

The Mobile Wallet Explosion in Thailand: Factors towards Predicting Consumer Loyalty

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ABSTRACT

In this research, we study the impact of the factors that predict consumer loyalty of mobile payments and mobile wallets usage in Thailand. We developed a research model based upon previous findings where we propose and examine four constructs of personal innovativeness, consumer attitudes, consumer satisfaction and loyalty. In general, all of the hypotheses were supported by variables related to consumer loyalty with mobile wallet usage. Personal innovativeness analyzed due to its potential mediation effect on loyalty, both from attitudes and from satisfaction. It was found that personal innovativeness was a mediator construct in predicting consumer loyalty. The overall model provides value to the mobile payment and mobile wallet application providers in term of improving service efficiency and business strategies to secure Thai consumer loyalty.

Keywords: Loyalty, Personal innovativeness, Consumer attitudes, Consumer satisfaction, Mobile payments, Mobile wallet

1. Introduction

In recent years, the mobile payment and mobile wallet markets are growing exponentially around the world, including Southeast Asia, and particularly in Thailand, where people has always been a great fan of making transactions in cash (Nielsen, 2015). This disruption has started as the result of the phenomenal growth in smartphone usage and an increasing adoption rate of the digital lifestyle. In Thailand, the smart-

phone penetration rate has exceeded 50% in 2017 and 90% of those who are internet users conduct their related daily activities online via smartphones (National Statistical Office of Thailand, 2017). Moreover, with the improvement in the telecommunication infrastructure, the expansion of 4G and LTE networks covers 95% of the population nationwide (DBS Bank, 2016). The advancement of financial payment processes has been led by the collaboration among mobile carriers (mPay by AIS, PaysBuy

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by DTAC, True Money by TrueMove), banks (SCB Easy by Siam Commercial Bank, K-Plus by Kasikorn Bank, Bualuang mBanking by Bangkok Bank), and private service providers, including restaurants, department stores, shops and third party mobile payment apps (Line Pay, Mobiamo, PromptPay, Paypal) (The Paypers, 2017; Fintechnews, 2016). These together with the recent national e-payment master plan has encouraged Thai consumers to move toward an 'Everything-Mobile' lifestyle (IDC Financial Insights, 2016) and has boosted the growing mobile wallet usage in Thailand.

In 2017, the transaction value in mobile payments in Thailand, including mobile wallet, amounts to 4 billion USD with annual growth rate (CAGR 2017-2021) of 72.3% resulting in the total estimate of 36 billion USD in 2021, according to Statista (2017). Thai smartphone users are now able to pay phone bills, utilities and lifestyle-related activities - such as top up prepaid phone cards, gaming cards, Skype, Google Play, iTunes, or purchase grocery products, clothes, movie tickets or other products and services through their mobile applications at anywhere and anytime (England, 2014). The NFC (contactless or near field communication) technology, QR code, and Bluetooth-based payments also have facilitated the adoption rate and increased the usage of mobile wallet payments. Although, the majority of Thai consumers are still concerned about online and mobile payment security (Tavilla, 2015) and are unfamiliar with this new payment method, the study by Marketbuzz (2016) revealed that of those who currently use mobile payments and mobile wallets, 55% believed the level of security is high, and more than 60% expressed that they will continue using mobile wallet apps on an average 5 times per month. Further, they will use mobile wallet payment apps 40% more often in the future. Thai SMEs positively support the

e-Payment movement in Thailand for different payment options such a credit card, debit card, mobile banking or mobile-wallet using a cell phone (EIC Research Series, 2017). Both vendors and consumers are willing to try mobile wallet apps and are interested in new technology payment innovations, where convenience is the main driver behind the adoption (Tavilla, 2015).

E-payment and mobile wallet apps can be a starting point for a variety of financial innovations and developments toward a cashless society in the future. This is because it reduces transaction costs and enhances cash management capabilities, as well as saves time for the consumer. However, in terms of consumer loyalty, it is difficult to say that Thai consumers are loyal with the current mobile-payment services, as there are many factors affecting consumer loyalty besides the convenience, such as service quality (Parasuraman et al., 1988), compatibility, trust, perceived usefulness, perceived ease of use (Chen and Wu, 2017), personal innovativeness and consumer attitudes (Amoroso and Ackaradejruangsri, 2017). Furthermore, high consumer satisfaction or excellent service does not always ensure consumer loyalty, as consumer satisfaction is an attitude, while loyalty is a behavior. Thus, different factors may also affect consumer behavior in loyalty differently and in different product categories and loyalty levels (Gajjar, 2013; Kuusik, 2007). Since mobile payments are restricted by app developments and there are limited research studies that can directly demonstrate the relationship among personal innovativeness, consumer attitudes, consumer satisfaction and loyalty, this study is particularly appropriate, in the case of Thailand consumers.

Therefore, in this paper, the intention is to analyze the mediating factors that contribute to the overall loyalty of Thai consumer with a focus on personal innovativeness in mobile payment adoption and

usage. Derived from theoretical findings from empirical studies, we designed a research model, a survey, pretested the survey items, and conducted reliability and validity tests. Data were collected using the snowball sampling technique, by accessing the respondent's social media. In addition, to verifying the proposed hypotheses, we applied confirmatory factor analysis, structural equation modeling (SEM) and mediator analysis to analyze the path coefficients. Overall, the research model examines the constructs and relationships together, using structural equation modeling, so that we can analyze the direct and mediating effects simultaneously.

