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Drivers of Mobile Payment Acceptance in China: An Empirical Investigation

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Abstract: With the rapid development of mobile technologies in contemporary society, China has seen increased usage of the Internet and mobile devices. Thus, mobile payment is constantly being innovated and is highly valued in China. Although there have been many reports on the consumer adoption of mobile payments, there are few studies providing guidelines on examining mobile payment adoption in China. This study intends to explore the impact of the facilitating factors (perceived transaction convenience, compatibility, relative advantage, social influence), environmental factors (government support, additional value), inhibiting factors (perceived risk), and personal factors (absorptive capacity, affinity, personal innovation in IT (PIIT)) on adoption intention in China. A research model that reflects the characteristics of mobile payment services was developed and empirically tested by using structural equation modeling (SEM) on datasets consisting of 257 users through an online survey questionnaire in China. Our findings show that perceived transaction convenience, compatibility, relative advantage, government support, additional value, absorptive capacity, affinity, and PIIT all have a positive impact on adoption intention, while social influence has no significant impact on adoption intention, and perceived risk has a negative impact on adoption intention. In addition, the top three factors that influence adoption intentions are absorptive capacity, perceived transaction convenience, and additional value.

Keywords: mobile payment; absorptive capacity; government support; additional value; perceived transaction convenience; adoption intention

1. Introduction

The rapid popularization of mobile devices and apps has driven the rapid development of mobile payment. Mobile payment refers to the process of completing payments through mobile communication devices, such as smart phones or personal digital assistants (PDAs), and to the conducting of authorization and authentication through such mobile devices in exchange for the economic value of services and commodities [1]. In short, mobile payment services offer a benefit to users, enabling them to purchase and pay for products via their smart phones. According to eMarketer [2], in 2019, 938 million people (that is, 36.0% of users with smart phones) have made mobile payments through their smart phones in retail channels, and this number will grow by 13.5% on an annual basis. Taking China as an example, eMarketer [2] predicts that 81.4% of smart phone users will use a mobile payment app due to the promotion of Ant Financials' Alipay and WeChat Pay. In addition, according to the report by Bigdata research [3], China's mobile payment transaction total has reached

RMB 159.8 trillion (Alipay and Tencent Finance accounted for 52.1% and 37.3% of the transaction volume, respectively), and this transaction total is expected to reach RMB 209.3 trillion in 2019.

Due to this, mobile payment is the fastest growing application of mobile technologies worldwide (especially in China). However, less attention has been offered to understand how to stimulate customers to adopt mobile payment in China. It is necessary to understand the factors facilitating or inhibiting the intention to adopt mobile payments in China. Previous studies mostly used TAM (Technology Acceptance Model) [4–7], UTAUT (Unified Theory of Acceptance and Use of Technology) [8], UTAUT2 (Unified Theory of Acceptance and Use of Technology) [9], and integrated TAM and UTAUT [10,11] to investigate the behavior intentions of mobile payment services usage. However, as these studies focused on technology adoption factors (e.g., ease of use and usefulness etc.), they ignored other influencing factors (e.g., environment factors and personal factors) to adopt user mobile payment services. In the wake of this, this study develops an integrated model to identify the various factors (facilitating factors, inhibiting factors environmental factors, and personal factors) that have been found in the previous literature [12–14] in the context of mobile payment adoption, and then this research adds three factors (perceived transaction convenience, affinity, and government support) to try to investigate the antecedents of adoption intention of mobile payments in China.

Mbogo [15] proposed that perceived transaction convenience has an impact on the intention to use mobile payment services; Yoon and Kim [16] suggested that perceived transaction convenience is an important determining factor affecting individual acceptance and use of information technology, which is in line with the survey on the main reasons for people to use mobile payment in China. Therefore, this study holds that perceived transaction convenience is a facilitating factor affecting the adoption of mobile payment. Schierz et al. [17] found that compatibility affects customers' acceptance of mobile payment and that compatibility has the greatest influence on the willingness to adopt mobile payment. Previous studies have also confirmed that compatibility has a positive impact on mobile payment adoption intention [18–20]; therefore, this study argues that compatibility is a facilitating factor regarding users' intention to adopt mobile payment. Kim et al. [21] proposed that relative advantage has a positive impact on behavioral intention in the service setting of mobile technology, as consumers are more willing to adopt mobile payment when the new services provide greater value to them, and they can realize satisfaction in terms of the existing relative economic benefits and personal image [22]. In addition, social influence is often considered to be a vital factor influencing adoption intention [8,10,19,23,24]. Such influence is different from the social pressures that an individual consumer faces in a free adoption choice context [21]. To sum up, this study integrates perceived transaction convenience, compatibility, relative advantage, and social influence as the facilitating factors into the research framework.

In the context of sufficient and perfect government policies, as well as many other facilitating factors, most people in China use mobile payment to buy products. This study adds two variables in the environmental factor—government support and additional value—in order to discuss the factors that affect Chinese people's intention to use mobile payments. The government should play its role by enacting clear laws to ensure that customers have more confidence in using mobile payment, and to help retailers encourage users to use mobile payment. Thus, government support has often been used in previous studies [25–27]. Kim and Han [28] stated that when consumers see messages, such as free e-coupons or discounted prices, via their smart phones, they search for ways to obtain these rewards. Pham and Ho [13] claimed that if consumers believe that the use of mobile payment services will obtain additional value (e.g., discounts, e-coupons etc.), they will be more likely to use this payment method. A survey of consumers in China by the Payment and Clearing Association of China [29] in 2018 found that "preferential and promotion activities" are second only to convenience in influencing the use of mobile payment by users in China, which shows that additional value has an important influence on consumers' willingness to use mobile payment.

