EXPLORING USER ACCEPTANCE OF INNOVATIVE MOBILE PAYMENT SERVICE IN EMERGING MARKET: THE MODERATING EFFECT OF DIFFUSION STAGES OF WECHAT PAYMENT IN CHINA

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EXPLORING USER ACCEPTANCE OF AN INNOVATIVE MOBILE PAYMENT SERVICE IN AN EMERGING MARKET: THE MODERATING EFFECT OF THE DIFFUSION STAGES OF WECHAT PAYMENTS IN CHINA

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Abstract

Although perceived risk and usefulness have been identified as two major factors that influence the acceptance of an innovative mobile payment, relatively few researchers have explored the impact of affective factors on user-perceived risk and usefulness. We also do not know whether there is a difference in the acceptance intention among users across different diffusion stages of this innovation. This paper aims to investigate: (1) the relative effects of cognitive (perceived risk and perceived usefulness) and affective (positive emotion) factors on acceptance intention, (2) the role of positive emotion in decreasing perceived risk and increasing perceived usefulness, and (3) the moderating effects of diffusion stages (introduction vs. growth) on the relationships between these three determinants and users’ intentions to accept a WeChat payment, an innovative mobile payment that has various usage scenarios in China. Empirical analysis on two datasets show that users’ acceptance intention is relatively related to perceived risk, perceived usefulness, and positive emotion. Positive emotion has a strong negative impact on perceived risk and a positive impact on perceived usefulness. More importantly, multi-group analyses find that both positive emotion and perceived risk have significant positive and negative impacts on acceptance intention at the stage of market introduction rather than market growth. Rather, the influence of positive usefulness on acceptance intention is significantly higher at the stage of market growth than at market introduction. The findings of this study indicate that exploring the moderating effect of diffusion stages in mobile payment acceptance provides a more comprehensive understanding of how to achieve a greater acceptance rate of an emerging or innovative mobile payment service.

Keywords: WeChat payment, mobile payment, Perceived risk, Positive emotion, diffusion stages.
1 INTRODUCTION

Mobile internet and mobile devices are changing people’s work lives, personal lives and consumption habits. An increasing number of people use the mobile internet with smart phones and other mobile devices and participate in more mobile payment (m-payment) activities; thus, m-payment is a rapidly growing, emerging market. Although m-payment presents several advantages for consumers, such as convenience, ubiquity and time-saving, it is not always readily accepted and used by consumers. For example, a large number of Apple’s users know about Apple pay, but only a small number of them use the Apple pay service. Similarly, despite having the world’s most important and promising m-payment market, China’s users have also not readily accepted and used m-payment since this service was introduced. It was reported that over 71% of Chinese users visiting the internet with a mobile phone never uses m-payment and that only 6.3% of users visiting the internet with mobile phones frequently use m-payment service (iiMedia 2013). Due to the increasing importance of m-payment, researchers should comprehensively understand the reasons why some people use this type of payment and why others are still reluctant to use it.

Several factors may explain the acceptance or resistance of consumers to use m-payment. Extant studies have identified and confirmed the influences of positive (e.g., perceived ease of use, perceived usefulness, trust, flow, satisfaction, compatibility, and relative advantage) and negative (e.g., need for interaction, perceived risk and cost) factors on user behavior intention for m-payment (Hanafizadeh et al. 2014; Kim et al. 2010; Liébana-Cabanillas et al. 2014; Schierz et al. 2010; Yang et al. 2015; Yang et al. 2012; Zhou 2013). Among these studies, perceived usefulness and risk are two main positive and negative factors that have been widely investigated in m-payment acceptance literature, leaving affective factors or the feelings of users relatively unexplored (Dahlberg et al. 2015). Some researchers examined the impacts of affective factors on consumer behavior in online shopping (Ahn et al. 2007; Koo et al. 2014; Shang et al. 2005); we expect that users’ positive emotions will play a similar role in m-payment acceptance. Further, although perceived usefulness and risk have been identified as two major factors for predicting m-payment acceptance, little is known about the interaction between these factors and positive emotion or the relative impact of these three cognitive and affection factors on acceptance intention. This poses the following interesting questions: How do perceived risk, perceived usefulness and positive emotion relatively influence the acceptance of consumers to use an innovative m-payment that is characterized with greater risk and more unknowns? Does positive emotion have an indirect impact on acceptance behavior by reducing users’ perception of risk and usefulness to such an innovation? To the best of our knowledge, in-depth analysis of these questions in m-payment acceptance research is lacking.