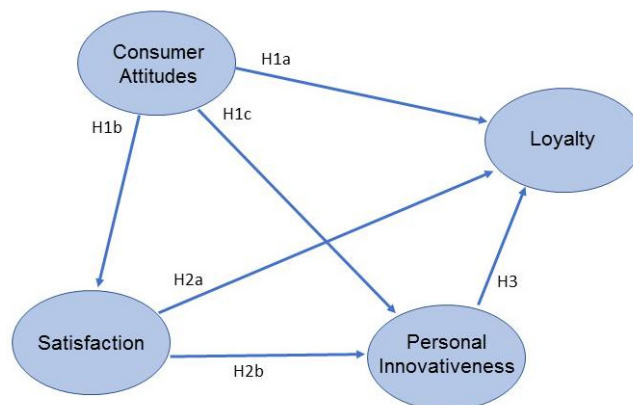
As a result of expanding the existing consumer loyalty model, this study presents empirical results in order to benefit both the academic and management communities. From a technology perspective, this study helps to understand how specific factors influence loyalty with mobile payment and mobile wallet applications, and ultimately what drives consumers' decisions to be satisfied and loyal consumers. The results of the analysis will provide a framework for understanding consumer behavior with respect to mobile payment and mobile wallet apps. We studied the factors that affect loyalty, particularly the effect of consumer attitudes on personal innovative-

ness and loyalty, consumer attitudes influencing satisfaction and loyalty, and the relationship between consumer satisfaction, personal innovativeness and loyalty. The value of our study suggests the importance of personal innovativeness as a mediating factor in understanding consumer loyalty. Therefore, this research presents insight into understanding the impact of personal innovativeness on consumer attitudes and satisfaction that, in turn, influence consumer loyalty with mobile payment and mobile wallet adoption and usage in Thailand. The two research questions studied in this research include:

- (1) *What is the impact of personal innovativeness as a mediator on consumer attitudes and satisfaction that influence on consumer loyalty?*
- (2) *What are the factors that affect loyalty with Thai consumers using mobile payment and mobile wallet apps?*

II. Theoretical Background and Hypotheses

Our research model (<Figure 1>) employs four constructs: personal innovativeness, consumer atti-



<Figure 1> Conceptual Mode

tudes, consumer satisfaction, and loyalty which appear to iteratively and separately serve as independent, mediating, and/or dependent variables in numerous studies. The literature has established these constructs as statistically significant; henceforth, every path in this model represents a testable hypothesis based upon underlying theories and findings shown by multiple studies which we discuss in the following literature review.

2.1. Consumer Attitudes

As defined by Cohen et al. (1972), consumer attitudes is the degree to which a person has a favorable or unfavorable evaluation of the behavior in question; or as a composite of consumer's beliefs and feelings toward some objects or behaviors (Bhatt, 2014). Davis et al. (1989) found that consumer attitudes statistically influenced repurchase intention. Further, Shih (2011) and Amoroso and Ogawa (2013), found positive relationships between attitude and behavioral loyalty in their attitudinal models. Moreover, Wixom and Todd (2005) found a relationship between consumer attitudes and satisfaction on purchasing intention, where culture acts as moderating variable measuring satisfaction as meeting expectations. Consumer engagement, as part of consumer attitudes, is also found to have a positive impact toward consumers' satisfaction, such as enthusiasm and enjoyment (Dessart et al., 2016). Likewise, several studies have investigated and linked consumer attitudes to online behavior. Liljander et al. (2007) found consumer attitudes to be an important key to explain loyalty and repurchase intention with mobile shopping. Marshall (2010) found a strong connection between consumer attitudes and loyalty toward purchasing from the same store online. These relationships show predecessor relationships that may exist between one or

more consumer attitudes and satisfaction and consumer attitudes and loyalty. Our hypotheses are:

H1a: Consumer attitudes positively influences loyalty.

H1b: Consumer attitudes positively influences satisfaction.

H1c: Consumer attitudes positively influences personal innovativeness.

2.2. Satisfaction

Researchers have defined consumer satisfaction as gratification and contentment with a vendor and/or product. The study by Wu and Qi (2010) revealed that satisfaction is not derived solely from a consumer's satisfaction with the product purchased, but also from other factors of consumption in both traditional and online stores. For instance, the variety of services, such as call center services are important factors that influenced consumer satisfaction when conducting mobile banking (Chavis, 2016). Ho and Wu (2011) found a strong positive relationship between consumer satisfaction and purchasing products and services online, particularly when loyalty led to continuance intention. Moreover, they also found that personal innovativeness is the mediator between consumer satisfaction and online store loyalty. The study by Anderson and Srinivasan (2003) found that satisfaction, which is a combination of trust and perceived value, was instrumental in explaining the underlining loyalty construct. Oliva et al. (1992) found positive relationship between consumer satisfaction and loyalty, as highly satisfied consumers are tending to be more loyal than the consumers who are merely satisfied. Other recent studies have further examined the relationships between consumer satisfaction and loyalty on mobile apps and similarly found a strong relationship between these two variables (Amoroso et al., 2017).

H2a: Satisfaction positively influences loyalty.

H2b. Satisfaction positively influences personal innovativeness.

2.3. Personal Innovativeness

According to Agarwal and Prasad (1999) and Rogers (1995), personal innovativeness is the degree of early acceptance of an innovation and the degree to which consumers adopt a product before others do. Personal innovativeness is defined by Ho and Wu (2011) as an individual attitude toward new ideas and innovative decisions of other's people experiences. Kim et al. (2013) found that personal innovativeness varies from one product category to another, where the socio-psychological perspective had influenced individual innate predisposition of personal innovativeness. The study by Lu et al. (2005) found that personal innovativeness has a direct influence on perceived ease of use and perceived usefulness, which, in turn, impacts consumer acceptance and satisfaction. Supporting by Chen (2008)'s study, personal innovativeness also proved to have a direct impact on consumer satisfaction that leads to customer loyalty. In addition, Zhang et al. (2013) found that when using information technologies, there is a direct relationship between personal innovativeness and consumer attitudes where personal innovativeness is one of the key factors in understanding consumer attitudes. Along with the previous findings, Amoroso and Lim (2014) and Lian et al. (2012) also found a strong positive relationship between personal innovativeness and attitudes toward online shopping, and eventually increasing behavioral purchasing intention. It was found that within the context of online shopping, personal innovativeness was further explored under a concept of risk-taking tendencies (Lee et al., 2007), as online shopping is more likely

to be adopted by highly innovative consumers. According to the aforementioned theories, we believe that a similar behavior of personal innovativeness that influences consumer attitudes, satisfaction and loyalty when shopping online and using information technologies and could be a mediator when adopting and using mobile payment and mobile wallet application. Thus, our hypotheses are as followed:

H3: Personal innovativeness positively influences loyalty.

