Applied Mathematics & Information Sciences
An International Journal

http://dx.doi.org/10.18576/amis/100233

Analyzing the Factors that Influence Development of Chinese Mobile Third-party Payment Platform: the Customers Perspective

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Received: 30 Aug. 2015, Revised: 17 Nov. 2015, Accepted: 18 Nov. 2015
Published online: 1 Mar. 2016

Abstract: Mobile terminals of third-party payment platform are developing so fast in China. At the end of September 2014, the transaction amount of mobile terminals third-party payment is about 1.43 trillion RMB (Iresearch report). And the number of the transaction amount is continuing increasing. In China, mobile terminals of third-party payment services become more and more important. But the mobile terminals related study is few in China. So, the authors would like to reveal the factors influencing mobile terminals of third-party payment platform development in China. Through the study of various literature and carrying out interviews with experts about mobile terminals of third-party payment plat for development, the authors collected 393 valid questionnaires from customers of mobile terminals third-party payment platform and then used Structural Equation Modeling to analyze the data, illustrate the relationships among perceived risk, quality of service, perceived ease of use, customer perceived cost and consumers intention and finally establish mobile terminal of third-party payment platform evaluation model. And model fit is accepted. The research findings would help third-party payment corporations advance platform development, and improve further studies in third-party payment area.

Keywords: Mobile terminal, third-party payment platform, SEM, China

1 Introduction

In recent years, the online shopping, traveling booking, subscription paying develop well in China, which improve the development of third-party payment. The third-party payment extends continually and it creates a rapid growth of industry scale. The high penetration rate of mobile phone and the development of mobile Internet promote the further development of mobile payment at the same time. More and more business implemented with the Internet electronic payment in the mobile terminal, like Alipay and WeChat wallet. And its payment method is simple and quick. Customers can use it anytime or anywhere. So the electronic payment market is from PC to mobile terminal such as mobile phone and ipad. According to the report of CNNIC (China Internet Network Information Center), at the end of June 2014, there are 632 million Internet users in China, which is larger than the end of 2013s 14.42 million. And 527 million customers use mobile phones to access the internet. The scale was larger than the traditional PC users. And according to the survey data, the use rate of all kinds of network application in China, as of 2014 June, the rate of using the network to pay online is 46.2% (292 million), which grows 12.3% compared to 2013 December. Mobile terminal payment is expected to become the future trend and hot of market.

In present study, most researches about the third-party payment platform focused on platform risk management, technical analysis and ease of use analysis. But these studies mainly involved the PC terminal of the third-party payment, but few scholars concerned the mobile terminal of the third-party payment. And the mobile terminal related researches are still lacking. Therefore, this paper adopted the method of questionnaire survey to research the target consumers who use the mobile terminal of the third-party payment; then use the Structured Equation Modeling (SEM) to find the major factor influencing people to adopt the mobile terminal of the third-party payment; finally, authors will base on research finding to present the third-party payment industry development strategies and suggestions.

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2 Literature review

2.1 The perceived risk

The concept of perceived risk initially extended from the psychology by Bauer [1]. He believes that it may not be able to know whether the expected result of the consumer buying behaviors are correct and some of the results may not be able to make themselves happy. Therefore, the purchasing decision of consumers may imply the uncertainty of the results. It is the initial concept of the risk. After that, many scholars put forward different definition of perceived risk, but most of scholars agree perceived risk is a multi-dimension concept. Feathermana and Pavlou [2] studied the consumers intention of using electronic services from the perspective of perceived risk. They divided the consumers perceived risk into time risk, financial risk, performance risk, privacy risks etc. With the progress of era, the development of information technology and the stronger function of the internet, the perceived risk has more to the more dimensions. Kong et al. [3] also points out the perceived risk can be studied from four dimensions in the presence of the third-party payment. They are privacy risk, physical risk, service risk, psychological risk. Online shopping has similar characteristics as well as third-party payment. So authors also studied some online shopping related articles. Liu and Wang [4] proposed that online shopping has operational risk, security risk, privacy risks and economic risks etc. It based on the empirical analysis of consumer patterns. On the basis of predecessors' research on perceived riskauthors are going to divided the factors that affect the perceived risk of the third-party payment platform through the mobile terminal into three dimensions which are privacy risk, operation risk and security risk.

