Promoting habitual mobile payment usage via the Thai government's 50:50 co-payment scheme

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ABSTRACT

The Thai government launched an economic stimulus initiative using mobile payments (m-payments) to alleviate the economic and public health effects of the COVID-19 outbreak. The advantages of this program and the simplicity, dependability, and contact-free nature of m-payments have led to its widespread adoption in Thailand. Many Thai individuals have never used the m-payment method before. Hence, the aim of this study was to investigate at potential factors that encourage frequent m-payment usage with an emphasis on user attitudes and continual usage intentions. The technology acceptance model and the mental accounting theory were used in this study to analyse 506 respondents who had completed a questionnaire survey. According to the structural equation modeling analysis of the survey data, Thai peoples' desire to take part in the government's co-payment program is most influenced by enjoyment, financial benefits, ease of use, health benefits, and situational factors. Surveyed participants particularly liked utilizing m-payment to benefit from the 50% rebate on full-priced goods and services. It was found that a positive attitude toward m-payment use alone is insufficient to promote long-term adoption of contactless payment technology. However, prolonged reliance on the m-payment system was shown to increase the likelihood of habitual usage.

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1. Introduction

Society is aware of the COVID-19 pandemic. Several governments globally had encouraged adopting cashless transactions as one of the appropriate initiatives during the pandemic to stem the COVID-19 spread. Thais are inclined to use cash more frequently than cashless payments in transactions (The Nation, 2021). However, considering the global situation, several countries have tried normalizing to this pandemic situation, focusing on information technology, particularly transaction processes via mobile phone. Global smartphone use and mobile application downloads are expected to experience continued growth, and this initiative attempts to capitalize on this growth. By 2023, 3.8 billion individuals are expected to be smartphone users, accounting for approximately 50% of the global population (Statista, 2020). In Thailand, where the

rate of technology adoption is already very high, by 2023, 80% percent of the population (i.e., 58.71 million individuals) are projected to possess an Internet-enabled smartphone (Statista, 2020). As mobile phones are increasingly being used to conduct financial transactions, Thailand currently ranks second in Southeast Asia in terms of m-payment growth (PWC, 2019). Despite these encouraging statistics, by 2023, it is expected that only 20% of the global population and 30% of Thais will rely on proximity m-payments (Statista, 2020). To encourage broader adoption of m-payments as a substitute to credit cards, cash, and debit cards, the factors that limit its widespread should be examined (H. V. Nguyen et al., 2020).

Interest in m-payment is growing among academic researchers. Several academicians have attempted to explain the use of m-payment in various contexts, such as from the perspectives of consumers and traders. For example, several studies have been conducted in Indonesia (Widayat, Masudin, & Satiti, 2020), the USA (Park, Ahn, Thavisay, & Ren, 2019), and Australia (Mondego & Gide, 2020) to discover the main reasons customers adopt electronic money. In the merchant context, Mishra, Walsh, and Srivastava (2022) examined the adoption of m-payment by unorganized

Please cite this article as: W. Boonsiritomachai and P. Sud-On, Promoting habitual mobile payment usage via the Thai government's 50:50 copayment scheme, Asia Pacific Management Review, https://doi.org/10.1016/j.apmrv.2022.07.006

retailers in urban India. Existing studies have shown that there are benefits for the user of m-payment, including convenience, efficient transaction time, and fast payment. These studies focused on m-payment functionality or individual behavior in m-payment adoption. However, the research on the socioeconomic and situational factors that influence consumer attitudes toward m-payment that may eventually result in habitual usage of the technology is inadequate. Studies conducted within the framework of government projects and COVID-19 are also uncommon. This is the justification for why the government-involved circumstances were used to conduct the research.

