Factor Influencing the Acceptance and Use of M-Payment in Thailand: A Case Study of AIS mPAY Rabbit

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ABSTRACT

The number of mobile usage has been continuously growing rapidly. The mobile technology that can be operated ubiquitous makes the use of mobile phone even more popular. Therefore, the mobile phone has changed the consumer behavior such as mobile banking and mobile payment. The mobile payment with Near Field Communication (NFC) technology was first launched in Thailand in 2012. The question concerning why consumers accept and use the mobile payment is still unclear. This study aims to explore the factors influencing the acceptance and use of mobile payment with NFC technology in Thailand. The research model of the Unified Theory of Acceptance and Use of Technology (UTAUT) is proposed with the integration of attitude towards the mobile payment factors including the switching cost, convenience and privacy factors are used to investigate the research question. Self-reported survey data from mobile payment users in Bangkok is analyzed by Structural Equation Model (SEM). The findings of this study provide the mobile payment service providers to improve the service, stimulate their market share and the development of mobile payment industry in Thailand.

Keywords: Mobile Payment, Near Field Communication (NFC), Unified Theory of Acceptance and Use of Technology (UTAUT)

INTRODUCTION

The rapid increase in the use of mobile phones results from the development of mobile technology which change from voice and text communication to the multimedia communication device such as camera feature, digital music & video player, internet access, online game & social network, etc. Moreover, the better about network quality enables the mobile phone to access internet easy and ubiquitous. Therefore, the mobile phone is not just a communication device but a part of individual lifestyle. The mobile phone has changed the consumer behavior, they search for information, connect to social network, and now they can purchase products and services by using a mobile phone or do banking and paying bills via mobile phone. Furthermore, the severe compete in the mobile business force the merchants and service providers to improve their service quality to increase the market share by improving the security system and privacy of personal information or reduce transaction time & fee. Before the emerging of this advance technology, consumer may take a whole day for products & services payment and/or money transfer. Nowadays, a consumer can do the transaction from anywhere, anytime,

without travel, which reduce time and cost of transactions. These benefits make the mobile payment even more popular.

Mobile Payment can be done by Short Message System (SMS), Radio-frequency Identification (RFID), and Near Field Communication (NFC) technology. NFC technology is a short range wireless two-way communication, which enables the consumers to exchange the payment information between mobile phone and the NFC reader device. In Thailand, Mobile Payment with NFC technology has been launched in 2012 for transportation fee of Bangkok Transportation System (BTS). Thus, it's interesting that what attributes affect the consumers' attitude towards Mobile Payment with NFC technology and the factors influencing the consumers' decision to accept and use this technology. The Unified Theory of Acceptance and Use of Technology (UTAUT) Model is applied as a conceptual framework in analyzing the decision making to accept and use of Mobile Payment.

CONCEPTUAL FRAMEWORK

Most of the previous studies about the decision to accept Mobile Payment use Technology Acceptance Model (TAM) to analyze in two aspects; Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) [2, 3, 7, 15, 18, 21]. In recent researches use the Unified Theory of Acceptance and Use of Technology (UTAUT) Model as this model can elaborates more in deep about the human behavior to accept new technology [5, 11, 12, 14, 17]. UTAUT model has four factors influencing the behavior to accept and use technology such as Performance Expectancy (PE), Effort Expectancy (EE), Social Factors (SC), and Facilitating Condition (FC).

The studies found that costs including the switching cost are the influencing factors determining the adoption of Mobile Payment [4, 8, 12, 13]. Because only the consumer who has the mobile phone that enables the NFC technology can be using the Mobile Payment. The consumer who doesn't have the mobile phone that support the NFC technology will have the switching cost to change their mobile phone. Moreover, the consumers are concerned about how they can trust the service provider.