2.2 Customer perceived cost

Customer perceived cost whose concept can be traced back earliest to the perception of value put forward by Monroe [5]. Monroe [5] argues that perceived value is all the cost for the customer in the time of purchase, it should include the purchase price, acquisition, transportation, installation, order processing, maintenance cost and risk of poor performance. However, his definition contains only monetary costs, and did not consider the other non-monetary cost factors. But some scholars focus on the non-monetary cost factors. Zeithaml [6] based on the concept of the monetary costs, and added to the time costs, search cost and psychological cost. Similarly, Kotler [7] proposed three types of non-monetary cost, including the time cost, the energy cost, and the psychological cost. Many Chinese scholars also proposed their own opinions about perceived cost. Yang Long [8] and Bai Lin et al. [9] have put forward the perceived costs which can be divided into monetary and non-monetary costs. Huang [10] combined the perceived cost with the internet products. He thought that the monetary cost refers to all of the money paid while the customers using online banking service to shop online; and the non-monetary cost include the amount of time and energy. Combining with the characteristics of mobile third-party payment platform, authors divide the perceived cost of mobile third-party payment platform into three dimensions, which are monetary cost, time cost and energy cost.

2.3 The quality of service

Gronroos [11] initially proposed the concept of customer perceived service quality. The initial concept is a result which compares discrepancy of the customers' service expectations and actual service performance. Parasuraman et al. [12] used a large amount of research data verifying the viewpoint, putting forward the similar definition [9]. In addition, many scholars conduct a series of studies on the importance of service quality. Zeithaml [13] had studied how the quality of service effect on retentively. Ruyter [14] made the further methods to determine the relationship between the perception of the service quality and loyalty. Many Chinese scholars have done research on the quality of service. Some of them believed the quality of service can impact customers loyalty, such as Bai and Liu [15]. So, its obvious that quality of service is essential for any industry. Gronroos [16] thought that the quality of service should include two aspects process quality and quality of results. Chang [17] proposed a new relationship from his research results. Network quality of service makes an influence on customer loyalty in a B2B (Business-to-business refers to a situation where one business makes a commercial transaction with another) environment. Given the commonality of mobile third-party payment platform and network, authors also divide the quality of service into three dimensions: service process quality, service quality of the results, and the quality of service recovery. The quality of service recovery would include compensation and feedback.

2.4 Perceived ease of use

In this paper, the understanding of the perceived ease of use based on Davis [18]. He points out that the perceived ease of use is the degree that customers don't need to work hard or go to efforts on a particular system. And Khosrow-Pour [19] more concisely defined perceived ease of use. He pointed out that the perceived ease of use is the physical and mental effort degree by using a particular system. Van der Heijden et al. [20] studied customers of online purchase intentions. And Fenget

al. [21] studied users intention of electronic logistics information system. Both of them believed that the perceived ease of use has a crucial impact on the customers selection. According to the handbook Software engineering product quality GB/T16260-2003 (ISO 9126-2001) [22], the perceived ease of use is divided into: comprehension, learn ability and the ease of use. Integrated the above scholars viewpoint, authors believe that the perceived ease of use refers to the easy degree when customers use the third-party payment by the mobile terminal. That is mean that the mobile terminal third-party payments ease of use consists of four parts. They are comprehension, learning, convenience and attracting users.

3 Material and methods

3.1 Research strategy

Consumers' intention is one of most important factors affecting the development of mobile terminals third-party payment platform. From the literature review, authors found that perceived risk, customer perceived cost, quality of service, perceived ease of use are significant issues that will influence consumers' intention to use mobile terminals third-party payment platform. So authors could use these four dimensions to measure consumers' intention. And there exists virtually little research examining customers' behavioral intention to adopt mobile terminals third-party payment platform by Structured Equation Modeling (SEM).

SEM is a statistical technique for testing and estimating causal relations through the use of combination of statistical data and qualitative assumptions. SEM has been widely used in health care, logistics, information management, banking, psychology, marketing and tourism management. SEM has become a preferred data analysis method for empirical research. Following the trend in empirical research, authors adopt SEM to analyze the first-hand data from survey.