Following the onset of the COVID-19 pandemic, the government of Thailand launched several economic stimulus and social rehabilitation projects, including the "50:50 co-payment" subsidy, the "we won't leave anyone behind" scheme, and the "we travel together" and "we win" cash handout campaigns, to encourage spending, create jobs, strengthen communities, and build infrastructure. The 50:50 co-payment scheme, which included approximately 291 billion baht, involved subsidizing 50% of costs incurred by consumers (The Nation, 2021). To qualify for participation in the scheme (which was open to 21.4 million Thai citizens) consumers had to register on the government's website, where they could access over 557,000 online and offline businesses providing diverse goods and services via independent websites or through popular platforms, e.g., Grab, FoodPanda, Lazada, Lalamove, and Lineman. The 50:50 co-payment scheme provided a 50% subsidy rebate of the purchase price published by the participating vendors with up to 150 baht rebate a day and up to 3500 baht rebate per person per campaign (Chantanusornsiri, 2021). To benefit from this co-payment rebate scheme, consumers were required to possess a smartphone with Internet access and had to use m-payments because physical cash transactions were not permitted.

The goal of this study is to identify the factors that inhibit or promote m-payment use and those that lead to habitual use. Specific focus was placed on Thai user attitudes and continual usage intentions during the period covered by the government's 50:50 co-payment scheme. Understanding the factors that influence users' willingness to make m-payments is significant to many different stakeholders. The Thai government's 50:50 rebate scheme presents a particularly interesting context because it permits examination of the influence of financial incentives on the m-payment use by individuals unfamiliar with digital payment systems.

This study is organized logically for easy comprehension, starting with the introduction, which outlines the need for the research and the examined topics. In Section 2, the literature review is presented to formulate hypotheses. The methodology, including the conceptual model, instrument development, data collection, sample size, and respondent demographics, is described in Section 3. Next, Section 4 presents our results. The discussion is presented in Section 5. Finally, theoretical contribution, practical contribution, the study limitations, and suggestions for future research are offered in Section 6.

2. Literature review

2.1. Theoretical background

User adoption of technology is an important topic that has been covered extensively in information systems literature, giving rise to a wide range of theories in various contexts (Venkatesh, Morris, Davis, & Davis, 2003), e.g., m-payments (Pal, Herath, & Rao, 2020). Most models proposed in this domain rely on the theory of reasoned action (TRA) proposed by Fishbein and Ajzen (1975) to explain human behavior. According to the TRA postulates,

consumers are typically rational and will consider the implications of their actions prior to deciding whether to perform a given behavior. Davis (1986) adapted the TRA to propose the technology acceptance model (TAM), which stipulates that consumer acceptance of a particular technology is determined by their voluntary intention to employ that technology, and this is governed by their perceptions of the technology's usefulness and ease of use, as well as their attitudes toward the use of the given technology.

In this context, perceived usefulness is related to consumer belief that using a specific technology will increase job or task performance. Similarly, perceived ease of use indicates the degree to which consumers expect that using the technology will be effortless and problem-free. The TAM is based on the TRA; thus, the strength of such belief–attitude–intention–behavior relationships in forecasting behavior is generally dependent on the degree of measurement specificity (Ajzen & Fishbein, 1980). Many researchers have applied these concepts to the technology acceptance context, concurring the beliefs relating to the use of technology are a more reliable predictor of technology adoption than the characteristics of the technology itself (Koenig-Lewis, Marquet, Palmer, & Zhao, 2015; Leong, Tan, Puah, & Chong, 2020).

The TAM provides a framework to investigate the effects of external variables on technology usage. Thus, it is an important foundation in understanding customer use of technology (Liebana-Cabanillas, Molinillo, & Japutra, 2021). Therefore, in this study, the TAM was combined with the mental accounting theory (MAT), which describes the role of transaction attributes (including benefits and risks) in the consumer decision-making process (Thaler, 1985). In digital transaction context, Park et al. (2019) argued that consumers would be willing to use m-payment if this maximized the transaction value in terms of convenience, economic benefits, enjoyment, knowledge, and social status. These factors were incorporated into the current conceptual model, along with public health benefits as an important consideration during the COVID-19 pandemic. An ample body of evidence indicates that reduced physical contact curbs the spread of infection, rendering m-payments particularly useful (Aji, Berakon, & Husin, 2020). However, m-payments are considered risky by some consumers, while others see them as highly convenient. Still, online payment security is still a major concern, as it offers limited identity protection (Pal et al., 2020).

