

According to Berteau (2010), various factors can influence the reliability of the data; so, in this research one can be assured about the reliability and validity. The indicators are highly correlated and interchangeable, and they are reflective so their reliability and validity

can be examined (Hair et al., 2013). Table 3 demonstrates components of constructs and the validity – namely, convergent and discriminant validity. This is Cronbach's alpha and discriminant validity. In this research, convergent validity was evaluated by Composite Reliability (CR) and Average Variance Extracted (AVE). As shown in table 3, Composite Reliability (CR) of all constructs are above 0.7, and Average Variance Extracted (AVE) are above 0.5. Based on the ideas of Nunnally & Bernstein (1994), it can be argued that all of the constructs have an acceptable value of CR and AVE. This means each item has a high degree of item-level reliability and good internal consistency. As identified by Fornell & Larcker (1981), for testing discriminant validity, the square root of AVE for each variable should be greater than the corresponding correlation coefficient between variables. As shown in Table 3, the AVE square root of each factor is larger than the correlation. Consequently, different factors had good discriminant validity.

	CR	AVE	Cronbach's α	1	2	3	4	5	6	7
1.Attitude	0.89	0.81	0.76	0.90						
2.Adoption of Innovation	0.84	0.57	0.75	0.40	0.76					
3.Intention to Use	1.00	1.00	1.00	0.77	0.62	1.00				
4.Percieved Behavioral Control	1.00	1.00	1.00	0.41	0.27	0.55	1.00			
5.Percieved Ease of Use	0.87	0.56	0.81	0.62	0.49	0.81	0.48	0.75		
6.Percieved Usefulness	0.90	0.55	0.86	0.75	0.51	0.82	0.46	0.70	0.74	
7.Social Influence	1.00	1.00	1.00	0.11	0.28	0.31	0.09	0.22	0.13	1.00

Table 3: Correlations and constructs validity

3.4. Structural Model and Data analysis procedures

$$z = \frac{ab}{\sqrt{(b^2SE_a^2) + (a^2SE_b^2)}}$$

The Partial Last Squares Path Model was tested to clarify the fit of the model to the data; regarding research models, the perceived usefulness (PU) and attitude act as moderators. Therefore, first of all, the conventional Sobel test (MacKinnon, Warsi, & Dwyer, 1995) is used for measuring significant moderation effects and to test whether moderators carry the impact of an independence variable (IV) to a dependence variable (DV). The Sobel statistic test formula is as follows:

Where a is the regression coefficient and SEa is the standard error for the relationship between the IV and the mediator, b is the regression coefficient and SEb is the standard error of the relationship between the moderator variable and the DV for the relationship between the moderator and the DV.

3.4.1. Mediation Analysis

For Sobel test and mediation analysis, as Gaskin (2012) suggests, this study tested the path coefficient between perceived ease of use (PEOU) and attitude (AT) without a mediator (PU), found the beta value, evaluated the significance of the mediator effect, and employed bootstrapping analysis to calculate the Sobel test; a and SEa were .821 and .017 and b and SEb were .598 and .071 respectively. The z-value for the Sobel test statistic was 8.29, which is greater than the t-statistic value 1.96 and $p < 0.05$. As a result, the mediator (PU) does mediate the effect between the perceived ease of use and attitude (Sobel 2015). Also, the direct path without the mediator was .687 and did decrease to .183 with the mediator; this illustrates partial mediation (James, Mulaik, & Brett (1982)). I did the same process for the second mediator (attitude) between perceived behavioral control (PBC) and intention. a and SEa were .579 and .048; b and SEb were .529 and .046 respectively. The z-value for the Sobel test statistic was 8.32. This mediator also is greater than 1.96, hence this mediator does mediate the impact between the independence variable (PBC) and other dependent variables such as intention. There is a decrease of their direct path without the mediator, and .687 to .183 with the mediator. To this end, there is partial mediation in both cases.

3.4.2. Model Analysis

In the second step, the strength of the relationship between related constructs was evaluated by checking the significance of path coefficients (β) and the squared R (R^2) coefficient of determination. R^2 is .782 for the intention dependent latent variable. It is comprised of other latent variables in the model, which substantially explains 78.2% of the variance in intention. According to the structural model, attitude (AT) has the strongest effect on intention with $\beta=.508$ and I hypothesized the path relationship between other variables and intention to be greater than 0.1. This means hypothesis H1, H2, H3, and H4 are statistically significant. Thus we can illustrate the following: attitude (perceived usefulness and perceived ease of use), adoption of innovation, perceived behavioral control and social influence are strong predictors of intention. As shown in figure 10, perceived Ease of Use (PEOU) and Perceived Usefulness (PU) have a significant effect on attitude with a path coefficient of $\beta=.162$ and $\beta=.617$ respectively, so hypothesis H5 and H6 was confirmed; also, the results show statistical support for strong effect of perceived ease of use to perceived usefulness, thus hypothesis H8 with $\beta=.705$ supports our analysis. Hypothesis H7 perceived behavioral control to attitude and did not support $\beta=.050$. In this research, the 2-stage approach (Chin et al., 2003) is used for the significance of testing the moderating effect. As it is presented in figure 10, the path coefficient (β) of all moderators are less than .05, and it shows hypothesis H9, H10, H11, H12, H13, H14, and H15 was not confirmed.