3.2 Hypothesis

Taking into account the previous considerations, the relationship among perceived risk, customer perceived cost, quality of service, perceived ease of use and consumers intention are evident in personal data handling and should be examined in greater detail. With the aim of testing the connections in the mobile terminals third-party payment platform, the following hypotheses are proposed (Figure 1).

H1. There will be a positive relationship between perceived risk and consumers intention.
H2. There will be a positive relationship between customer perceived cost and consumers intention.
H3. There will be a positive relationship between quality of service and consumers intention.
H4. There will be a positive relationship between perceived ease of use and consumers intention.
H5. There will be a positive relationship between customer perceived cost and perceived risk.
H6. There will be a positive relationship between customer perceived cost and quality of service.
H7. There will be a positive relationship between quality of service and perceived ease of use.
H8. There will be a positive relationship between customer perceived cost and perceived ease of use.
H9. There will be a positive relationship between perceived risk and perceived ease of use.

3.3 Data collection

The design of the initial questionnaire was confirmed by experts in third-party payment platform industry and then practiced through in-depth discussions with customers of third-party payment platform. Pre-tests of the initial 23-item questionnaire were carried out with 30 customers of third-party payment platform to improve the questionnaire. The resulting modified 17-item pool was presented to customers of third-party payment platform in the survey. Respondents were asked about their attitude towards customers of third-party payment platform when answering the questionnaire. Non-random method of collecting the data (volunteer sampling) generated 393 valid questionnaires from customers of mobile terminals third-party payment platform, whose opinions could reflect about the use condition of mobile terminals third-party payment platform in China. The authors used one of the most famous questionnaires web sites Sojump (www.sojump.com) to collect questionnaires. Authors compared some of the results in the survey with available information about the population and found that they are quite similar. As a consequence, authors could conclude that the sample represents customers of mobile terminals third-party payment platform in China.

In this study, authors use the adapted question items as the instrument to measure the respective constructs below, using a 7-point Likert scale for each item (with 1=strongly agree, 2=agree, 3=slightly agree, 4=neutral, 5=slightly disagree, 6=disagree, and 7=strongly disagree).

4 Results and discussion

4.1 Exploratory Factor Analysis

An exploratory factor analysis using SPSS 17 (SPSS is a software package used for statistical analysis produced by SPSS Inc. 17 means No. 17 version) was conducted on all the data. The rotated factor matrix, resulting from an Promax rotated principal axis factor extraction of the

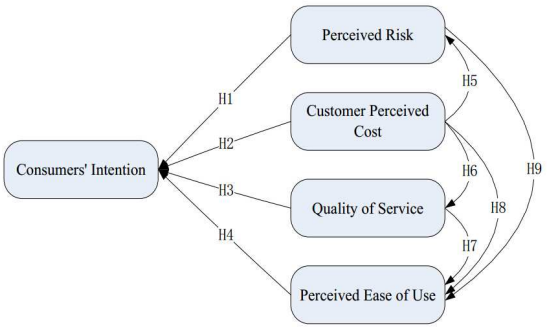

Fig. 1: The proposed model and hypotheses of consumer intention in third-party payment platform

Table 1: Summary of construct reliability, convergent validity and factor loadings

Factors	Factor loading	Cronbach alpha	Variance explained (%)	Construct Reliability (CR)	AVE
Consumer Intention		0.843	9.719	0.8466	0.6483
Continue (C)	0.728				
More frequent(MF)	0.933				
Recommendation (R)	0.884				
Perceived Risk		0.771	5.579	0.8558	0.6737
Privacy Risk(PR)	0.847				
Operation Risk(OR)	0.814				
Security Risk(SR)	0.816				
Customer Perceived Cost		0.804	8.675	0.8171	0.6109
Monetary Cost(MC)	0.905				
Time Cost(TC)	0.834				
Energy Cost(EC)	0.696				
Quality of Service		0.864	14.061	0.836	0.5627
Process quality(PQ)	0.663				
Results of Quality (RQ)	0.935				
Compensation(CO)	0.800				
Feedback(FB)	0.738				
Perceived Ease of Use		0.913	37.704	0.9058	0.7061
Comprehension (CP)	0.822				
Learning(L)	0.822				
Attracting users (AU)	0.917				
Convenience(CON)	0.916				