Thus, MAT was adopted in the present study, which attempted to acquire better understanding of the consumer decision-making process. This project was government-sponsored and conducted during the COVID-19 pandemic; thus, trust in government and situational conditions were included in the model in order to elucidate Thai consumer attitudes toward using m-payment and the factors (e.g., perceived benefits, perceived ease of use, trust in government, perceived risk, and situational conditions) that lead to habitual m-payment usage.

2.2. Perceived benefits of m-payment adoption

In line with the TAM theory, benefits that can be derived from technology use are commonly classified under utilitarian, hedonic, and social value categories (Kakar, 2020; P. Wang & Li, 2019). Conversely, technology non-adopters tend to be motivated by fear of obsolescence (Turel, Serenko, & Bontis, 2010). In this context, utilitarian value stems from convenience and monetary savings, hedonic value is derived from exploration and entertainment, and social value is realized via status gains due to technology ownership (Rintamaki, Kanto, Kuusela, & Spence, 2006).

In the m-payment adoption context, the utilitarian value would be derived from the convenience and financial benefits inherent in using such mobile services. Particularly, convenience is achieved by

the ease and speed of transactions and is a major driver behind the adoption of m-payment (Gao & Waechter, 2017) and other technology adoptions (Dong, Chang, Wang, & Yan, 2017). Similarly, financial benefits are realized through various incentives offered by digital payment providers and vendors, e.g., gifts, discounts, and redeemable points for other products or services. According to Wu, Liu, and Huang (2017), such benefits can strengthen positive attitudes toward m-payment usage at the early adoption stage; thus, we consider the following hypotheses.

Hypothesis 1. (H1): Convenience positively affects users' attitudes toward m-payment.

Hypothesis 2. (H2): Financial benefits positively affect users' attitudes toward m-payment.

Hedonic motivation (conceptualized as perceived enjoyment or pleasure derived from an activity) has been investigated in a wide range of technology acceptance studies under the assumption that customers are more willing to adopt new technologies if they are fun to use (Venkatesh, Thong, Chan, Hu, & Brown, 2011). Therefore, enjoyment is the key determinant of consumer attitudes toward m-payment (Park et al., 2019) because higher levels of perceived enjoyment are associated with lower levels of anxiety, concern, and perceived risk related to the adoption of new technology (Koenig-Lewis et al., 2015). This relationship has been confirmed in previous studies on technology adoption in Internet banking (Lee, 2009) and m-payment contexts (Kalinic, Marinkovic, Molinillo, & Liebana-Cabanillas, 2019). Consistent with these findings, we also consider the following hypothesis.

Hypothesis 3. (H3): Enjoyment positively affects users' attitudes toward m-payment.

De Kerviler, Demoulin, and Zidda (2016) and Park et al. (2019) concurred that social influence could enhance both positive and negative opinions of technology. In particular, users are most influenced by the views held by their social reference group, e.g., family members, friends, and colleagues (Oliveira, Thomas, Baptista, & Campos, 2016). In the m-payment adoption context, Park et al. (2019) and Wei, Luh, Huang, and Chang (2021) found that social value is derived from elevated status in one's social environment. De Kerviler et al. (2016) found that such benefits also apply to in-store m-payments. During the COVID-19 pandemic, some of these social benefits might have been reduced because most governments mandated social distancing, which resulted in store closures and necessitated the adoption of digital platforms. Thus, in this context, the primary social benefit of m-payment use is the protection of public health through reduced risk of virus transmission. This is also in line with the World Health Organization's recommendation to limit the use of cash payments (Brown, 2020). Therefore, those that rely on m-payments contribute to curbing virus transmission (Aji et al., 2020); hence, we consider the following hypotheses.