2.4. Loyalty

Defined by Lin et al. (2015), loyalty is expressed as consumer dependence and goodwill toward a product or service, as a result of culminating in consumer satisfaction. In other words, loyalty is a strong commitment behavior toward a vendor or brand; and a loyal consumer not only continuously comes back to the same vendor or brand but also helps the vendor/brand sustain long-term growth through advocacy. Furthermore, a vendor/brand can also gain from cross-/up-selling opportunities, forecast accuracy, receive constructive feedback, leading to marketing and service costs reduction and brand image improvement. Hence, establishing consumer loyalty and retention is an important business activity, as it often leads to more consumer purchases, increasing in both sales and profits (Chi, 2005). Cyr et al. (2006) found loyalty to be an indicator of continuance intention with online transactions. Holland and Baker (2001) found that creating a brand site leads to both favorable behavioral and attitudinal of consumer outcomes, such as repetitive visits of the site and strong support from the consumer toward the brand. Loyalty also has positive relationships with consumer attitudes and satisfaction, of which behavioral loyalty and attitudinal loyalty are predicted from consumer

satisfaction (Amoroso and Ogawa, 2013; Shih, 2011). Noyan and Simsek (2014) found consumer satisfaction among other factors to have the most significant impact on e-loyalty. Likewise, loyalty was found to have been affected by personal innovativeness, enhancing switching costs in online stores (Wu and Qi, 2010). Accordingly, personal innovativeness, consumer attitudes, and satisfaction are antecedents of loyalty.

III. Methods

3.1. Construct Operationalization

The constructs for mobile payments and mobile wallet apps were operationalized using validated items from prior research. <Table 2> shows the specific measures used to measure each of the constructs. We developed a survey instrument to measure personal innovativeness, consumer attitudes, consumer satisfaction and loyalty using the items as observed indicators, and generating a pool of questions for each construct. We selected between two to four scales per construct in order to keep the survey length reasonable. We pre-tested the items in order to discard questions that appeared ambiguous or similar to others in order to avoid a cross loading of items on alternative factors.

3.2. Data Collection

We used the snowball approach to collect data by posting a survey link on social media accounts. It was found that social media-generated samples provide a high-quality alternative for procuring large sample sizes (Baltar and Brunet, 2012; Kosinski et al., 2015). Atkinson and Flint (2001) found that snow-

ball-sampling mirrors true randomization while adding increased sample sizes and new respondents that were not ever have been targeted using traditional data collection techniques. We used SurveyMonkey to collect our responses where the electronic survey link was posted on different social media. At the end of the data collection period, 507 respondents took the survey online. Cases with biased responses and incomplete answers were eliminated, yielding a final sample of 461, or a 90.9% usability rate.

<Table 1> shows the descriptive statistics of survey respondents. There was a greater age variance among the respondents, with the majority of almost 42% of the respondents were 21-25 years, 19% were 18-20 years and 26-30 years respectively; where 24.9% were men and 75.1% were female. AIS at 39%, DTAC at 38% and TRUE at 31% were the top three telecom carriers reported by the respondents. There is a high percentage of prepaid consumers in our study at 81%, similar to typical consumers in other Asian countries. However, it is noticeable that there was about 120% as total usage of telecom providers in Thailand, implying that some of the consumers in our study used more than one SIM-card or mobile phone and subscribed to more than one telecom providers.

The respondents were also asked to indicate which mobile phone usage and mobile payment/ wallet apps they most frequently used. The results indicated that mobile Internet apps (94%), text messaging (88%) and email (82%) were the top mobile activities that they used. Within internet apps usage, conducting banking transactions at 55% is the most frequently used app, including checking balances and transferring money within their accounts online. Loading apps, including music, games, and load is equally important at 55%. The respondents in addition often used mobile device to shop online and use their

<Table 1> Descriptive Statistics of Survey Respondents

Gender	Freq	%
Male	115	24.9
Female	346	75.1
Total	461	100

Age	Freq	%
< 18	5	1.1
18 - 20	89	19.3
21 - 25	195	42.3
26 - 30	91	19.7
31 - 35	33	7.2
> 35	48	10.4
Total	461	100

Mobile phone usage	Number	%
Internet apps	433	94.0
Text messaging	408	88.6
Email	381	82.6

Mobile wallet apps	Number	%
Banking - balances, transfers	256	55.5
Load apps and load	255	55.3
Shop and pay with mobile	250	54.2
Transfer money to others	232	50.3
Pay bills	151	32.7

Mobile carrier	Freq	%
AIS	217	39.5
DTAC	208	37.9
TRUE	171	31.1
TOT	20	3.7
Other	43	7.8

Pre-paid or Post-paid	Freq	%
Post-paid	87	18.9
Pre-paid	374	81.1
Total	461	100

mobile wallet for payment at 54%. They also transferred money to others via their mobile device at 50%. About 32% often paid the bills with their mobile wallet apps.

IV. Results

4.1. Measurement Model Assessment

In order to conduct measurement model assessment, we conducted (1) Cronbach Alpha tests for reliability, (2) AVE for discriminant validity, and (3) confirmatory factor analysis. Firstly, after conducting Cronbach Alpha analysis, we found that all four of the scales showed relatively high Cronbach alphas (see <Table 2>) at $\alpha \geq 0.70$ for all the measures. There is a pattern of high scale reliability consistent

with prior research. Secondly, we assessed discriminant validity, which requires that the square root of the AVE should be greater than the correlation between two constructs. The result shows that the average variance extracted or AVE estimate, which measures the amount of variance that is captured by a construct in relation to the amount of variance due to measurement error, ranged from 0.852 to 0.901. This indicates for all of the constructs, they share more variances with their indicators than with other constructs. Thus, our proposed measures exhibited sufficient discriminant validity.