In addition, most of the extant studies on user behavior intention toward m-payment services were conducted after they were adopted in the target market (Chen 2008; Schierz et al. 2010; Yang et al. 2012). However, according to Karahannet et al. (1999), the results of these studies on the relationship between behavior intention and its determinants may not be the same for the initial adoption of an innovative m-payment service; the degree of influence may differ. Innovation diffusion is the process by which an innovation is communicated over a period of time among members, suggesting how an innovation spreads (Rogers 2003). People who adopt an innovation early (such as at the market
introduction stage) have different characteristics than those who adopt an innovation later (such as at the market growth stage) (Di Pietro et al. 2015). The Yang et al. (2012) study enhanced our understanding of determinants of m-payment adoption for potential and current users. However, they only examined the impact of cognitive factors on adoption outcomes and collected data during the same period rather than at different diffusion stages. This motivates us to ask: Do the impacts of perceived usefulness, perceived risk, and positive emotion on users’ acceptance of an innovative m-payment system differ at different diffusion stages of such an innovation?

Given these gaps in knowledge, this study, taking the example of the WeChat payment in China, specially investigates (1) whether positive emotion can decrease perceived risk and increase perceived usefulness, (2) what influences the acceptance intention of an individual more—perceived usefulness, perceived risk, or positive emotion, and (3) how do their relative impacts on acceptance intention change from the market introduction stage to the growth stage of an innovative m-payment system? This study attempts to contribute to a better theoretical understanding of the antecedents of user acceptance of an innovative m-payment service and to determine the impact of these antecedents across two innovative diffusion stages. Additionally, it provides practical insights for understanding and managing users’ adoption and acceptance at each stage of the m-payment diffusion process.

The rest of this paper is organized as follows. The next section provides background for China’s WeChat payment system, focusing on two well-known promotions of WeChat payment. The theories and hypotheses are then presented, followed by a description of the research methodology. Then, we report and describe the empirical results. Finally, we conclude with a discussion, including the limitations.

2 BACKGROUND

In recent years, m-payment in China has continued to grow in a strong and steady manner. According to the latest statistics by iResearch, after its early introduction to China, m-payment achieved a significantly rapid growth, even during the recent economic crisis (2012-2014). The transaction volume of m-payment in China exceeded 5992 billion RMB (or 966 billion USD) in 2014, an increase of 391.3% over that of 2013 (iResearch 2015). Alipay and WeChat payments, backed by two internet giants in China, Alibaba and Tencent, are the two most important and popular m-payment tools in China. This study particularly focuses on WeChat payment for three reasons. First, WeChat first enabled m-payment on its platform in August 2013. By successfully competing with China’s largest m-payment tool, Alipay, it has become one of the most popular m-payment services in China in less than four years. Second, it is different from most m-payment services because it is a special m-payment tool that is linked to a social platform—WeChat—which is one of the most popular instant messaging applications in the world. Third, it has achieved a significant increase in user penetration rates by using two well-known promotions: gifting WeChat red envelopes (微信红包) and collaborating with Didi Dache (滴滴打车). We believe that the knowledge that we gained from studying WeChat payment can be used to guide companies to develop efficient and effective strategies to increase the acceptance rate of an innovative m-payment service.
2.1 Gifting WeChat Red Envelopes

Gifting red envelopes to family and relatives is an ancient tradition during the Chinese Lunar New Year. Now, this old custom has a new face in the mobile internet age. The WeChat red envelope, which was developed to deliver virtual money, check a user’s history and withdraw cash, was developed by WeChat during the 2014 Spring Festival to gain new m-payment users. To compete for a larger market share, Tencent partnered with the CCTV Spring Festival Gala and introduced the WeChat red envelope shake on 18 February 2015. Users simply had to shake their smart phones for a chance to grab red envelopes. Statistics from WeChat show that 3.27 billion red envelopes were sent and received by WeChat users between Feb 18 and Feb 23. At its peak, as many as 1.65 million red envelopes were opened on WeChat every 60 seconds. Additionally, the number of shakes during the gala promotion achieved a total of 11 billion and a peak of 810 million per minute. To win red envelopes and good luck in the new year, people shook multiple smart phones to increase their chance of winning these envelopes.

