The Relationship between Barriers to Use and Resistance Behavior of Mobile Payment Systems

Natakon Sudpipat[1]
Assoc. Prof. Dr Sureerut Inmor[1*]
Information System Department[1]
Rajamangala University of Technology
Thanyaburi
Thailand
natakon_s@rmutt.ac.th,
sureerut_i@rmutt.ac.th* (Corresponding Author)

Abstract— Research on the Influence of Technological Knowledge as an Intermediate Between Obstacles to Use and Resistance Behavior of Mobile Payment Systems, conducted a survey with the population of small and medium enterprises. A sample population of 400 enterprises, calculated from the Cochran formula. Questionnaires were used to collect basic data from October 2020 to September 2021. The questionnaire was try out with the 30 sample using Cronbach's Alpha coefficient method and got a confidence value of 0.91. The statistics used for data analysis were descriptive statistics and multiple linear regression analysis. It was found that the barriers to use factor was positively correlated with the opinions against mobile payments. There was a positive correlation with anti-mobile payment at low level. What was interesting was that overall usability barriers inevitably affect anti-payment resistant behavior.

Keywords— Barriers, Mobile Payment, Innovation Resistance, consumer resistance

I. INTRODUCTION

Payment using a smartphone has been used and accepted in many countries around the world both in the Americas and in Canada with Near Field Communication (NFC) technology [1]. The service is subject to country regulations. It is a joint transaction between mobile operators and financial institutions. Payment network software application ends at debiting deposits from financial institutions which various organizations. Related parties will be involved in the investment decision for the development of the system for the users.

Mobile payment is a financial technology that plays an important role in the growth of electronic businesses. Whether it's selling via the website (E-Commerce), selling via smart phones (M-Commerce) or selling via social networks (S-Commerce). The entrepreneurs want to gain confidence that they will receive money for the product for sure. The consumers also want to be confident that they will receive the products as they are ordered. Payment via smartphone is a very popular payment method all over the world due to the ease of use as well as the ability to keep the payment transaction evidence. However, despite its many advantages and benefits, this method of payment still faces problems related to its not being accepted and used by some consumers. This is a major problem with retail businesses as customers do not accept payments with this method and still accept payments in cash. In the matter of selling products online, there is still a need for a system to collect money on delivery.

This research will examine the factors affecting consumers' opt-out of using mobile payment systems. By using the Innovation Resistance Theory (IRT) to find a suitable way to encourage consumer acceptance and use of the system. This will enable e-business to drive towards a cashless society and make data processing items more efficient. It will benefit both consumers and entrepreneurs as well.

II. LITERATURE REVIEW

Thailand 4.0 was born from the idea of reforming the economic structure towards an innovation-driven economy (Value-Based Economy), which has transformed the system in 4 key elements: traditional agriculture to modern agriculture, traditional small business to high potential business, traditional services to high-value services, and low-skilled workers to high-skilled workers, and five technology groups and target industries were divided. which consists of: [2][3]

1. Food, Agriculture and Biotechnology Group (Food, Agriculture & Bio-Tech), with an emphasis on Agricultural Technology (Agritech) and Food Technology (Foodtech).

2. Public Health, Health and Medical Technology (Health, Wellness & Bio-Med) groups focusing on health technology (Healthtech), medical technology (Meditech), and spa.

3. Smart Devices, Robotics & Mechatronics, focusing on robot technology (Robotech).

4. Digital group and Internet technology that connects and controls various devices. Artificial Intelligence

and Embedded Technology (Digital, IoT, Artificial Intelligence & Embedded Technology), focusing on financial technology (Fintech), connected online devices without people (IoT), education technology (Edtech), e-marketplace (E-Marketplace), and E-Commerce (E-Commerce).

5. Creative, Culture & High Value Services, focusing on Designtech, Lifestyle Business, Traveltech, and Service enhancement.

These has set goals to achieve within 3-5 years for creating wealth and sustainability for the country concretely. It will start from the fact that Thailand will develop by itself mainly and then build on to a network of international cooperation.

