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**The moderating role of behavioral and demographic factors on the adoption behavior  
of digital wallet: Chinese youth perspective**

In Partial Fulfillment of the Requirements  
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by

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## **The Moderating Role of Behavioral and Demographic Factors on the Adoption Behavior of Digital Wallet: Chinese Youth Perspective**

### **ABSTRACT**

The main focus of this thesis is to determine the antecedents which significantly affect the attitude towards digital wallet adoption in the context of Chinese youth and to explore the moderating role of demographic and behavioral factors on the relationships between digital wallet adoption and its antecedents. The sample consists of 212 respondents. The multiple regression results indicated that perceived complexity and trialability have statistically significant relationships with digital wallet adoption. Moreover, the moderated regression analysis showed that the frequency of usage significantly moderates the relationship between the intention to adopt digital wallets and relative advantages. The findings of this thesis not only improve understandings of predictors affecting digital wallet adoption and behavioral differences influencing the degree of adoption but also provide insights for digital wallet service providers to redesign and develop their program in order to increase the rate of satisfaction among customers.

**Keywords:** Digital wallet, Diffusion of innovations theory, Moderating effect, Chinese youth

**JEL Classification:** L86, M31, O33

## I. INTRODUCTION

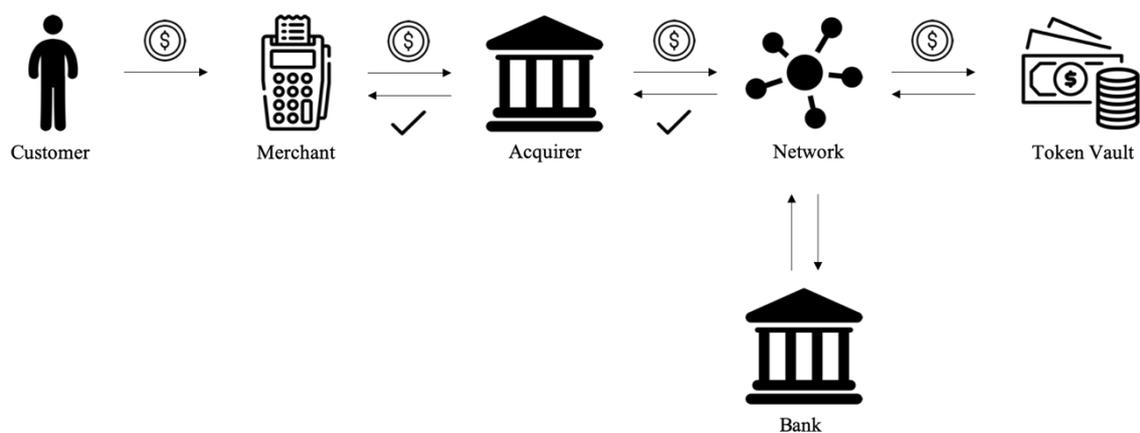
Recently, relying on the increased penetration of mobile devices and the low cost of internet services (Shukla, 2016), digital wallets have become a worldwide payment method. In China, particularly, paying with your digital wallet is a daily gesture. Tencent's WeChat Wallet and Alibaba's Alipay, the two China's digital wallet giants, have revolutionized the way Chinese people pay for things. It is so ubiquitous in China that customers rarely carry the cash with them. Not only people in big cities but also in rural China, are reported to use digital wallets very regularly. Now with the advanced development of 5G technology, the explosion of the volume of digital wallet users is reaching the peak. Chinese youth, as the major force of boosting digital wallet usage, is leading China into a cashless society (Patel, 2016).

With the explosion number of China online users and accelerated development speed of the internet, the Chinese digital wallet industry is on an expanding trend. Based on China Finance Information, the transaction volume has increased rapidly, from 0.14 trillion RMB in 2012 to 9.13 trillion RMB in 2015, realizing an increase of more than 60 times. According to Ipsos, in 2018, 83% of the total payments were conducted through digital wallets. Therefore, in order to understand the why digital wallet has become such a big success, the purpose of this thesis is to explore the variables that influence the attitudes towards digital wallet adoption in the context of Chinese youth and to find out the moderating role of demographic and behavioral factors on the relationships between those factors and digital wallet adoption.

Considered as a huge revolution in the digital era, the digital wallet has resolved several technology problems from the early twenty-first century, such as security, speed, and interaction (Sharma et al., 2018). Under the big impact of E-commerce development in China, customers have been experiencing the tremendous benefits that digitalization brought us, such as timely, economical and efficient. With the rapid development of digital wallets,

the daily pace of customers is speeded up and the payment processes are simplified. From the aspect of merchants, digital wallets not only larger the customer base, but also improve the business efficiency. There are generally two types of digital wallets commonly used in the market, one is NFC based like Google Pay and the other is internet-based like Alipay. Figure 1 exhibits the mechanism of how NFC based digital wallets work. Apart from customers, the working process of NFC based digital wallet involves five entities and eight steps (Pham & Ho, 2015).

**Figure I.** Mechanism of Digital Wallets



**Source:** Pham & Ho, 2015.

First, the customer has to add a card to the digital wallet on the mobile device. A payment token is then stored in the device, which is encrypted by a limited or single-use storage key. At the point of payment, the customer taps the mobile device on near-field communication (NFC) enables terminal at the merchant's point-of-sale (POS) system. Through the NFC protocol, the mobile device sends the token, expiry date, and cryptogram to the terminal. With the card data on hand, the merchant is able to process the payment via the acquiring bank. After collecting the data through NFC readers, acquirer processes those data by an appropriate payment network. The token service provider (TSP) is then introduced into the system to validate the cryptogram and translate the token into the customer's physical card. As long as the validation is completed by the TSP, the network sends an indicator to the

customer's card-issuing bank with the card number and expiration date. Account-level validation and authorization are then completed by the card-issuing bank. All the validated information and authorization responses are later sent to the network by the bank. Finally, the authorization response is transported by the network from the acquirer to the POS and at last received by the customer and cashier.

