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FACTORS INFLUENCING ADOPTION AND ACTUAL USAGE OF DIGITAL PAYMENT SYSTEMS IN THE ERA OF THAILAND 4.0 FOR THAI SOCIETY

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Abstract

The 20-year Thailand Digital Economy and Society Development Plan driven through Thailand 4.0 is the country's priority and a key driver to promote cashless society. It's crucial for Thailand to ensure that acceptance and adoption of digital payment systems are on track and understand where to do better after implementing the e-Payment initiative. This study aims to explore factors influencing adoption and actual usage (AU) of digital payment systems in the early era of Thailand 4.0, validate a new integrated model between the unified theory of acceptance of use of technology 2 (UTAUT2) and the innovation resistance theory (IRT) under the context of users, and investigate the mean differences of AU among different income levels. This research was conducted a quantitative analysis through a survey method in form of online questionnaire. 780 consumers who have ever used any modes of the digital payment systems from all region across Thailand were selected as target respondents for this study. The results indicate that behavioral intention (BI) to use and innovation resistance (IR) affect the usage of digital payment systems. Both BI and IR could well explain AU. There were mean differences arising from the differences of income levels toward AU. In addition, insights deriving from some defined factors were interestingly found out from this study which would benefit to concerned stakeholders.

Keywords: digital payment, digital society, e-payment, m-payment, UTAUT, UTAUT2, IRT, innovation resistance, behavioral intention, actual usage, Thailand 4.0, cashless

Introduction

The Thai government has prioritized transforming the country into "Digital Thailand" through the 20-year Thailand Digital Economy and Society Development Plan known as Thailand 4.0 aiming to drive the new S-curve industries by leveraging its well-established nationwide digital technologies and infrastructure. A decrease of 7.7% of banknote production volume in 2016 corresponded with the country's digital payment initiative (Bank of Thailand [BOT], 2017). This leads to a commitment of Thai government to make Thailand a digital society and a hub for ASEAN aligning with the global payment direction (Thailand Board of Investment, 2016). Adoption of digital payment systems is considered being one of challenges for the country to accomplish. A success ultimately depends on the user's acceptance and adoption of the systems. This is of interest and leads to an empirical study of the adoption of digital payment systems in the era of Thailand 4.0 to find out answers for the following research questions.

Q1: What is the situation in Thailand after implementing e-Payment initiative and what are key factors influencing acceptance and adoption of the digital payment systems?

Q2: Are there any mean differences among income levels toward actual usage of the digital payment systems at its nascent stage?

There are no existing researches found to comprehensively study a wide range of factors influencing the acceptance and adoption of digital payment systems for Thai context in the early era of Thailand 4.0. This research therefore constructed a conceptual framework to fill this gap. It explored factors influencing the behavioral intention and innovation resistance as barriers toward actual usage of digital payment systems and applied a new integrated model between the unified theory of acceptance and use of technology 2 (UTAUT2) and innovation resistance theory (IRT) to come up with statistical evidences to support the afore-mentioned research questions. Surprising and interesting results were highlighted and discussed in this paper. Therefore, the knowledge of factors influencing the adoption of digital payment systems from the citizens' point of view and demographic profiles benefits to all stakeholders. It allows each party to understand in depth, perform their roles appropriately, and better formulate their strategies to strengthen the acceptance and adoption of digital payment systems in the later stages.

Digital payments are defined as electronic fund transfers. ATM transactions, transfer via a smartphone, point of sales transfer, internet and card payments are examples of digital payment systems which are dependent upon different technologies (Sivathanu, 2018). Digital payment is a mode of payment initiated through digital format which both payer and payee use it to send and receive money without involving hard cash i.e. coin and paper cash aligning with Hord (2005). All the transactions in the digital payment system are made and completed online which is also called as electronic payment (Pandey, 2017). The terms, mobile payment, mobile commerce, and

contactless payment, also encompass the definition of digital payment (Taylor, 2016).

Digital payment systems in this study are defined as all modes of payment other than cash and paper forms i.e. checks, which may or may not link to a bank account. Examples of digital payment systems are ATM, BAHTNET, credit card, debit card, e-Money (7 Card, Easy Pass, Rabbit Card, PromptPay, QR Code, etc.), internet payment, mobile payment, contactless payment, etc.

Literature review

Unified theory of acceptance and use of technology 2 (UTAUT2)

There is a number of models with different set of factors explaining how users accept and use innovations or technologies (Venkatesh, Morris, Davis & Davis, 2003; Venkatesh, Thong & Xu, 2012). The unified theory of acceptance and use of technology (UTAUT) is formulated by integrating four determinants (performance expectancy, effort expectancy, social influence, and facilitating conditions) that influence the adoption of information technology in the organizational context (Venkatesh et al., 2003). It was respectively extended other three determinants of behavioral intention and use behavior (hedonic motivation, price value, and habit) to serve the context of users known as UTAUT2 (Venkatesh et al., 2012). This study therefore considers UTAUT2 model to comprehensively explore factors influencing the adoption and actual usage of digital payment systems in Thailand.

Innovation resistance theory (IRT)

Sheth (1981) studied the innovation resistance (IR) psychology of consumers. He argued that the habit towards the existing behavior is one of factors to construct IR for adoption of innovation. Ram and Sheth (1989) therefore linked the theory of adoption with the theory of IR together by developing psychological (tradition and image) and functional (usage, value, and risk) barriers to innovation adoption. Hence, it's appropriate to combine the theory of IR as part of the conceptual framework for this study.