Privacy is another crucial factors affect the individual to adopt the Mobile Payment. Most of the consumers are concerned about the security and privacy of their personal information. They afraid that their personal information might be stolen between the transaction and/or being revealed to the third party without permission of the service provider [6, 8, 19]. Furthermore, the study found that convenience has a correlation to the adoption of Mobile Payment. The convenience to accept and use Mobile Payment comprises of the convenience to subscription, the convenience between the transaction, and the convenience after the transaction end [8 & 13].

The conceptual framework of the factors determining the decision to accept and use the Mobile Payment in this study follows the UTAUT model. The researcher has removed the Job-fit factor due to this study tend to explore the individual's acceptance of Mobile Payment which not concern to the job. Another factor that doesn't include in this study is the Voluntariness of Use. Since the UTAUT model was first used to analyze the adoption of new technology in the organization, which the staff may or may not volunteer to use. But in this study the decision to use is upon

the individual's perception, not concern to the "voluntariness". Besides of the UTAUT model, the researcher has extended the factors to Switching Cost, Convenience, and Privacy that can be stated as the following function:

$$Y = f(\textit{Personal Factors, Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Condition, Attitude, Switching Cost, Convenience, and Privacy}) \qquad (1)$$

The models applied in this study to determine the factors that influence the decision to use Mobile Payment can be stated as:

$$Y_i = \beta_0 + \beta_1 Gender_i + \beta_2 Age_i + \beta_3 Education_i + \beta_4 Marrital\ Status_i + \beta_5 Net\ Income_i + \beta_6 Performance\ Expectancy_i + \beta_7 Effort\ Expectancy_i + \beta_8 Social\ Influence_i + \beta_9 Facilitating\ Condition_i + \beta_{10} Attitude_i + \beta_{11} Switching\ Cost_i + \beta_{12} Convenience_i + \beta_{13} Privacy_i + u_i \qquad (2)$$

where: Y is the decision to adopt the Mobile Payment. Personal Factors are the personal characteristic factors of mobile payment user. Performance Expectancy is Perceived Usefulness (PU), Extrinsic Motivation, Relative Advantage, and Outcome Expectation. Effort Expectancy Factors are Perceived Ease of Use (PEOU), Complexity, and Ease of Use (EOU). Social Influence Factors are Subjective Norm, Social Factors, and Image. Facilitating Condition is Perceived Behavioral Control, Facilitating Condition, and Compatibility. Attitude is the perception toward mobile payment affecting the decision making to use mobile payment. Switching Cost is the cost that the consumer has to pay to use the Mobile Payment service such as the cost of new mobile phone that support the NFC technology and the subscription fee. Convenience is the convenience to use the service for prior, between, and after the service is provided. Privacy is the security of the consumer's personal information are saved and not transferred to the third parties. u_i is disturbance term and assumed to be normally distributed with zero mean and constant variance.
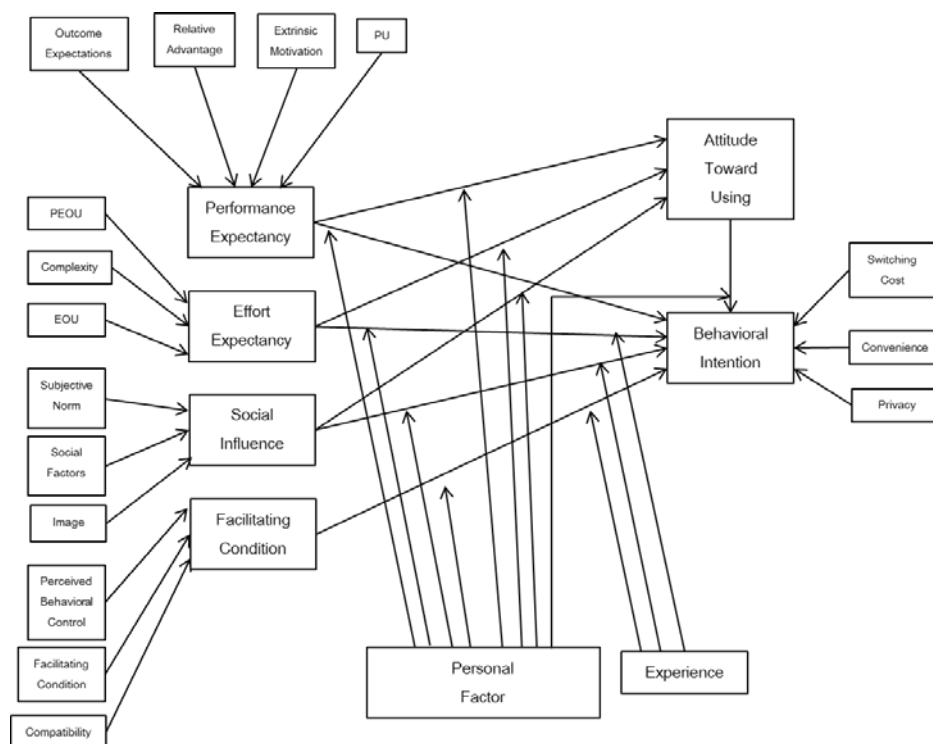
Figure1: Research framework