Used SPSS Principal Axis Factoring extraction with Equamax rotation method

independent variables using the 1.0 eigenvalue cut-off criterion (see table 1), which indicates that seventeen factors emerged and also reports their factor loadings. The data were tested through the use of the SPSS 17 Exploratory Factor Analysis to evaluate the Cronbach alpha. The Cronbach alpha indicator is the most frequently used test in assessing reliability. Some scholars consider that it underestimates reliability. Consequently, the use of composite reliability has been suggested [23], using a cut-off value of 0.7. The results show the value for consumers intentions Cronbach alpha is 0.843, the value for perceived risks Cronbach alpha is 0.771, the value for customer perceived costs Cronbach alpha is 0.804,the value for quality of services Cronbach alpha is 0.864, the value for perceived ease of uses Cronbach alpha is 0.913.These numbers are satisfactory (a cut-off value of 0.7). Each item was evaluated respectively to ensure convergent validity and item reliability. And all factor loadings were larger than 0.5, representing an acceptable significant level of internal validity.

The factor loadings ranged from 0.728 to 0.933 for consumers intention, from 0.814 to 0.847 for perceived risk, from 0.696 to 0.905 for customer perceived cost, from 0.663 to 0.935 for customer perceived cost and from 0.822 to 0.917 for perceived ease of use. All factor loadings were of acceptable significant, all seventeen items were retained for further analysis (see table 1).

4.2 Confirmatory Factor Analysis

Authors developed Structural Equations Modeling (SEM), in which the objective of test is the proposed hypotheses (Figure 2). According to the research result, authors observed that the hypothesis was supported at the 0.05 level. Model fit was acceptable (Chi-square =308.624, df = 100, p ¡0.05, normed Chi-Square = 3.086) From calculation, the author obtained SEM model fit indexes, and listed the processes in the following paragraphs.

The GFI (Goodness of Fit Index) was devised by [24] Jöreskog and Sörbom (1984) for MI and UI is estimation, and generalized to other estimation criteria by [25] Tanaka and Huba (1985). The GFI is given by

$$\mathrm{GFI} = 1 - \frac{\hat{F}}{\hat{F}_b} \tag{1}$$

Where $\hat{F}$ is the minimum value of the discrepancy function and $\hat{F}_b$ is obtained by evaluating F with $\sum^{(g)} = 0, g = 1,2,\cdots,G$. An exception has to be made for maximum likelihood estimation, since (D2) is not defined for $\sum^{(g)} = 0$. For the purpose of computing GFI in the case of maximum likelihood estimation, $f(\sum^{(g)}, S^{(g)})$ is calculated as:

$$f\left(\sum^{(g)}, S^{(g)}\right) = \frac{1}{2}\mathrm{tr}\left[K^{(g)^{(-1)}}(S^{(g)} - \sum^{(g)})\right]^2 \tag{2}$$

with $K^{(g)} = \sum^{(g)}(\hat{\gamma}_{\mathrm{ML}})$, where γ_{ML} is the maximum likelihood estimate of γ. By using the formula (1) and (2), the author calculated the Model's GFI as 0.913. The AGFI (Adjusted Goodness of Fit Index) takes into account the degrees of freedom available for testing the model. It is given by

$$\mathrm{AGFI} = 1 - (1 - \mathrm{GFI})\frac{d_b}{d} \tag{3}$$

Where

$$d_b = \sum_{g=1}^{G} p^{*(g)} \tag{4}$$

Through the use of the formula (3) and (4), the author concluded that the model's AGFI value is 0.867.

The Bentler-Bonett normed [26] (Bentler and Bonett, 1980) fit index (NFI), or Δ_1 in the notation of [27] Bollen (1989) can be written as

$$\mathrm{NFI} = \Delta_1 = 1 - \frac{\hat{C}}{\hat{C}_b} = 1 - \frac{\hat{F}}{\hat{F}_b} \tag{5}$$

Where $\hat{C} = n\hat{F}$ is the minimum discrepancy of the model being evaluated and $\hat{C}_b = n\hat{F}_b$ is the minimum discrepancy of the baseline model. By using the formula (5), the author calculated the Model's NFI as 0.921.