Fintech is a technology that belongs to the digital group 4, the meaning of fintech comes from the word Financial Technology. It is a technology used in financial transactions [4], which is different from traditional transactions. It will include services such as mobile payments, borrowing money, money transfers, fundraising, and asset management through electronic processes. There are two types of companies involved in the development of this type of technology that are Traditional Fintech is a large financially funded enterprise and Emergent Fintech is a small enterprise that is responsible for developing new technologies and innovations. To be able to successfully use this type of technology, it should be developed to have a user-friendly format, convenient, and fast. It has lower costs and fees than financial transactions through the banking system including the need to build confidence in the matter of security as well.

Payment via smartphone is a technology that is popular in many countries. The highlight is the convenience and speed of payment. The buyer can pay for retail products by debiting the account. As for the seller's side, the money will be credited to the account immediately and also has a service for issuing a product receipt, record transactions sales, and summary report. There are also other services that help promote sales, such as receiving services based on location (Location Based Service), giving out and receiving electronic coupons (E-coupons) [5].

Self-service technology (SSTs) are systems designed for direct contact between an organization and its customers which relates to the use of electronic systems. The design and implementation of this type of technology is highly competitive. Therefore, effective design and evaluation are required to lead to sustainable competitiveness of the organization. Research team [6] proposed a method to measure the quality of this technology. All seven areas are usability, enjoyment, security, assurance, design, convenience, and the ability to customize the system.

Benjamin Bloom [7] defined knowledge as the process of remembering. The knowledge is divided into 6 levels as follows:

1. Knowledge is a level that focuses on memory and recall.
2. Comprehension is the ability to interpret and summary.
3. Analysis is the ability to consider discriminating and understanding the relationship of different parts.
4. Synthesis is the ability to gather knowledge to create a new pattern or structure under creativity.
5. Evaluation is the ability to make judgments for the purpose of evaluation.

At present there is a variety source of knowledge related to technology. They are divided into two main categories [8][9][10].

1. Formal source by reading the user manual and training which for the trend of knowledge in technology. This method is not used very often today due to the rapid change in technology making it not worth for the formal learning management.
2. Informal source or word of mouth, such as studying the use of applications by viewing friends or to read the instructions for use from reliable sources on the Internet.

The research on the influence of trust on the adoption of e-wallet technology by [11] looked at a number of factors according to the form of technology acceptance. Studies have shown that users will accept and use this technology once they know its benefits. Users learn usage patterns through informal learning methods. The user's biggest concern is the reliability of the system, which aligns with the job. The research of [12] concluded that whether the user decides to accept the use of a smartphone payment system or not it is important that users want clear information about the security system and the reliability of using the service from the service provider.

Research on a study on the influence of factors hindering the adoption of mobile payments [13] used the anti-innovation theory. The findings suggest that the barriers affecting the characteristics of different anti-innovators are: barriers to use, barriers from traditional methods, and perceived risks respectively. Since this research was conducted in 2015, which is almost 5 years ago, the current situation in Thailand may change. Because of at that time, it was just the beginning of the use of this payment system in Thailand.

Research on obstacles and drivers for the adoption of NFC technology for mobile payment [14]. Two main theories were used in this research which are Ram and Sheth's anti-innovation theory and Rogers' innovation dissemination theory. A sample of NFC-enabled mobile phone users., have a credit or debit card, and knows but does not use NFC technology to pay for products via mobile phones in Bangkok and its vicinity. The results showed that the factors that hindered were: risk hurdles and barriers to the image of technology. The factors that drive acceptance are comparative advantage and trust in the payment of goods. Mobile payment knowledge has a comparative advantage and payment assurance affects trust in technology usage.

The Moderation Effect of Age on Adopting E-Payment Technology [15] studied users in Indonesia on the adoption and use of payment systems electronically. It is recognized that the age of the user will influence the adoption of this type of technology. This study examined differences in technology adoption at different ages. The theory of adoption of TAM technology, classified by age, has been used. The results of the research showed that acceptance of ease of use had a positive effect on acceptance of the benefits of use.

An innovation resistance theory perspective on mobile payment solutions [16]. The system was negatively correlated with the intention to use the system. When an analysis against recommending the system to others for use, it was found that the usability and cost barriers of the system were negatively correlated with the intention of recommending the system to others [17].

III.   METHODOLOGY

A. Purpose of the Study

To analyze factor that affect the anti-mobile payment behavior.