While this thesis mainly focuses on an internet-based digital wallet. The internet-based digital wallet has a much easier working mechanism compared to NFC based digital wallet. As an application pre-installed in the mobile phone, digital wallets enable customers to conduct transactions via their mobile devices, connecting all transaction details directly to the bank accounts (Madan & Yadav, 2016). After downloading the digital wallet application and choosing a card for payment, the customer gets a unique QR code at the checkout screen for each payment. The cashier then scans the QR code displayed on the screen to verify the transaction, recording all the information from the merchant to the bank. Apart from the QR code, the most basic authentication method, the biometric authentication methods are gradually introduced into daily life. In order to enhance the security level of the digital wallet payment process, biometric verifiers, such as figure print, voiceprint, and iris, are applied to protect that sensitive transaction information and provide an efficient payment environment (Pal, 2017).

Compared to traditional physical wallets, digital wallets appear in a more favorable way to conduct financial transactions, offering a collection of valued applications attached to mobile devices. Apart from carrying less cash and credit cards, digital wallets also allow people to experience a bunch of benefits: reduction of fraud, saving time and efforts, efficient payments, and so on (Shaw & Kesharwani, 2019). When customers go to the supermarket, for example, all they need to do is simply tap their mobile phone on the check-out terminal to conduct the payment. What you need to perform such digital payment is authentication, such

as password, phone number, fingerprint, etc. Whatever forms it takes, the payment process of the digital wallet is basically a sequence of procedures of encryption and authentication via the network. It benefits customers from convenience and protection. From the merchant's aspect, they also benefit from digital wallet payment since it protects them from fraud. Moreover, the digital wallet also serves as a great opportunity for merchants to increase their revenue as they are likely to sell more products due to the efficiency of the digital wallet system (Madan & Yadav, 2016).

A closer look at previous studies on digital wallet reveals that a relatively small amount of research has investigated the moderating role of demographic and behavioral variables on the relationships between digital wallet adoption and its predictors. Most literature focuses merely on testing the factors that influence digital wallet adoption behavior (Kazan et al., 2018; Oliveira et al., 2016; Yang et al., 2015). Usefulness, performance expectancy, and security risk are found to be common technological factors affecting attitudes towards adopting digital wallet (Xu, 2017; Cao & Niu, 2019). However, little research has shed light on the Chinese youth market. Motivated by this, this thesis emphasizes the adoption behavior in the context of Chinese youth to examine the moderating effect.

This thesis uses the Diffusion of Innovations Theory (DIT) as a broad framework to explore the factors that influenced the behavior of digital wallet adoption. DIT identified five primary attributes of innovation affecting the adoption intention. Apart from the above five attributes introduced in the DIT, perceived risk has also been tested as an essential predictor in the intention of adopting mobile services (Unnikrishnan & Jagannathan, 2018). Besides, DIT fails to consider the moderating effect of demographic and behavioral variables, which is believed to play an essential role in the adoption behavior of digital wallets. Therefore, the extended DIT is adapted specially for this thesis to gain a deeper understanding of moderators in the process of digital wallet adoption.

The findings of this thesis suggest that perceived complexity and trialability have statistically significant relationships with the adoption of the digital wallet. Perceived complexity has a negative relationship with digital wallet adoption, whereas trialability positively affects the attitude towards digital wallet adoption. Thus, the more ease of use customers perceived, the more likely potential customers are to adopt digital wallets. Moreover, a reasonable trial period is favorable for a potential customer to adopt digital wallets (Teagarden et al., 2009). Besides, drawn from the moderated regression analysis, frequency of usage has a moderating role on the relationship between the intention to adopt digital wallet and its relative advantages, indicating that individuals who adopt the digital wallet focus more on the evident advantages of using digital wallets (Shaikh & Karjaluo, 2016). However, gender, a demographic variable, fails to moderate the relationships between digital wallet adoption and its predictors based on the results of this thesis.

By extending the DIT and adding the moderating effects, the findings of this thesis not only improve understandings of predictors affecting digital wallet adoption and behavioral differences influencing the degree of adoption but also provide insights for digital wallet service providers to redesign and develop their program in order to increase the rate of adoption among potential customers, especially among Chinese youth. Therefore, this thesis has two vital contributions to digital wallet studies. The findings of this thesis enrich the theoretical background of the digital wallet adoption pattern of Chinese youth. Meanwhile, this thesis provides helpful implications for digital wallet service providers to better target the Chinese youth market.

The remaining of the thesis is organized as follows. First, the related literature on digital wallet adoption and moderating effects are reviewed and hypotheses are developed based on previous studies. Second, research methodology, including data collection and measurement procedures, is explained. Third, the empirical results and findings drawn from the study are

exhibited. Finally, the conclusion is presented to discuss the implications, limitations, and suggestions for further studies.

## **II. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT**

Abundant researches and studies have been conducted on the adoption of technological innovations ranging from the digital wallet (Shin, 2009), mobile banking (Al-Jabri & Sohail, 2012), E-government (Al-Athmay et al., 2016), mobile payment applications (Humbani & Wiese, 2019), etc. Digital wallet, in particular, has gained increasing traction in recent years ((Kazan et al., 2018; Oliveira et al., 2016; Yang et al., 2015). As a growing part of the digital market, the digital wallet is the latest version of mobile payment that replaces the physical wallet with the functions of cash, credit card, membership card, etc. (Shin, 2009). In terms of digital wallet adoption, previous studies have covered a variety of aspects. However, among the articles reviewed, relatively few studies had shed light on the Chinese youth market, which plays an important role in boosting digital wallet usage (Patel, 2016). Hence, of particular interest to this thesis is the attitudes towards digital wallet adoption among the Chinese youth.