Perceived risk is defined as the "uncertain or possible negative consequences felt when using products or services" [30] and is considered as the main obstacle to e-commerce [31] and mobile

payment adoption intention [12,14,32,33]. It can be seen that perceived risk inhibits users' adoption of mobile payment services; therefore, this study regards perceived risk as an inhibiting factor in the research framework. In terms of personal factors, this study added three variables: absorptive capacity, affinity, and personal innovation in IT (PIIT). Lee et al. [34] argued that an individual's absorptive capacity directly affects their willingness to use mobile financial services. Pham and Ho [13] held that absorptive capacity refers to an individual's capacity to have a priori knowledge of mobile payment and apply this knowledge to the use of mobile payment. Ozturk et al. [14] defined affinity as the relationship between people and their smart phones. Aldás-Manzano et al. [35] held that the more people depend on smart phones in their lives, the more likely they are to shop through their smart phones. Park et al. [36] claimed that highly innovative users are likely to form a group of innovators or early adopters, as they are very interested in new information services and are willing to accept challenges. When they become public opinion leaders and spread information about services by word-of-mouth, service acceptance is promoted, which attracts the favor of most people. PIIT is also an important factor that determines the application results of mobile technology [21,37], and more previous studies have included it in the research of mobile payment [12,23,38].

In conclusion, as the number of mobile payment users in China has grown rapidly in recent years, this study explores the factors that affect users' intention to use mobile payment, including the two main factors, which are the facilitating factors (perceived transaction convenience, compatibility, relative advantage, social influence) and the inhibiting factors (perceived risk), as well as the environmental factors (government support, additional value) and personal factors (absorptive capacity, affinity, and PIIT), to understand the factors that affect the adoption of mobile payment by Chinese users.

2. Materials and Methods

2.1. Facilitating Factors

2.1.1. Perceived Transaction Convenience (PTC)

The innovative services brought about by information technology make people's lives more convenient and efficient, and when such innovative services enhance consumers' personal image, convenience, and satisfaction, a relative benefit for consumers will be realized [22]. Perceived transaction convenience is described as 'consumers' perceived effort and time spent on a transaction process" [39]; in the mobile payment environment, mobile devices connect mobile payments to card accounts through user permission to eliminate the inconvenience caused by many credit cards [40]. Teo et al. [8] adopted the UTAUT (Unified Theory of Acceptance and Use Technology) model to explore the usage intentions of Internet banking users for mobile payment, and the results showed that perceived transaction convenience has a positive impact on adoption intention. Liu et al. [41] studied the adoption of M-coupon apps, and the results showed that convenience has a positive impact on adoption intention.

2.1.2. Compatibility

Compatibility is defined as the degree to which new technologies are consistent with customers' previous life experiences, lifestyles, and needs [42–44]; a high compatibility is of great importance for the use of new technologies, as it can help to reduce the potential uncertainties associated with the use of new technologies [45]. Compatibility is considered to be one of the main determining factors in the process of innovation diffusion. It is believed that a high compatibility leads to the rapid adoption of new technologies, especially in mobile payment [13,15]. Chen [42] proposed that when customers find that mobile payment is compatible with their lifestyle, they increase their behavioral intention to use mobile payment. Oliveira [19] confirmed that compatibility is the most important variable in explaining the adoption of mobile payment, and believed that if customers see the benefits of using mobile payment to perform certain activities, they may consider mobile payment to have

better compatibility with their needs. In addition, previous studies have mentioned that compatibility is a vital factor affecting the adoption of mobile payment services [13,15,25,46], and have proposed that when customers discover the advantages of mobile payment and believe that mobile payment is consistent with their lifestyle, they increase their adoption of mobile payment, which also proves that compatibility has a positive impact on the users' intention to adopt mobile payment [12,20].

2.1.3. Relative Advantages

Relative advantage refers to the degree to which an innovation is perceived as being better than the idea it supersedes; the higher the individuals' cognition of the relative advantages of an innovation, the higher the possibility of adopting such innovation [22]. Yang et al. [12] and Lou et al. [46] mentioned that mobile payment services are more convenient, efficient, and popular than traditional payment services in many cases, and have greater relative advantages, meaning that they develop a positive intention to adopt mobile payment services.

2.1.4. Social Influence

Social influence refers to an individual's perception of "the extent to which important others believe he should use a new technology" [47]; in other words, individuals believe that others want them to engage in this activity, thus social influence is considered as a direct factor affecting consumers' behavior intentions. In recent years, in the context of the adoption of mobile technology services, many studies have incorporated social influence into their research models and have found that social influence has a positive impact on adoption intention. For example, Oliveira et al. [19] studied customers' adoption and recommendation of mobile payment services, and found that social influence has a positive impact on adoption intention; other scholars studying social influence include Teo et al. [8], Morosan and DeFranco [9], Koenig-Lewis et al. [10], Liébana-Cabanillas et al. [23], and Aydin and Burnaz [24].

2.2. Environment Factors

2.2.1. Government Support

Tan and Teo [48] defined government support as "government assistance", and believed that government support can play an intervening and leading role in the diffusion of technological innovation. Moreover, government regulations can either encourage or hinder the adoption of innovation [49]; the government can provide financial incentives and assist in training personnel with logistics skills to promote the more efficient use of RFID [27], while, on the other hand, the severe intervention of governments and some bureaucracies has limited the diffusion of Information and Communications Technology (ICT), and both excessive intervention and nonsupport limit the development of new technologies. Sánchez-Torres et al. [50] argued that government support is indispensable for the successful implementation of e-learning projects. In addition, previous studies have confirmed that government support has a significant impact on the adoption of innovative information technologies [50–52].

2.2.2. Additional Value

Additional value refers to the degree to which mobile payment users obtain the financial benefits (discounted prices, promotions, free e-coupons, etc.) of using the mobile payment services; users are unlikely to switch to mobile payment unless additional value is provided [13]. By promoting mobile payment discounts and offers through users' smart phones, such additional value attracts users to switch to new payment methods. Kim and Han [28] deemed that when consumers see free coupons or discounted prices in smart phone messages, they search for ways to obtain these rewards; thus, consumers are concerned about added value. In the mobile payment context, the actual benefits

provided by downloading and using mobile payment may lead consumers to form a positive intention to adopt mobile payment services.