Hypothesis 4. (H4): Social benefits positively affect users' attitudes toward m-payment.

Hypothesis 5. (H5): Health benefits positively affect users' attitudes toward m-payment.

2.3. Perceived m-payment ease of use

According to the TAM model, when users feel that technology (including m-payments) does not require much effort, they have higher expectations about its ease of use (Davis, 1986; Oliveira et al., 2016). The perceived ease of use is considered a reliable predictor of the attitude toward and intention to use new technology (Liebana-Cabanillas et al., 2021), including m-payment systems (Kim, Mirusmonov, & Lee, 2010; Wei et al., 2021) and Internet of Things (Dong et al., 2017). However, some scholars have argued that consumer attitude toward using m-payments is unaffected by the ease of use (Koenig-Lewis et al., 2015), especially if mobile devices make it difficult to enter the required information (Leong et al., 2020). Thus, based on these contradictory findings, we consider the following hypothesis.

Hypothesis 6. (H6): Perceived ease of use positively affects users' attitudes toward m-payment.

2.4. Trust toward government

In extant research into technology adoption, trust has emerged as an important factor because consumers worry about the misuse of their data or potential security breaches that can result in financial or reputational losses (Daştan & Gürler, 2016; Mondego & Gide, 2020). However, in extant research, trust is typically explored from the perspective of users, merchants, and service providers (Kalinic et al., 2019), and the role of government is generally overlooked in this process. This gap is addressed in the current study as we focus on the Thai government's co-payment scheme as a potential driver of m-payment adoption. An ample body of evidence indicates that government policies can have a significant impact on people's behaviors. For example, Sahu and Singh (2018) found that removing certain banknotes from circulation had an immediate effect on the behavior of Indian consumers, who rapidly began to adopt digital payment methods. However, Tsui (2019) failed to identify any link between technology adoption and consumers' trust in the Taiwanese government. The current study focuses on a specific government-subsidized co-payment scheme that was in place during the COVID-19 pandemic; thus, it is expected that consumers' trust in government would influence their willingness to adopt the m-payment system. Thus, we consider the following hypothesis.

Hypothesis 7. (H7): Trust toward government positively affects users' attitudes toward m-payment.

2.5. Perceived risk associated with m-payment methods

Financial transactions via mobile phones are perceived to be risky due to the greater potential for the misuse of personal information (Cozzarin & Dimitrov, 2016). This issue is highly prevalent because m-payment users in France (Koenig-Lewis et al., 2015), China (Wu et al., 2017), and Australia (Mondego & Gide, 2020) have expressed significant concerns about the potential loss of privacy and financial data, which could result in their money being stolen. As personal and financial information provided during m-payments can be intercepted and used fraudulently, this payment mode is considered to involve greater risk than other traditional payment methods (Kalinic et al., 2019). Despite efforts by m-payment providers to mitigate potential vulnerabilities and risks (Leong et al., 2020), many consumers remain reluctant to use m-payment methods (Wei et al., 2021). Thus, we consider the following hypothesis.

Hypothesis 8. (H8): Perceived risk negatively affects users' attitudes toward m-payment.

2.6. The influence of COVID-19 pandemic on m-payment adoption

Consumer attitudes toward technology are influenced by their circumstances (Kroenung & Eckhardt, 2015); thus, it is unsurprising that the COVID-19 pandemic changed consumer purchasing

behaviors. According to C. Nguyen and Duong (2020), consumers had to find other means to satisfy their needs due to the restrictions imposed on movement and social interactions. These findings are supported by Immanuel and Dewi (2020), who found that consumer attitude toward using m-payment is influenced by situational factors. In addition, Yan, Tan, Loh, Hew, and Ooi (2021) found that, as numerous retailers, merchandizers, and restaurants mandated the use of contactless payment methods during the COVID-19 pandemic, this prompted more widespread m-payment uptake. Therefore, we consider the following hypothesis.