Performance expectancy)PE(

Performance expectancy is a scope of an individual's belief that helps him or her to gain job performance (Venkatesh et al, 2003). Five constructs pertaining to the performance expectancy and evolving in the literature from various models are perceived usefulness, extrinsic motivation, job-fit, relative advantage, and outcome expectations. Their similarities are acknowledged by some authors (Davis, 1989; Davis, Bagozzi & Warshaw, 1992; Thompson, Higgins & Howell, 1991; Moore & Benbasat, 1991; Plouffe, Hulland & Vandenbosch, 2001; Compeau & Higgins, 1995). Benefits of PE that the consumers get are personal image, economic benefits, convenience, and satisfaction (Taylor & Todd, 1995a, 1995b; Rogers, 1995) which match with the context of this study.

Effort expectancy (EE)

Effort expectancy is the ease of use experienced by the customers while using the system. The concept of EE from the existing models consists of

three constructs with similar definition i.e., perceived ease of use, complexity, and ease of use (Venkatesh et al, 2003). Cognitive efforts are required while learning and using the technology in the initial phase (Gefen, 2003; Venkatesh & Davis, 2000). The customers' expectations are improved for expected performance when they are at ease while using the mobile banking (Zhou, Lu & Wang, 2010; Hongxia, Xianhao & Weidan, 2011; Thakur, 2013; Mohammadi, 2015; Koksal, 2016; Martins, Oliveira & Popovic, 2014). Thus, the customers intend to use any kind of technology if there is less effort required (Sivathanu, 2018).

Social influence (SI)

Social influence is the consumers' perception toward belief of society that includes family members, friends, and other consumers who use the technology (Venkatesh et al., 2003). The consumers form a favorable image toward the use of technology and believe in what they can obtain from their societies as social image and status (Venkatesh & Morris, 2000; Venkatesh & Davis, 2000). SI is represented as subjective norm, social factors, and image (Venkatesh et al., 2003). Social norms are stated by Thompson et al. (1991) as a term to define their construct with its meaning similar to the subjective norm.

Facilitating condition (FC)

Facilitating condition is the degree to which an individual believes that an organizational and technical infrastructure exist to support the utilization of systems. The three constructs can explain the same i.e., perceived behavioral control, facilitating conditions, and compatibility which are formed to eliminate barriers to use the digital payment system (Venkatesh et al., 2003). Taylor & Todd (1995a, 1995b) indicate that facilitating covers resources, software, hardware, knowledge of information, and technical support. FC will be a guideline, assistance, training provided for users when it comes to use of any technology (Venkatesh, Thong & Xu, 2012).

Hedonic motivation (HM)

Hedonic motivation is the way to measure pleasantness, fun, and enjoyment that derives from using the systems that consumers perceived. It contributes to the consumers' behavioral intention to use the technology. The critical influence of HM is from the novelty seeking and innovativeness existing in utilizing new systems (Venkatesh et al., 2012). Consumers enjoy using technology when the technology is pleasurable to use can well explain HM by Lee, 2009, Leong, Ooi, Chong & Lin (2013).

Habit (HA)

Habit is identified by the perceptional concept of doing or performing often, routinely, and regularly as repeated behavior (Venkatesh et al., 2012). If an individual keeps doing some actions regularly and is satisfied with the result, it explains the actions as habitual pattern (Venkatesh et al., 2012). A few existing researches concluded that habit contributed to BI to use information technology (Lankton, Wilson & Mao, 2010; Aarts & Dijksterhuis, 2000) and had an influence on BI when mobile payment was used (Dahlberg & Oorni, 2007). However, Raman and Don (2013) examined that habit had a

negative influence towards BI. Thus, it is reasonable to apply these literatures to this study when using the system becomes a habit for consumers to adopt the digital payment system.

Usage barrier (UB)

Usage barrier is formed when consumers feel against the innovation owing to any new systems are not well corresponded with the current ones including practices and habits (Ram & Sheth, 1989; Laukkanen, Sinkkonen & Laukkanen, 2009) confirmed that the resistance to the usage of banking technology was existing based on prior studies. UB is considered as one of the major factors that influences innovation resistance of consumers who use the innovation. Thus, the consequence of UB towards IR for the digital payment systems should be considered to prove whether it's in line with the previous studies or not.

Value barrier (VB)

Value barrier is the consumers' view from financial aspect arising from the innovation that adds value to its operation; in particular (Davis, Bagozzi & Warshaw, 1989). Innovation may fail to deliver smarter performance compared to the existing alternate systems to the users. Hence, they do not realize any value added to the new innovation (Ram & Sheth, 1989). It was reported that the banks did not provide online banking services or system features that they used to offer to the consumers (Fain & Roberts, 1997). This would be considered as VB and reasonable to examine with the IR to use the digital payment systems.

Risk barrier (RB)

Risk barrier is the perceived risks that causes damages to the consumers in areas of financial, social, physical, and psychological (Forsythe & Shi, 2003). There are some concerns related to PIN codes, security, and privacy in the internet and mobile banking services which are considered as risk (Kuisma, Laukkanen & Hiltunen, 2007; Luarn & Lin, 2005). Confidentiality is the perceived security regarding the internet banking in addition to other risks perceived by the consumers who used the digital payment systems according to Liao and Cheung (2002). An influence of RB towards IR therefore makes sense to be focused on in this study.

Traditional barrier (TB)

Traditional barrier is realized as an obstacle deriving from norms, traditions, and any kinds of behavior which the consumers tend to present it in a way that conflict the norms maintaining in family, community, society, or groups (Herbig & Day, 1992). Innovation resistance is a consequence of disapproval of the society according to Ram and Sheth (1989). There are a few instances to well describe the barrier in this context i.e., the consumers are not familiar with electronic medium when they are paying bills (Fain & Roberts, 1997), and they prefer using traditional channel to pay their bills at the bank instead of processing it through electronic mode available (Forman & Sriram, 1991). The relationship of TB towards IR for adoption of the digital payment systems is investigated in this research.