METHODOLOGY

This study aims to predict the consumer behavior and intention to accept and use the Mobile Payment in Thailand by extending the UTAUT model with three extra factors. A survey was developed and conducted in Bangkok, Thailand context. In model developing we extensively reviewed the existing literature. Based on the result we developed the survey instrument using a multiple item with five-point Likert scale approach ranging from "strongly disagree" to "strongly agree". The questionnaire was developed and tested to determine content validity and pre-tested to a small scale in order to assess its clarity and conciseness. The revision was made according to comments and suggestion data analysis. Purposive Sampling is applied to this study. A self-reported questionnaire will be given to the consumer of Bangkok Transportation System (BTS).

This study adopted a two-stage approach to test the structural equation model [1]. The first stage determines the adequacy of the measurement model. The second stage is to construct the structural equation model. The confirmatory factor analysis (CFA) was used to assess the measurement properties and to test a hypothesized structural model. The data were analyzed by using statistical software package STATA by explaining the data in two parts: Descriptive statistic and Inferential statistic to describe the relationship of various factors using structural equation modeling (SEM) analysis.

RESULTS

Table I
The goodness of fit statistics

Fit statistic	Value	Description
Likelihood ratio		
chi2_ms(222)	2470.781	model vs. saturated
p > chi2	0	
Population error		
RMSEA	0.231	Root mean squared error of approximation
Information criteria		
AIC	11101.192	Akaike's information criterion
BIC	11351.213	Bayesian information criterion
Baseline comparison		
CFI	0.472	Comparative fit index
TLI	0.399	Tucker-Lewis index
Size of residuals		
SRMR	0.162	Standardized root mean squared residual
CD	0.941	Coefficient of determination

Table I illustrates the relevant overall fit indices for constructs of Performance Expectancy, Effort Expectancy, Social Influence, Facilitating Condition, Attitude, Switching Costs, Convenience, and Privacy. There are some indices values below average rate (RMSEA ≤ 0.06, CFI ≥ 0.95, SRMR ≤ 0.05) [16], the coefficient of determination: CD is 0.941, indicates that the hypothesis of a model relate to the empirical data.