Hypothesis 9. (H9): Situational conditions positively affect users' attitudes toward m-payment.

2.7. The relationship among attitudes, continuance intention, and habitual m-payment usage

The predictive power of attitudes for user post-adoption behavior (i.e., continuance intention and habitual usage) has been investigated in a number of studies on technology adoption (Kroenung & Eckhardt, 2015). The findings indicate that continuance intention is a reliable measure of technology success (C. Wang, Teo, & Liu, 2020). According to the TAM, attitude impacts behavioral intention, which in turn influences actual behaviors (Ajzen & Fishbein, 1980). Park et al. (2019) stated that when individuals form a positive attitude toward technology, they will have stronger adoption intention; thus, they are more likely to use the technology continually. In a replication study, Law (2020) found that attitude, continuance intention, and habitual usage are valid constructs to explain individual intention to use various forms of technology. Therefore, it is reasonable to suggest that when users have positive attitudes toward m-payment, even when the Thai government's co-payment scheme ends, they will continue to use this payment mode, which will eventually lead to habitual usage of m-payment. Therefore, we consider the following hypotheses.

Hypothesis 10. (H10): Users' attitudes toward m-payment positively affect their continuance intention.

Hypothesis 11. (H11): Users' attitudes toward m-payment positively affect their habitual usage.

Hypothesis 12. (H12): Users' continuance intentions mediate the relationship between attitudes toward m-payment and habitual usage.

3. Methodology

3.1. Conceptual model

The proposed conceptual model adopted in this study is shown in Fig. 1.

3.2. Instrument development

To obtain pertinent data, a questionnaire was developed by adopting relevant items from previous studies based on reflective measurement models. Specifically, perceived convenience, financial benefits, enjoyment, and social benefits were assessed using three items adapted from the scales developed by Lee (2009), Mimouni-Chaabane and Volle (2010), Venkatesh et al. (2011), and Park et al. (2019). In addition, health benefits were measured using four items adapted from the instrument proposed by Aji et al. (2020). In terms of ease of use, five items were adapted from the Kim et al. (2010) instrument, and perceived risk was measured using four items adapted from the questionnaire designed by Liebana-Cabanillas, Herrera, and Guillen (2016). Trust in government and situational influence were measured using four and three items each adapted from the instruments developed by Tsui (2019) and Immanuel and Dewi (2020), and attitude and continuance intention were measured using three items adapted from the questionnaires used previously by Law, Kwok, and Ng (2016) and Venkatesh et al. (2011). Finally, habitual usage was measured using four items adapted from the survey conducted by Venkatesh et al. (2011). Notably, all items required responses on a Likert scale ranging from 1 = "Strongly Disagree" to 5 = "Strongly Agree."

The questionnaire targeted Thai citizens who live in Bangkok and was initially developed in English; thus, it was back-translated to ensure correctness. Prior to conducting the main study, a pilot test was conducted to verify that there were no additional concerns with the questionnaire (e.g., to ensure a logical flow of questions and eliminate ambiguities or misunderstandings).

3.3. Data collection

Thirty Thai individuals who resided in Bangkok took part in the government's co-payment program for the pilot test. The participants were recruited at several public locations in Bangkok (e.g., shopping malls, central district buildings, a university, a fresh produce market, and convenient stores).

Bangkok was chosen for the pilot research and study population because it is the capital of Thailand, is known as a megapolis and serves as a significant regional business hub in Southeast Asia. In addition, 180,000 retailers that subscribed to the government's 50:50 co-payment scheme were from Bangkok, which is equivalent to four times the number of stores in the second-ranked province (Chantanusornsiri, 2021). The questionnaires were distributed on different days and at different times of day to randomize the sampling process. Note that only those who had used the co-payment scheme that were new to the m-payment concept were eligible for participation; thus, all potential participants were asked screening questions prior to administering the questionnaire.