Image barrier (IB)

Image barrier is an impediment of product features or attribute of an

innovation. According to Ram and Sheth (1989), the image generally arises from the various types of information, rumors, and a general image of a certain group of people known as stereotypes. Fain and Roberts (1997) suggested that the difficulty to use electronic and mobile services perceived by the consumers is a negative image of technology. With this adverse view, IB towards IR is included in this study.

Behavioral intention (BI)

Behavioral intention is a degree of intention of an individual to act or execute a specific behavior (Davis et al., 1989). It is also explained as the extent to which users are willing to use a technology (Carlsson, Carlsson, Hyvonen, Puhakainen & Walden, 2006; Harsono & Suryana, 2014). The subjective norm construct for behavioral intention is the most supreme antecedent (Ajzen, 1991). The theory of planned behavior (TPB) clarifies the purchase intention (Ajzen & Madden, 1986). It connects the behavior and attitude intentions together (May So, Wong & Sculli, 2005). The theory of reasoned action (TRA) is another model describes that performance of an obvious behavior is presented by the intention to carry out the behavior itself (Warshaw, 1980). There are a few researches conducted by Shih and Huang (2009) and Vatanasakdakul, Aoun & Li, (2010) emphasized that BI directly and positively influences actual usage of ERP systems. McKnight, Cummings & Chervany, 1998; McKnight, Choudhury & Kacmer, 2002, define BI as a trust construct to become trust related behaviors that accumulates and influences BI to AU (Pavlou, 2003). These views align with a context of BI to use digital payment systems for this study.

Innovation resistance (IR)

Innovation resistance is reaction of consumers towards an innovation. It creates either potential changes from a satisfactory status quo or conflict to their belief perspective. It is called as one of the critical factors for adoption of technological innovation (Szmigin & Foxall, 1998). Resistance to change, imposed by the innovation e.g. changes in adoption of digital payment systems under this study, is one aspect of innovation resistance (Gatignon & Robertson, 1989). Innovation resistance is but a special version of resistance to change (Ram, 1987). The resistance to change is any conduct that serves people to maintain the status quo in the area of pressure to alter the status quo. It is a nature of response of human being to any changes that disturb the balance of living environment or firms' actions (Zaltman & Duncan, 1977). Several studies identified resistance as the natural preference or tendency of individuals to avoid changes (Davis, 2004; Hartmann & Fischer, 2009; Lapointe & Rivard, 2005; Martinko, Henry & Zmud, 1996; Val & Fuentes, 2003; Waddell & Sohal, 1998). There are three forms of resistance which lead the consumers' response towards innovation resistance (Mirella, Nick & Wetzels, 2009). They are *direct rejection* i.e. no valuable advantage is offered by the innovation (Szmigin & Foxall, 1998), *postponement* i.e. delaying the adopting of digital payment systems to future, and *opposition* i.e. searching for more information after adopting the digital payment systems or protesting it. The most extreme form of

innovation resistance is the direct rejection (Mirella et al., 2009).

Actual usage (AU)

Actual usage is defined as *frequency of usage* which is one of the two dependent variables in addition to the Behavioral Intention (BI) to use digital payment systems, and derived from the UTAUT model of Venkatesh et al. (2003). Because of the necessity from an organization, some individuals will engage in certain behaviors to help predict actual usage of technology services (Ratten & Ratten, 2007). However, others may have opinions on the technological innovation based on time required to believe in the innovation. Thus, an individual's beliefs about the innovation will be partly presented by his or her actions and attitudes towards adoption of digital payment systems (Chen & Chang, 2013). It seemed that actual usage is unlikely easy to measure, but these beliefs can be part of help evaluate the adoption behavior in this context (Ratten, 2015).

Research framework and methodology

Research objective

This study aims to explore factors influencing acceptance and adoption of digital payment systems in areas of Behavioral Intention (BI), Innovation Resistance (IR), and Actual Usage (AU) of the systems in the early era of Thailand 4.0 after Thai government has launched the National e-Payment Master Plan to promote the digital economy across the country. Validating a new model integrated between the unified theory of acceptance and use of technology 2 (UTAUT2) and the innovation resistance theory (IRT) is also covered in this study. In addition, the researcher extends the study to investigate the mean differences of AU of digital payment systems as a result of different income levels to uniquely contribute and add value to this paper.

Conceptual framework

The conceptual framework of this study (Figure 1) is adopted from the theoretical model of Sivathanu (2018) who integrated UTAUT2 and IRT models into a single framework. The Price Value (PV) construct is not considered in this paper because the government provides an incentive of transfer fee exemption to promote both Thailand 4.0 growth model and the digital economy policy.