WeChat users send or receive red envelopes by linking a bank account to their WeChat red envelope account. Therefore, the WeChat payment platform is needed to allow money to move between bank accounts and WeChat accounts. This led hundreds of millions of new users to accept and use the WeChat payment service and helped WeChat payments double its market share since the red envelope campaign was launched in 2013.

2.2 Collaborating with Didi Dache

Didi Dache is one of only two taxi-hailing apps in China. Didi Dache’s core offering is a taxi-booking service. Consumers post their current locations and destinations using the Didi Dache app and taxi drivers can take orders from the app. It is quite easy to use and convenient for both consumers and taxi drivers.

In addition to the digital red envelope, Tencent also pushed the WeChat payment service through its collaboration with Didi Dache. Consumers can choose to use WeChat payment to pay for their ride. The collaboration strategy adopted by Tencent offered a premium to those who used their apps frequently and included both taxi drivers and consumers. However, both taxi drivers and consumers must use WeChat to receive those premiums. In January 2014, Didi Dache introduced subsidies-promotion activities: consumers who use Didi Dache and WeChat payment can enjoy a onetime coupon of ¥10. Meanwhile, an additional ¥10 subsidy will be paid to drivers. This collaboration between Tencent and Didi Dache enables WeChat payments to penetrate into the daily lives of ordinary consumers.

3 THEORIES AND HYPOTHESES

3.1 Consumer Response System Model

Holbrook and Hirschman(1982) proposed a comprehensive model of the consumer response system to describe how consumers respond to marketing stimuli. According to this model, a consumer response system involves cognition, affect, and behavior. Park et al.(2005)examined the impact of online
product presentation on these three response systems in the e-commerce environment and found relationships among cognitive responses (perceived risk), affective responses (mood), and behavior responses (purchase intention). Based on the consumer response system model and related literature, we incorporate consumers’ perceived risk, usefulness (cognitive response) and positive emotion (affective response) into our research model (Figure 1) to make a better understanding of why people are willing to accept WeChat payments (behavior response).

3.2 Perceived Risk

During the red envelope war between Tencent and Alibaba, mobile payment security is the greatest concern of Chinese mobile internet users. These users are mainly afraid that their personal information and smartphone bank accounts and money will be stolen. Moreover, compared to Alipay Wallet, WeChat payment is still in its infancy and has not been tested over time. In addition, WeChat payment is based on WeChat, whose powerful social networking function unavoidably provokes people’s concern about its security. Recent studies have confirmed that there is a negative influence of perceived risk on behavioral intentions to m-payment in China (Lu et al. 2011; Yang et al. 2012), Germany (Schierz et al. 2010), Spain (Liébana-Cabanillas et al. 2014), Finland (Mallat 2007), Iran (Hanafizadeh et al. 2014), and India (Thakur et al. 2014). Consistent with these findings, we hypothesize,

H1. Perceived risk is negatively related to the intention to accept WeChat payment.

3.3 Perceived Usefulness

The technology acceptance model (Davis 1989) is most frequently used to predict user behavior intentions to adopt or accept m-payment. Perceived usefulness reflects consumers’ cognitive evaluation of the superiority of m-payment services. In the TAM, perceived usefulness is a key variable for predicting consumer acceptance and use of m-payments (Schierz et al. 2010). For gifting WeChat red envelopes, consumers not only withdraw a small amount of cash during the Spring Festival, but they also obtain coupons from online and offline promotions. Additionally, a number of merchants directly promote their products on Friends Circle of WeChat and service accounts that enable direct transactions by sending out WeChat red envelopes. For Didi Dache, consumers accept and use the Didi Dache app for greater convenience, saving time and reducing costs (¥10 relief once time during the promotion). Thus,
H2. Consumers’ intention to accept WeChat payment is positively associated with perceived usefulness.