2.3. Inhibiting Factors: Perceived Risk

Liébana-Cabanillas et al. [30] defined perceived risk as the uncertainty or possible negative consequences of purchases, as perceived by new users. The perceived risk is higher when the expectation of loss is higher [53]. This implies that an increasing level of uncertainty will elevate the level of perceived risk toward mobile payment usage. Mobile payment users mainly worry about unauthorized use, mobile device communication reliability, privacy leaks, and transactions errors [11]. Previous studies have shown that perceived risk can directly affect users' intention to adopt mobile payment services [11,13,54–59].

2.4. Personal Factors

2.4.1. Absorptive Capacity

Pham and Ho [13] defined absorptive capacity as the capacity of individuals to have prior knowledge of mobile payment and to apply this knowledge to use of mobile payment. Lee et al. [34] found that individuals' absorptive capacity directly affects the adoption intention of mobile payment; in other words, if individuals have prior knowledge of mobile payment and are able to utilize this knowledge to mobile payment, they are more likely to use mobile payment.

2.4.2. Affinity

Ozturk et al. [14] defined affinity as the importance of mobile payment in daily life, meaning the higher the dependence on smart phones, the more likely people are to shop through them. Aldás-Manzano et al. [35] held that the more people depend on mobile devices in their lives, the more likely they are to shop through smart phones.

2.4.3. Personal Innovativeness in Information Technology (PIIT)

Agarwal and Prasad [60] defined PIIT as "the willingness of an individual to try out any new information technology". Yang et al. [12] and Thakur and Srivastava [58] argued that when promoting the adoption of mobile payment, the differences in personal innovativeness and acceptance should be considered, as PIIT will have a positive impact on users' adoption intention. Zeng and Cleon [37] concluded that PIIT has a positive impact on behavioral intentions. In other words, the higher the PIIT, the more willing they are to accept new information technologies.

3. Research Model and Hypotheses

In order to understand the factors that affect users' intention to adopt mobile payment in China, this study divided the factors that affect users' intention into two major factors: facilitating factors (perceived transaction convenience, compatibility, relative advantage, and social influence) and inhibiting factors (perceived risk). In addition, environmental factors (government support and additional value) and personal factors (absorptive capacity, affinity, and PIIT) were added to explore users' intentions to adopt mobile payment in China. Figure 1 illustrates the model.

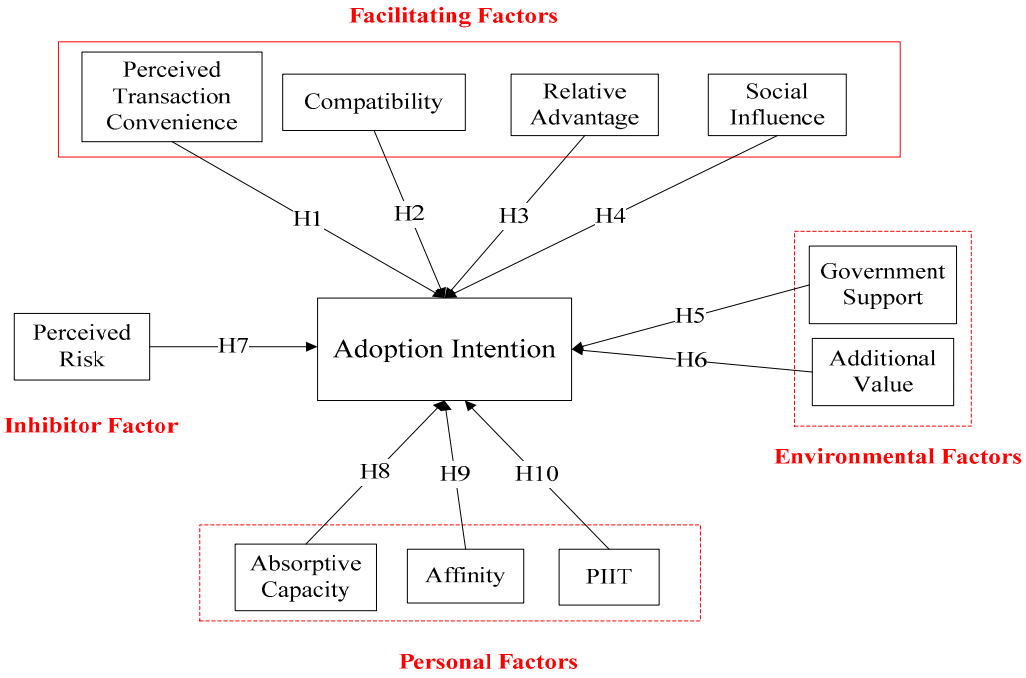

Figure 1. Research model.

3.1. Facilitating Factors and Adoption Intention

3.1.1. Perceived Transaction Convenience and Adoption Intention

Hayashi [40] found that the main motivation for using a specific payment instrument is convenience. The more time and effort a transaction can save, the more perceived transaction convenience the transaction may have. Teo et al. [8], Ozturk et al. [14], and Gao and Waechter [61] conducted research on mobile payment users, and the results showed that perceived transaction convenience positively affects behavioral intentions; Teh et al. [62] pointed out that perceived transaction convenience positively affects the intention of using smart phones. Thus, we proposed the following hypothesis:

H1. *Perceived transaction convenience positively affects adoption intention.*

3.1.2. Compatibility and Adoption Intention

Compatibility refers to whether a new information technology is consistent with the previous lifestyle and habits of users [22]; Ozturk et al. [14] also described compatibility as the extent to which mobile payment technologies are suitable for individuals' lifestyles, needs, and ways they wish to complete payments. Compatibility is also a vital factor in the adoption of new technologies, as a high degree of compatibility can reduce the uncertainty about new technologies and can prove a high degree of connection between the new technologies and customers' lifestyles or habits [45]. Kuo and Yen [63] pointed out that compatibility has a direct impact on whether consumers adopt new technologies. Previous studies concerning mobile payment have confirmed that compatibility has a positive impact on customers' intention to adopt mobile payment [14,20,23,25,64]. Thus, the following hypothesis was proposed:

H2. *Compatibility positively affects adoption intention.*

3.1.3. Relative Advantage and Adoption Intention

Lou et al. [46] defined relative advantage as the degree to which an innovation is perceived as being better than the product it supersedes. When users think that the new technology has obvious advantages over the old technology, the possibility of users adopting the new technology

increases [65,66]. For example, Chen [67] mentioned that mobile banking has great immediacy and convenience, meaning consumers can enjoy it anytime and anywhere. Moreover, Yang et al. [12], Pham and Ho [13], and Kapoor et al. [68] found that relative advantage positively affects consumers' intention to use mobile payment; when people find that mobile payment can provide value that traditional devices or payment services cannot provide, they have a more positive intention towards adopting mobile payment services. Thus, we proposed the following hypothesis:

H3. *Relative advantage positively affects adoption intention.*

3.1.4. Social Influence and Adoption Intention

Social influence has a significant impact on consumers' behavioral intentions [69]: in other words, consumers' behaviors are influenced by the opinions of their relatives, friends, colleagues, and superiors. Previous studies regarding mobile services included the following aspects: mobile banking, mobile APP, and mobile payment [8,10,11,56,70–72], which all showed that social influence positively affects usage intention. In other words, if others who are important to the user believe they should use the mobile payment services, the user is likely to be more motivated to use it. Therefore, the following hypothesis was formulated:

H4. *Social influence positively affects adoption intention.*

3.2. Environmental Factors and Adoption Intention

3.2.1. Government Support and Adoption Intention

Government support can play an intervening and leading role in the diffusion of technological innovation [48]. Nasri and Charfeddine [25] pointed out that, regarding mobile banking, the government should support the banking industry to formulate clear and solid laws to ensure that customers have more confidence when using online banking. Regarding electronic data interchange (EDI), Rawashdeh and Al-namlah [73] indicated that government support has a positive impact on the intention of Small and Medium Enterprises (SMEs) to adopt EDI. Hasani et al. [74] studied the adoption of SCRM (Social Customer Relationship Management) technology by enterprises, and found that government support may enhance the intention of enterprises to adopt SCRM. Therefore, we posited the following hypothesis:

H5. *Government support positively affects adoption intention.*

3.2.2. Additional Value and Adoption Intention

Additional value is usually defined as the downloading of time-limited electronic coupons and the customization of personal shopping habits as the main advantages of mobile payment [28]. Aydin and Burnaz [24] argued that the rewards obtained in the form of actual benefits (monetary rewards, e-coupons, free gifts, lucky draw, etc.) can motivate consumers; Pham and Ho [13] held that unless additional services are provided to give additional value, users are unlikely to switch to using mobile payment. By promoting mobile payment discounts and offers through users' smart phones, such additional value attracts users to switch to new payment methods. Thus, the following hypothesis was established:

H6. *Additional value positively affects adoption intention.*

3.3. Inhibitor Factor (Perceived Risk) and Adoption Intention

Kim et al. [31] pointed out that the risks perceived by consumers are an important obstacle for consumers who are hesitant regarding whether to shop online; Tan and Lau [75] confirmed the negative impact of perceived risk on the intention to adopt mobile banking services among generation Y consumers in Malaysia. As mobile payment involves personal and sensitive financial information,

security issues may become barriers to technology adoption [37,76]; perceived risk was included in this study to explore the most important resistance factors, which may explain the low utilization rate of actual mobile payment. Previous studies have confirmed that perceived risk has a negative impact on the adoption of mobile payment [11–13,54–59,77]. Thus, the following hypothesis was established:

H7. *Perceived risk negatively affects adoption intention.*

3.4. Personal Factors and Adoption Intention

3.4.1. Absorptive Capacity and Adoption Intention

According to research on the adoption of an electronic supply chain management (eSCM) system by enterprises, Lin [78] found that absorptive capacity positively affects the adoption intention of enterprises. When discussing mobile learning, Mohammadi [79] found that absorptive capacity positively affects individuals' adoption intentions. When discussing the adoption of cloud computing in the Malaysian manufacturing industry, Ooi et al. [80] found that absorptive capacity positively affects the adoption intention of enterprises. In addition, Pham and Ho [13] and Upadhyay and Jahanyan [81] confirmed that absorptive capacity positively affects the adoption intention of mobile payment. Based on these lines of logic, this study proposed the following hypothesis:

H8. *Absorptive capacity positively affects adoption intention.*

3.4.2. Affinity and Adoption Intention

Aldás-Manzano et al. [35] held that the more people depend on smart phones in their lives, the more likely they are to shop through their mobile phones. Zha et al. [82] investigated users' use of virtual communities, and found that the more users rely on the virtual communities, the more they use them. Leung and Chen [83] found that when discussing the adoption of mobile TV by consumers, the higher the affinity of users with mobile TV, the greater the possibility of watching TV programs through smart phones. Ozturk et al. [14] found that the higher the users' affinity, the higher the adoption intention. Thus, the following hypothesis was formulated:

H9. *Affinity positively affects adoption intention.*

3.4.3. Personal Innovation in IT (PIIT) and Adoption Intention

Rogers [22] suggested that personal innovation is a key factor affecting the adoption of innovative technologies and involves users' willingness to accept new technologies. Yang et al. [12] argued that when promoting the adoption of mobile payment, the difference in personal innovativeness should be taken into account. In addition, previous studies have confirmed that the higher the individuals' PIIT, the more willing they are to accept new information technology [13,37,79,84]. Based on this rationale, this study proposed the following hypothesis:

H10. *Personal Innovation in IT positively affects adoption intention.*

4. Results

4.1. Data Collection

According to an eMarketer [2] report, 81.4% of smart phone users use mobile payment services; hence, the objective of this study was to empirically test our research model on mobile payment service adoption in China. The primary subject of the analysis was users with actual experience using mobile payment services. The data for the study were collected through a web-based questionnaire; the sampling method was a combination of convenience and snowball sampling. A survey hyperlink was placed on the homepage (http://www.wjx.cn/), and 257 valid respondents were utilized for analysis.