	OIM Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]	
Structural						
Performance <- Attitude	.382224	.0475905	8.03	0.000	.2889484	.4754997
Effort <- Attitude	.5536659	.0662895	8.35	0.000	.4237409	.6835909
Social <- Attitude	.5351964	.072833	7.35	0.000	.3924463	.6779465
Facilitating <- Attitude	.2200296	.0518174	4.25	0.000	.1184693	.3215898
Attitude <- Intention	.6110103	.0736496	8.30	0.000	.4666598	.7553609
Cost <- Intention	-.1612462	.0883021	-1.83	0.068	-.3343152	.0118228
Privacy <- Intention	.4935065	.0729715	6.76	0.000	.3504849	.6365281
Convenience <- Intention	.7104254	.0634991	11.19	0.000	.5859695	.8348814
Measurement						
x101 <- Performance	1 (constrained)					
_cons	3.863158	.056304	68.61	0.000	3.752804	3.973512
x102 <- Performance	1.974826	.2669355	7.40	0.000	1.451642	2.49801
_cons	3.610526	.078274	46.13	0.000	3.457112	3.763941
x103 <- Performance	.8584705	.1287659	6.67	0.000	.6060939	1.110847
_cons	3.831579	.0533141	71.87	0.000	3.727085	3.936073
x104 <- Performance	1.414779	.1904889	7.43	0.000	1.041428	1.78813
_cons	3.231579	.0732715	44.10	0.000	3.08797	3.375188
x201 <- Effort	1 (constrained)					
_cons	3.126316	.0753511	41.49	0.000	2.97863	3.274001
x202 <- Effort	1.330285	.1412648	9.42	0.000	1.053411	1.607159
_cons	3.147368	.0758833	41.48	0.000	2.99864	3.296097
x301 <- Social	1 (constrained)					
_cons	3.294737	.0827998	39.79	0.000	3.132452	3.457022
x302 <- Social	1.463396	.221394	6.61	0.000	1.029472	1.89732
_cons	2.968421	.0883537	33.60	0.000	2.795251	3.141591
x303 <- Social	1.763007	.2463852	7.16	0.000	1.280101	2.245913
_cons	3.084211	.0884856	34.86	0.000	2.910782	3.257639
x401 <- Facilitating	1 (constrained)					
_cons	3.578947	.0710655	50.36	0.000	3.439662	3.718233
x402 <- Facilitating	1.312026	.2778431	4.72	0.000	.7674636	1.856588
_cons	3.336842	.0826235	40.39	0.000	3.174903	3.498781
x403 <- Facilitating	1.8029	.3279823	5.50	0.000	1.160067	2.445734
_cons	3.852632	.0681926	56.50	0.000	3.718977	3.986287
x501 <- Attitude	1 (constrained)					
_cons	3.252632	.0867821	37.48	0.000	3.082542	3.422721
x502 <- Attitude	.7359053	.0803107	9.16	0.000	.5784992	.8933114
_cons	2.978947	.0848521	35.11	0.000	2.81264	3.145254
x503 <- Attitude	.7082541	.078194	9.06	0.000	.5549966	.8615115
_cons	2.789474	.0814649	34.24	0.000	2.629805	2.949142