Thirdly, we conducted both exploratory factor analyses (EFA) and confirmatory factor analysis (CFA) using Amos 25. EFAs were firstly used to examine the basic structure of the measurement items. Using a principle components extraction method, all of the measures were analyzed through

<Table 2> Construct Reliability and Validity

Construct	Indicator	Observed Indicators	References	EFA Loading	CFA Loading	Cronbach Alpha (CA)	Average Variance Extracted
Consumer Attitudes	ATT1	The idea of using the mobile wallet to conduct financial transactions is appealing	Amoso and Lin (2015); Cohen et al. (1986); Dassart et al. (2016); Kim et al. (2012); Lian et al. (2012); Liljander et al. (2007); Marshall (2010); Troshani (2009); Wu (2003); Zhang et al. (2013)	0.722	0.821	0.871	0.901
	ATT2	I like the idea of conducting financial transactions via the mobile wallet		0.743	0.815		
	ATT3	Overall, I feel strongly about using the mobile wallet for financial applications		0.801	0.802		
Personal Innovativeness	INNOV1	When I hear about a new web site for financial applications, I often find an excuse to go visit it	Amoroso and Lim (2015); Bhatt (2014); Chen (2008); Jayasingh and Eze (2009); Lee et al. (2007); Lu et al. (2005); Trevedi and Kimar (2014); Zhang et al. (2011)	0.750	0.772	0.823	0.852
	INNOV2	Among my peers, I am usually the first to try out new internet site for financial applications		0.579	0.769		
	SAT1	I am satisfied with my decision to use the mobile wallet		0.834	0.670	0.921	0.869
Satisfaction	SAT2	My choice to use the mobile wallet for certain financial application was a good one	Amoroso and Lim (2015); Anderson and Swaminathan (2011); Chen (2008); Ho and Wu (2010); Lin et al. (2013); Wixom and Todd (2005); Wu and Qi (2010)	0.527	0.658		
	SAT3	I think I did the right thing to use the mobile wallet for financial applications		0.762	0.727		
	SAT4	Overall, I am satisfied with the financial applications I am using with the mobile wallet		0.796	0.821		
Loyalty	LOY1	I like to be the mobile wallet at whichever Web site gives me the best prices	Amoroso and Ogawa (2013); Cyr et al. (2006); Holland and Baker (2010); Lin et al. (2015); Reichheld and Scheffer (2000); Shih (2011)	0.635	0.680	0.825	0.887
	LOY2	Customer service is very important for me to conduct financial transactions using the mobile wallet		0.683	0.752		
	LOY3	I plan to return to using the mobile wallet for financial applications upon superior customer service		0.704	0.746		

<Table 3> Correlation Matrix

Construct	Cronbach alpha	AVE	Inter-construct correlations			
			1	2	3	4
1. Personal Innovativeness	0.823	0.853	1.000			
2. Consumer Attitudes	0.871	0.901	.397**	1.000		
3. Loyalty	0.825	0.887	.419**	.559**	1.000	
4. Satisfaction	0.921	0.869	.485**	.695**	.655**	1.000

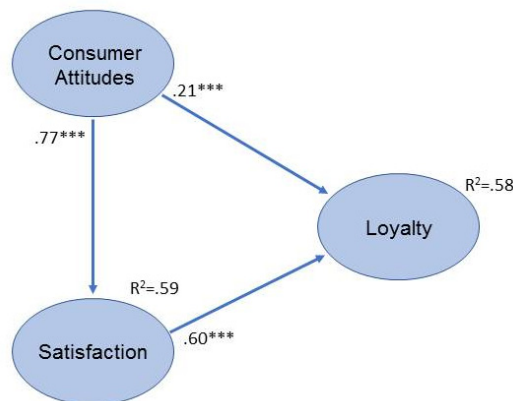
Varimax rotation. The EFA factors loadings are reported on <Table 2>, where each of the measurement items loaded cleanly on one and only one factor, without any cross-loadings. Next, a confirmatory factor analysis with maximum likelihood was conducted on the 12 indicators of the four latent variables to further ensure the reliability and validity of the measurement items. The structural model fit was estimated to test the proposed research model and hypotheses. The final factor analysis accounted for 75.7% of the total variance. While all EFA loadings ranged from 0.527 to 0.834; the CFA loadings ranged from 0.658 to 0.821. The goodness of fit indices and lack of cross-loadings lend support to the construct validity of each measure in the model, as indicated by the earlier EFA and CFA results. These coefficients also provided evidence for the convergent validity, suggesting that each construct is well represented by its own indicators.

4.2. Structural Equation Model Analysis

To determine whether our sample data are consistent with hypothesized research model, three structural equation models (SEM) were developed and produced with AMOS 25. <Figure 2> presents the

base SEM model for mobile payment and mobile wallet apps in Thailand, without the personal innovativeness construct. We found that the NFI (0.972), RFI (.961), IFI (.982), TLI (.975), and CFI (.982) are reasonable > 0.90, and RMSEA is reasonable at 0.052. We found a strong adjusted R² values for both loyalty and satisfaction, at .58 and .59, respectively. Consumer attitudes showed a weak path coefficient with loyalty at .21, however consumer attitudes showed a strong path coefficient with consumer satisfaction (.77). Satisfaction also showed strong path coefficients with loyalty (.60).

<Figure 3> presents the SEM model for mobile payment and mobile wallet apps in Thailand after adding personal innovativeness as a mediator variable between consumer attitudes and loyalty. We found that the NFI (0.967), RFI (.955), IFI (.980), TLI (.972), and CFI (.980) are reasonable > 0.90, and RMSEA is less than 0.05 at 0.0487. These imply a very good fit of the model; in other words, the proposed constructs could well explain consumer satisfaction with mobile payment and mobile wallet apps in Thailand. With a 95% confidence interval and a sample of 461, the SEM results positively signify the true population mean. Loyalty and satisfaction both have strong adjusted R² values of .71 and .62 respectively,