### **Diffusion of Innovations Theory (DIT)**

The existing literature on technological innovations adoption is used as a theoretical lens to investigate whether these widely studied innovation attributes can explain attitudes among the Chinese youth toward digital wallet adoption. The Diffusion of Innovations Theory (DIT) (Rogers, 1995) is considered as one of the most useful models in predicting the factors affecting individuals adopting an innovation. Widely examined and used by a great number of studies regarding the adoption of technology (Mannan et al., 2017; Min et al., 2019; Zhang et al., 2015), therefore, DIT is adopted in this thesis as a sound theoretical foundation to examine digital wallet adoption.

According to Rogers and Shoemaker (1997), adoption, the dependent variable, refers to the decision to perceive an innovative idea as the optimal course of action available. In order to explain the rate of adoption, previous studies described adoption in various terms such as implementation (Gurau, 2002), satisfaction (Liza, 2014), usage (Marinkovic & Kalinic, 2017), and so on. Satisfaction, the most widely used measure of adoption (Liguo et al., 2017), is applied in digital wallet adoption. Served as the surrogate measure of adoption, satisfaction has a high degree of face validity (Al-Jabri & Sohail, 2012). In the case of independent variables, DIT identified five primary factors that affect the behavior of adoption: relative advantage (RA), perceived complexity (PC), compatibility (CO), and observability (OB) respectively. Following is a summary of six attributes and their relationships with digital wallet adoption.

### ***Relative Advantage***

Defined by Rogers (1995), relative advantage (RA) refers to the level of which an innovation is considered as outperforming its predecessor. The theory indicates that the relative advantage of new technology has a positive effect on the rate of adoption. According to Mallat (2007), one of the key factors impacting the perceived relative advantage of mobile technological innovations is free of the restriction of location and time. In the context of digital wallets, relative advantages such as fast, affordability, and convenience can be expected to have a positive influence on the adoption behavior (Lin, 2011). Thus, the hypothesis is presented as:

***H1a:*** RA positively affects the behavior of digital wallet adoption among youth in China.

### ***Compatibility***

Compatibility refers to the consistency between potential adopters' existing beliefs, present needs and previous experience (Rogers, 1995). Compatibility is a significant attribute of innovation since users' lifestyles can impel a speedy rate of new technology adoption

(Pham & Ho, 2015). In addition, compatibility has been found determinantal in the adoption of mobile banking (Koenig-Lewis, 2010), mobile payment (Oliveira et al., 2016), and E-learning system (Islam, 2016) Thus, it is likely that the relationship between compatibility and adoption will hold in respect of digital wallet. Thus, the following is the hypothesis:

**H2a:** CO has a positive impact on the adopting intention of digital wallets among youth in China.

### ***Perceived complexity***

Perceived complexity is defined as the level of technology that is considered difficult to use and understand. Users' intention to adopt an innovation would be limited if they find it time-consuming and frustrating. There is a vast body of empirical researches suggests that complexity strongly affects the adoption behavior of new technologies (Cruz et al., 2010; Kapoor et al., 2015). The opposite meaning of complexity, perceived ease of use is also tested in a considerable amount of past studies. Perceived ease of use is defined as the level of innovation that is considered easy to understand and use (Al-Jabri & Sohail, 2012). Similarly, users generally form a positive attitude towards adopting an innovation if it is user-friendly and easy to use (Shaw, 2014). In the case of the digital wallet, a higher level of perceived complexity would inhibit the success of the adoption. Thus, the following hypothesis is presented:

**H3a:** PC negatively affects the behavior of digital wallet adoption among youth in China.

### ***Trialability***

The trialability of innovation describes the capacity to experiment with innovation on a limited basis before adoption (Rogers, 1995). Innovations that permit users to use on a trial basis, in general, tend to be adopted more quickly than those without a trial basis since the trialability attribute contributes to minimizing the uncertainty towards using new technologies (Liguó et al., 2017). Tan and Teo (2000) further suggest that users had a chance

to experiment with an innovation decrease their fear concerning the usage of the innovation. With digital wallets providing a trial demonstration on its usage, potential users will find to be more willing and more comfortable to adopt the digital wallet. Thus, the following hypothesis is presented:

**H4a:** TR positively affects the behavior of digital wallet adoption among youth in China.

### ***Observability***

Observability refers to the visibility of the results of using innovation to others (Rogers, 1995). The observability of new technology enables users to realize its advantages, therefore, facilitating adoption (He et al., 2006). As for digital wallet, observability can be reflected in several aspects: communicating to others about the accessibility benefits; seeing the effect of digital wallet transactions immediately, and accessing the digital wallet from anywhere without any disruption, etc (Hayes et al., 2015). Through such exposure, users get to know the benefits of the digital wallet, increasing their rate of adoption. Therefore, the hypothesis is presented as:

**H5a:** OB positively affects the behavior of digital wallet adoption among youth in China.

### **Extension of Diffusion of Innovations Theory (DIT)**

#### ***Perceived Risk***

Apart from the above five attributes introduced in the DIT, perceived risk has also been examined as an essential predictor in the intention of adopting mobile services (Unnikrishnan & Jagannathan, 2018). Perceived risk is described as an uncertainty feeling towards possible negative outcomes of using an innovation (Featherman & Pavlou, 2003). Most customers today are concerned about security, transaction risks, and privacy of personal information while using mobile services (Luarn & Lin, 2005; Lu et al., 2011). Perceived risk, in the context of the digital wallet, served as a prominent hurdle towards the adoption, includes unfavorable financial results, the leaking of personal information, anxiety or psychological

discomfort, and dissatisfaction with performance (Yang et al., 2015). Therefore, the hypothesis is presented as:

***H6a:*** PR negatively affects the behavior of digital wallet adoption among youth in China.

### **Moderating Effect**

Instead of merely focusing on the technology adoption and its antecedents, numerous studies have investigated into the moderating role of demographic and behavioral variables on innovation adoption, including age (Hur et al., 2014), gender (Hwang, 2010; Ahmad & Khalid, 2017), education background (El-Ouirdi et al., 2016; Alharbi, 2017), and frequency of usage (Sun & Zhang, 2006; Newman et al., 2018), etc.. Baron and Kenny (1986) defines moderators as constructs that strengthen, weaken, cancel, or reverse the relationship between dependent variable and the independent variable. According to Shin (2008), applying moderators in a model can increase predictive validity and be able to explain results in various disciplines. Therefore, gender, the demographic variable, and frequency of usage, the behavioral variable, are examined in this thesis. Following is a summary of two variables and their influences on digital wallet adoption.

#### ***Demographic Variable - Gender***

Gender, an important personal characteristic, has been found as a significant moderator concerning technology adoption (Shin, 2009). According to Ong and Lai (2006), males and females react differently toward technology adoption due to their different perspectives. In general, females are more anxious than males when exposed to new technology (Chawla & Joshi, 2018). Further studies also indicate that, regarding an innovation, the male has a higher level of adoption intention than female in terms of complexity, usefulness, and enjoyment (Riquelme & Rios, 2010; Wang et al., 2016; Hoque, 2016; Park et al., 2019). Based on these articles, gender is suggested to have a moderating effect on the associations between digital wallet adoption and its antecedents. Thus, the hypotheses are presented as:

**H1b:** The relationship between digital wallet usage intention and RA is moderated by gender.

**H2b:** The relationship between digital wallet usage intention and CO is moderated by the demographic variable - gender.

**H3b:** The relationship between digital wallet usage intention and PC is moderated by the demographic variable - gender.

**H4b:** The relationship between digital wallet usage intention and TR is moderated by the demographic variable - gender.

**H5b:** The relationship between digital wallet usage intention and OB is moderated by the demographic variable - gender.

**H6b:** The relationship between digital wallet usage intention and PR is moderated by the demographic variable - gender.

### ***Behavioral Variable – Frequency of Usage***

As a behavioral variable, frequency of usage serves as an excellent tool to recategorize user group. Heavy users, a relatively small group size, usually represented as a highly welcomed segment for companies because of their large consumption volume (Chen, 2013). Despite its potential value, the frequency of usage has received little research attention as a moderator that influences technological adoption up to now. Shaikh and Karjaluto (2016), by reclassifying user group into two categories, heavy users and light users, have found that the frequency of usage is positively related to intention to adopt online services. Thus, the following hypotheses are presented:

**H1c:** The relationship between digital wallet usage intention and RA is moderated by the behavioral variable – frequency of usage.

**H2c:** The relationship between digital wallet usage intention and CO is moderated by the behavioral variable – frequency of usage.

**H3c:** The relationship between digital wallet usage intention and PC is moderated by the behavioral variable – frequency of usage.

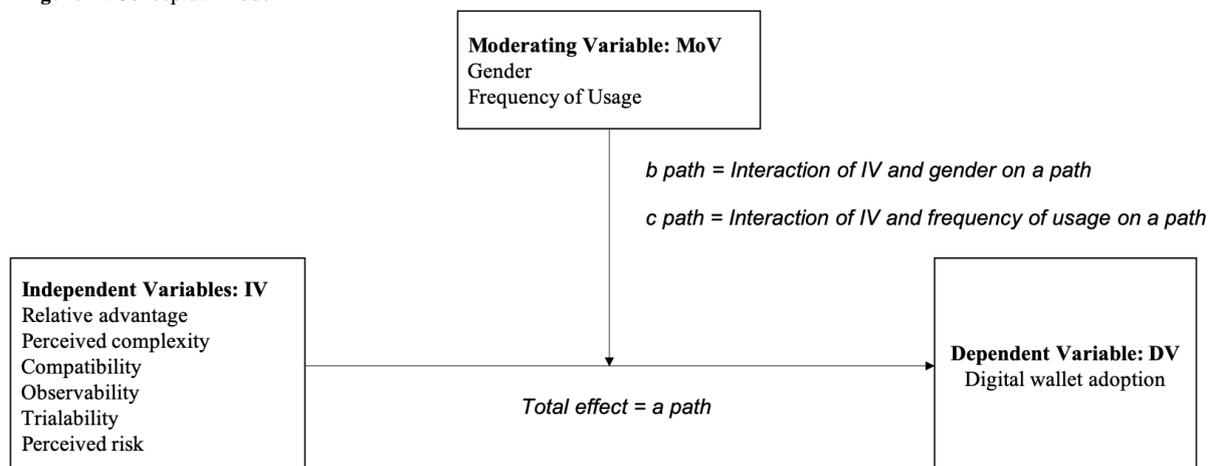
**H4c:** The relationship between digital wallet usage intention and TR is moderated by the behavioral variable – frequency of usage.

**H5c:** The relationship between digital wallet usage intention and OB is moderated by the behavioral variable – frequency of usage.

**H6c:** The relationship between digital wallet usage intention and PR is moderated by the behavioral variable – frequency of usage.