3.4 Positive Emotion

Most studies on technology adoption and usage continuance examine cognitive factors, leaving affective factors or the feelings of users relatively unexplored (Kim et al. 2007). Paul Slovic proposed an affect heuristic in which people let their likes and dislikes determine their beliefs about the world and make judgments and decisions by consulting their emotions (Slovic et al. 2002). As we mentioned previously, most consumers use WeChat payments and receive red envelopes just for fun and good luck rather than to obtain a small amount of money. Chinese people appreciate the holidays after a year’s hard work. Lunar New Year is the most important holiday for them and is supposed to be a time of reunification and building relationships. WeChat red envelopes provide an efficient platform for interacting with relatives and friends and are a part of the festivities during the Spring Festival. Positive emotion or enjoyment was theorized to directly influence behavior intention in some studies, such as those of Nysveen et al. (2005), Zhang’s (2013), and Koo et al. (2014). Thus, we suggest, 

H3. Consumers’ positive emotion has a positive impact on their acceptance intention toward WeChat payment.

3.5 Relationships between Emotions, Risk and Usefulness

Previous studies note the roles of risk and enjoyment in forming consumer attitudes and/or intentions to use new technologies. However, the relationships between risk, enjoyment, and usefulness are unclear (Ha et al. 2009). In many domains of life, people make decisions that directly express their feelings and their basic tendency to approach or avoid, often without knowing that they are doing so. From the perspective of the affect heuristic (Slovic et al. 2002), when people are favorably disposed toward a technology, they rate it as offering large benefits (perceived usefulness) and having little risk; when they dislike a technology, they can only consider its disadvantages, and few advantages came to mind (Finucane et al. 2000). Hong and Tam (2006) found that positive emotion exerts indirect effects via perceived usefulness on behavior intention to accept mobile data service. In an online shopping context, perceived usefulness was also confirmed to be influenced by shopping enjoyment (Ha et al. 2009). Based on the affect heuristic and prior findings, we believe that, in the context of m-payment, consumers may positively judge usefulness and risk when they have positive emotions evoked by an innovative m-payment tool. Hence, we hypothesize,

H4. Positive emotion will have a significant negative effect on perceived risk. 
H5. Positive emotion will have a significant positive effect on perceived usefulness.

3.6 Moderating Effect of Diffusion Stages

The classical product life cycle has four stages (Levitt 1965): an initial introduction period of slow sales growth, a period of rapid growth in sales, a maturity period in which sales level off and are relatively stable, and a decline period in which sales drop off. Conceptually, the length of the product lifecycle is the time between introduction and withdrawal from the marketplace (Bayus 1998). The product life cycle in marketing is largely similar to the innovation diffusion process in technological
innovation. Karahanna et al. (1999), Yang et al. (2012), and Liébana-Cabanillas et al. (2014) used the Diffusion of Innovation Theory to examine users’ adoption differences of information technology over time. However, in the IS literature, few empirical studies have made a distinction regarding the determinants of individuals’ behavior intentions between the introduction and growth stages of an innovative m-payment technology. Thus, this distinction remains an important unanswered question in IS research and is also crucial to understanding and managing this diffusion process over time.

WeChat payment was first launched in August 2013. This study specifically assesses two diffusion stages, i.e., market introduction and growth. When WeChat payment was brought to market (in the market introduction stage), it was a new and innovative m-payment service that was different from Alipay. Bringing such an innovation to the market is fraught with risk and unknown variables. Potential users are more concerned about potential risks and uncertainty than utilitarian value at this phase before deciding to accept a new product. Many products fail and do not move past this stage because of consumers’ high perceived risks and worries about expectation-disconfirmation.

Conversely, in the market growth stage, WeChat payment was adopted by the majority of WeChat users. More competitors launch competing products at this stage. Demand begins to accelerate and the size of the total market expands rapidly. In light of the study by Karahanna et al. (1999), an individual’s perceived attributes, attitudes, and beliefs regarding an innovative m-payment system will be influenced by the individual’s social environment. At this phase, the actual consequences of other users’ behavior will change an individual’s perception of usefulness and risk. This is because other users change one’s perceived probability that accepting the innovation will generate risks regarding money, privacy, and expectations or well lead to relative advantages and allow individuals to achieve task goals. Other users’ successful experience will reduce the individual’s perceived risk. Meanwhile, the appearance of competing products will enable users to assess the relative advantages and utilitarian value among various products. Thus,

H6a. The impact of perceived risk on acceptance intention is significantly higher during the market introduction stage of WeChat payment diffusion.