3.4. Sample size and respondent demographics

The sample size for this study was determined using SEM's rule of thumb based on the ratio of observations to estimated parameters (N:q). According to Kline (2011), for path analysis, 5−20 observations (participants) are required for each estimated parameter in the model. The questionnaire used in this study comprised 44 items, which is equivalent to 440 respondents (44 × 10). Thus, to satisfy this criterion, 524 individuals who live in Bangkok participated in the survey. However, 18 questionnaires had to be discarded for various reasons, such as missing values and extreme outliers; thus, a total of 506 questionnaires were considered for analysis.

As shown in Table 1, 54.3% of the 506 participants were male, most in the age group of 18−30, had completed a bachelor's degree, and were company employees earning 10,000−30,000 baht per month.

4. Results

In this study, the Statistical Package for the Social Sciences (SPSS) AMOS version 22.0 was employed for data analyses. The acquired data were subjected to descriptive analysis, where the percentage and mean value for a specific variable(s) were calculated. In addition, confirmatory factor analysis (CFA; also referred to as principal component factor analysis) was performed to assess the reliability and validity of the scales employed to measure the constructs considered in this investigation. CFA was used in this study because it is widely employed in social research to establish
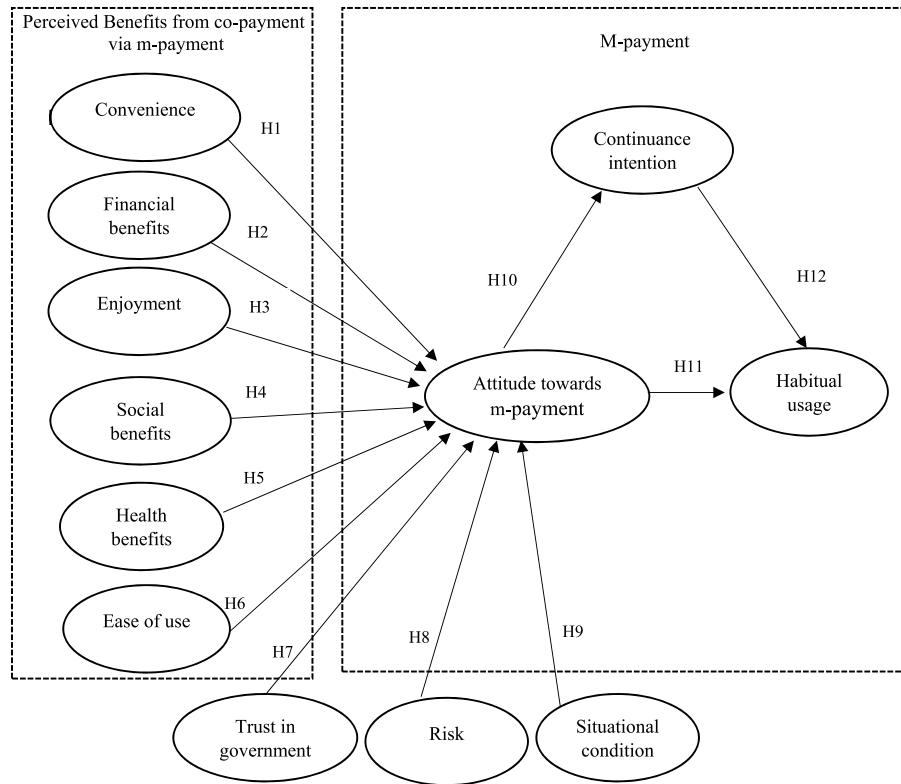
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Fig. 1. Conceptual model.

Table 1
Demographic characteristics of respondents.