Based on the hypotheses developed above, the conceptual model adapted specially for this thesis is depicted in Figure 2. By extending the DIT, apart from five attributes affecting innovation adoption, this thesis includes another commonly investigated factor, perceived risk into the independent variables. Moreover, instead of merely focus on the antecedents of digital wallet adoption, the conceptual model of this thesis also tests the degree of which the demographic and behavioral variables can influence the relationships between the adoption behavior of digital wallets and the six predictors.

**Figure II.** Conceptual Model



**Source:** Al-Jabri & Sohail, 2012; Bhaumik et al., 2018; Shaikh & Karjaluo, 2016.

### III. RESEARCH METHODOLOGY

#### Data collection

The survey instrument design consisted of two phases, review of the literature and focus group discussion. Three groups of five college students were invited to participate in the discussion on why do they used digital wallets and how they perceived their current use of digital wallets. The response of the focus group are divided into two categories, reasons prompting them to adopt digital wallet and reasons inhibiting them adopt digital wallet. Factors such as “saving time”, “preventing cash from stolen”, “facilitating shopping experience”, “no need to take physical wallet”, and “convenience” are highly mentioned as reasons why customers adopt digital wallets. While “security concerns”, “leading to over-consumption”, “rely heavily on mobile phones”, and “possibilities of leaking personal sensitive information” are frequently raised when discussing the reasons for factors that preventing them from adopting digital wallets.

With the help of the ideas gathered from the focus group, the items not captured by prior studies were identified. Based on the input from the focus group and the review of the literature, a questionnaire was synthesized and divided into two sections. The first part of the survey was designed to capture the demographic and behavioral characteristics of respondents. The second part was designed to capture the latent variables that affect the digital wallet adoption using five-point Likert scales points with strongly disagree (1) and strongly agree (5).

After developing the questionnaire, a pre-test was conducted on 50 randomly selected Chinese college students, who had installed a digital wallet prior to participating in the pilot test. Since the respondents were non-native English speakers, the questionnaire originally designed in English was translated into the Chinese version in order to facilitate better

responding. Based on the feedbacks, the wordings, completeness, and sequencing of some questions were modified. As a result, the formal questionnaire was comprised of 45 questions and the final measuring items are presented in Table 1.

**Table 1. Measurement Items**

<b>Factors</b>	<b>Items</b>	<b>References</b>
Relative Advantage (RA)	RA1. Digital wallet has more advantages than offline payment because services are not limited by location and time.	Lu et al., 2011; Mallat, 2007.
	RA2. Digital wallet is more convenient than offline payment.	
	RA3. Digital wallet is more efficient than offline payment.	
	RA4. Digital wallet is more effective than offline payment in managing a payment account.	
	RA5. Digital wallet avoids queue.	
	RA6. Digital wallet enhances payment instrument availability.	
	RA7. Digital wallet is a complement to cash.	
Compatibility (CO)	CO1. Using digital wallet is compatible with all aspects of my work.	Lu et al., 2011; Karjaluoto et al., 2010; Pham & Ho, 2015; Mallat, 2007.
	CO2. Using digital wallet fits my lifestyle.	
	CO3. Using digital wallet is suitable for me.	
	CO4. My digital phone is compatible with digital wallet technology.	
	CO5. Using digital wallet fits well with the way I like to manage my finances.	
	CO6. Digital wallet is high compatible with all types of purchases	
Perceived Complexity (PC)	PC1. Manage separate accounts of digital wallet is burdensome.	Mallat, 2007; Cruz et al., 2010; Cruz et al., 2010; Kapoor et al., 2015; Shaw, 2014.
	PC2. Digital wallet has complex registration procedures.	
	PC3. Digital wallet is complicated to use.	
	PC4. Digital wallet requires knowledge and learning.	
	PC5. Using digital wallet is challenging and frustrating.	
	PC6. Using digital wallet is more complicated than using an actual payment card	
Trialability (TR)	TR1. I want to be able to use digital wallet on a trial basis first to see what it can do.	Liguo et al., 2017; Kapoor et al., 2015; Pham & Ho, 2015.
	TR2. I want to see a trial demo first.	
	TR3. Before deciding on whether or not to adopt digital wallet, I would be able to properly try it out.	
	TR4. I would be permitted to use digital wallet on a trial basis long enough to see what it can do.	
	TR5. I have to expend much effort in trying digital wallet.	
	TR6. I have adequate opportunities to try digital wallet.	
Observability (OB)	OB1. I have no difficulty telling others about the results of using digital wallet.	Liguo et al., 2017; Kapoor et al., 2015.
	OB2. I could communicate to others the consequences of using digital wallet.	
	OB3. The results of using digital wallet are apparent to me.	
	OB4. Being seen as a user of digital wallet is good for my image.	
	OB5. People who use digital wallet are visible in my social circle.	
	OB6. I have seen others using digital wallet.	
Perceived Risk (PR)	PR1. Information about my transactions may be tampered by others.	Al-Jabri & Sohail, 2012; Nguyen & Huynh, 2018.
	PR2. Information about my transactions may be known to others.	
	PR3. There may be caused error in the process of payment by digital wallet	
	PR4. There may be caused fraud or lost money when using digital wallet	
	PR5. There may be accessed into unauthorized personal data by hackers	
	PR6. Digital wallet transactions may not be secure	

The questionnaires were distributed through the online platform Sojump among Chinese college students. By the time the survey finished, 277 visitors had browsed the questionnaire and 233 questionnaires were submitted, of which 21 were excluded because of incompleteness, leaving 212 usable responses. Table 2 presents the characteristics of respondents.