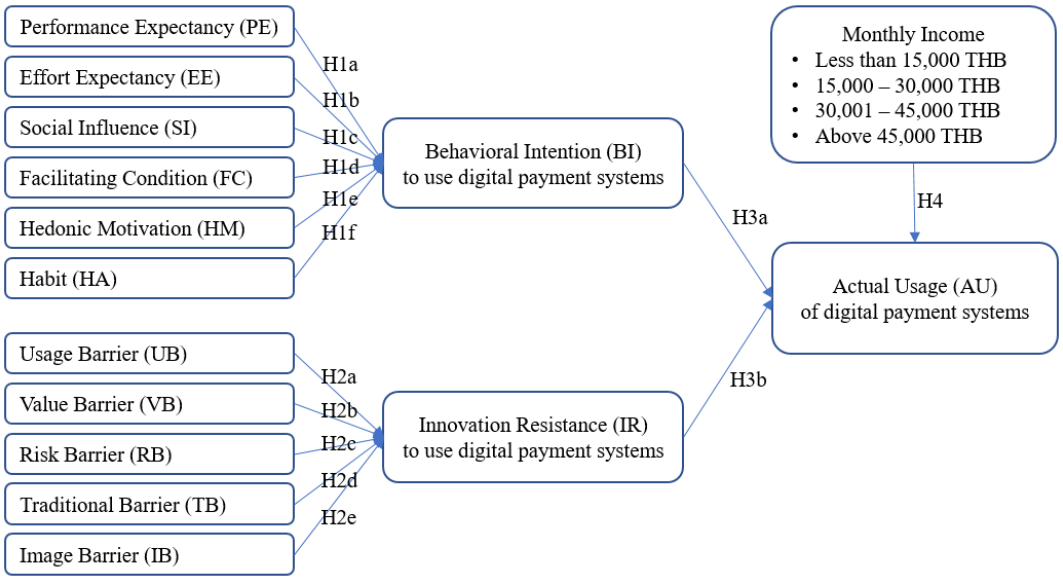

Figure 1 Conceptual Framework

This study forms fourteen hypotheses, as shown in Table 1, intended to achieve the research objective. The hypotheses are defined to align with the conceptual framework as follow:

Table 1 Defined Hypotheses

No.	H	Hypotheses
1	H1a	PE positively significant influences BI to use digital payment systems
2	H1b	EE positively significant influences BI to use digital payment systems
3	H1c	SI positively significant influences BI to use digital payment systems
4	H1d	FC positively significant influences BI to use digital payment systems
5	H1e	HM positively significant influences BI to use digital payment systems
6	H1f	HA positively significant influences BI to use digital payment systems
7	H2a	UB positively significant influences IR to use digital payment systems
8	H2b	VB positively significant influences IR to use digital payment systems
9	H2c	RB positively significant influences IR to use digital payment systems
10	H2d	TB positively significant influences IR to use digital payment systems
11	H2e	IB positively significant influences IR to use digital payment systems
12	H3a	BI to use digital payment systems has a positive significant influence on AU of digital payment systems

13	H3b	IR to use digital payment systems has a negative significant influence on AU of digital payment systems
14	H4	There is a significant mean difference in monthly income level on AU of digital payment systems

Research methodology

This research was conducted by performing the quantitative analysis for the adoption of digital payment systems in Thailand through a survey method. The survey was carried on in form of online questionnaire to collect all required data. The convenience and snowball sampling techniques were used as non-probability sampling for the data collection. In addition, the quota sampling was also intentionally selected to find out a mean difference of AU of the digital payment systems arising from the levels of monthly income.

Measurement of conceptual framework and variables

The literature review was conducted to ensure that UTAUT2 and IRT models were appropriate for developing the conceptual framework, and to understand all variables incorporated in this study. A five-point Likert scale was applied to test all hypotheses by ranking from strongly disagree (1) to strongly agree (5) throughout this study (Barnette, 2000).

Population and sample

Consumers who are residents in all region of Thailand and have ever used any modes of digital payment systems were selected as target respondents for this study. The total initial number of respondents who participated in the survey was 798 from various demographic profiles while at least 384 respondents are required at 95% confident level to represent 67 million people of Thai population size (Krejcie & Morgan, 1970). After validating the sample by two screening questions, 780 respondents were finally qualified to appropriately carry on the study. This is a similar sample size compared to Sivathanu (2018) who conducted an empirical study in adoption of digital payment systems in the era of demonetization in India.

Reliability test

The reliability test was established at the pilot stage when number of respondents reached 30. Cronbach's Alpha Coefficient was considered examining the reliability level of each group of items included in the questionnaire whether it is consistent and higher than 0.7 or not (Cronbach, 1951). With reference to Table 2, the Cronbach's Alpha Coefficient falls in a range between 0.748 to 0.963 which is greater than 0.7. This indicates that high internal consistency is met for all research constructs defined according to Nunnally (1978). Therefore, the questionnaire developed for this study is fully achieved the standard required for reliability test, and is acceptable to move the research forward.

Table 2 Reliability test

Second-order Construct	First-order Construct	No. of Items	Cronbach's Alpha
Behavioral Intention)BI(	Performance Expectancy)PE(	4	0.799
	Effort Expectancy)EE(	4	0.919
	Social Influence)SI(	4	0.830
	Facilitating Condition)FC(	4	0.855
	Hedonic Motivation)HM(	3	0.963
	Habit)HA(	4	0.921
	N/A	6	0.937
	Usage Barrier)UB(	5	0.846
	Value Barrier)VB(	3	0.895
	Risk Barrier)RB(	5	0.953
	Traditional Barrier)TB(	2	0.889
	Image Barrier)IB(	3	0.852
Innovation Resistance)IR(	N/A	3	0.748
Actual Usage)AU(	N/A	4	0.889

Result and discussion

Data analysis

Multiple Linear Regression (MLR) was used as a statistical tool to analyze the hypotheses based on the conceptual framework. The first group consists of six independent variables i.e. Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), Facilitating Condition (FC), Hedonic Motivation (HM), and Habit (HA), and one dependent variable which is Behavioral Intention (BI) to use digital payment systems. The second group comprises with five independent variables i.e. Usage Barrier (UB), Value Barrier (VB), Risk Barrier (RB), Traditional Barrier (TB), and Image Barrier (IB), and one dependent variable which is Innovation Resistance (IR) to use digital payment systems. The last group has two independent variables i.e. Behavioral Intention (BI) and Innovation Resistance (IR) to use digital payment systems, and one dependent variable which is Actual Usage (AU) of digital payment systems. In addition, One-Way ANOVA was used to analyze the score of mean differences of the Actual Usage (AU) of digital payment systems among the monthly income levels.