H6b. The impact of perceived usefulness on acceptance intention is significantly higher during the market growth stage of WeChat payment diffusion.

An early study suggested that affect will have a more pronounced effect in determining behavior when the behavior is new, and this influence on behavior will decrease as users become more experienced (Triandis 1971). Another study in IS literature found that the influence of affect on IS usage was greater for inexperienced (as innovators or early adopters in the market introduction stage) than for experienced (as the adopter majority in market growth) users (Thompson et al. 1994). Thus, we hypothesize,

H6c. The impact of positive emotion on acceptance intention is significantly higher during the market introduction stage of WeChat payment diffusion.

4 METHODS

4.1 Measurements

Each factor was measured with multiple items. All items were adapted from extant research to improve content validity. We used 21 items to measure five potential variables. The measures of
perceived risk were derived from Wu and Wang (2005). Five items of perceived usefulness were adapted from Schierz et al. (2010) and Liébana-Cabanillas et al. (2014). Three items of acceptance intention toward WeChat payment were adapted from Schierz et al. (2010) and Venkatesh et al. (2012). The positive emotion scale, including 4 measures, was revised from Sun and Zhang (2006). Each item was measured on a 5-point Likert scale from 1 (“strongly disagree”) to 5 (“strongly agree”). In addition, demographic characteristics, such as age, gender, income, and WeChat usage experience, were measured as control variables.

4.2 Procedure and Sample

An online survey was conducted to collect data. Our target participants were Chinese consumers with usage experience of WeChat. Given the specific population of subjects that we targeted, the questionnaire was developed and our data collection was conducted by a third-party online survey platform, SOJUMP.COM.

Table 1. Demographic information of respondents

<table>
<thead>
<tr>
<th>Measure</th>
<th>Items</th>
<th>Market introduction(N=187)</th>
<th>Market growth(N=297)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Frequency</td>
<td>Percentage</td>
<td>Frequency</td>
</tr>
<tr>
<td>Gender</td>
<td>Male</td>
<td>94</td>
<td>50.3</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>93</td>
<td>49.7</td>
</tr>
<tr>
<td>Age</td>
<td>18-22</td>
<td>13</td>
<td>7.0</td>
</tr>
<tr>
<td></td>
<td>23-26</td>
<td>70</td>
<td>37.4</td>
</tr>
<tr>
<td></td>
<td>27-35</td>
<td>72</td>
<td>38.5</td>
</tr>
<tr>
<td></td>
<td>36-45</td>
<td>30</td>
<td>16.0</td>
</tr>
<tr>
<td></td>
<td>&gt;46</td>
<td>2</td>
<td>1.1</td>
</tr>
<tr>
<td></td>
<td>&lt;1000</td>
<td>14</td>
<td>7.5</td>
</tr>
<tr>
<td>Monthly income (RMB)</td>
<td>1001-2000</td>
<td>89</td>
<td>47.6</td>
</tr>
<tr>
<td></td>
<td>2001-3000</td>
<td>35</td>
<td>18.7</td>
</tr>
<tr>
<td></td>
<td>3001-5000</td>
<td>19</td>
<td>10.2</td>
</tr>
<tr>
<td></td>
<td>&gt;5000</td>
<td>30</td>
<td>16.0</td>
</tr>
<tr>
<td></td>
<td>&lt;1</td>
<td>6</td>
<td>3.2</td>
</tr>
<tr>
<td>WeChat usage experience(years)</td>
<td>1-2</td>
<td>16</td>
<td>8.6</td>
</tr>
<tr>
<td></td>
<td>2-3</td>
<td>55</td>
<td>29.4</td>
</tr>
<tr>
<td></td>
<td>&gt;3</td>
<td>110</td>
<td>58.8</td>
</tr>
</tbody>
</table>

The data collection included two stages. The WeChat payment system was launched in August 2013. Our first data collection was in October 2013 during the stage of market introduction. At this stage, out of 217 collected samples, a total of 187 usable samples were left in the market introduction dataset after eliminating those that were invalid. Next, given that the number of WeChat payment users increased to nearly 80 million in one year, we performed the same procedure in August 2014 to collect
data at the stage of market growth. During this stage, we received 312 samples with 297 valid responses in the market growth dataset. Table 1 shows the demographic information of 484 respondents.