B. Conceptual Framework and Hypotheses

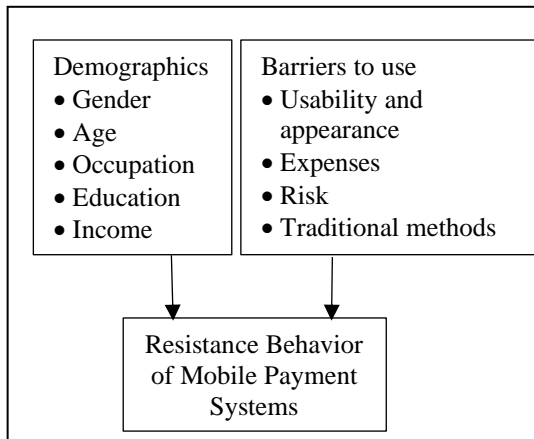The conceptual framework for the research is as follow:

Figure 1. Research Framework.

Hypothesis:
1. Different demographic characteristics result in different resistance behavior of mobile payment Systems.
2. Barriers to use factors has a relationship with resistance behavior of mobile payment Systems.

C. Scope of Study

The population used in the study was consumers who used to buy products through electronic commerce and do not use mobile payment systems. The sample size was estimated at 400 people using the Cochran formula [18], since the exact population is unknown. The calculation formula uses 95% confidence intervals and has an error value of ±5%. It can be expressed as follows:

$$n_0 = \frac{Z^2 pq}{e^2} = \frac{(1.96)^2(.5)(.5)}{(.05)^2} = 385$$

The result of the calculation was a sample population of 385 people. As to prevent errors in data collection, a total of 400 questionnaires will be distributed. In this research, the study tool was a questionnaire. A quantitative method was used to obtain the data from the four parts of the questionnaire, consisting of:

- The first part of the questionnaire contains demographic characteristics including gender, age, occupation, level of education, and income.
- The second part of the questionnaire is about the barriers to using mobile payment systems in four aspects. There are usability/appearance, expenses, risk, and traditional methods.
- The third part is a question about anti-payment behavior were measured using the Likert Scale on 5 levels.

Questionnaires were used to collect basic data from October 2020 to September 2021. The questionnaire was try out with the 30 sample using Cronbach's Alpha coefficient method and got a confidence value of 0.91. The statistics used for data analysis were descriptive statistics and multiple linear regression analysis.

IV.   FINDINGS

Part 1 Data analysis of demographic factors as gender, age, occupation, education level and income using descriptive statistics such as frequency and percentage.

The results of the analysis for consumer data who used to buy products through electronic commerce systems and not use mobile payment systems. To classified by gender, age, occupation, educational level and income, the amount and percentage can be distributed as follows:

TABLE I.   SHOW NUMBER (FREQUENCY) AND PERCENTAGE VALUES FOR GENDER

Gender	Number	Percentage
Male	139	34.8
Female	261	65.2
Total	400	100

It was found that more females than males. More than 50 percent of the respondents were female at 65.2 percent.

TABLE II.   SHOW NUMBER (FREQUENCY) AND PERCENTAGE VALUES FOR AGE.

Age	Number	Percentage
18-25 yrs.	240	60.0
26-35 yrs.	89	22.2
36-45 yrs.	43	10.8
45-60 yrs.	23	5.8
More than 60 yrs.	5	1.2
Total	400	100.00

It was found that the majority of respondents were adolescents aged between 18 to 25 years, over 50 percent, at 60.0%, followed by 26 to 35 years old at 22.2%. The elderly aged 60 years and over were the lowest at 1.2%.

TABLE III. SHOW NUMBER (FREQUENCY) AND PERCENTAGE VALUES FOR LEVEL OF EDUCATION.

Level of Education	Number	Percentage
Less than Bachelor	212	53.0
Bachelor	176	44.0
Higher than Bachelor	12	3.0
Total	400	100.00

It was found that most of the respondents had an education level lower than bachelor's degree at 53.0%, followed by a bachelor's degree at 44.0% and a higher education than bachelor at 3.0%, respectively.

TABLE IV. SHOW NUMBER (FREQUENCY) AND PERCENTAGE VALUES FOR OCCUPATION.

Occupation	Number	Percentage
Student	160	40.0
Government/state enterprise	34	8.5
Private company employees	72	18.0
Freelance	100	25.0
Other	34	8.5
Total	400	100.00

It was found that the occupations of the respondents were mostly students, 40%, followed by self-employed 25%, and employees of private companies 18%, respectively.