Demographic profile

This section aims to highlight the characteristics of demographic factors arising from the data that are collected from 780 respondents who are residents of Thailand and have ever used digital payment systems. Majority of

respondents is female which is two third or 67.7% of the total sample size whereas male is one third or 32.3% of the population. The respondents who participated in this study are Millennial or Gen Y (45.7%), Gen X (43.3%), and Baby Boomers (10.9%). They are from all regions across Thailand. The majority respondents live in Bangkok and Metropolitan (66.2%) followed by North (8.7%), Central exclusive of Bangkok and Metropolitan (7.7%), and South (6.5%) respectively. More than a half of respondents holds Diploma/Bachelor's Degree (56.4%) followed by Master Degree or higher (30.6%), Certificate/Secondary (8%), and less than that in a proportion of 5%. Over a half of respondents works for private companies (53.4%), followed by government (22.8%), state enterprises (5.1%) and the rest from varieties of occupation (18.7%) such as student, freelance, entrepreneur, retired people, housewife, and staff of international organizations. The monthly income levels of the respondents are very close to each other given that a quota sampling technique is intentionally applied to this study. The major monthly income ranges are 15,000-30,000 THB (27.4%) and above 45,000 THB (27.2%) and approximately 23% each for income ranges less than 15,000 THB and 30,001-45,000 THB.

With reference to the most preferred digital payment methods that the respondents have ever used, ATM is the first rank at 80.6%, credit cards/debit cards come second at 70.2%, followed by internet payment and mobile payment which both represent the same level of preference in the third rank at 62.9%. e-Money comes next at 47.3% whereas BAHTNET stands last at 2.7% respectively. The respondents use digital payment systems mostly once a week)28.3%(and once every 2-3 days)27.3%(whereas every day comes at the moderate frequency)17.7%(. Once every 4-6 days and once a month are at the least frequencies from the survey i.e. 13.9% and 12.8% respectively.

Descriptive analysis

Pearson's correlation

Table 3 Correlation Matrix)H1a – H1f(

Variable	Mean	SD	BI	PE	EE	SI	FC	HM	HA
BI	3.8794	0.84123	1						
PE	3.9583	0.65653	0.665*	1					
EE	3.8779	0.71964	0.664*	0.617*	1				
SI	3.9173	0.74558	0.657*	0.653*	0.603*	1			
FC	3.6122	0.75628	0.660*	0.605*	0.662*	0.635*	1		
HM	3.5029	0.89264	0.714*	0.595*	0.645*	0.608*	0.634*	1	
HA	3.7750	0.91837	0.832*	0.631*	0.677*	0.608*	0.688*	0.674*	1

*Note: * represents the correlation which is significant at 0.05 level (1-tailed).*

With reference to the Pearson's Correlation Matrix for H1a – H1f as exhibited in Table 3, all variables have positive correlations among each other with P-value less than 0.05. According to the strength of correlations defined by the Political Science Department at Quinnipiac University)Statistic how to, n.d.(, the overall relationship between variables has a strong positive relationship in the range 0.595-0.688 while two pairs in the matrix showing very strong relationship. Those are Hedonic Motivation)HM(and Behavioral Intention)BI(at 0.714 correlation, and Habit)HA(and Behavioral Intention)BI(at 0.832 correlation.

Table 4 Correlation Matrix)H2a – H2e(

Variable	Mean	SD	IR	UB	VB	RB	TB	IB
IR	1.7884	0.93803	1					
UB	2.4674	0.92242	0.600*	1				
VB	2.3017	0.94657	0.642*	0.722*	1			
RB	3.7523	0.90185	0.168*	0.400*	0.345*	1		
TB	3.4090	0.72551	0.082*	0.043	0.003	0.169*	1	
IB	2.3340	0.93795	0.723*	0.732*	0.677*	0.332*	0.070*	1

*Note: * represents the correlation which is significant at 0.05 level (1-tailed).*

According to the Correlation Matrix for H2a – H2e shown in Table 4, it indicates positive correlations between variables in all pairs with P-values less than 0.05 except two ones of TB:UB and TB:VB which both P-values are more than 0.05. Different degrees of relationship can be reported as follow: VB:UB, IB:IR, and IB:UB have very strong positive relationship in the range 0.722 – 0.732. RB:UB, UB:IR, VB:IR, and IV:VB have strong positive relationship in the range 0.400 – 0.677. IB:RB and RB:VB have moderate positive relationship at 0.332 and 0.345 respectively. TB:IR, RB:IR, and TB:RB have no relationship between each other in the range 0.082 – 0.169.