5 RESULTS

5.1 Reliability and Validity

Construct reliability and validity were examined by a confirmatory factor analysis. The results in Table 2 show Cronbach’s alphas from 0.762 to 0.876. The values of composite reliability are all above 0.85 and near 0.90. These results indicate the good reliability of the scales. The average variance extracted(AVE) for every construct are well above 0.6, indicating good convergent validities(Fornell et al. 1981). Additionally, as shown in Table 3, the square roots of the AVEs are larger than all of the corresponding correlation coefficients, suggesting good discriminant validities of the scales (Fornell et al. 1981).

Table 2. Reliability and convergent validity results

<table>
<thead>
<tr>
<th>Variables</th>
<th>Items</th>
<th>Alpha</th>
<th>Loadings</th>
<th>AVE</th>
<th>C.R.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived risk</td>
<td>PR1</td>
<td>0.876</td>
<td>0.809</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PR2</td>
<td></td>
<td>0.847</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PR3</td>
<td></td>
<td>0.765</td>
<td>0.647</td>
<td>0.880</td>
</tr>
<tr>
<td></td>
<td>PR4</td>
<td></td>
<td>0.773</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PE1</td>
<td></td>
<td>0.675</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PE2</td>
<td></td>
<td>0.774</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PE3</td>
<td></td>
<td>0.755</td>
<td>0.654</td>
<td>0.883</td>
</tr>
<tr>
<td></td>
<td>PE4</td>
<td></td>
<td>0.654</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PU1</td>
<td></td>
<td>0.592</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PU2</td>
<td></td>
<td>0.653</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>PU3</td>
<td></td>
<td>0.780</td>
<td>0.653</td>
<td>0.878</td>
</tr>
<tr>
<td></td>
<td>PU4</td>
<td></td>
<td></td>
<td>0.663</td>
<td></td>
</tr>
<tr>
<td></td>
<td>PU5</td>
<td></td>
<td></td>
<td>0.661</td>
<td></td>
</tr>
<tr>
<td></td>
<td>IN1</td>
<td></td>
<td></td>
<td>0.735</td>
<td></td>
</tr>
<tr>
<td></td>
<td>IN2</td>
<td></td>
<td>0.762</td>
<td>0.712</td>
<td>0.862</td>
</tr>
<tr>
<td></td>
<td>IN3</td>
<td></td>
<td></td>
<td>0.712</td>
<td></td>
</tr>
</tbody>
</table>
Table 3. Discriminant validity results

<table>
<thead>
<tr>
<th>Variable</th>
<th>PU</th>
<th>PR</th>
<th>PE</th>
<th>IN</th>
</tr>
</thead>
<tbody>
<tr>
<td>PU</td>
<td>0.768</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PR</td>
<td>-0.367</td>
<td>0.804</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PE</td>
<td>0.698</td>
<td>-0.253</td>
<td>0.808</td>
<td></td>
</tr>
<tr>
<td>IN</td>
<td>0.774</td>
<td>-0.100</td>
<td>0.370</td>
<td>0.822</td>
</tr>
</tbody>
</table>

Note: N=484. Values in parentheses in the matrix of constructs correlation are the square roots of the average variance extracted of each construct.

5.2 Hypotheses Tests

AMOS 17.0 was used to test the proposed research model. The goodness of fit measures for the structural model show satisfactory values (CMIN/df=1.803, RMR=0.032, GFI= 0.950, CFI =0.995; RMSEA =0.029). Fig. 2 presents the standardized estimates.