**Table 2. Characteristics of Respondents (N = 212)**

<b>Variable</b>	<b>Frequency</b>	<b>Cumulative Frequency</b>	<b>Percentage (%)</b>	<b>Cumulative Percentage (%)</b>
<b><i>Gender</i></b>				
Male	95	95	44.8	44.8
Female	117	212	55.2	100.0
<b><i>Year</i></b>				
Freshman	51	51	24.1	24.1
Sophomore	76	127	35.8	59.9
Junior	45	172	21.2	81.1
Senior	40	212	18.9	100.0
<b><i>Frequency of Usage</i></b>				
Several times a day	38	38	17.9	17.9
Once a day	41	79	19.3	37.3
Once every 2-3 days	38	117	17.9	55.2
Once every 4-5 days	31	148	14.6	69.8
Once every week	36	184	17.0	86.8
Once every few weeks	28	212	13.2	100.0

## **Measurement**

SPSS version 25 was used to conduct exploratory and confirmatory factor analysis to ensure data reliability and validity. Subjected to exploratory factor analysis, 1 item was eliminated and 36 items remained after Varimax rotation. The Kaiser-Meyer-Olkin (KMO) was calculated as greater than .5 (KMO = .873) and Bartlett's Test of Sphericity was significant at .001 level. Six factors, relative advantage (RA), observability (OB), perceived risk (PR), compatibility (CO), perceived complexity (PC), and trialability (TR) respectively, were suggested with an eigenvalue greater than 1 and together explained 75.866 percent of the total variance.

Confirmatory factor analysis (CAF) was then performed to make sure that the factors obtained in exploratory factor analysis (EFC). Cronbach's alpha was used as an indicator to examine the reliability of the scales, using .6 as the cutting point. With regard to convergent validity, factor loadings means of the predictors were tested and were found greater than .7. Comparing the average variance extracted (AVE) with correlation square, discriminant validity was evaluated and was well satisfied among the seven constructs. Therefore, the condition of validity was confirmed. The results of the analysis are summarized in Table 3.

In order to examine the moderating role of demographic and behavioral variables, the multiple regression equation (Bhaumik et al., 2018) is proposed as follows:

$$y = \beta_0 + \beta_1x_1 + \beta_2x_2 + \beta_3(x_1x_2) + e$$

where  $y$  represents the dependent variable, adoption intention towards the digital wallet.  $x_1$  represents the independent variables, six attributes of digital wallet adoption, compatibility, observability, perceived complexity, perceived risk, relative advantage, and trialability.  $x_2$  represents the moderating variable.  $x_1x_2$  represents the interaction between the moderator and independent variables. To test the role of moderating variables  $x_2$ , the coefficient  $\beta_3$ , the level of interaction between the moderator and independent variables, is tested.

**Table 3. Reliability and Validity for Each Group**

<b>Construct</b>	<b>Items</b>	<b>Factor Loadings</b>	<b>Eigenvalues</b>	<b>Cronbach's <math>\alpha</math></b>
Relative Advantage	RA1	0.875	5.356	0.942
	RA2	0.885		
	RA3	0.839		
	RA4	0.867		
	RA5	0.859		
	RA6	0.812		
	RA7	0.882		
Observability	OB1	0.893	5.159	0.939
	OB2	0.899		
	OB3	0.879		
	OB4	0.884		
	OB5	0.894		
	OB6	0.865		
Perceived Risk	PR1	0.887	5.021	0.871
	PR2	0.820		
	PR3	0.863		
	PR4	0.875		
	PR5	0.850		
	PR6	0.860		
Compatibility	CO1	0.889	4.318	0.939
	CO2	0.882		
	CO3	0.868		
	CO4	0.886		
	CO5	0.855		
	CO6	0.858		
Perceived Complexity	PC1	0.863	4.113	0.850
	PC2	0.876		
	PC3	0.849		
	PC4	0.877		
	PC5	0.843		
	PC6	0.848		
Triability	TR1	0.845	3.345	0.906
	TR2	0.858		
	TR3	0.835		
	TR4	0.877		
	TR5	0.835		

**Notes:** Five-point Likert Scale: 1 "Strongly Disagree", 5 "Strongly Agree"

#### IV. EMPIRICAL RESULTS

The relationship between six predictors of digital wallet adoption and satisfaction of digital wallet, a surrogate measurement for digital wallet adoption, was first tested by conducting the correlations analysis between independent variables and dependent variables. As exhibited in Table 4, perceived compatibility, and trialability are positively correlated with the dependent variable, while relative advantages, observability, complexity, and perceived risk are negatively correlated with the dependent variable.

**Table 4. Correlations Between Independent Variables and Dependent Variable**

	RA	PC	OB	CO	PR	TR	SA
Relative Advantage (RA)	1						
Perceived Compatibility (PC)	-0.028	1					
Observability (OB)	-0.047	-0.010	1				
Complexity (CO)	0.061	0.097	0.200**	1			
Perceived Risk (PR)	0.014	-0.007	0.077	0.164*	1		
Trialability (TR)	0.021	0.144*	-0.036	0.008	-0.010	1	
Satisfaction (SA)	0.032	0.010	-0.073	-0.166*	-0.049	0.173*	1

**Notes:** \* Correlation is significant at the 0.05 level; \*\* Correlation is significant at the 0.01 level

Further, multiple regression was conducted to test the relationship of all independent variables with digital wallet adoption. The results of multiple regression analyses are presented in Table 5. The result shows that trialability (TR) had a positive significant effect ( $p < 0.05$ ) and perceived complexity (PC) had a negative significant effect ( $p < 0.05$ ) on digital wallet adoption. However, relative advantage (RA), compatibility (CO), observability (OB), and perceived risk (PR) had no statistically significant effect on the intention to adopt digital wallets.