Data analysis was completed using statistical software packages, including SPSS and PLS (Partial Least Squares). Table 1 summarizes the respondent characteristics.

Table 1. Respondents' demographic data.

Measure	Items	Frequency	Percentage
Gender	Male	109	42.4
	Female	148	57.6
Age	16–25	89	34.6
	26–35	66	25.7
	36–45	55	21.4
	46–55	38	14.8
	Over 55	9	3.5
Education	High school or less	85	33.1
	University	148	57.6
	Graduate school	24	9.3
Occupation	Full-time student	93	36.2
	Military, public service, and education	26	10.1
	Finance	5	1.9
	Communication worker	3	1.2
	Freelancer	39	15.2
	Service industry	21	8.2
	Manufacturing	28	10.9
	Construction industry	5	1.9
	Specialist	10	3.9
	Information industry	5	1.9
	Agricultural/forestry/fishing/herding	4	1.6
	Housewife	14	5.4
	Other	4	1.6
Mobile payment application used (multiple selection)	ALIPAY	236	41.8
	WeChat pay	244	43.2
	UNION pay	49	8.7
	Apple pay	15	2.7
	JD PAY	12	2.0
	Bestpay	4	0.7
	Others	5	0.9
Length of usage	<3 months	15	5.8
	Between 3 and 6 months	5	2.0
	Between 6 months and 12 months	8	3.1
	Between 1 year and 3 years	88	34.2
	Above 3 years	141	54.9
Frequencies of usage	Everyday	185	72.0
	Once per every week	47	18.3
	Once per month	18	7.0
	Others	7	2.7
Money for average per consumption (RMB)	<100	156	60.7
	100–500	71	27.6
	500–1000	12	4.7
	More than 1000	18	7.0

According to the analytical results, there were more female (57.6%) than male (42.4%) respondents. Most respondents were less than 25 years old (34.6%), followed by 26–35 years old (25.7%) and 36–45 years old (21.4%). The majority of respondents had a bachelor's degree (57.6%), followed by a

high school degree or less (33.1%). Alipay, WeChat pay, and Union Pay were the top three payment apps used, contributing 41.8%, 43.25%, and 8.7%, respectively. The highest ranking responses for customers' experiences for usage of mobile payment services were "more than 3 years" and "less than 3 months", accounting for 54.9% and 34.2%. A total of 72.0% of the respondents used mobile payment services at least once per day, whereas 18.3% used mobile payment services at least once per week. The highest ranking responses regarding how much money was spent per consumption in using mobile payment services were "less 100 RMB" and "RMB 100–500", accounting for 60.7% and 27.6%.

4.2. Measurement Items

The instruments measuring the constructs were adapted from previous literature; there were two steps to validate: pretest and pilot test. Three professors in the information management field were invited to the pretest step; they provided suggestions, while eliminating redundant or unrelated words/sentences. The instrument was then further pilot-tested, with 35 respondents with usage experience being invited to participate. The respondents were requested to rate each questionnaire item on a seven-point Likert-type scale ranging from 1 = "strongly disagree" to 7 = "strongly agree". Table 2 lists all of the questionnaire items and cited literature.

Table 2. Measurement items.

Construct	Measure	Factor Loading	Adapted Source
	Perceived Transaction Convenience (PTC) Cronbach's α = 0.890 Composite Reliability = 0.924		
PCT1	I believe that using mobile payment will be convenient.	0.853	[20,22,31,61]
PCT2	I think that it is easy to use mobile payment to accomplish my payment tasks.	0.851	
PCT3	Mobile payment saves me time.	0.880	
PTC4	Compared to traditional payment methods, I believe that mobile payment methods are more convenient.	0.883	
	Compatibility (COM) Cronbach's α = 0.818 Composite Reliability = 0.878		
COM1	Using mobile payment fits into my lifestyle.	0.756	[19,23,25,31,64]
COM2	I believe that using mobile payment fits well with the way I like to buy.	0.904	
COM3	Using mobile payment is compatible with the way I like to shop.	0.743	
COM4	I would use the mobile payment over other kinds payment services (e.g., cash or traditional credit cards).	0.797	
	Relative Advantage (RA) Cronbach's α = 0.852 Composite Reliability = 0.901		
RA1	Mobile payment is more efficient than Internet or off-line payment.	0.843	[23,33,68]
RA2	Mobile payment provides greater flexibility.	0.753	
RA3	Mobile payment provides quicker access to the transactions that I need to make.	0.820	
RA4	Mobile payment is more convenient than Internet or off-line payment	0.912	
	Social interaction (SI) Cronbach's α = 0.880 Composite Reliability = 0.901		[11,56,70–72]
SI1	People who are important to me expect me to use mobile payment.	0.921	
SI2	Those people that influence my behavior think that I should use mobile payment.	0.876	
SI3	I will use mobile payment if the service is widely used by people in my community	0.889	