x601 <- Cost	1 (constrained)					
_cons	4	.0868022	46.08	0.000	3.829871	4.170129
x602 <- Cost	.8285034	.3740682	2.21	0.027	.0953432	1.561664
_cons	3.978947	.0794573	50.08	0.000	3.823214	4.134681
x901 <- Privacy	1 (constrained)					
_cons	3.242105	.0785716	41.26	0.000	3.088108	3.396103
x902 <- Privacy	1.336283	.1731925	7.72	0.000	.996832	1.675734
_cons	2.905263	.0809046	35.91	0.000	2.746693	3.063833
x1001 <- Convenience	1 (constrained)					
_cons	2.715789	.0763888	35.55	0.000	2.56607	2.865509
x1002 <- Convenience	.7185707	.0882462	8.14	0.000	.5456114	.89153
_cons	3.294737	.0800787	41.14	0.000	3.137785	3.451688
x1101 <- Intention	1 (constrained)					
_cons	2.705263	.0814506	33.21	0.000	2.545623	2.864903
x1102 <- Intention	1.130038	.0566172	19.96	0.000	1.01907	1.241006
_cons	2.768421	.0877245	31.56	0.000	2.596484	2.940358
Variance						
e.x101	.3748357	.0471807			.2928869	.4797134
e.x102	.2768989	.0660826			.1734522	.442041
e.x103	.3724013	.0446736			.2943746	.4711097
e.x104	.5647101	.0701478			.4426801	.720379
e.x201	.5626151	.0695188			.4416047	.7167852
e.x202	.1806339	.0710202			.0835855	.3903622
e.x301	.9534697	.1058293			.7670589	1.185182
e.x302	.7355312	.0910214			.5771194	.9374251
e.x303	.4024666	.0710626			.2847312	.5688851
e.x401	.7438216	.0814736			.6001136	.9219432
e.x402	.9256921	.1198137			.7182808	1.192996
e.x403	.1823041	.1187175			.0508732	.6532871
e.x501	.3101781	.0558206			.2179848	.441363
e.x502	.7610358	.0962525			.5939485	.9751275
e.x503	.6987539	.0897655			.5432185	.8988224
e.x601	.3008146	.5070677			.0110528	8.187015
e.x602	.4233799	.35012			.0837177	2.141132
e.x901	.6122654	.0863543			.464393	.8072233
e.x902	.2424437	.1086921			.1006934	.5837417
e.x1001	.0545896	.0980743			.0016138	1.846533
e.x1002	.6741108	.0856707			.5254781	.8647847
e.x1101	.2282063	.0386194			.1637866	.3179632
e.x1102	.143938	.0434629			.0796435	.2601359
e.Performance	.063756	.0228694			.0315641	.1287802
e.Effort	.172609	.0427743			.1062006	.2805434
e.Social	.0281163	.0244471			.0051149	.154553
e.Facilitating	.1614782	.0524835			.0853999	.3053307
e.Attitude	.7353467	.1104738			.5477886	.987123
e.Cost	1.103924	.5176163			.4403739	2.767305
e.Privacy	.3092852	.0667627			.2025899	.4721723
e.Convenience	.5331061	.1141359			.3504086	.8110592
Intention	1.032292	.130843			.805217	1.323404