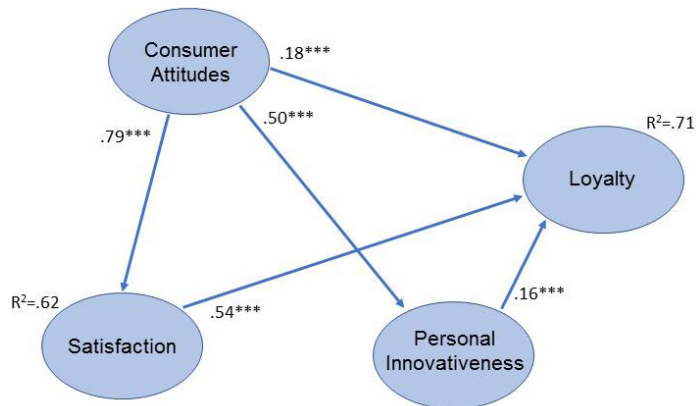


<Figure 2> Structural Equation Model #1 Without Personal Innovativeness

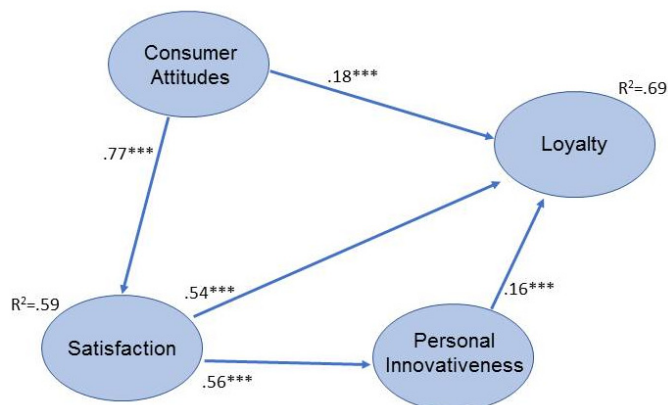
showing large variances explained. The variance for loyalty in Model #2 after adding personal innovativeness was up 10% over Model #1.

The path coefficients from consumer attitudes to satisfaction (.79) was exceptionally strong, with $p < 0.001$, but to loyalty much weaker (.18). Satisfaction also showed a strong path coefficient to loyalty (.54) with $p < 0.001$. Consumer attitudes has a strong coefficient to personal innovativeness (.50), however personal innovativeness showed a weaker path coefficient to loyalty (.16). Most of the path coefficients between consumer attitudes, loyalty and satisfaction remain closely the same from Model #1 to Model #2.

<Figure 4> presents the SEM model for mobile wallet apps in Thailand after adding personal innovativeness as a mediator variable between satisfaction and loyalty. We found that the NFI (0.967), RFI (.955), IFI (.980), TLI (.972), and CFI (.980) are reasonable > 0.90 , and RMSEA is less than 0.05 at 0.0483. These imply a very good fit of the model, in other words, the proposed constructs could well explain consumer loyalty with mobile wallet apps in Thailand. With a 95% confidence interval and a sample of 461, the SEM results positively signify the true population mean. Loyalty and satisfaction both have strong adjusted R^2 values of .69 and .59



<Figure 3> Structural Equation Model #2 Adding Personal Innovativeness as Mediator Between Attitudes and Loyalty



<Figure 4> Structural Equation Model #3 Adding Personal Innovativeness as Mediator Between Satisfaction and Loyalty

respectively, showing large variances explained.

The path coefficient from consumer attitudes to satisfaction (.77) was particularly high but weaker to loyalty (.18), with $p < 0.001$. This finding is similar to Model #2 when personal innovativeness is introduced. Satisfaction also shows a strong path coefficient to loyalty (.54) and a strong path coefficient to personal innovativeness (.56) with $p < 0.001$. Remarkably, the weakest path coefficient is from personal innovativeness directly to loyalty (.16), possible suggesting mediating effects. Most of the path coefficients between consumer attitudes, loyalty and satisfaction remain closely the same from Models #1 and #2.

4.3. Mediator Analysis

MacKinnon (2008) recommends using the bootstrapping methodology in Amos 25 to create a sampling distribution to create confidence intervals for testing mediation. In our model, mediation analysis will be useful to understand the potential mediation effects of consumer attitudes and loyalty of personal innovativeness on satisfaction. Bootstrapping is also useful in assuming a more normal distribution, required as an assumption of SEM, reducing type 1 errors (Changya and Wang, 2010). Cheung and Lau (2008) recommended the generation of 1,000 bootstrap samples in order to determine the type 1 error rate. We ran the predictive SEM model producing the indirect, direct and total effects and we examined

the two-tailed significance (BC) for significance. Both the lower bounds and upper bounds at a 95% bootstrap confidence interval were tested. Rucker et al. (2011) recommends that the criterion for mediation is the identification of a significant indirect effect of the predictor on the outcome, rather than a significant decrease in the direct effect. <Table 4> shows the path relationships, direct and indirect effects and whether there was significance related to mediating effect.

Regarding the mediating effect of consumer attitudes on loyalty, we found a mediating effect by personal innovativeness, which means that personal innovativeness counts for some, but not all of the relationship between consumer attitudes and loyalty. With respect to the mediating effect of satisfaction on loyalty through personal innovation, we found a mediating effect by personal innovativeness, which means that personal innovativeness counts for some, but not all of the relationship between satisfaction and loyalty.

V. Discussion

5.1. Academic Contributions

Based upon existing theories and the findings from previous studies, three different models are developed to explain the impact of personal innovativeness as a mediator variable in order to understand consumer

<Table 4> Mediator Analysis

	Direct effect without mediator	Direct effect with mediator	significance of indirect effect (p-value)	Mediation effect at the $P < 0.01$ level
Consumer Attitudes → Personal Innovativeness → Loyalty	0.181***	0.523***	< 0.001	yes
Satisfaction → Personal Innovativeness → Loyalty	0.542***	0.671***	< 0.001	yes

loyalty of mobile payments and mobile wallets usage in Thailand. In Model #1, we analyzed the constructs without personal innovativeness, while in Model #2, we added personal innovativeness as mediator between consumer attitudes and loyalty. In Model #3, personal innovativeness acted as mediated between consumer satisfaction and loyalty. These three models tested underlying relevant theories and findings as well as relationships among the factors as related to mobile payment and mobile wallet apps usage. We validated all of the hypotheses related to consumer attitudes, personal innovativeness, consumer satisfaction and loyalty. The overall results of the confirmatory factor analysis, the SEM model and mediator analysis show that there are many significant relationships among the proposed constructs.

Remarkably, consumer attitudes have stronger coefficient to satisfaction than to loyalty, even when adding personal innovativeness as mediator. Consumer satisfaction also was found to have a strong coefficient to loyalty at .54 when personal innovativeness mediated the relationship to loyalty. We found strong support for all of the hypothesized relationships, albeit some at different strength levels (see <Table 5> for results of hypotheses tests).