![Path diagram and causal relationships](image)

As shown in Fig. 2, the path analysis results of the full samples provide strong support for all of the hypotheses. The negative effect of perceived risk (Hypothesis 1) and the positive effects of perceived usefulness (Hypothesis 2) and positive emotion (Hypothesis 3) on acceptance intention are supported. The negative and positive effects of positive emotion on perceived risk (Hypothesis 4) and perceived usefulness (Hypothesis 5) are also found to be significant.

5.3 Moderating Effects of Diffusion Stages Test

To evaluate the moderating effect of the (WeChat payment) diffusion stages, the sample was divided into two datasets, depending on the data collection period. Then, we conducted comparison testing to test the difference in the strength of path coefficients between the market introduction and market growth stages. The results presented in Table 4 show that the relative impact of three determinants on acceptance intention were found to be significantly different between two diffusion stages.
Table 4. Result of moderating effect of diffusion stage

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Introduction stage (N=187)</th>
<th>Growth stage (N=297)</th>
<th>CRDP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>standardized coefficient</td>
<td>t-Value</td>
<td>standardized coefficient</td>
</tr>
<tr>
<td>Usefulness &lt;--- Emotion</td>
<td>0.67</td>
<td>7.12</td>
<td>0.75</td>
</tr>
<tr>
<td>Risk &lt;--- Emotion</td>
<td>-0.13</td>
<td>-1.44</td>
<td>-0.58</td>
</tr>
<tr>
<td>Intention &lt;--- Risk</td>
<td>-0.20</td>
<td>-3.18</td>
<td>-0.13</td>
</tr>
<tr>
<td>Intention &lt;--- Emotion</td>
<td>0.53</td>
<td>4.81</td>
<td>0.19</td>
</tr>
<tr>
<td>Intention &lt;--- Usefulness</td>
<td>0.30</td>
<td>3.38</td>
<td>0.63</td>
</tr>
</tbody>
</table>

Note: CRDP=Critical Ratios for Differences between Parameters

Concerning hypothesis H6a, it was observed that although the Critical Ratio for Differences between Parameters was slightly less than 1.96, the influence of perceived risk on acceptance intention was greater in the market introduction dataset ($\beta = -0.20, p < 0.01$) than in the market growth dataset ($\beta = -0.13, p > 0.05$). Therefore, hypothesis H6a was confirmed.

With regard to the relationship proposed under hypothesis H6b, it was found that the relationship between perceived usefulness and acceptance intention was higher in the case of users in the market growth stage ($\beta=0.63, p<0.001$) than in the market introduction stage ($\beta=0.30, p<0.001$), thus supporting H6b.

With regard to hypothesis H6c, the coefficient linking positive emotion and acceptance intention was higher among the users in the market introduction stage ($\beta=0.53, p<0.001$) than among those in the market growth stage ($\beta=0.19, p>0.05$). Thus, our results clearly support H6c.

6 DISCUSSION

6.1 Discussion of Findings

The purpose of this study is to understand the differences of consumers’ intention to accept an innovative m-payment service, WeChat payment in China, across two different diffusion stages. The results support our hypotheses, yielding interesting findings. First, perceived risk can significantly and negatively influence users’ acceptance intention toward an innovative m-payment service. More importantly, this impact is different among users at different diffusion stages. In the market introduction stage, the negative effect of perceived risk is significant. However, this effect is not significant during the market growth stage.

Second, in support of prior m-payment acceptance studies, perceived usefulness is positively related to acceptance intention. Additionally, as expected, the results indicate that the positive impact is significantly higher during the market growth stage than the market introduction stage. This finding indicates that perceived usefulness plays a relative role in predicting users’ acceptance intention across different diffusion stages.
Third, this study further suggests that positive emotion can directly or indirectly increase acceptance intention by reducing perceived risk and enhancing perceived usefulness, indicating that positive emotion plays a critical role in facilitating potential users to accept an innovative m-payment service. Another interesting finding is that, contrary to the findings related to perceived usefulness, the positive impact of positive emotion on acceptance intention is significant at the diffusion stage of market introduction rather than market growth. This means that the influence of positive emotion on acceptance behavior will decrease as users learn more about an innovative m-payment service.

