Exploring the Users Behavior Intention on Mobile Payment by Using TAM and IRT

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ABSTRACT

The purpose of this study is to explore the willingness of consumers on using mobile payments through the Innovation Resistance Theory (IRT) and Technology Acceptance Model (TAM). The research subjects weretheTaiwan mobile payment users, distribute surveys by using purposive sampling method from online. A total of 430 surveys were issued, 363 valid surveys were collected and achieving84.41% effective response rate. Collected data were analyzed through the confirmatory factor analysis, structure equation model and descriptive statistics. The results of this study are as follows: The model of user's behavior intention on mobile payment by using TAM and IRT has good compatibility; Innovation Resistance has a significant negative impact on perceptual usefulness and perceived ease of use; Perceptual usefulness and perceived ease of use has a positive impact on the behavior intention; Perceptual barriers can effectively influence innovation resistance. This study found that the. mobile payment users are negatively impacted on Innovation Resistance. The TAM is positively affecting the subsequent behavior intention,it can establish a brand image and increase consumer confidence in mobile payments.

CCS Concepts

• **Applied computing**→**Consumer products.**

Keywords

1. INTRODUCTION

In recent years, mobile payments have significant impacts on the technology industry, service industry, retail industry and financial sectors. Because it brought huge transaction amounts, economic benefits, and a big data to understand the trend of the future market. Mobile payment transactions in the service industry are expected to reach $3.4 billion by year 2022[1]. Apple, Samsung and Google respectively entered to Taiwan in 2017 which drive reform the mobile payment of Taiwan[2].With the advancement of science and technology, and changes in lifestyles, people are constantly trying and changing the different consumption patterns. Mobile payment, a new payment mode, which can make our lives without any cash, checks or credit cards. [3].

TAM, a model widely used in personal prediction and interpretation of information systems [4]. It thinks that the behavior intention in using new technology will significantly influence the "Perceived Ease of Use" and "Perceived Usefulness" of user's[5].Therefore, this study uses the TAM to understand the affecting factors of mobile payment.

Mobile payment can be described as an innovation model in this era. However, the emergence of new things will appear with the running of the social phenomenon. [6]. argues that the emergence of innovation resistance mainly comes from personal behavior habits and perceived risks brought about by innovation. Sensitive information such as devices that are easily lost or stolen has always received the attention of consumers [7]. Mobile payments can be made through mobile devices at any time and from any location in a fast, convenient, secure and simple way [8]. [9] deem that the innovation resistance can be divided into "Functional Barriers" and "Psychological Barriers". Functional barriers can be

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referring as a degree of consumer on dissatisfaction with innovative products or services and psychological barriers is referring to the inner thoughts of consumers, consumers may have psychological barriers to innovation and refuse to use innovation. Mobile payment as a product of information technology and can bring more convenience to people's lives, but consumers' attitudes toward using mobile payment and willingness to use are worthy of us to explore.

Mobile payment has gradually become an emerging trend, but the results of promoting mobile payment in Taiwan is not as effective as expected. Therefore, this study will incorporate IRT and TAM to explore the behavioral model of mobile payment.

2. RESEARCH METHOD AND PROCEDURE

2.1 Research Subjects
The participants in this study were the mobile payment users in Taiwan. The questionnaire for this study were distributed through the network from March 15, 2018 to May 5, 2018. A total of 430 surveys were issued, 363 valid surveys were collected and achieving 84.41% effective response rate.

2.2 Research Method
After referring to the relevant literature, this study using questionnaire survey adapted into "behavior intention of mobile payment" and each issue was measured by using the Likert Seven-Point Scale. Perceptual usefulness scale is based on the measurement of [10], factor load is between .73 ~ .82, CR value is .85, and AVE value is .60. The perceptual ease of use scale was measured by [10] and [11], factor load is between .52 ~ .86, CR value is .81, and AVE value is.52. The willingness to use scale is based on the measure of [10] and[11], the factor load is between .61 ~ .90, CR value is .89, and AVE value is .66.