The results show that consumer attitudes and consumer satisfaction have positive influences on Thai consumer loyalty, albeit satisfaction was strongest. However, when adding personal innovativeness, the mediating effect results showed a significant effect between consumer attitudes and loyalty, and between consumer satisfaction and loyalty. In other words,

<Table 5> Results of Hypotheses Tests

Model #1

Number	Hypothesis	Estimate	SE	CR	<i>p</i>	Result
H1a	Consumer attitudes is positively correlated with loyalty	0.21	0.081	2.655	***	Supported
H1b	Consumer attitudes is positively correlated with satisfaction	0.77	0.058	16.119	***	Supported
H2a	Satisfaction is positively correlated with loyalty	0.60	0.070	7.903	***	Supported

Model #2

Number	Hypothesis	Estimate	SE	CR	<i>p</i>	Result
H1a	Consumer attitudes is positively correlated with loyalty	0.18	0.093	2.170	***	Supported
H1b	Consumer attitudes is positively correlated with satisfaction	0.79	0.059	16.434	***	Supported
H1c	Consumer attitudes is positively correlated with personal innovativeness	0.50	0.077	9.529	***	Supported
H2a	Satisfaction is positively correlated with loyalty	0.54	0.072	6.842	***	Supported
H3	Personal innovativeness is positively correlated with loyalty	0.16	0.040	2.715	***	Supported

Model #3

Number	Hypothesis	Estimate	SE	CR	<i>p</i>	Result
H1a	Consumer attitudes is positively correlated with loyalty	0.18	0.080	2.528	***	Supported
H1b	Consumer attitudes is positively correlated with satisfaction	0.77	0.058	16.210	***	Supported
H2a	Satisfaction is positively correlated with loyalty	0.54	0.075	6.619	***	Supported
H2b	Satisfaction is positively correlated with personal innovativeness	0.56	0.058	11.361	***	Supported
H3	Personal innovativeness is positively correlated with loyalty	0.16	0.040	2.428	***	Supported

Thai consumers most likely have positive attitudes towards adopting and being loyal to the mobile payment and mobile wallet applications, when they have substantial level of self-efficacy. Thai consumers are found to be relatively satisfied and have positive intention to continue using mobile wallet apps, noticeably continue to make online banking transactions via mobile applications, as evident in our survey. In particular, positive attitudes strongly drive Thai consumers' satisfaction with mobile payment and mobile wallet applications, to be loyal to continue to use those mobile apps.

Our models show several insights that strongly support existing theory and establish new findings, especially with mobile payment and mobile wallet usage. First, in line with previous research on consumer satisfaction and loyalty (Ho and Wu, 2011; Oliva et al., 1992), Thai consumers are most responsive to repurchase of mobile wallet apps when they feel satisfied with the application experiences. Second, we also found substantial impacts at different levels when personal innovativeness acts as mediator between consumer attitudes and loyalty and between consumer satisfaction and loyalty. This is similar to the study findings by Chen (2008), and Lian et al. (2012) and implies, regardless e-payment methods, Thai consumers, in general, tend to behave the same between online banking (via laptop) and mobile banking, albeit at different weights among the studied constructs.

However, the significant findings from this study show that personal innovativeness mediates both consumer attitudes and satisfaction to loyalty. Without a driver from willingness to use and previous satisfaction with the brand, Thai consumers are not likely to adopt the mobile payment apps or be loyal to certain vendors. In addition, we also found weak path coefficients between personal innovativeness

and loyalty in both Model #2 and Model #3 (.16). This suggests Thai consumers who have a high level of self-efficacy, are not necessarily satisfied and committed to repurchase. Other factors such as habit, trust or competitiveness of rival apps might have some effects on Thai consumer loyalty behaviors. An extended model by including inertia, trust, competitiveness of rivals, and service quality could enhance our findings.

5.2. Managerial Implications

Personal innovativeness proved to have significant mediation effects from consumer attitudes, consumer satisfaction, and loyalty, even though Thai consumers in this study were not found to be substantially strong in personal innovativeness. The major factor that drives consumers' loyalty with mobile wallet apps adoption and usage in Thailand was derived from the consumers' satisfaction. Therefore, in the case that mobile app developers fail to consider the ease of use factor, Thai consumers could potentially perceive that apps to be difficult to navigate or use, which would most likely affect their attitudes and have less satisfaction. This is reasonable in a consumer behavior context, since when a consumer perceives a product to be less complicated and easier to use, their level of personal innovativeness is lower. However, being able or not to satisfy the consumer to stay loyal to Thai mobile payment and mobile wallet apps, this depends largely on personal innovativeness and consumer attitudes, as driven through satisfaction. Mobile app developers need to take into consideration many factors before making an investment decision. It is not the question of where to invest, but rather it is a question of when and how to improve consumer attitudes to increase satisfaction that leads to loyalty creation.

Personal innovativeness and favorable experiences prove to be an influential factor to increase satisfaction and generate loyalty. Learning from these findings, mobile app developers and service providers could emphasize the optimization of the user experience, particularly in the Thai market, where consumers are moderately sensitive to switching to other alternatives. All in all, there are many opportunistic areas where mobile wallet applications could be improved for the Thai market, apart from the Internet connection and security in mobile payment boundaries. Personal innovativeness drives both consumer attitudes and satisfaction, which is an important factor driving mobile wallet apps loyalty in Thailand.

5.3. Limitations and Future Research

This research has some limitations that present

opportunities for future research. First, we did not examine other possible individual, environmental factors, and product/service characteristics that might influence a consumer's cognitive and emotional responses to purchase and continue to use mobile wallet applications, such as inertia, trust, competitiveness of the rivalries, and service quality. We believe with these additional constructs, we may derive a more powerful explanation of the model that could add to understanding consumer loyalty. Second, we did not categorize the mobile wallet apps in our study, such as online shopping payment, top-up mobile credit, or simply e-money transfer. We believe that focusing on different types of mobile wallet apps, could certainly provide additional insights. Finally, we did not take cultural factors into the construct. We plan to make a comparison study across cultures in future research.