TABLE V. SHOW NUMBER (FREQUENCY) AND PERCENTAGE VALUES FOR INCOME.

Income	Number	Percentage
Less than 15,000 Baht	236	59.0
15,001 – 25,000 Baht	103	25.8
25,001 -35,000 Baht	26	6.4
More than 35,001 Baht	35	8.8
Total	400	100.00

It was found that most had income less than 15,000 baht per month, as high as 59.0%, followed by income between 15,001 – 25,000 baht, 25.8% and income from 35,001 baht or more, 8.8% respectively. An analysis of opinion levels that hinder the use of mobile payment systems is divided into four types as usability and appearance, expenses, risk, and traditional methods.

TABLE VI. DISPLAYS THE STANDARD DEVIATION FOR BARRIERS TO USE AND APPEARANCE

The level of opinions	$\overline{X}$	S.D.	Meaning	Order
Mobile payments are difficult to use.	1.66	.979	Lowest	3
Payment takes a long time	1.75	.977	Lowest	2
There are unclear procedures.	1.87	.976	Low	1
Average	1.76		Lowest	

Most of the respondents had the opinion that barriers to use and appearance overall is the lowest level.

TABLE VII. DISPLAYS THE STANDARD DEVIATION FOR BARRIERS OF EXPENSES

The level of opinions	$\overline{X}$	S.D.	Meaning	Order
Causing more expenses	1.81	1.15	Low	2
There are hidden costs such as fees.	2.32	1.08	Low	1
It costs more than a credit/debit card.	1.66	0.85	Lowest	3
Average	1.93		Low	

The majority of respondents had overall opinion on barriers of expenses at a low level.

TABLE VIII. DISPLAYS THE STANDARD DEVIATION FOR BARRIERS OF RISK

The level of opinions	$\overline{X}$	S.D.	Meaning	Order
The accuracy of the information could not be verified.	1.66	.978	Lowest	3
Causing invalid billing	2.37	.848	Low	2
May be stolen in bank information.	3.43	.750	High	1
Average	2.48		Low	

Most of the respondents had overall opinion on the risk barriers at a low level. However, from the questionnaire, it was found that mobile payments can be stolen in bank information was at high level.

TABLE IX. DISPLAYS THE STANDARD DEVIATION FOR BARRIERS OF TRADITIONAL METHODS

The level of opinions	$\overline{X}$	S.D.	Meaning	Order
Prefer cash payment	3.27	1.36	Moderate	2
Prefer paying by credit or debit card.	3.38	1.63	Moderate	1
Like the way used to pay more.	2.20	1.08	Low	3
Average	2.95		Moderate	

The majority of respondents were of the opinion that they agreed with traditional payment methods at a moderate level.

TABLE X. DISPLAYS MEAN AND STANDARD DEVIATION SUMMARIZES THE LEVEL OF OPINIONS THAT HINDER THE USE OF MOBILE PAYMENT SYSTEMS.

The level of opinions that hinder the use of mobile payment systems.	$\overline{X}$	Interpret	Order
Usability and appearance	1.76	Lowest	4
Expenses	1.93	Low	3
Risk	2.48	Low	2
Traditional methods	2.95	Moderate	1
Total average	**2.28**	**Low**	

From Table X Overall, it was found that total average score at 2.28, rated as low level opinion, showing that hinder the use of mobile payment systems by obstacles from traditional methods. Respondents thought it was the first obstacle with an average of 2.95, followed by a risk barrier ranked 2nd with an average of 2.48, and the expenses barrier ranked 3rd with an average of 1.93, respectively.

The analysis of resistance behavior of mobile payment Systems.

TABLE XI. SHOWS THE MEAN AND STANDARD DEVIATION OF THE RESISTANCE BEHAVIOR OF MOBILE PAYENT SYSTEM.

The level of opinions	$\overline{X}$	S.D.	Meaning
To what extent are you against mobile payments?	2.61	.866	Moderate
Average	2.61		Moderate

It was found that respondents were against mobile payments overall at moderate level.

The results of the data analysis to test the hypothesis. Hypothesis 1. Different demographic factors affect different levels of opinion against mobile payments.