The usage barrierscale is based on the measurement of[9], factor load is between .61 ~ .86, CR value is .86, and AVE value is .66. The value barrier scale is based on the measurement of [9], factor load is between .50 ~ .81, CR value is .90, and the AVE value is .70. The risk barrier scale is based on the measurementof[4], factor load is between .70 ~ .93, CR value is .71, and AVE value is .55. The tradition barrier scale is based on the measurement of[9], factor load is between .68 ~ .83, CR value is .86, and AVE value is .69. The image barrier scale is based on the measurement of [9], factor load is between .52 ~ .79, CR value is .80, and the AVE value is .58.The information barrier scale is based on the measurement of[9] and [12], factor load is between .58 ~ .74, CR value is .76, and the AVE value is .51.

According to [13], the compositional reliability (CR) must be above 0.7, and according to [14], the standard value of AVE must be greater than 0.5.All of the values barrier after analysis of this scale reached the standard, the overall scale of the research mobile payment has good reliability and validity. In terms of the overall model, RMR=.07, RMSEA=.06, GFI=.81, NFI=.82, IFI=.80, TLI/NNFI=.89, CFI=.89, PNFI =.80, CN=150, χ2/df=2.10. The overall behavioral pattern of this study is generally well-adapted, indicating that this model can be accepted, the relationship and influence between the various facets can be further discussed.

3. RESULTS AND DISCUSSIONS

3.1 Subject Data Analysis
The study subject features are as follows: women (54.4%); the age group was between 21-30 years old (33.1%), the majority as students (36.6%), the average monthly income below 10,000 NTD (30.0%), the number of mobile payment in the past month less than one (51.9%), the mobile payment system used has been used by Line Pay (42.3%), and the most commonly used mobile payment is other (34.8%).

3.2 Confirmatory Factor Analysis of the Mobile Payment User Behavior Model

3.2.1 Normality Test Result
The observation data of the structural equation model must conform to the multivariate normal distribution. Therefore, this study uses the average number, standard deviation, Skewness and Kurtosis of descriptive statistical analysis to test the obtained data. According to [15], the Skewness criterion for each variable needs to be less than 2 and the kurtosis should not be greater than 7. The analysis results show that the average number of the observed variables in this study is between 2.27 ~ 4.47, the standard deviation is between 0.87 ~ 1.37, the skew value is between -1.46~1.00, and the kurtosis value is between -0.04 ~ 3.97. The data are in compliance with the normality test standards.

3.2.2 Discriminant Validity Result
This study mainly uses the confidence interval method to test the difference validity of the overall behavior pattern. Before performing the discriminant validity test, the correlation analysis between each variable is presented, and the Pearson product difference correlation is analyzed, and then the overall behavior mode difference validity test is performed. According to the correlation analysis results of the action payment variables, each variable is significantly correlated, and the Pearson correlation coefficient value is between -39 ~ .81, indicating that there is a positive correlation between the variables. According to [16], if the confidence interval test is used, the confidence interval does not contain 1, that is, there is no correlation at all, indicating that the facets have discriminant validity. In this study, the bootstrap method was used to estimate the number of times (2000 times), the confidence level was below 95%, and the estimation method was used to measure the error correction method and the percentile method. The correlation coefficient between the variables of this study is examined. The upper bounds of the confidence interval method are between -0.54~74, and the lower bounds are between -0.24~.86, which do not contain 1, indicating that there is no completeness between the behavioral modes. Relevant, so each variable has a different validity.