<References>

- [1] Agarwal, R., and Prasad, J. (1999). Are Individual Differences Germane to the Acceptance of New Information Technologies? *Decision Sciences*, 30(2), 351-359.
- [2] Amoroso, D., and Ackaradejruangsri, P. (2016). Exploring the Adoption of Mobile Technologies in Thailand: Development of a Research Model. *Journal of Business Management and Research*, 6(1), 19-28.
- [3] Amoroso, D., and Ackaradejruangsri, P. (2017). How Consumer Attitudes Shape Repurchase Intention and Increase Loyalty. *International Journal of E-Services and Mobile Application*, 9(3), 38-61.
- [4] Amoroso, D., Ackaradejruangsri, P., and Lim, R. (2017). The Impact of Inertia as Media and Antecedent on Consumer Loyalty and Continuance Intention. *International Journal of Customer Relationship Marketing and Management*, 8(2), 1-20.
- [5] Amoroso, D., and Lim, R. (2014). Innovativeness of Consumers in the Adoption of Mobile Technology in the Philippines. *International Journal of Economics, Commerce, and Management*, 2(1), 1-12.
- [6] Amoroso, D., and Lim, R. (2015). Exploring the Personal Innovativeness Construct: The Roles of Ease of Use, Satisfaction and Attitudes. *Asian Pacific Journal for Information Systems*, 25(4), 662-685.
- [7] Amoroso, D., Lim, R., Ackaradejruangsri, P., and Sato, O. (2015). The Ease of Use Construct: Why Japanese Consumers Like Complex Mobile Applications. *JASMIN 2015*, Tokyo, Japan, May 30-June 1, 2015.
- [8] Amoroso, D., and Ogawa, M. (2013). Comparing mobile and PC Internet adoption factors of loyalty and satisfaction with online shopping consumers. *International Journal of E-Business Research*, 9(2), 1-24.
- [9] Anderson, R., and Srinivasan, S. (2003). E-Satisfaction and E-loyalty: A Contingency Framework. *Psychology and Marketing*, 20(2), 123-128.
- [10] Atkinson, R., and Flint, J. (2001). Assessing Hidden

- and Hard-to-Reach Populations: Snowball Research Strategies. *Social Research Update, University of Surrey*, 33(2001), 1-4.
- [11] Balter, F., and Brunet, I. (2012). Social Research 2.0: Virtual Snowball Sampling using Facebook. *Internet Research*, 22, 57-74.
- [12] Bhatt, A. (2014). Consumer Attitude towards Online Shopping in Selected Regions of Gujarat. *Journal of Marketing Management*, 2(2), 29-56.
- [13] Blunch, N. (2013). *Introduction to Structural Equation Modeling Using IBM SPSS Statistics and Amos*, 2nd Edition, New York: Sage Publications.
- [14] Changya, H., and Wang, Y. (2010). Bootstrapping in AMOS. *Working paper: North Carolina Central University*, 1-14.
- [15] Chau, P., and Hu, P. (2011). Information Technology Acceptance by Individual Professionals: A Model of Comparison Approach. *Decision Sciences*, 32(4), 699-719.
- [16] Chavis, K. (2016). Empirical Evidence on Mobile Banking Service Quality and its Effect on Customer Satisfaction in Thailand. *ASEAN Journal of Management & Innovation*, 3(1), 36-42.
- [17] Chen, L. (2008). A Model of Consumer Acceptance of Mobile Payment. *International Journal of Mobile Communications*, 6(1), 32-52.
- [18] Chen, L. Y., and Wu, W. N. (2017). An Exploration of The Factors Affecting User's Satisfaction with Mobile Payments. *International Journal of Computer Science & Information Technology*, 9(3), 97-105.
- [19] Cheong, G., and Lau, R. (2008). Testing mediation and suppression effects of latent variables: Bootstrapping with structural equation models. *Organizational Research Methods*, 11(2), 296-325.
- [20] Chi, G. (2005). *A Study of Developing Destination Loyalty Model*. Doctor of Philosophy Dissertation, Oklahoma State University.
- [21] Cohen, J., Fishbein, M., and Clancy, O. (1972). The Nature and Uses of Expectancy-Value Models in Consumer Attitude Research. *Journal of Marketing Research*, 456-472.
- [22] Cyr, D., Head, M., and Ivanov, A. (2006). Design Aesthetics Leading to M-loyalty in Mobile Commerce. *Information and Management*, 43, 950-963.
- [23] Davis, F., Bagozzi, R., and Warshaw, P. (1989). User acceptance of computer technology: a comparison of two theoretical model. *Management Science*, 35, 982-1003.
- [24] DBS Bank (2016). *Industry Outlook: Telecommunications, Thailand*
- [25] Dessart, L., Veloutsou, C., and Morgan-Thomas, A. (2016). Capturing Consumer Engagement: Duality, Dimensionality and Measurement. *Journal of Marketing Management*, 32(5-6), 399-426.
- [26] England, L. (2014). *Cellum launches first Thai mobile wallet*. Retrieved from <http://www.paymenteye.com/2014/10/03/cellum-launches-first-thai-mobile-wallet/> (October 3, 2014).
- [27] Fintechnews (2016). *5 Mobile Payment Methods in Thailand that You Must Know*. Retrieved from <http://fintechnews.sg/5993/mobilepayments/5-mobile-payment-methods-thailand-must-know/> (October 14, 2016).
- [28] Gajjar, N. B. (2013). Factors Affecting Consumer Behavior. *RET Academy for International Journal of Multidisciplinary Research*, 1(2), 10-14.
- [29] Hill, S., and Troshani, I. (2009). Adoption of Personalization Mobile Services: Evidence from Young Australians. *Paper presented at the BLED 2009 Proceedings*.
- [30] Holland, J., and Baker, S. (2001). Customer Participation in Creating Web Site Brand Loyalty. *Journal of Interactive Marketing*, 15(4).
- [31] Ho, C., and Wu, W. (2011). Role of Innovativeness of Consumer in Relationship Between Perceived Attributes of New Products and Intention to Adopt. *International Journal of Electronic Business Management*, 9(3), 258-266.
- [32] IDC Financial Insight. (2016). E-payment players ready to rumble. Retrieved from <https://www.bangkokpost.com/business/news/1376963/e-payment-players-ready-to-rumble> (December 22, 2017).
- [33] Kim, J., Shin, B., and Lee, H. (2013). The mediating