Inferential analysis and multicollinearity validation

Table 5 Multiple linear regression result)H1a – H1f(, Dependent variable: BI

	Standardized Coefficient		
Hypothesis	**(β)**	**VIF**	**Result**
H1a	0.114*	2.215	Supported
H1b	0.037	2.418	Not Supported
H1c	0.120*	2.237	Supported
H1d	0.005	2.483	Not Supported
H1e	0.186*	2.310	Supported
H1f	0.534*	2.654	Supported
R Square		0.759	
Adjusted R Square		0.757	

*Note: * represents standardized coefficient (β) with P-value ≤ 0.05.*

The result exhibited in the Table 5 represents R^2 at 0.759 which means that 75.9% of all six independent variables in this first group i.e. Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), Facilitating Condition (FC), Hedonic Motivation (HM), and Habit (HA) could well explain the dependent variable, Behavioral Intention (BI) to use digital payment systems, at 0.05 significant level or 95% of confident level. The P-values of the independent variables, PE, SI, HM, and HA, are less than 0.05 indicate that H1a, H1c, H1e, and H1f are supported whereas other two hypotheses i.e. H1b and H1d are not supported because of P-values greater than 0.05. As a result, PE, SI, HM, and HA have statistically significant positive influences on BI to use digital payment systems at the Standardized Coefficients (Beta) 0.114, 0.120, 0.186, and 0.534 respectively. HA has the most statistically significant positive influence on BI with Standardized Coefficient 0.534. This implies that satisfaction with favorable results and convenience offered by service providers, encouragement from society (i.e. family members, friends, and other consumers), enjoyment, and preference of using it regularly are what the consumers perceived with less effort and without seeking training and technical support while executing transactions through digital payment systems. The variance inflation factors (VIFs) were verified to validate the multicollinearity problem. All VIFs were less than 5.00. This indicates that no critical issues exist with this study.

Table 6 Multiple linear regression result)H2a-H2e(, Dependent variable: IR

	Standardized Coefficient		
Hypothesis	**(β)**	**VIF**	**Result**
H2a	0.059	2.803	Not Supported
H2b	0.294*	2.342	Supported
H2c	-0.142*	1.237	Supported
H2d	0.066*	1.038	Supported
H2e	0.523*	2.403	Supported
R Square		0.585	
Adjusted R Square		0.582	

*Note: * represents standardized coefficient (β) with P-value ≤ 0.05.*

The outcome from the Table 6 reveals R^2 at 0.585 which interprets that 58.5% of all five independent variables in this second group i.e. Usage Barrier)UB(, Value Barrier)VB(, Risk Barrier)RB(, Traditional Barrier)TB(, and Image Barrier)IB(could explain the dependent variable, Innovation Resistance)IR(to use digital payment systems, at 0.05 significant level. The P-values of all independent variables are less than 0.05 except UB which confirm that the hypotheses namely H2b, H2c, H2d, and H2e are supported whereas H2a is not supported. This result leads to a conclusion that VB, RB, TB, and IB have statistically significant influences on IR to use digital payment systems. IB has the most positive influence on IR to use digital payment systems with Standardized Coefficient 0.523, followed by VB at 0.294. Surprisingly, the result obviously presents that only RB has negative significant influence on IR to use the digital payment systems with Standardized Coefficient -0.142. Hence, RB is considered being an inhibitor to the innovation resistance. The multicollinearity problem was also validated and found no issues similar to the previous group. This implies that financial benefit in area of cost savings together with economy benefit in area of time savings, availability of traditional modes of payment, negative image of technology in areas of features and attributes spread via word of mouth or rumors are factors for consumers to create potential changes while less concerns in security and privacy are demonstrated to adopt the digital payment systems in the era of Thailand 4.0.

Table 7 Multiple linear regression result)H3a-H3b(, Dependent variable: AU

	Standardized Coefficient		
Hypothesis	**(β)**	**VIF**	**Result**
H3a	0.624*	1.118	Supported
H3b	-0.235*	1.118	Supported
R Square		0.539	
Adjusted R Square		0.538	

*Note: * represents standardized coefficient (β) with P-value ≤ 0.05.*

The result presented in the Table 7 shows R^2 at 0.539 which indicates that 53.9% of both independent variables as intermediate ones in the last group i.e. Behavioral Intention)BI(and Innovation Resistance)IR(to use digital payment systems could explain the dependent variable, Actual Usage)AU(of digital payment systems, at 0.05 significant level. The P-values of both independent variables are less than 0.05 which also confirm that both hypotheses, H3a and H3b, are supported. This implies that BI and IR to use digital payment systems have statistically significant influences on AU of digital payment systems. With reference to the Standardized Coefficients reported in the Table 8 for both BI)0.624(and IR)-0.235(, it leads to a conclusion that BI has a positive influence on AU of digital payment systems whereas IR, in contrast, has a negative influence on AU of digital payment systems. The multicollinearity problem was accurately validated and found no issues in line with the previous two groups. This reveals that trust accumulated for the consumers to express their intention and reaction towards an innovation as conflict to their belief affect the frequency of use of the digital payment systems because it may take time for some of them to believe and rely on the systems.

Table 8 One-way ANOVA

ANOVA					
AU					
	Sum of Squares	**df**	**Mean Square**	**F**	**Sig.**
Between Groups	8.937	3	2.979	3.670	0.012
Within Groups	629.823	776	0.812		
Total	638.760	779			

An analysis of variance exhibited in the Table 8 above shows that the influence of mean difference of monthly income levels on Actual Usage)AU(of digital payment systems is significant, F)3, 776(= 3.67, p = 0.012.

Table 9 Scheffe's post hoc test)Multiple comparisons(

Income Level (THB)	Income Level (THB)	Mean Difference
(I)	(J)	(I-J)
Less than 15,000	15,000-30,000	0.256*
	30,001-45,000	0.284*
	Above 45,000	-0.180
15,000-30,000	Less than 15,000	0.256*
	30,001-45,000	-0.028
	Above 45,000	0.077
30,001-45,000	Less than 15,000	0.284*
	15,000-30,000	0.028
	Above 45,000	0.105
Above 45,000	Less than 15,000	0.180
	15,000-30,000	-0.077
	30,001-45,000	-0.105

*Note: * represents the mean difference with P-value ≤ 0.05.*

The Scheffe's Post hoc Test result exhibited in the Table 9 indicates that there are statistical differences of mean scores of Actual Usage (AU) of digital payment systems between two income levels i.e. between less than 15,000 THB and 15,000 – 30,000 THB, and between less than 15,000 THB and 30,001-45,000 THB vice versa at 95% confident level. Thus, H4 is supported. This indicates that the differences of income levels of consumers influence intention of individuals to execute transactions through digital payment systems. Thus, the way to approach each group of consumers should be considered differently when launching marketing campaigns to suit each group because their levels of income matters.