Table 2. *Cont.*

Construct	Measure	Factor Loading	Adapted Source
	Government Support (GS) Cronbach's α = 0.897 Composite Reliability = 0.925		
GS1	The government is active in setting up the facilities to enable mobile payment.	0.773	[50–52]
GS2	For me, the government supporting mobile payment is important.	0.913	
GS3	The government promotes the use of the mobile payment.	0.902	
GS4	The government has good laws and regulations for mobile payment.	0.857	
GS5	For me, the government promoting the use of the mobile payment is important.	0.761	
	Additional Value (AV) Cronbach's α = 0.924 Composite Reliability = 0.942		
AV1	I will use mobile payment if I receive an incentive.	0.879	[16,23,27]
AV2	Using mobile payment would obtain additional value when performing transactions.	0.809	
AV3	I will use mobile payment if I receive a discount.	0.914	
AV4	I think that using mobile payment would help me to keep up to date with the promotion of e-coupons.	0.867	
AV5	I would like to benefit from a discount offered by a mobile payment transaction.	0.900	
	Absorptive Capacity (AC) Cronbach's α = 0.925 Composite Reliability = 0.943		
AC1	I have the necessary knowledge to understand mobile payment services.	0.849	[23,34,81]
AC2	I understand clearly about the goals, tasks and responsibilities of mobile payment services.	0.838	
AC3	I have the technical capability to absorb mobile payment knowledge.	0.869	
AC4	I have information on state-of-the-art mobile payment services.	0.920	
AC5	I have superior skills and capabilities to perform tasks using mobile payment compared to other colleagues.	0.792	
	Affinity (AFFI) Cronbach's α = 0.906 Composite Reliability = 0.929		
AFFI1	Using mobile payment is one of my major daily activities.	0.849	[31,35,82]
AFFI2	I cannot go without using mobile payment for several days.	0.838	
AFFI3	I would have a sense of loss without mobile payment.	0.869	
AFFI4	Mobile payment is important in my life.	0.920	
AFFI5	If my mobile payment is down, I really miss it.	0.792	
	Personal Innovation in IT (PIIT) Cronbach's α = 0.878 Composite Reliability = 0.914		
PIIT1	I like to try new information technologies.	0.871	[23,37,58,64]
PIIT2	I am willing to try new information technologies.	0.889	
PIIT3	If I heard about a new information technology, I would look for ways to experiment with it.	0.897	
PIIT4	I am usually one of the first among my peers to explore new information technologies.	0.746	

Table 2. *Cont.*

Construct	Measure	Factor Loading	Adapted Source
	Perceived Risk (PSR) Cronbach's α = 0.885 Composite Reliability = 0.918		[56–58]
PSR1	I am concerned that the mobile payment system collects too much personal information from my transactions.	0.884	
PSR2	I would feel secure sending sensitive information through mobile payment.	0.869	
PSR3	Overall mobile payment is a safe place to send sensitive information.	0.916	
PSR4	I am not worried about using mobile payment because other people may be able to access my account.	0.804	
	Adoption Intention (AI) Cronbach's α = 0.950 Composite Reliability = 0.962		[8,10,25,58]
AI1	I intend to use mobile payment in the future.	0.892	
AI2	I predict I would use mobile payment in the future.	0.849	
AI3	I intend to use mobile payment services when the opportunity arises.	0.937	
AI4	I am willing to use mobile payment services in the future.	0.945	
AI5	I will always try to use mobile payment in my daily life.	0.941	

4.3. Measurement Model Testing

Hair et al. [85] suggested the use of Cronbach's α and composite reliability (CR) to evaluate the internal reliability of the measurement of items, and the average variance extracted (AVE) was used to assess the convergent validity [85]. As shown in Table 2, the values for Cronbach's α and composite reliability ranged from 0.818 to 0.950 and from 0.878 to 0.962, respectively. Both values exceeded the recommended level of 0.70, and all the constructs showed adequate internal consistency [85]. The convergent validity was evaluated in terms of the factor loadings and AVEs. First, as listed in Table 2, all items exhibited loadings greater than 0.7 within their respective constructs. Second, Table 3 shows that all of the AVEs ranged from 0.644 to 0.835 and all of the AVEs satisfied a 0.5 minimum, thus both criteria for convergent validity were met [86]. Moreover, we assessed the discriminant validity in a correlation matrix, as shown in Table 3. The square root of the AVE for each construct was larger than the correlation of the construct with any other constructs, which demonstrated discriminant validity [86]. Table 3 shows that the correlation between the pair of constructs was less than the corresponding the square root of AVEs (diagonal values). All of the constructs met the requirement, providing evidence of discriminant validity.

Table 3. Correlations and average value extracted (AVE).

	AVE	AC	AFFI	AI	AV	COM	GS	PIIT	PSR	PTC	RA	SI
AC	0.835	0.914										
AFFI	0.724	0.641	0.851									
AI	0.752	0.701	0.614	0.867								
AV	0.729	0.636	0.524	0.623	0.853							
COM	0.769	0.408	0.481	0.425	0.379	0.877						
GS	0.712	0.698	0.532	0.660	0.615	0.381	0.844					
PIIT	0.644	0.698	0.596	0.632	0.478	0.377	0.558	0.803				
PSR	0.695	−0.084	−0.095	−0.172	−0.257	−0.056	−0.216	−0.126	0.834			
PTC	0.802	0.408	0.385	0.469	0.305	0.753	0.385	0.369	−0.052	0.895		
RA	0.765	0.437	0.494	0.486	0.325	0.757	0.373	0.448	−0.011	0.703	0.875	
SI	0.738	0.253	0.343	0.229	0.158	0.256	0.090	0.336	−0.021	0.272	0.356	0.859

Note: Diagonal elements in the 'correlation of constructs' matrix are the square root of the average variance extracted. AC = absorptive capacity; AFFI = affinity; AI = adoption intention; AV = additional value; COM = compatibility; GS = government support; PIIT = personal innovation in IT; PSR = perceived risk; PTC = perceived transaction convenience; RA = relative advantage; SI = social influence.