**Table 5. Multiple Regression Model of Digital Wallet Adoption**

Independent variables	$\beta$	Std. Error	<i>t</i>	p-value
Relative Advantage	0.037	0.063	0.551	0.582
Perceived Compatibility	0.001	0.061	0.015	0.988
Observability	-0.030	0.058	-0.450	0.653
Complexity	-0.160	0.076	-2.269	0.024*
Perceived Risk	-0.020	0.075	-0.281	0.779
Trialability	0.172	0.066	2.511	0.013*

Notes: Dependent Variable = Satisfaction;  $R^2 = 0.061$ ;  $F = 2.206$

\* is significant at the 0.05 level; \*\* is significant at the 0.01 level

To examine the moderating role of the demographic variable emerges naturally from the study. Gender, itself, serves as a pre-established moderator. A dummy variable for gender is then created to distinguish male (0) and female (1). To identify the moderating level for the behavioral variable, frequency of usage, on digital wallet adoption, the dataset is divided to form two set based on the mean of the variable, heavy users (0) and light users (1).

With respect to the moderating effects of demographic variable, gender, the results shown in Table 6 indicate that gender does not serve as a moderator among digital wallet adoption and six independent variables, compatibility, observability, perceived complexity, perceived risk, relative advantage, and trialability respectively since the interaction effects in those models are insignificant.

**Table 6. Gender as a Moderator**

	Interaction between IV $\times$ MoV			
	$\beta$	Std. Error	<i>t</i>	p-value
Relative Advantage (RA)	0.043	.064	0.624	.533
Perceived Compatibility (PC)	0.134	.064	1.943	.053
Observability (OB)	0.077	.065	1.120	.264
Complexity (CO)	0.075	.064	1.103	.271
Perceived Risk (PR)	0.016	.065	0.225	.822
Trialability (TR)	0.098	.063	1.436	.152

Notes: \* is significant at the 0.05 level; \*\* is significant at the 0.01 level

As exhibited in Table 7, the behavioral variable, frequency of usage, significantly moderates the relationship between relative advantage (moderating effect = -0.162;  $p < 0.05$ ) and attitude towards digital wallet adoption. It is demonstrated that the more frequently users

access the digital wallet, the stronger the link is between intention to adopt digital wallets and its relative advantages.

**Table 7. Frequency of Usage as a Moderator**

	Interaction between IV × MoV			
	$\beta$	Std. Error	<i>t</i>	p-value
Relative Advantage (RA)	-0.162	.064	-2.329	.021*
Perceived Compatibility (PC)	-0.025	.065	-0.360	.720
Observability (OB)	-0.024	.066	-0.351	.726
Complexity (CO)	-0.016	.064	-0.228	.820
Perceived Risk (PR)	-0.123	.064	-1.783	.076
Trialability (TR)	0.025	.064	0.360	.719

**Notes:** \* is significant at the 0.05 level; \*\* is significant at the 0.01 level

The empirical results are summarized in Table 8, revealing that perceived complexity and trialability significantly influence the behavioral intention of digital wallet adoption in the context of Chinese youth. Moreover, the behavioral variable – frequency of usage significantly moderates the relationship between relative advantage and behavioral intention to digital wallet adoption. The next section provides further discussion on interpretations of the empirical results.

**Table 8. Summary of Empirical Results**

<b>Path/s</b>	<b>Results</b>
<i>a path – Total effect – to determine which antecedents greatly influence digital wallet adoption intention</i>	
H1a: Relative Advantage (RA) has a positive effect on digital wallet adoption among youth in China.	Insignificant
H2a: Compatibility (CO) has a positive effect on digital wallet adoption among youth in China.	Insignificant
H3a: Perceived complexity (PC) has a negative effect on digital wallet adoption among youth in China.	Significant
H4a: Trialability (TR) has a positive effect on digital wallet adoption among youth in China.	Significant
H5a: Observability (OB) has a positive effect on digital wallet adoption among youth in China.	Insignificant
H6a: Perceived risk (PR) has a negative effect on digital wallet adoption among youth in China.	Insignificant
<i>b path – Moderating effect on a path – to determine the moderating effects of demographic variable between antecedents and digital wallet adoption</i>	
H1b: The relationship between digital wallet usage intention and RA is moderated by the demographic variable - gender.	Insignificant
H2b: The relationship between digital wallet usage intention and CO is moderated by the demographic variable - gender.	Insignificant
H3b: The relationship between digital wallet usage intention and PC is moderated by the demographic variable - gender.	Insignificant
H4b: The relationship between digital wallet usage intention and TR is moderated by the demographic variable - gender.	Insignificant
H5b: The relationship between digital wallet usage intention and OB is moderated by the demographic variable - gender.	Insignificant
H6b: The relationship between digital wallet usage intention and PR is moderated by the demographic variable - gender.	Insignificant
<i>c path – Moderating effect on a path – to determine the moderating effects of behavioral variable between antecedents and digital wallet adoption</i>	
H1c: The relationship between digital wallet usage intention and RA is moderated by the behavioral variable – frequency of usage.	Significant
H2c: The relationship between digital wallet usage intention and CO is moderated by the behavioral variable – frequency of usage.	Insignificant
H3c: The relationship between digital wallet usage intention and PC is moderated by the behavioral variable – frequency of usage.	Insignificant
H4c: The relationship between digital wallet usage intention and TR is moderated by the behavioral variable – frequency of usage.	Insignificant
H5c: The relationship between digital wallet usage intention and OB is moderated by the behavioral variable – frequency of usage.	Insignificant
H6c: The relationship between digital wallet usage intention and PR is moderated by the behavioral variable – frequency of usage.	Insignificant

## V. CONCLUSION

### Discussions and Implications

The purpose of this thesis is to determine the antecedents that significantly influence the attitude towards digital wallet adoption in the context of Chinese youth and to explore the moderating role of demographic and behavioral factors on the relationships between digital wallet adoption and its antecedents. The multiple regression results indicated that perceived complexity ( $p < 0.05$ ) and trialability ( $p < 0.05$ ) have statistically significant relationships with digital wallet adoption. While other four antecedents, compatibility, observability, perceived

risk, and relative advantage respectively, do not serve as significant predictors of digital wallet adoption from Chinese youth perspectives.