Hypothesis Test 1.1 Different ages influence different opinions against mobile payments using One-Way ANOVA statistics.

TABLE XII.   COMPARISON OF OPINIONS AGAINST MOBILE PAYMENTS BY AGE

	Source of variance	SS	df	MS	F	Sig.
Anti-Mobile Payments	between groups	11.948	4	2.987	4.442	.002*
	within the group	265.642	395	.673		
	Total	277.590	400			

* had a statistically significant level of .05

The test was found to have a Sig. of .002, indicating that different ages influenced different opinions against mobile payments at a significant level of .05. The Least-Significant Different: LSD is shown in Table VII as follows:

TABLE XIII.   SHOWS COMPARATIVE DATA ON PAIRWISE AVERAGES BETWEEN DIFFERENT AGE RANGES.

Age	$\overline{X}$	18-25 yrs.	26-35 yrs.	36-45 yrs.	45-60 yrs.	>60 yrs.
		2.55	2.48	2.84	3.04	3.40
18-25 yrs.	2.55		.512	.035*	.006*	.022*
26-35 yrs.	2.48			.021*	.004*	.015*
36-45 yrs.	2.84				.331	.147
45-60 yrs.	3.04					.379
>60 yrs.	3.40					

* had a statistically significant level of .05

When testing the average pairs based on the LSD method, it was found that there was a statistically significant difference at the .05 level between 46-60 years and the younger one.

Hypothesis Test 1.2 Different income affects different opinions against mobile payments using One-Way ANOVA statistics.

TABLE XIV.   COMPARISON OF OPINIONS AGAINST MOBILE PAYMENTS BY INCOME

	Source of variance	SS	df	MS	F	Sig.
Anti-Mobile Payments	between groups	5.813	3	1.938	2.823	.039*
	within the group	271.777	396	.686		
	Total	277.590	400			

* had a statistically significant level of .05

The test was found to have a Sig. of .039, indicating that different income influenced different opinions against mobile payments at a significant level of .05. The Least-Significant Different: LSD is shown in Table XV as follows:

TABLE XV.   SHOWS COMPARATIVE DATA ON PAIRWISE AVERAGES BETWEEN DIFFERENT INCOME RANGES.

Income (Baht)	$\overline{X}$	<15000	15001-25000	25001-35000	>35001
		2.59	2.63	2.96	2.34
Less than 15,000	2.59		.699	.032*	.096
15,001 - 25,000	2.63			.070	.032*
25,001 - 35,000	2.96				.004*
More than 35,001	2.34				

* had a statistically significant level of .05

When testing the average pairs based on the LSD method, it was found that there was a statistically significant difference at the .05 level between income range 25001 – 35000 Bahts and the lower one.

Test of hypothesis 2, the barriers to use factor were positively correlated with anti-mobile payment feedback using Pearson Correlation.

TABLE XVI.   THE CORRELATIONS BETWEEN USABILITY BARRIERS WERE POSITIVELY CORRELATED WITH ANTI-MOBILE PAYMENT FEEDBACK.

Usage Barries		Anti-mobile payment	Associate Level
Usability and appearance	Pearson Correlation	0.477*	Low
	Sig. (2-tailed)	0.000	
Expenses	Pearson Correlation	0.333*	Low
	Sig. (2-tailed)	0.000	
Risk	Pearson Correlation	0.487*	Low
	Sig. (2-tailed)	0.000	
Traditional methods	Pearson Correlation	0.341*	Low
	Sig. (2-tailed)	0.000	

* Significant correlation at the .01 level (p<.01).

The results of the correlation analysis using Pearson Correlation showed that all four barriers to use factor were positively correlated with the opinions against mobile payments at low level.

V.   Conclusion/Recommendation

From the hypothesis of the overall summary research, it was found as follows:

Hypothesis 1: Analysis of different demographic factors with different opinions against mobile payments using t-test and One-Way ANOVA statistics. The result revealed that different ages and incomes affect the different anti-payment via mobile phones. Those with higher incomes of 35,001 baht and above had significantly higher resistance to payments than those with lower incomes. Among those aged 45-60, they were more likely to resist payments than others. This may lead to the conclusion that high-income seniors may fear of mobile payments than others.