4.4. PLS Analysis

We tested the research model with Smart PLS 2.0 to acquire the path coefficients and t-value, which were used to test the research hypotheses. As shown in Table 4, nine out of the 10 hypotheses were significant. Among the facilitating factors, the perceived transaction convenience, compatibility, and relative advantage (β = 0.160, 0.137, 0.124; t = 6.777, 6.585, 4.936, respectively) were significant, while social influence (β = −0.026, t = 1.841) was not significant. Among the environment factors, government support and additional value (β = 0.114, 0.151; t = 4.573, 7.032, respectively) were significant. Regarding the inhibiting factors, perceived risk had a significant negative influence on adoption intention (β = −0.051; t = −4.350). Furthermore, personal factors (absorptive capacity, affinity and personal innovation in IT) had positive impacts on adoption intention (β = 0.400, 0.111, 0.091; t = 14.735, 3.400, 4.573, respectively). As a result, hypotheses H1, H2, H3, H5, H6, H7, H8, H9, and H10 were supported, while H4 was rejected. In summary, absorptive capacity, perceived transaction convenience, and additional value appeared to be top three most important drivers of the adoption of mobile payment services.

Table 4. Summary of hypotheses test results.

Hypothesis	Path Coefficient	t-Value	Decision
H1: Perceived Transaction Convenience → Adoption Intention	0.160 ***	6.771	supported
H2: Compatibility → Adoption Intention	0.137 ***	6.585	supported
H3: Relative Advantage → Adoption Intention	0.124 ***	4.936	supported
H4: Social Influence → Adoption Intention	−0.026 ns	−1.841	non-supported
H5: Government Support → Adoption Intention	0.114 ***	4.573	supported
H6: Additional Value → Adoption Intention	0.151 ***	7.032	supported
H7: Perceived Risk → Adoption Intention	−0.051 ***	−4.350	supported
H8: Absorptive Capacity → Adoption Intention	0.400 ***	14.735	supported
H9: Affinity → Adoption Intention	0.111 ***	3.400	supported
H10: Personal Innovation in IT → Adoption Intention	0.091 ***	4.573	supported

Note. *** $p < 0.001$.

In order to assess the model's goodness of fit, this study used Smart PLS 2.0 to compute the R^2 value. The R^2 values of the endogenous constructs can be explained through the explanatory power of the proposed model. As shown in Figure 2, the explained variance was 68.3% for adoption intention, the value exceeding the minimum level of 0.40 [87], and thus indicating good explanation power in our research model.

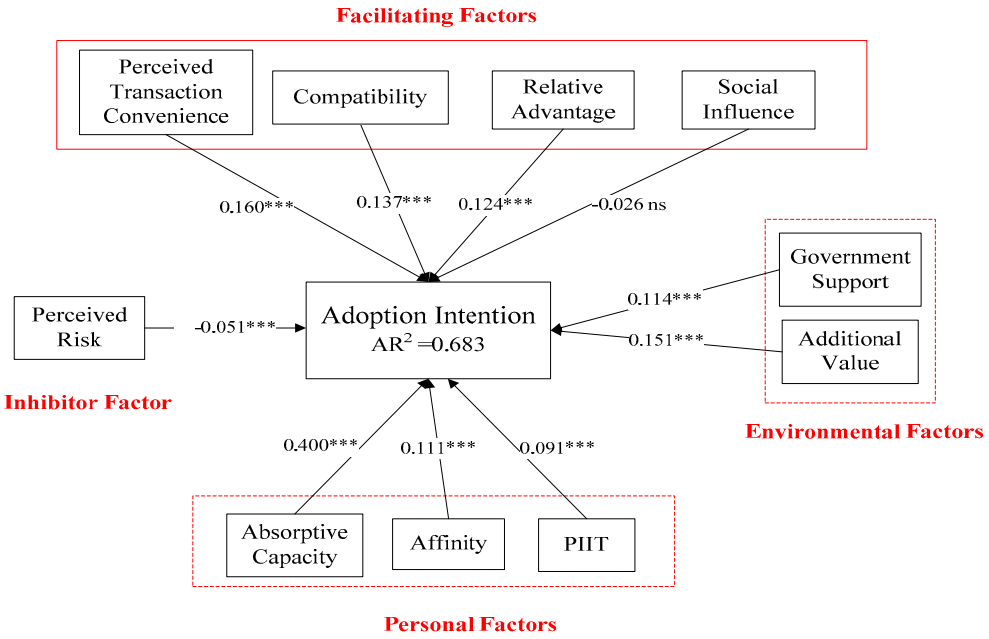

Figure 2. Results of the structure modeling analysis. (*** $p < 0.001$).

5. Discussion

5.1. Summary of Results

Based on the analysis results, it can be concluded that this study offers an appropriate research framework (including perceived transaction convenience, compatibility, relative advantage, social influence, perceived risk, government support, additional values, absorptive capacity, affinity, personal innovation in IT, and adoption intention) for investigating the intention to adopt mobile payment services in China. Several insightful findings are summarized, as follows:

5.1.1. Facilitating Factors

The results show that "perceived transaction convenience", "compatibility", and "relative advantage" have a positive impact on "adoption intention". Among them, perceived transaction convenience is the second most important factor among all factors in affecting adoption intention, which indicates that consumers mostly increase their intention to use mobile payment due to convenient usage. This study finds that users in China are more willing to use mobile payment (compatibility) when it is consistent with their living habits, and such results are in line with those of Oliveira et al. [19], and Ooi and Tan [20]. In addition, as mobile payment is more convenient and efficient than traditional payment methods, people in China give priority to using mobile payment services, and these results are consistent with those of Pham and Ho [13], Kapoor et al. [68], and Lu et al. [88]. Moreover, the consumer adoption of mobile payment is a voluntary action and is often conducted solo, which means that Chinese mobile payment users seem to be less interested in the recommendations of their family and friends. The nonsignificance of social influence also agrees with other studies [72,89].