The comparative fit index [28](CFI; Bentler, 1990) is given by

$$\mathrm{CFI} = 1 - \frac{\max(\hat{C} - d, 0)}{\max(\hat{C}_b - d_b, 0)} = 1 - \frac{\mathrm{NCP}}{\mathrm{NCP}_b} \tag{6}$$

Where $\hat{C}$, d and NCP are the discrepancy, the degrees of freedom and the noncentrality parameter estimate for the model being evaluated, and $\hat{C}_b d_b$ and NCP_b are the discrepancy, the degrees of freedom and the noncentrality parameter estimate for the baseline model. Through the use of formula (6), the author calculated that the Model of the study's CFI is 0.913.

F_0 incorporates no penalty for model complexity and will tend to favor models with many parameters. In comparing two nested models, will never favor the simpler model.Steiger and Lind(1980) [29] suggested compensating for the effect of model complexity by dividing F_0 by the number of degrees of freedom for testing the model. Taking the square root of the resulting ratio gives the population "root mean square error of approximation", called RMS by Steiger and Lind (1980) [29], and RMSEA by Browne and Cudeck (1993) [30].

$$\text{Population RMSEA} = \sqrt{\frac{\mathrm{F}_0}{d}} \tag{7}$$

$$\text{Estimated RMSEA} = \sqrt{\frac{\hat{\mathrm{F}}_0}{d}} \tag{8}$$

The results show that the RMSEA index is 0.073.

Overall, our model exhibited a reasonable fit with the data collected. We assessed the model fit using other common fit indices, such as the Goodness-of-Fit Index (GFI), Adjusted Goodness-of-Fit Index (AGFI), Normed Fit Index (NFI), Comparative Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA). The model exhibited a fit value exceeding or close to the commonly recommended threshold for the respective indices, the commonly suggested in Table 2.

Table 2: Overall model fit indices of the research model

Fit statistic	Suggested	Obtained
Chi-square		308.624
df		100
Chi-square significance	$P \leq 0.05$	0.000
Chi-square/df	< 5	3.086
GFI	> 0.90	0.913
AGFI	> 0.80	0.867
NFI	> 0.90	0.921
CFI	> 0.90	0.913
RMSEA	< 0.08	0.073

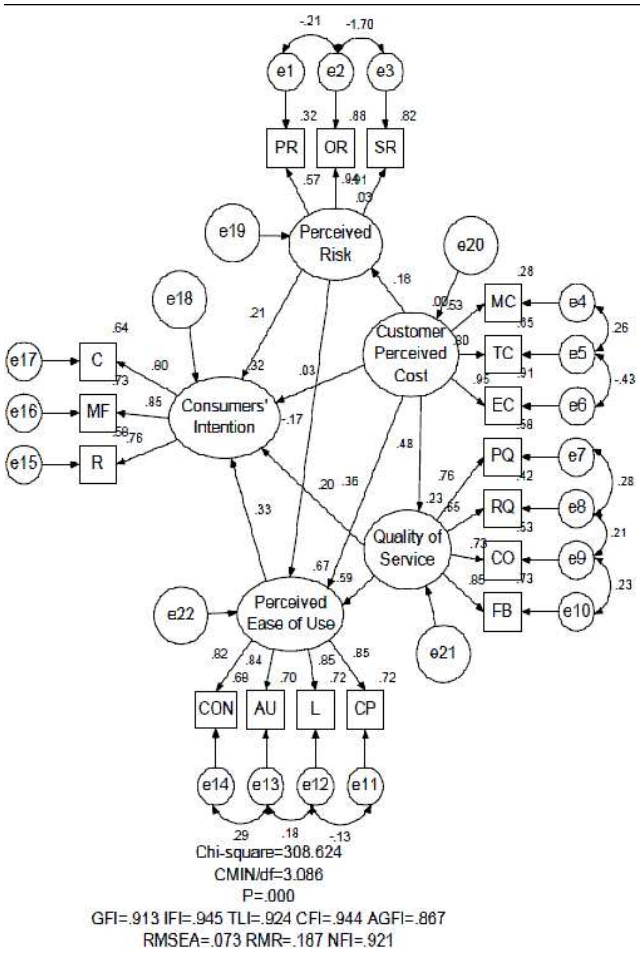

Fig. 2: Structural Equation resultsłconsumer intention model in third-party payment platform