- role of psychological contract breach in IS outsourcing: inter-firm governance perspective. *European Journal of Information Systems, supply. Special Issue: Governing IT in inter-organizational*, 22(5), 529-547.
- [34] Kosinski, M., Matz, S., Gosling, S., Popov, V., and Stillwell, D. (2015). Facebook as a Research Tool for the Social Sciences. *American Psychologist*, 70(6), 543-556.
- [35] Koufaris, M. (2002). Applying the Technology Acceptance Model and Flow Theory to Online Consumer Behavior. *Information Systems Research*, 13(2), 205-223.
- [36] Kuusik, A. (2007). *Affecting Customer Loyalty: Do Different Factors have Various Influences in Different Loyalty Levels*. Retrieved from <http://ftp.repec.org/opt/ReDIF/RePEc/mtk/febpdf/febawb58.pdf>
- [37] Lee, H., Qu, H., and Kim, Y. (2007). A study of the impact of personal innovativeness on online travel shopping behavior-A study of Korean travelers. *Journal of Tourism Management*, 28(3), 886-897. Doi:10.1016/j.touriman.2006.04.013
- [38] Lian, S., Chen, X., and Wang, J. (2012). Content distribution and copyright authentication based on combined indexing and watermarking. *Multimedia Tools and Applications*, 57(1), 49-66.
- [39] Liljander, V., Polsa, P., and Forsberg, K. (2007). Do mobile CRM services appeal to loyalty program customers? *International Journal of E-Business Research*, 3(2), 24-40.
- [40] Lin, Y. S., Li, Y. J., and Tsay, C. Y. (2015). An Investigation of the Relationship between Customer Satisfaction and Loyalty on the Brand Image of Taiyen's Products - A Case Study of the Customer in Pingtung Area. *Journal of marketing Management*, 3(1), 53-63.
- [41] Lu, J., Yao, J., and Yu, C. (2005). Personal Innovativeness, Social Influences, and Adoption of Wireless Internet Services via Mobile Technology. *Strategic Information Systems*, 14(3), 245-268.
- [42] MacKinnon, D. (2008). *Introduction to Statistical Mediation Analysis*. New York: Lawrence Erlbaum Association.
- [43] Malabuppha, T. (2018) *E-Wallet Challenges in Thailand*. Retrieved from <https://thanawat.co/2018/01/02/e-wallet-future-payment/> (7 March, 2018)
- [44] Marketbuzz (2016). *Using Mobile for Payment*. Retrieved from <http://ecomeye.com/blog/guests/mobile-payment-research-in-thailand-and-southeast-asia/> (August, 2016).
- [45] Marshall, N. (2010). Commitment, Loyalty and Customer Lifetime Value: Investigating The Relationships Among Key Determinants. *Journal of Business and Economics Research*, 67-84.
- [46] National Statistical Office of Thailand (2017). *The 2016 Household Survey on the Use of Information and Communication Technology*.
- [47] Nielsen (2015). *Trend that will shape the Mobile Landscape in 2015*. Nielsen Report.
- [48] Noyan, F., and Simsek, G. G. (2014). The Antecedents of Customer Loyalty. *Procedia-Social and Behavioral Science*, 109, 1220-1224.
- [49] Oliva, T. A., Oliver, R. L. and MacMillan, I. C. (1992). A Catastrophe Model for Developing Service Satisfaction Strategies. *Journal of Marketing*, 56, 83-95.
- [50] Parasuraman, A., Zeithaml, V., and Berry, L. (1988). SERVQUAL: A Multiple-Item Scale for Measuring Consumer Perceptions of Service Quality. *Journal of Retailing*, 64(1), 12-40.
- [51] Rogers, E. (1995). Bringing Innovation to Market. *Journal of Marketing*, 53(2), 1995, 131-167.
- [52] Rucker, D., Preacher, K., Tormala, Z., and Petty, R. (2011). Mediation analysis in social psychology: current practices and new recommendations. *Social and Personality Psychology Compass*, 5/6, 359-371.
- [53] Sambandaraksa, D. (2015). AIS teams with CIMB for interest-paying mobile wallet. Retrieved from <http://www.telecomasia.net/content/ais-teams-cimb-interest-paying-mobile-wallet> (March 24, 2015).
- [54] Shih, C. (2011). Comparisons of Competing Models between Attitudinal Loyalty and Behavioral Loyalty. *International Journal of Business and Information*, 8(1), 149-166.

- [55] Standard Chartered (2017). *Change the way you pay with mobile wallets* (June 9, 2017).
- [56] Statista (2017). *Digital Payments, Mobile Payments Highlights*. Retrieved from <https://www.statista.com/outlook/331/126/mobile-payments/thailand#marketStudy> (April 26, 2017).
- [57] Tavilla, E. (2015). *A Case Study in Mobile: Paving the Way for Mobile Payments in Thailand*. Federal Reserve Bank of Boston, 1-9.
- [58] The Paypers (2017). Preferred payment methods Thailand, thepappers.com, June 9, 2017.
- [59] Trivedi, J., and Kumar, S. (2014). Determinants of Mobile Commerce Acceptance amongst Gen Y. *Journal of Marketing Management*, 2(2), 145-163.
- [60] Wu, J., and Qi, D. (2010). Moderating effect of personal innovativeness in the model for e-store loyalty. *Proceedings of the 2010 International Conference on E-Business and E-Government* (2065-2068).
- [61] Vogt, W. (1999). *Dictionary of Statistics and Methodology: A Nontechnical Guide for the Social Sciences*. London: Sage.
- [62] Zhang, J., Zhu, H., and Ding, H. (2013). Board Composition and Corporate Social Responsibility: An Empirical Investigation in the Post Sarbanes-Oxley Era. *Journal of Business Ethics*, 114(3), 381-392.

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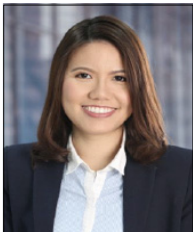


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