The result of perceived complexity corroborates with the findings of many previous studies (Yang et al., 2006; Kapoor et al., 2015), emerging a negative relationship with digital wallet adoption. Since digital wallet heavily depends on mobile devices, customers need to pay more efforts to get used to the downsides of mobile devices, such as the small keyboard, small screen size, and complicated functions (Shih, 2008). In other words, the more ease of use customers perceived, the more likely potential customers are to adopt digital wallets. According to Chong (2013), as customers become more familiar with an innovation, perceived ease of use shows fewer efforts on affecting adoption behavior. Thus, redesigning the interfaces of digital wallets to make it more user-friendly at the initial purchasing point for the customer is important considerations for digital wallet service providers. Digital wallet is still an undergoing dynamic market since new applications are continuously introduced to the market. Service providers have to expend a lot of effort to reduce the complexity level for customers to operate digital wallet.

Trialability, though found as significant predictors that positively influence the rate of digital wallet adoption, is confirmed to have no effect on customers' attitudes toward use (Lou & Koh, 2017). However, according to Karahanna et al (1999), trialability did have a significant effect on the potential adopter group. Therefore, digital wallet service providers ought to provide customers with various kinds of experiments whenever launching a new function on the platform. In addition, the trial period should be reasonable in order for customers to fully realized the benefits of the digital wallet and adopt the service with a satisfying perspective (Teagarden et al., 2009).

Moreover, the moderated regression analysis showed that the frequency of usage moderates the relationship between digital wallet adoption intention and relative advantages,

which is supported by the findings of Chen et al (2009). Shaikh and Karjaluo (2016) also concluded from their study that individuals who adopt the digital wallet focus more on the evident benefits of using digital wallets. While gender does not moderate the relationships between digital wallet adoption and its predictors, supporting the study of Chawla and Joshi (2018). Thus, digital wallet service providers need to understand what distinguishes them from other payment methods thereby developing their differentiation strategy to stand out in the industry. Digital wallet is a continuously changing market, only by keep developing new features and functions that meet customers' needs can service providers remain competitiveness.

By extending the Diffusion of Innovation Theory (DIT) and adding the moderating effects, the findings of this thesis not only improves understandings of predictors affecting digital wallet adoption and behavioral and demographic differences influencing the degree of adoption but also provide insights for digital wallet service providers to redesign and develop their program in order to increase the rate of adoption among potential customers, especially among Chinese youth. Therefore, this thesis contributes to both the theoretical background of the digital wallet adoption pattern of Chinese youth and practice implications for digital wallet service providers to better target the Chinese youth market.

Understanding the customer behavior towards digital wallet adoption, not only benefits digital wallet service providers, but also other important entities, such as technology providers, merchants, financial institutions, and government and so on. With the knowledge of the behavioral intention of customers, each entity involved is able to adapt and update the most suitable strategy to improve the adoption rate of digital wallet and raise the satisfaction rate of customers, accelerating the development of the whole industry and in turn boosting the E-commerce economics in China.

### **Limitations and Future Research**

However, this thesis is not without limitations. Although the study focuses on Chinese youth and their attitudes towards digital wallet adoption, the majority of the sample size is Chinese college students, well-educated and experienced digital wallet users. Hence the result drawn from the sample data may not be generalized since consumers with different education backgrounds might respond differently concerning the same item. It is reasonable that well-educated users will perceive less difficulty operating digital wallet compared with less-educated ones. Thus, future studies ought to enlarge the sample size, investigating both young Chinese consumers with high education and those with less.

Apart from the five attributes of innovation adoption and perceived risk, many other essential factors influence customers' intention to adopt the digital wallet. For instance, perceived usefulness (Chong, 2013), trust (Madan & Yadav, 2016), and perceived enjoyment (Oghuma et al., 2016) are also important predictors commonly examined by previous studies. Future research may take those essential customer-related predictors into account to better understand the behavior of digital wallet adoption in the context of Chinese youth.

Moreover, the respondents are mainly collected from Beijing, Shanghai, and Zhejiang, which may not serve as an excellent representation of the whole population. Since the digital wallet was first launched in those areas and is much more prevalent in those areas compared with inland of China. The result would be more convincing if future research could take other provinces into account. Apart from Chinese customers who live in Mainland of China, future studies may also enlarge the sample size by distributing the questionnaires to Chinese youth living in foreign countries. The findings would be more interesting if compared to the results in different countries.

Besides, when investigating the moderating effect of demographic and behavioral variables, this thesis only applies gender and frequency of usage as the representative for each category. However, apart from gender, demographic variables also include age,

educational background, income, occupation, marital status, etc., all of which may influence the degree of relation between digital wallet adoption behavior and its antecedents.

Behavioral variables, as well, contain not only frequency of usage, but also user status, user's loyalty situation, user's knowledge towards the products or services and so on. Thus for any further research exploring the moderating effect of demographic and behavioral variables on the relations between adoption behavior of digital wallet and its antecedents, the study would be more thoroughly if the variables listed above are taken into considerations.

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