6.2 Theoretical Implications

This study has several significant theoretical implications. First, while cognitively positive and negative factors are often employed to investigate m-payment acceptance and use (Liébana-Cabanillas et al. 2014; Lu et al. 2011; Pham et al. 2015; Schierz et al. 2010), the influence of affective factors has been unexplored (Dahlberg et al. 2015). This study integrates both cognitive and affective factors to examine users’ acceptance of an innovative m-payment service. We propose that users’ acceptance is mainly influenced by three cognitive and affective determinants: perceived risk, perceived usefulness, and positive emotion. Although prior studies have investigated the impact of cognitive determinants (e.g., perceived risk and usefulness), we argue that, theoretically, both cognitive and affective determinants can be integrated into a single research framework and further empirically confirm that two types of antecedents have direct and interactive effects on acceptance intention. In general, the proposed framework can provide more comprehensive insights for predicting users’ acceptance of m-payments and other innovative technologies.

Second, a recent review of m-payment research suggests that researchers have rarely engaged in empirical longitudinal studies (Dahlberg et al. 2015). Going beyond prior studies investigating the roles of perceived risk and usefulness in affecting acceptance of m-payments (Liébana-Cabanillas et al. 2014; Pham et al. 2015; Yang et al. 2015), the current study, as a response to Dahlberg et al. (2015), argues that the impacts of perceived risk and usefulness change throughout the diffusion stages of an innovative m-payment. As expected, our findings show that perceived risk only has a significant influence on acceptance intention at the market introduction stage and that the impact of perceived usefulness on acceptance is higher at the market growth stage than the market introduction stage. Our findings not only provide comprehensive insights into future technology acceptance research but may also explain the inconsistent results on the effects of perceived risk and/or usefulness on acceptance intention.

Third, this study extends the affect heuristic (Slovic et al. 2002) to an emerging context: a mobile payment service. While exceptional studies have recently attempted to investigate the effect of positive emotion on perceived risk in online decision aids (Ma et al. 2009), rarely has research focused on this effect in an m-payment context. This enriches research on technology and m-payment acceptance by identifying the strong indirect influence of positive emotion on acceptance behavior by simultaneously reducing perceived risk and increasing perceived usefulness. Additionally, this study extends the studies of Ma et al. (2009) and Rodger et al. (2014), which examined the direct impact of positive emotion on adoption intention by empirically examining the differential impact of positive emotion for consumers between two diffusion stages: market introduction and market growth.
6.3 Practical Implications

The findings of this study also have practical implications for designing, managing, and marketing an innovative m-payment system. For instance, this study shows that perceived risk and positive emotion have greater impacts on consumers’ intention to accept WeChat payment at the stage of market introduction. This means that when an innovative m-payment service is launched, app developers and service providers should pay more attention to reducing potential users’ perceptions of risks and uncertainties and to eliciting more positive emotions and feelings. Our findings that perceived usefulness has a significantly greater impact at the market growth stage provide insight to m-payment service providers. When an innovative m-payment system has been adopted by innovators and early adopters, companies should be more concerned about enriching usage scenarios and linking more merchants to increase consumers’ perceived usefulness. In addition, this study proposed and confirmed the significant direct and indirect influences of positive emotion in m-payment system acceptance. Thus, when encouraging users to accept an innovative m-payment service, managers can offer gifts and discounts and add interesting usage scenarios (like what Tencent did for the WeChat payment system), which can induce users’ positive emotion and encourage users to form more favorable attitudes toward them-payment system and its potential risks.

7 LIMITATIONS AND FUTURE RESEARCH

We acknowledge some limitations in this study. First, this study examines the acceptance of an innovative m-payment system embodied in a social platform in China. It is possible that our findings are specific to China’s WeChat samples and are not generalized to other populations. Thus, future studies should attempt to generalize the results to other types of m-payments in other countries. Second, although this study specifically underlines the role of positive emotion in predicting users’ acceptance, future research should integrate more relevant affective factors (e.g., negative emotion) or detailed emotions (e.g., arousal and valence), such that a more comprehensive understanding of m-payment acceptance would be achieved. Third, the current study investigates users’ acceptance intention. An important recommendation is to elaborate the concept of acceptance to better represent real-life payment scenarios.

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