Hypothesis 2: It was found that the barriers to use factor was positively correlated with the opinions against mobile

payments. There was a positive correlation with anti-mobile payment at low level. What was interesting was that overall usability barriers inevitably affect anti- payment resistant behavior.

When considering both sides is the demographic difference (age and income), as well as factors that hinder use. It will lead to ways to increase the system of mobile payments among seniors with high incomes by providing knowledge to reduce obstacles in various fields. Relevant agencies may use advertisement or public relations to build trust in the mobile payment system to be able to overcome various obstacles that hinder the operation.

REFERENCES

[1] Ross, P.E., 2012. Phone-y money. Spectr. IEEE 49 (6), 60-63.

[2] Suwit Maesincee. (2017). Thailand 4.0 Thailand 4.0. Source http://www.admissionpremium.com/news/1377 , accessed March 15, 2017.

[3] Suwit Maesincee. (2016). Crack the code "Thailand 4.0" to create a new economy. Overcome the middle income trap. Thairath newspaper, 2 May 2016, source: http://www.thairath.co.th/content/613903

[4] MoneyHub. (2016). FinTech, a financial technology that is no longer unknown today. Source https://moneyhub.in.th/article/financial-technology/, accessed March 15, 2017.

[5] Hoofnagle, Chris, Urban, Jennifer, Li, Su, 2012. Mobile Payments: Consumer Benefits & New Privacy Concerns. Available at SSRN 2045580.

[6] Lin, J. C., & Hsieh, P. (2011). Assessing the Self-service Technology Encounters: Development and Validation of SSTQUAL Scale. Journal of Retailing, 87(2), 194–206. http://dx.doi.org/10.1016/j.jretai.2011.02.006

[7] Bloom, B.S. (1956) Taxonomy of Educational Objectives, Handbook: The Cognitive Domain. David McKay, New York.

[8] Dahlberg, Tomi, Mallat, Niina, Öorni, Anssi, 2003. Trust enhanced technology acceptance model – consumer acceptance of mobile payment solutions tentative evidence. Paper Presented at the Stockholm Mobility Roundtable Flood, Darren, West, Tim, Wheadon, Daniel, 2013. Trends in mobile payments in developing and advanced economies. RBA Bull., 71–80.

[9] Gefen, David, Karahanna, Elena, Straub, D.W., 2003a. Inexperience and experience with online stores: the importance of TAM and trust. IEEE Trans. Eng. Manag. 50 (3), 307.

[10] Xin, Hua, Techatassanasoontorn, Angsana A, Tan, Felix B., 2013. Exploring the Influence of Trust on Mobile Payment Adoption.

[11] Norman, S. (2014). The mediating influence of trust in the adoption of the mobile wallet. Journal of Retailing and Consumer Services 21 (2014) 449–459.

[12] Dong-Hee, S. (2009). Towards an understanding of the consumer acceptance of mobile wallet. Computers in Human Behavior 25 (2009) 1343–1354.

[13] Janjira Wilasri and Madupayas Thongmak. (2015). A study of the influence of factors that hinder the acceptance of mobile payments. Journal of Burapha Peritat College of Commerce : Year 10 No. 2 July-December 2015.

[14] Pornpun Ahcheewakesa and Madupayas Thongmak. (2017). Barriers and Drivers of Acceptation of Near Field Communication (NFC) Mobile in Payment Adoption: A Case Study of Thailand. Journal of Business Administration, Economics and Communication: Year 12 No. 1 January – June 2017.

[15] Anggar Riskinanto, Bayu Kelana, Deliar Rifda Hilmawan (2017). The Moderation Effect of Age on Adopting E-Payment Technology. Procedia Computer Science 124 (2017) 536-543.

[16] Puneet Kaur, Amandeep Dhir, Naveen Singh, Ganesh Sahu and Mohammad Almotairi (2020). An innovation resistance theory perspective on mobile payment solutions. Journal of Retailing and Consumer Services, 2020, vol. 55, issue C.

[17] Considinea, E. & Cormicana K. (2016). Self-service technology adoption: An analysis of customer to technology interactions. Procedia Computer Science 100 (2016) 103 – 109.

[18] Israel, G.D. (1992) Determining Sample Size. University of Florida Cooperative Extension Service, Institute of Food and Agriculture Sciences, EDIS, Florida.