3.3 Mobile Payment Behavior Pattern
In the normality test result, the sample data collect that the sample data conformed to the single variability normal state, but the c.r. value of multivariate kurtosis was 225.55, which failed to meet the multivariate normal distribution. In order to correct the chi-square value 2 which may cause excessive expansion due to the non-multiple normal state. This study was modified using the [17] Bootstrap method. The overall model fit analysis, allvalues have reached the standard, GFI=.91, AGFI=.89, RMSEA=.01, SRMR =.74, NFI =.91, RFI=.91, CFI=.99, CN=283 and χ2/df =2.20, indicating that the overall model fit well and then continue the discussion.
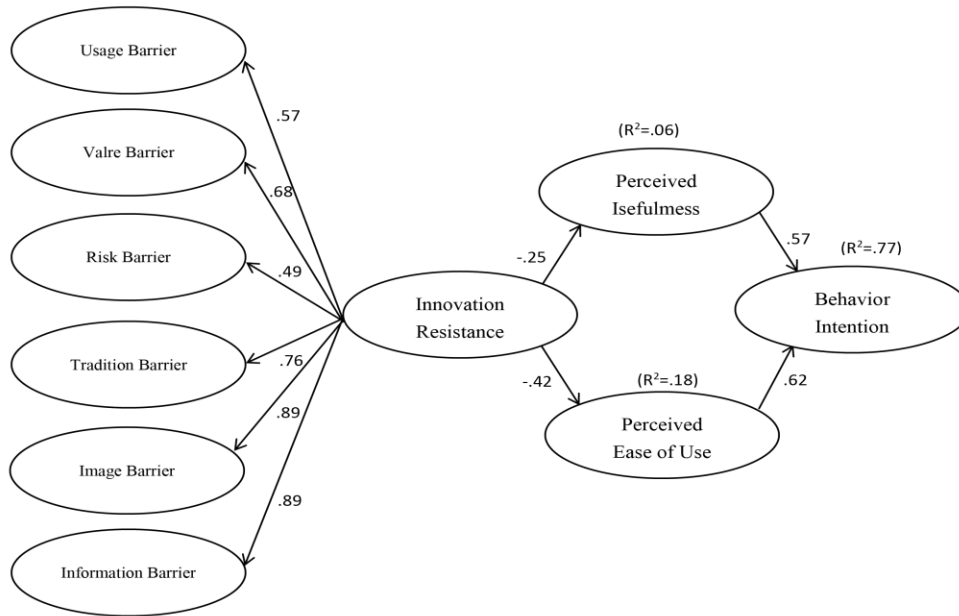
Figure 1. Path coefficient of the mobile payment user behavior pattern.

Through the Figure 1, it is known that the perceptual usefulness and perceptual ease of use have a positive influence on the willingness to use in the technology acceptance mode, and the influence coefficient of perceptual ease of use on the willingness to use (. 62) Larger, followed by the influence coefficient of perceptual usefulness on the willingness to use (.56), indicating that the user agrees with the use and operation of the action payment, and believes that the system can effectively complete the payment action quickly and make it in the store. It is more convenient and can check the transaction related records.According to [18], it is pointed out that due to the complexity of the design of new technology products, users spend less information on the information technology they have learned. They also have a positive feeling about IT and the usefulness of their products. And ease of use is the biggest reason for affecting the willingness to use [19]. According to the above results, if the consumer is considered to be simple and easy to learn for the mobile payment, it will have a positive and acceptable attitude towards the use of mobile payment.

Innovative resistance has a significant negative impact on perceived usefulness and perceived ease of use. The influence coefficient of innovation resistance on perceived ease of use (-.42) is large, while the influence coefficient of usefulness is (-.25). Low means that the user thinks that the action payment operation interface is clear and easy to operate, and it is quite easy to learn to use the action payment, so the innovation resistance has a significant negative impact on the perceived ease of use.According to the DataYogurt survey of the Industrial Bureau of the Ministry of Economic Affairs [20], it is also pointed out that issues related to security, such as piracy or personal escaping, are one of the reasons why people who have not used action payments are worried. Service providers need to gain the trust of the people. The establishment of supporting measures and protection mechanisms can reverse the insecurities of the public for digital transactions.According to [12], there are also major reasons for the negative information about using mobile payments, the new payment system security concerns or the excessive media reports, and the innovation resistance has a greater impact on perceived

ease of use. It can be seen that the user believes that the perceptual ease of use is simple and clear, and can effectively complete the most influencing factors of payment, and one of the demands of the mobile payment innovation is convenience, that is, easy to operate and use.