Table 2: Measure Model Analysis

The estimated coefficients illustrated in the table 2 are unstandardized coefficients. The coefficients that start with e. and listed at the bottom of the table are the estimated

error variances. They represent the variance of the indicated measurement that is not measured by the latent variables. The p-value in the measurement model analysis are presented significance at the p<=0.1 level. Based on the analysis shown in figure 2, there are seven positive relationships and only one negative indicating. The result shown in table 1, the overall model fit indices are acceptable. As shown in figure 2, the standardized regression weights (r) and p-value in the structural model are presented. The attitude is associated (r = 0.61, p = 0.000) with behavioral intention to use. Along with the switching cost is associated (r = 0.16, p = 0.068) with behavioral intention to use. Convenience has a significant relationship (r = 0.71, p = 0.000) with behavioral intention to use. Also the privacy has a significant relationship (r = 0.71, p = 0.000) with behavioral intention to use.
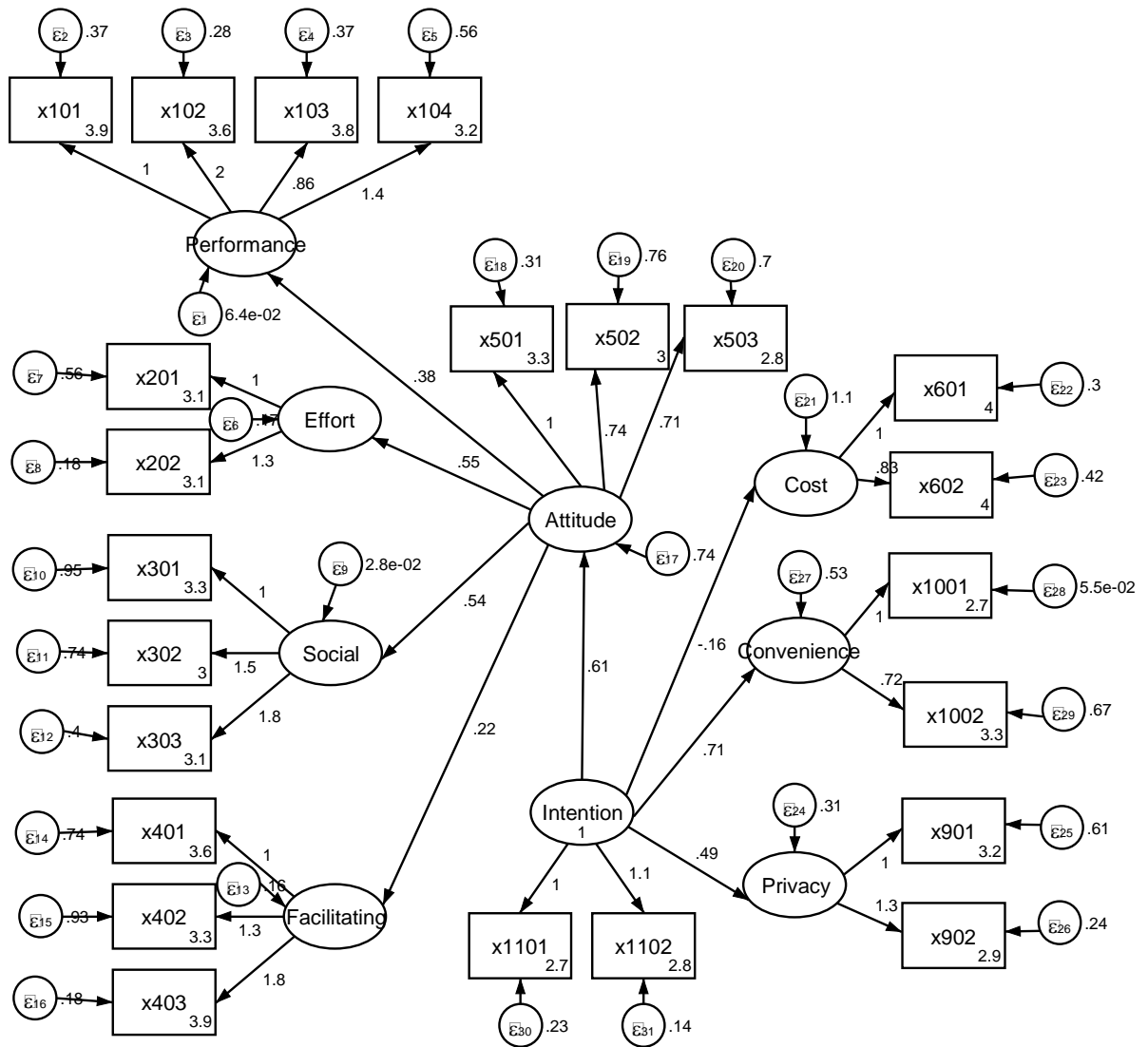

Figure 2: Structural Model

CONCLUSION AND DISCUSSION

This survey conducted to model the antecedents of consumer behavior towards the acceptance and use of Mobile Payment in Thailand. Since the introduction of Mobile Payment with NFC technology in Thailand, other network providers have been investigating and analyzing the possible impact to their customer as this is the introduction of the service in the market. The empirical results mentioned earlier of this paper found that the convenience and attitude are the most significant determinants to the intention to use Mobile Payment. While the Privacy of personal information and the switching cost are also significantly affect the intention to use. Therefore, the other network providers can stimulate their market share by upgrading their service by increase the convenience for the customer to easily access the service and also between or after the service are provided. The considering of reducing the switching cost or no cost at all is the interesting option to gain the new customers. Together, the privacy policy should be revised to increase trust and confident amongst the customer to accept and use the Mobile Payment.

ACKNOWLEDGEMENTS

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