4.3 Construct Reliability Analysis

The construct reliability means that a set of latent indicators of constructs are consistent in their measurement [28]. If the construct reliability is higher than 0.7, the quality of the structural Equations model is considered acceptable [29]. The authors will use the model standardized regression weights to calculate the construct reliability, presented as ρ_c. Perceived risk, customer perceived cost, quality of service, perceived ease of use and consumers intention were calculated at a suggested lower limit of 0.70 with Equation (9). The results have been shown in the Table 1.

$$\rho_{c1} = [\frac{(\sum \lambda_1)^2}{(\sum \lambda_1)^2 + \sum \theta_1}] \quad (9)$$

Another index, similar to construct reliability, is Average Variance Extracted (AVE), presented as ρ_v. This index can explain how much variance explained in the latent variable comes from the observed variables. The higher the average variance extracted, the better the observed variables could explain the latent variable. Generally speaking, the models quality is considered good when the average variance extracted is higher than 0.5 [31]. The average variance extracted from Perceived risk, customer perceived cost, quality of service, perceived ease of use and consumers intention were calculated at a suggested lower limit of 0.50 with Equation (10). The results have been shown in the Table 2.

$$\rho_{v1} = [\frac{(\sum \lambda_1^2)}{(\sum \lambda_1^2) + \sum \theta_1}] \quad (10)$$

4.4 Results of hypothesis testing

After establishing an acceptable measurement model, we evaluated the structural model shown in a path diagram in Figure 2. There Path coefficients and their significance values are reported in Table 3. The results of the SEM analysis show that H1, H3, H4, H5, H6, H7, H8 and H9 were supported (These Hypothesiss path coefficients are less than 0.05). To test the statistical significance of the

Table 3: Path coefficients and their significance values

Path	Hypothesis	Standardized coefficients	S.E.	C.R.	P
Consumer Intention ← Perceived Risk	H1	0.284	0.076	3.751	***
Consumer Intention ← Customer Perceived Cost	H2	0.036	0.088	0.406	0.685
Consumer Intention ← Quality of Service	H3	0.201	0.095	2.117	0.034*
Consumer Intention ← Perceived Ease of Use	H4	0.288	0.095	3.028	0.002**
Perceived Risk ← Customer Perceived Cost	H5	0.17	0.061	2.767	0.006**
Quality of Service ← Customer Perceived Cost	H6	0.613	0.09	6.84	***
Perceived Ease of Use ← Quality of Service	H7	0.672	0.07	9.571	***
Perceived Ease of Use ← Customer Perceived Cost	H8	0.528	0.085	6.214	***
Perceived Ease of Use ← Perceived Risk	H9	-0.258	0.064	4.064	***

*Significance at $p < 0.05$ level.
**Significance at $p < 0.01$ level.
***Significance at $p < 0.0001$ level.