Perceptual barriers have a positive impact on innovation resistance, image barriers and information barrier (.89) being the largest, followed by traditional barrier (.76), value barrier (.69), and barrier to use (.57). The risk barrier (.49) is the lowest, with the image barrier and the information barrier in the innovation barrier being the biggest. According to [12], the information barrier indicates that when information continues to innovate, consumers need to collect and learn more new knowledge. When the ability accept to new messages exceeds the load of the individual, it will create obstacles. [9] Image will influence consumers to accept innovation. If innovative products have a negative impression before contact, they will delay the use or even refuse to use.If innovative products need to spend, the cost will higher than other products with similar services.But, consumers will choose services that are relatively cheaper or more familiar, and the resistance of traditional obstacles will become more and more obvious [21], Therefore, it can be seen that the consumer has a special experience in the payment failure of the mobile payment device in the past and the need to take the mobile phone or the overall development is not perfect, which may lead to a decline in the willingness to use.

4. CONCLUSION
4.1 Perceptual Usefulness and Perceived Ease of Use Have an Impact on Usage Intentions
In this study, perceptual usefulness and perceived ease of use have a significant positive impact on the willingness to use. Therefore, this study believes that when users use mobile payment services, they realize that the system can greatly reduce the time of payment and have other additional functions, which is one of the key factors that will allow users to use the action again.

4.2 The Effect of Innovation Resistance on Perceived Usefulness and Perceived Ease of Use

In this study, the innovation resistance has a significant negative impact on perceived usefulness and perceived ease of use. It showing that the higher the barriers to user perception of mobile payment, the lower the usefulness and ease of cognitive on mobile payment,buthigher impact on ease of use. This study believes that when users have difficulty using the innovative device, will affect their perception on mobile payment, and define it as not easy to use, not easy to learn, cannot be completed successfully payment cognitive.

4.3 The Impact of Perceptual Barriers on Innovation Resistance

The study found that users of mobile payment have a significant positive impact on the innovation resistance in the various barriers of perceptual barriers, but the image barriers and information barriers have the greatest impact. This study believes that users have too many reports on the mobile payment, and they feel confused and unable to get relevant offers instantly.

5. RECOMMENDATIONS

According to the results of this study, the obstacles mentioned will occurrence of resistance to mobile payment, with information barriers and image barriers being the largest, followed by traditional barriers, value barriers and the lowest risk barriers.

5.1 Set Up A Simple and Clear Interface

The perceptual usefulness and perceived ease of use proposed by the TAM have a significant positive effect on the behavioral intention in the mobile payment. This also means that the user's willingness to use, and it is also affected by whether the payment system is easy to use. Also found that the situation of mobile payment development has indeed emerged as a situation of innovation resistance. Users are confronted with these new technologies, a kind of resistance, cognitive value difference, risk uncertainty, and use. Factors such as obstacles may affect users' doubts about whether the payment is easy to use and easy to use. However, as long as the operation interface is clear, consumers are still willing to maintain a high degree of willingness to use.

5.2 Diversified Payment

When the user use mobile payment, the users realizes that the system can greatly reduce time of payment and has other additional functions (for example, auditing, consumption classification), which is why the user will use it again. The technology is designed to simplify and simpler operation, such as simplifying the operation of the payment process, or more intuitive design (for example, the payment function can be activated near the card reader), and the card is operated by the store staff. The machine, rather than being enabled by the consumer itself, can reduce the user's operation and increase the willingness to use it for consumers who are not familiar with the payment function.

5.3 Establish Brand Image and Establish Word of Mouth

Some of the image barriers, traditional barriers and information barriers have more impact in the innovation resist. If the image barriers can reduce the negative impact of consumers on the use of mobile payments, they can build a brand image through advertising and enhance consumer mobile pay confidence;

In the traditional resist, it can be more collocation with marketing activities, allowing consumers to try more ways to use the mobile payment, so that consumers is really improve convenience, and then achieve the habit of using: In the information barrier, the current payment due to Taiwan is too much, causing consumers to choose the above difficulties, not accustomed to using mobile payment, but launched a variety of mobile payments, and each mobile payment process is different, resulting in the use of psychology The obstacles, according to another information barrier in this study, are too much media-related reports, and are too broad, so that consumers are resistant to mobile payments, and if relevant reports can make more detailed information about the mobile payment information. , improve the use of mobile payment usage.

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