Description	Frequency (N = 506)	Percent
Gender		
Male	275	54.3
Female	231	45.7
Age (years)		
18-30	218	43.0
31-40	101	20.0
41-50	133	26.3
50+	54	10.7
Income (baht)		
<10,000	109	21.5
10,000−30,000	260	51.4
30,001−50,000	97	19.2
>50,000	40	7.9
Education		
<Secondary school	42	8.3
Diploma	26	5.1
Bachelor	352	69.6
Master and above	86	17.0
Occupation		
Freelance	85	16.8
Company employees	195	38.5
Farmers	1	0.2
Unemployment	9	1.8
Government officer	73	14.4
Business owner	54	10.7
Housewives	17	3.4
University staff	16	3.2
Students	56	11.0
Total	**(506)**	**(100)**

whether the measures of a construct are consistent with its nature (Hair, Risher, Sarstedt, & Ringle, 2019). Finally, the research hypotheses were tested using SEM.

4.1. Evaluation of the measurement model

SEM includes a two-step process comprising measurement model validation followed by evaluation of the structural model's fit to the data. CFA is typically used to test the relationship between latent variables and those included in the measurement model, where the reliability, internal consistency, and validity of both latent and measured variables is determined (Ho, 2006). In the current study, composite reliability (CR) and Cronbach's alpha were calculated to indicate the shared variance among the observed variables used to measure a latent construct (Fornell & Larcker, 1981). As shown in Table 2, the Cronbach's alpha and CR values obtained in this study exceeded the threshold of 0.6. To establish the convergent validity, average variance extracted (AVE) was calculated, thereby allowing the variances captured by each measured construct to be determined. The results revealed that all measured constructs met the AVE's rule of thumb of 0.5 (Fornell & Larcker, 1981).

In addition, discriminant validity was calculated to examine the distinctiveness of the manifest variables from other constructs in the path model. As indicated by the results reported in Table 3, all correlations were less than the squared root of AVE, thereby confirming that the dependent variables were sufficiently distinctive from other constructs (Fornell & Larcker, 1981). Based on these findings, the conceptual model exhibited adequate reliability, convergent validity, and discriminant validity, while also substantiating the research model.

4.2. Measurement of the mediating role and effect size

In this study, the mediating role of continuance intention between attitude toward m-payment and habitual usage was also measured. According to Baron and Kenny (1986), to test the

Table 2
Construct reliability and validity.

Main Construct	Code	Loading	Cronbach's Alpha	CR	AVE
Convenience			0.865	0.872	0.696
	CON_1	0.889			
	CON_2	0.850			
	CON_3	0.758			
Financial benefits			0.749	0.770	0.529
	ECO_1	0.678			
	ECO_2	0.805			
	ECO_3	0.693			
Enjoyment			0.946	0.947	0.855
	ENJ_1	0.884			
	ENJ_2	0.946			
	ENJ_3	0.943			
Social benefits			0.918	0.920	0.793
	SOC_1	0.855			
	SOC_2	0.934			
	SOC_3	0.881			
Health benefits			0.919	0.921	0.747
	HEA_1	0.894			
	HEA_2	0.767			
	HEA_3	0.956			
	HEA_4	0.828			
Ease of use			0.929	0.932	0.735
	EAS_1	0.876			
	EAS_2	0.878			
	EAS_3	0.932			
	EAS_4	0.870			
	EAS_5	0.716			
Trust in government			0.925	0.927	0.761
	TGO_1	0.872			
	TGO_2	0.827			
	TGO_3	0.949			
	TGO_4	0.836			
Risk			0.898	0.899	0.691
	RIS_1	0.712			
	RIS_2	0.831			
	RIS_3	0.915			
	RIS_4	0.854			
Situational condition			0.774	0.843	0.642
	SIT_1	0.776			
	SIT_2	0.807			
	SIT_3	0.821			
Attitude toward m-payment			0.937	0.939	0.863
	ATM_1	0.904			
	ATM_2	0.943			
	ATM_3	0.896			
Continuance intention			0.924	0.926	0.807
	COI_1	0.855			
	COI_2	0.932			
	COI_3	0.907			
Habitual usage			0.942	0.946	0.814
	HAB_1	0.955			
	HAB_2	0.902			
	HAB_3	0.950			
	HAB_4	0.792			

mediating role and effect size, both direct and indirect effects should be estimated to establish the influence of independent constructs on the dependent constructs. As defined by Cohen (2013), the threshold values for effect size are 0.35 (strong), 0.15 (moderate), and 0.02 (weak). The standardized direct effect of attitudes toward m-payment on habitual usage was found to be trivial at 0.061, and its standardized indirect effect through continuance intention was strong at 0.651. In addition, at 0.785, the direct effect of attitudes toward m-payment on continuance intention was greater than the 0.35 cut-off value (see Table 4).