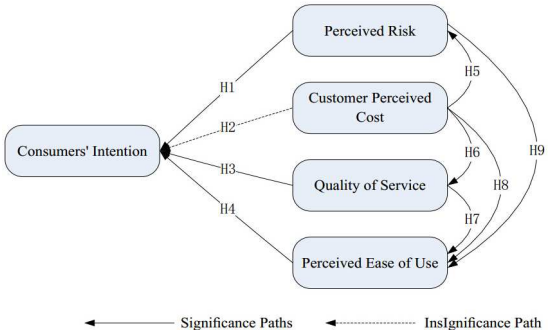

Fig. 3: Structural Equation results model

parameter estimates from SEM, the test statistic is the Critical Value (C.R.), which represents the parameter estimate divided by its Standard Error (S.E.). Based on a significance level of 0.05, the C.R. needs to be $> \pm 1.96$; based on a significance level of 0.01, the C.R. needs to be $> \pm 2.576$ [32]. These significance values between consumer intention and perceived risk, between quality of service and customer perceived cost, between perceived ease of use and quality of service, between perceived ease of use and customer perceived cost, between perceived ease of use and perceived risk (Table 3) were significant at level of 0.001. These significance values between consumer intention and perceived ease of use, between perceived risk and customer perceived cost (Table 3) were significant at level of 0.01. These significance values between consumer intention and quality of service (Table 3) were significant at level of 0.05. The result shows that perceived risk, quality of service, perceived ease of use can affect consumers intention in mobile third-party payment behavior. The factor perceived ease of use has the largest influence in these factors (0.33). The second most important one is perceived risk (0.21) and the last one is quality of service (0.20). Customer perceived cost does not have direct effect to consumers intention, but it can affect perceived risk (0.18), quality of service (0.48), perceived ease of use (0.36). The results of hypothesis testing express that the perceived ease of use about mobile third-party payment platform has the highest influence compared with perceived risk and quality of service for consumers to adopt mobile third-party payment. And Customer perceived cost get through the indirect effect was established between customer perceived cost and consumers intention in mobile third-party payment behavior (Figure 3).

5 Conclusion

With Chinas popularity of mobile terminal, improving mobile terminals of third-party payment platform has become a trend for the development of the industry. In the research result, authors get some significant findings, and give some suggestions in the paper as follows:

In order to seize the rapid developing mobile terminal market, operators of the third-party payment platform should use some security methods to focus on reducing their perceived risk and protect customers private information included the trade messages. It can increase consumers trust, and increase the transaction amount of third-party payment platform.

Improving customer ease of use can attract more customers to use platform. But improving the ease of use and improving perceived risk are conflict. When the operators improve the ease of use for third-party payment platform, more customers will feel more convenience. But some customers will feel more risky, like quick payment. So the operators are improving the platform's ease of use, at the same time they also should pay attention to network security of third-party payment platform. The platforms can use some techniques to improve the platform's ease of use and network security, like Fingerprint identification.

In China, there are 256 operators of the third-party payment. Competition is fierce in third-party payment market. Most consumers pay attention to customer service. So operators of the third-party payment platform should increase service qualitys investment; increase customers satisfaction; meet the reasonable needs of users. It will be good for the companies development.

From the researchs results, authors could know most customers do not care about perceived cost, because perceived cost factor has no significant effect to customers intention. But perceived cost can affect the perceived risk, service quality and ease of use. From the indirect impact, perceived cost also can affect the users intention. So, Operators of the third-party payment platform should decrease perceived cost, it will increase customers satisfaction.

The research results of this paper provide evaluation model for the third-party payment operators in the circumstance of the popularization and rapid prosperity of its third-party payment field. It could guide these operators to improve the third-party payment platform. In the future, authors plan to cover more representative samples to investigate. Moreover, more factors which influence consumers intention to use the third-party payment by mobile terminal will be considered. And more methods would be used to analyze the consumers paid behavior by mobile terminal.

Acknowledgement

The authors would like to express our deepest appreciation to all the individuals who have helped us in the completion of the study. The project was sponsored by National Natural Science Foundation of China (ID: 71273277); Beijing Social Science Foundation (ID: 14JGC121); Beijing Outstanding Talent foundation (ID: 2013D009051000001); A grant from the Humanities and Social Sciences Youth Foundation of the Ministry of Education (No. 10YJC630363); and Science Foundation of China University of Petroleum (Beijing) (No. 2462014YJRC051).

Conflicts of Interest

The authors declare no conflict of interest.