Conclusion, limitation and recommendations

Discussion and conclusion

This research was conducted an empirical study to examine factors influencing adoption and actual usage of digital payment systems in the early era of Thailand 4.0 for Thai society after the launch of the National e-Payment Master Plan by the Thai government. The study was also extended to investigate the mean differences of monthly income levels of 780 respondents across the country, which influenced the actual usage of digital payment systems as a unique contribution of this paper. The conceptual framework was adopted from an integration of the unified theory of acceptance and use of technology 2 of

Venkatesh et al., (2012) and the innovation resistance theory of Ram and Sheth (1989) to test fourteen hypotheses. The results obtained from Pearson's Correlation, Multiple Linear Regression, and One-Way ANOVA lead to a conclusion of this study.

Performance expectancy (H1a), social influence (H1c), hedonic motivation (H1e), and habit (H1f) have positive significant influences on behavioral intention to use digital payment systems consistent with the existing studies (Aarts & Dijksterhuis, 2000; Kim, Park & Oh, 2008; Lankton et al., 2010; Tarhini, El-Masri & Serrano, 2016; Venkatesh & Morris, 2000; Venkatesh et al., 2003).

However, effort expectancy (H1b) and facilitating condition (H1d) do not have positive significant influences on behavioral intention to use digital payment systems. Effort expectancy becomes nonsignificant over periods of sustained and extended usage which is in line with previous researches (Agarwal & Prasad, 1997, 1998). Influence of effort expectancy will be stronger for women and older workers with limited experience (Venkatesh et al., 2003). This concludes that there is less effort required from respondents who intend to use digital payment systems in Thai society. It interprets that "Ease of Use" is the key component of designing the digital payment systems and developing its online application. Thus, system developers are still needed to assure the ease of use for the systems. With reference to influence of facilitating condition, the finding exactly aligns with the studies of Hosseini, Delaviz & Derakhshide (2016), and Tarhini, Masa'deh, Al-Busaidi, Mohamad, & Maqubleh (2017). Venkatesh (2000) also concluded that when both performance expectancy and effort expectancy are presented, facilitating condition becomes nonsignificant on behavioral intention which is consistent with the finding of this study. In contrast, facilitating condition would have a direct influence when testing with actual usage alone. This concludes that a guidance, technical support, training would be considered as unnecessary for users in the early era of Thailand 4.0 when using the digital payment systems because they are experienced users and keen to use the systems. In addition, they perceived ease of use and benefited from convenience and were satisfied while using digital payment systems as performance expectancy and effort expectancy are presented according to Venkatesh (2000). 87% of respondents hold education degrees equivalent to bachelor's and higher is rational to support this conclusion in a way that they get to know well how the digital payment systems work. This means that education is needed to support adoption and acceptance of digital payment systems. This leaves a challenge with the government to cope up with it in a long-run.

Value barrier (H2b), risk barrier (H2c), traditional barrier (H2d), and image barrier (H2e) have positive significant influences on innovation resistance to use digital payment systems. These findings are consistent with the study of Sivathanu (2018) except usage barrier ((H2a) which has no positive significant influence on innovation resistance. This reveals that users feel that using digital payment systems are simple, user-friendly, and quicker. Development of

the digital payment systems is understandable, and changing PIN codes is convenient with no harm. Hence, this reflection makes sense and can be considered as another insight arising from this study.

The influence of value barrier arises from the awareness of consumers to be charged for transactions initiated via digital payment modes after the government has withdrawn the incentives. Thus, increasing of transaction fees must be carefully considered. The value of new digital payment systems perceived less than the existing ones is another concern.

Risk barrier (H2c) plays an inhibitor role to innovation resistance to use digital payment systems. There are two studies found negative influence of perceived risk towards behavioral intention (Tan & Lau, 2016; Wu, Liu & Huang, 2017). The finding of this study is in contrast with Sivathanu (2018) which can contribute and be considered as food for thought for Thai context where the consumers have less concerns of loss of internet connection, accuracy of input information via digital systems, making mistake in tapping the bill information, account accessing by third party, and having PIN codes with wrong hands during the early era of Thailand 4.0. This could imply that the consumers have less resistance to use digital payment system and rely more on the security protection and new designs of the systems such as QR code which can eliminate mistakes and risks. However, they are still aware of the risk while using the digital payment systems. Therefore, maintaining good security protection with innovative approaches at all time will dilute concerns in this area.

Traditional barrier (H2d) is confirmed as an influencer of innovation resistance given that the consumers still prefer using traditional channels to pay their bills for some reasons (Forman & Sriram, 1991). One rationale would be a restriction of threshold for making one transaction via digital payment systems such as ATM. Image barrier (H2e) in areas of features and attributes of digital payment systems including images arising from word of mouth regarding difficulty to use is what consumers are concerned. It plays the most important role with the most influence on innovation resistance.

Behavioral intention (H3a) has a positive significant influence on actual usage of digital payment systems which is consistent with the previous studies (Sivathanu, 2018; Venkatesh & Zhang, 2010; Venkatesh et al., 2003, 2012). It implies that the launch of the National e-Payment Master Plan influences on actual usage of digital payment systems. Positive feedbacks of Thai citizens from frequency of use responding to this initiative in executing transactions through digital payment systems are a key success of the government and all stakeholders. Hence, the afore-mentioned factors should be monitored in order to promote this initiative in a sustainable manner.