5.1.2. Environment Factors

Research results have shown that "government support" and "additional value" have a positive impact on adoption intention. Due to the significant positive impact of government support on adoption intention, it can said that the higher the level of government support for mobile payment is, the more likely Chinese people are to use mobile payment, which is consistent with the research results of Tan and Teo [48] and Zolait [90]. "Additional value" is the third most important factor among all factors to impact adoption intention, meaning that users in China adopt mobile payment

due to rewards (red packets, coupons, discounts) and promotional offers, which is consistent with the results of Pham and Ho [13] and Aydin and Burnaz [24]. Therefore, it is suggested that retailers and enterprises that offer mobile payment methods should improve their incentive systems or increase discounts to enhance consumers' use of mobile payment.

5.1.3. Inhibiting Factor

The results show that "perceived risk" has a negative impact on "adoption intention", which is consistent with the results of Pham and Ho [13], Baganzi and Lau [54], Chen et al. [55], Merhi et al. [56], and Zhang et al. [59]. This means that, while many users in China are using mobile payment, they are concerned about the safety of information transmission when using mobile payment and worry about the threat and inconvenience to consumers caused by internet or system problems in the payment process. Hence, this study suggests that mobile payment service providers should reduce the probability of system failure and perceived security risks in mobile payment transaction systems, in order to reduce customers' fear of the perceived risks.

5.1.4. Personal Factors

The results find that "absorptive capacity", "affinity", and "PIIT" have a positive impact on "adoption intention". Among them, the value of absorptive capacity was the largest among all factors, and is a key factor affecting Chinese users' adoption of mobile payment, which is in line with the results of Pham and Ho [13] and Upadhyay and Jahanyan [81], showing that Chinese users are confident enough to understand mobile payment and have the ability to apply their knowledge to the use of mobile payment. Affinity has a positive impact on adoption intention, indicating that Chinese users rely heavily on smart phones for mobile payment, which is consistent with the results of Ozturk et al. [14]. Furthermore, PIIT has a significant impact on adoption intention, representing the high willingness of Chinese people to try new information technologies, such as mobile payment, and this result is consistent with results of Pham and Ho [13], Oliveira et al. [19], Liébana-Cabanillas et al. [23], and Gbongli et al. [84].

5.2. Theoretical Implication

This study proposed a research framework to provide a profound understanding of the factors facilitating or impeding the adoption of mobile payments among Chinese users; there are several implications for research emerging from this study. First, although the TAM/UTAUT have been intensively examined by the prior literature on mobile payment services in China, little work has been done to combine other influencing factors (e.g., perceived transaction convenience, government support, additional value, absorptive capacity, and affinity) in order to test their effects on the intention to adopt mobile payment. This is because the consumer adoption of mobile payment is a voluntary action and is often conducted solo; in this sense, the role of environmental factors and personal factors had been ignored in prior research of mobile payment adoption intention.

Second, in previous research, absorption capacity was rarely used regarding mobile payment service adoption; however, our analytical results reveal that absorption capacity (β = 0.400; t = 14.735) was the most important factor regarding adoption intention. Hence, this study integrated absorptive capacity into the research model to enhance the explained power of mobile payment service adoption intention.

Third, the additional value of mobile payments was added as a new variable in the proposed framework; it was expected that there would be a difference between the value of the relative advantage and the additional value of mobile payment usage. Our analytical results reveal that the importance of additional value (β = 0.151; t = 7.032) is superior to relative advantage (β = 0.124; t = 4.936). In addition, the second, third, and sixth most important factors for influencing adoption intention are perceived transaction convenience (β = 0.160; t = 6.771), additional value, and government support

(β = 0.114; t = 4.573). In other words, our study proposed a comprehensive framework to understand the willingness of consumers to adopt mobile payment service in China.

Finally, government support and affinity were taken into account to investigate the adoption intention of consumers to use mobile payments in our study. The study brings a comprehensive understanding about how to encourage mobile payment service adoption. It provides a useful guideline to help researchers investigate issues related to mobile payment services.

5.3. Managerial Implication

According to the research results of this study, absorptive capacity, perceived transaction convenience and additional value are the top three most important variables that affect Chinese users' adoption of mobile payment; therefore, it is suggested that enterprises/retailers operating mobile payment services can attract consumers by using these three aspects (e.g., making mobile payment transaction systems simpler and more convenient, and increasing preferential activities and red envelopes), thereby increasing the number of people using mobile payment. In addition, perceived risk is another challenging problem that impedes the process of adopting mobile payments services. As such, mobile network operators and the government should make the necessary investment to ensure a stable and secure payment infrastructure. Minimizing the risk in the transaction process and providing authentication will attract more users' intentions to use mobile payment services.

5.4. Limitations and Future Research

Based on the results and conclusions of this study regarding the factors that affect the adoption of mobile payment by people in China, the following suggestions are put forward:

1. Even though statistical results support generalizability when the sample size is greater than 100, larger samples guard for many biases and strengthen the explanation power of this study [85].
2. The results of this study show that social influence does not have a significant impact on Chinese users' adoption of mobile payment. As this result is inconsistent with previous studies, it is suggested that further discussion can be conducted regarding whether social influence has a significant impact on users in different demographics variables (e.g., gender, education, usage experience, etc.) adopting mobile payment services.
3. Although the age structure of the questionnaire is relatively evenly distributed among users aged 16–25, 26–35, and 36–45 years old, China has a large population and many elderly people. Therefore, it is suggested that more questionnaires be completed by older respondents to render such research results more comprehensive, in order to better understand the influence on users in China by the factors regarding mobile payment.
4. China has a vast territory and a large urban–rural gap, thus the results cannot fully reveal the situation of consumers in various areas. Therefore, it is suggested that interviewees from more areas may be added in order to gain a more comprehensive understanding of the situation of using mobile payment in China, as well as the differences in the factors regarding the use of mobile payment in different Chinese regions (e.g., urban and rural areas).
5. According to an eMarketer [2] report, 81.4% of smart phone users use mobile payment services; in the future, we also plan to examine the applicability of the research model in different categories of user groups (use and nonuse of mobile payment services). We would like to investigate our research model in different user groups and make comparisons of users' willingness to adopt mobile payment services.

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