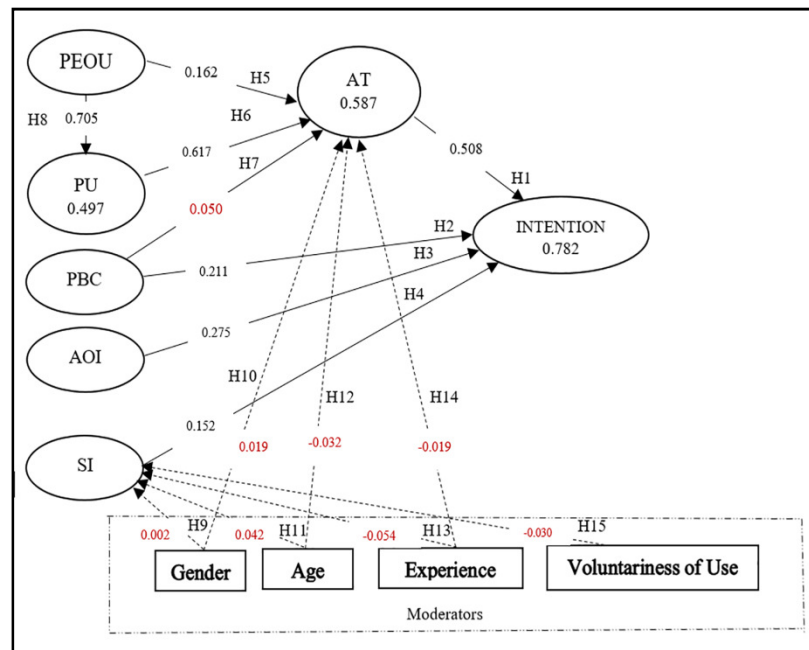


Figure 10: PLS-SEM Structural Model

3.5. Structural Path Significance

To confirm the stability of results in the structural model, I applied Bootstrapping in PLS-SEM algorithms. As it is shown in table 4, the T-statistics for all linkage are larger than 1.96 except in the perceived behavioral control to attitude (t=0.985) and was not supported as seen by the path coefficients in figure 10 and t-values in Table 4. In this research, in order to explore the existence of moderators, the Product Indicator Approach (Chin, Marcolin, & Newsted, 2003) is used for the significance test of the moderating effect. The results are displayed in table 4, and it can be demonstrated that moderators don't have a positive effect on manifest variables. Effect size (*f*²) is calculated for determining the strength of the moderating effect, as shown as table 5. According to Cohen (1988, p.410-414), moderators in this research have don't have any effect on latent variables.

	Original Sample (O)	Sample Mean (M)	Standard Error	T Statistics	P Values
AT ->Intention to use	0.508	0.506	0.039	13.142	0.000
AOI -> Intention to use	0.275	0.276	0.039	7.023	0.000
SI ->Intention to use	0.152	0.152	0.037	4.079	0.000
PEOU -> PU	0.705	0.709	0.035	20.299	0.000
PEOU -> AT	0.162	0.163	0.061	2.659	0.008
PU -> AT	0.617	0.617	0.053	11.669	0.000
PBC -> AT	0.050	0.046	0.051	0.985	0.325
PBC -> Intention to use	0.211	0.211	0.038	5.586	0.000
AT*Age -> Intention to use	0.019	0.019	0.031	0.753	0.546
AT*Gender -> Intention to use	-0.032	-0.032	0.034	0.691	0.340
AT *Experience ->Intention to use	-0.019	-0.024	0.032	0.098	0.553
SI*Age ->Intention to use	0.002	0.001	0.041	1.064	0.959
SI*Gender ->Intention to use	0.042	0.043	0.030	1.290	0.156
SI*Voluntaries -> Intention to use	-0.030	-0.031	0.031	0.033	0.332
SI*Experience -> Intention to use	-0.054	-0.052	0.030	1.766	0.076

Table 4: Bootstrapping Structural Path Significance

	Effect size <i>f</i> ²
AT *Experience ->Intention to use	0.002
AT*Age -> Intention to use	0.002
AT*Gender -> Intention to use	0.004
SI*Age ->Intention to use	0.000
SI*Gender ->Intention to use	0.007
SI*Voluntaries -> Intention to use	0.005
SI*Experience -> Intention to use	0.014

Table 5: Effect Size

4. Discussion and Implications

The purpose of this research is to investigate all factors of the main theories, and to find out which factors have the most influence on mobile commerce adoption in China. Because this country has the largest population, the most prestigious in terms of the number of subscribers, and having continuous growth in the number of mobile commerce adoption, they are the, readiest people to accept m-commerce and e-commerce adoption. In this research, i introduced an integrated model of all theories that studied which factors influence consumers' intention to use mobile commerce. In a survey and the subsequent SEM in Smart PLS, the main factors that lead to the intention to use mobile commerce are distinguished. In this research, as it is shown in figure 10, the attitude is the main factor to influence intention, and to use mobile commerce. Meanwhile, it is also revealed that the adoption of innovation is the second important factor (t-value .275) to influence the intention to use mobile commerce by the Chinese consumer. Thus, mobile providers need to adopt strategies to increase mobile user attitude such as entertainment, mobile media advertising, discount voucher and shopping to increase user attitude. The managers can also increase user motivation with a rigorous training program, an

encouragement and welfare plan, the benchmarking of new product and services, and to allocate resources according to an increase in user motivation, and to adopt innovation and intention to use mobile commerce.

As a consequence, it is suggested that the mobile provider and managers focus on capturing the attitude and increasing the adoption of innovation by the mobile user.

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