Innovation resistance (H3b), in contrast, has a negative significant influence on actual usage of digital payment systems which is in line with the previous studies (Garcia & Atkin, 2002; Sivathanu, 2018). This proves that the above-mentioned barriers still exist as obstacles on actual usage of the digital payment systems in the early era of Thailand 4.0. Thus, the more the barrier

of VB, TB, and IB are reduced, the less resistance will become an inhibitor similar to RB which will support the acceptance and adoption of the digital payment systems in Thailand.

The analysis of mean differences of actual usage of the digital payment systems among monthly income levels shows that there are two groups of income levels with mean differences. Those are the income levels between less than 15,000 THB and 15,000 – 30,000 THB, and less than 15,000 THB and 30,001 – 45,000 THB vice versa. This result provides the same insight compared to the studies of Connolly & Stavins (2015) and Stavins (2016) who concluded that the income was correlated with consumers' payment behavior.

In conclusion, based on the above-mentioned results and discussions, habit (HA) should be the factor to address as it plays the most significant positive influence role on behavioral intention (BI) for Thai context, however, it may become negative influence in accordance with the research conducted by Raman and Don (2013). Hence, satisfaction of services should be seriously monitored; otherwise, it will create impact on the habitual pattern of the acceptance and adoption of the digital payment systems. In addition, image barrier (IB) which related to product features of the systems is another major factor to carefully consider because it easily creates a negative image of technology from unpleasant features of the digital payment systems.

Theoretical contribution

Behavioral intention to use digital payment systems was well explained by performance expectancy, effort expectancy, social influence, facilitating condition, hedonic motivation, and habit as independent variables under the unified theory of acceptance and use of technology 2 model at 75.9%.

Innovation resistance to use digital payment systems was explained by usage barrier, value barrier, risk barrier, traditional barrier, and image barrier as independent variables under innovation resistance theory model at 58.5%.

Actual usage of digital payment systems was also explained by behavioral intention and innovation resistance under the unified theory of acceptance and use of technology 2 and innovation resistance theory models at 53.9%.

This is a unique contribution made to recognize the study of Sivathanu (2018) who integrated these two models for studying adoption of digital payment systems in the era of demonetization in India. The theoretical model could be recognized and adopted to appropriately carry on this research to explore factors influencing adoption and actual usage of digital payment systems in the context of Thai society.

Implication and recommendation

Given that no study exists to investigate the new integrated model arising from the study of Sivathanu (2018) regarding the adoption and actual usage of digital payment systems, this research was carried out to validate the model for the first time by comparing the findings and results from the country contexts of

demonetization in India and Thailand 4.0 of Thai society under the National e-Payment framework. There is some food for thought derived from this study as valuable insights that should be highlighted and would benefit to researchers.

This study extended the implication to digital payment service providers including commercial banks as the government's counterparts. They should conquer all existing barriers and issues influenced digital payment systems, and take all key factors influencing behavioral intention into account by playing an active role in promoting and facilitating attractive marketing campaigns to increase awareness of using digital payment systems, in particular of considering the result of mean differences of consumers' income levels that influence on actual usage of digital payment systems. The waivers of fees which have been announced recently are what Thai commercial banks introduced to promote their digital payment services. This initiative should be continuously maintained. The service providers should make the systems trendy, fun, and enjoyable to increase customers' satisfaction and motivation and serve their digital lifestyles. Promoting more on social medias to boost engagement and build professional image is recommended strengthening the social influence as smartphones are considered as a tool that the people can't live without it in the digital world.

The country economists can also benefit from this study by having the insights analyzed in depth from economist perspective in order to advise and provide inputs for the government to monitor, enhance the infrastructure, and prepare for being cashless society in the future.

Bank of Thailand as one of policy makers who is accounted for the National e-Payment framework can utilize the findings and insights to optimize the ongoing policies and initiatives i.e. PromptPay, QR Code. Formulating new policies and enforcing cyber and security protection laws to suit and attract the citizens and all stakeholders are also recommended to mitigate unexpected risk. Maintaining incentives of fees exemption is the right scheme to promote and sustain the actual usage of digital payment systems for Thailand.

Consumers as key players and users including new entrants who are reluctant to use the digital payment systems should gain knowledge from insights of this study, especially the concern of risk which was reported as the inhibitor to innovation resistance. This highlights a very positive signal for the existing consumers and the new entrants to feel more confident with less concerns in security, privacy, and confidentiality when using the digital payment systems in the era of Thailand 4.0.

Limitation and future research directions

This research is limited with the new integrated model, the unified theory of acceptance and use of technology 2 and the innovation resistance theory, and aims to achieve the objective based on appropriateness identified. Thus, other models of technology adoption and innovation resistance should be

considered carrying on the further studies. This research was conducted in the context of Thailand only. With diversity and rapid growth of disruptive technology in various dimensions, it makes sense to consider looking to different contexts in terms of countries, cultures, FinTech, in particular of PromptPay, QR Code, Bitcoin, Crypto currencies and so on which are now considered as part of mega trend as one of directions for future studies.

Another demographic factor may be considered testing and providing an insight to benefit concerned stakeholders. For instance, education level is recommended examining for adoption of digital payment systems according to the study of Singh (2017). Incorporating other relevant factors such as price value, trust, loyalty, and government support is also recommended coming up with new theories and conceptual frameworks in order to comprehensively understand different contexts, make differences and uniqueness, and add value to the upcoming studies. In addition, a later stage of Thailand 4.0 is highly recommended studying further before moving forward to the cashless society in the near future.

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