References

[1] R. A. Bauer, Consumer Behavior as Risk-taking. Dynamic Marketing for a Changing World, Chicago: American Marketing Association **1**, 389-393 (1960).
[2] M. S. Featherman and P .A. Pavlou, Predicting e-services adoption: a perceived risk facets perspective. International Journal of Human-Computer Studies **59**, 451-474 (2010).
[3] W. C. Kong, S. F. Chen, and X. Y. Qi, Study on perceived risk in the process of the third-party payment–An Empirical Analysis based on the consumer to consumer model. Zhejiang Academic Journal **04**, 174-179 (2011)(In Chinese).
[4] X. Liu and M. A. Wang, Study on the Perceived Risk Dimensions in Online Shopping Advances in Artificial Intelligence vol. 4Proceedings of 2011 International Conference on Management Science and Engineering (MSE 2011) 2011:5 (In Chinese).
[5] K. B. Monroe, Pricing-Marketing Profitable Decisions, New York, McGraw Hill, 1991.
[6] V. A. Zeithaml, Customer Perceptions of Price, Quality, and Value: A Means-end Model and Synthesis of Evidence,Journal of Marketing **53**, 2-22 (1988).
[7] P. Kotler, Marketing Management: Analysis Planning Implementation, and Control Ninth Edition, Prentice-Hall International, 1999.
[8] L. Yang and Y. G. Wang, Analysis of customer value and its driving factors, Management World **06**, 146-147 (2002).
[9] L. Bai and X. Chen, New progress in the study on driving factors of customer perceived value, Foreign Economies & Management **28**, 39-45 (2006).
[10] L. Q. Huang, Analysis of composition factors of personal internet banking customer perceived value, Modern Communication **09**, 73-75 (2009).
[11] C. A. Gronroos, Service Quality Model and Its Marketing Implications. European Journal of Marketing **18**, 36-44 (1984).
[12] A. Parasuraman, V. Zeithaml, L. Berry, SERVQUAL:A Multipleitem Scale for Measuring Consumer Perceptions of Service Quality. Journal of Retailing **64**, 12-40 (1988).
[13] V. A. Zeithaml and L. L. Berry, Parasuraman, A.The Behavioral Consequences of Service Quality. Journal of Marketing **60**, 31-46 (1996).
[14] K. Ruyter, M. Wetzels, J. Bloemer, On the Relationship between Perceived Service Quality, Service Loyalty and Switching Costs. International Journal of Service Industry Management **9**, 436-453 (1998).
[15] C. Bai, and C. Liu, Customer Loyalty and Its Determinants for Service Firms[J]. Nankai Business Review **6**,64-69 (2002)(In Chinese).
[16] C. Gronroos, Service management and marketing - based on Customer Relationship Management strategy (Second Edition), Beijing: Publishing House of Electronics Industry, 2002.
[17] Y. Chang, Y. Liu, J. Yan, J. Zhang, Influence mechanism of web service quality on customer loyalty inB2C environment.Systems Engineering-Theory &Praetie **06**, 94-106 (2009) (in Chinese).
[18] F. D. Davis, Peceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Quarterly **13**, 319-340 (1989).

[19] M. Khosrow-Pour, Advanced Topics in Information Resources Management, Beijing: Science Press, 2005.
[20] H. Van der Heijden, T. Verhagen, M. Creemers, Understanding online purchase intentions: contributions from technology and trust perspectives. European Journal of Information Systems **12**, 41-48 (2003).
[21] C. T. Feng, S. C. Chang, C. M. Chou, An extension of trust and TAM model with IDT in the adoption of the electronic logistics information system in HIS in the medical industry. International journal of medical informatics **77**, 324-335 (2008) .
[22] GB/T16260-2003(ISO 9126-2001), Software engineering product quality.
[23] K. G. Jooreskog, Simultaneous factor analysis in several populations. Psychometrika **36**, 409-426 (1971).
[24] K. G. Jöoreskog and D. Sörbom, LISREL-VI user's guide (3rd ed.). Mooresville, IN: Scientific Software, 1984.
[25] J. S. Tanaka and G. J. Huba, A fit index for covariance structure models under arbitrary GLS estimation. British Journal of Mathematical and Statistical Psychology **38**, 197-201 (1985).
[26] P. M.Bentler and D. G. Bonett, Significance tests and goodness of fit in the analysis of covariance structures. Psychological Bulletin **88**, 588-606 (1980).
[27] K. A. Bollen, A new incremental fit index for general structural Equation models. Sociological Methods and Research **17**, 303-316 (1989).
[28] P. M. Bentler, Comparative fit indexes in structural models. Psychological Bulletin **107**, 238-246 (1990).
[29] J. H. Steiger and J. C. Lind, Statistically-based tests for the number of common factors. Paper presented at the Annual Spring Meeting of the Psychometric Society Iowa City, 1980.
[30] M. W. Browne and R. Cudeck, Alternative ways of assessing model fit. Testing structural Equation models, Newbury Park, California, 1993.
[31] R. B. Kline, Principles and practice of structural Equation modeling, New York: The Guilford Press, 1998.
[32] T. C. E Cheng, D. Y. C. Lam, A. C. L. Yeung, Adoption of internet banking: An empirical study in Hong Kong, Decision Support Systems **42**, 1558 -1572 (2006).

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