4.3. Evaluation of the structural model

The structural model outcomes were measured using the coefficient of determination (R^2), effect size, goodness-of-fit (GOF) index, correlation coefficients related to latent variables, and path coefficients (β values). In this study, R^2 was used to measure the percentage of variance explained by the dependent variables, thereby determining the predictive model's accuracy. As shown in Table 5, values of 0.743, 0.616, and 0.770 were obtained for the path model, which indicates that the independent constructs (i.e., convenience, financial benefits, enjoyment, social value, health benefits, ease of use, trust in government, perceived risk, and situational factors) explained 74% of the variance in consumer attitudes toward m-payment, and the consumer attitudes explained 62% of the variance in continuance intention and 77% of the variance in habitual usage. Finally, the R^2 value obtained in this study (i.e., 0.616–0.770) was acceptable because the closer R^2 is to 1, the greater the model's predictive power (Hair et al., 2019; Henseler, Ringle, & Sinkovics, 2009).

Table 3
Discriminant validity of constructs.

	COI	CON	FIN	ENJ	SOC	HEA	EAS	RIS	TGO	SIT	ATM	HAB
COI	**0.899**											
CON	0.243	**0.834**										
FIN	0.431	0.373	**0.728**									
ENJ	0.405	0.500	0.659	**0.925**								
SOC	0.186	0.548	0.490	0.519	**0.891**							
HEA	0.457	0.495	0.522	0.577	0.428	**0.864**						
EAS	0.645	0.306	0.597	0.431	0.257	0.415	**0.857**					
RIS	0.001	−0.077	0.018	0.033	−0.091	0.027	0.007	**0.831**				
TGO	0.389	0.563	0.672	0.635	0.524	0.594	0.480	0.125	**0.872**			
SIT	0.249	0.420	0.375	0.414	0.576	0.495	0.119	−0.219	0.452	**0.802**		
ATM	0.763	0.399	0.624	0.439	0.306	0.541	0.815	−0.020	0.521	0.192	**0.915**	
HAB	0.856	0.298	0.418	0.369	0.289	0.461	0.617	−0.040	0.356	0.383	0.702	**0.902**

*Diagonals (in bold) presents the square root of the Average Variance Extracted (AVE), COI = Continuance intention, CON = Convenience, FIN = Financial benefits, ENJ = Enjoyment, SOC = Social benefits, HEA = Health benefits, EAS = Ease of use, RIS = Risk, TGO = Trust in government, SIT = Situational condition, ATM = Attitude toward m-payment, , and HAB = Habitual usage.

Table 4
Total, direct and indirect effect in estimated model.

Causal relationship	Total effect	Direct effect	Indirect effect	R^2
ATM → COI	0.785***	0.785	0.000	0.616
ATM → HAU	0.712	0.061	0.651	0.770
χ^2/df (CMIN/DF)	2.982 ($\leq$3)			
p-value	0.000 (>0.05)			
SRMR	0.069 (<0.08)			
NFI	0.839 (Closer to 1.00)			
CFI	0.869 (Closer to 1.00)			
TLI	0.853 (Closer to 1.00)			

*ATM = Attitude toward m-payment, COI = Continuance intention, HAU = Habitual usage, NFI = Normed fit index, CFI = Comparative fit index, and TLI = Tucker−Lewis index.
***Significant at 0.001.

Table 5
Outcome of hypothesis.

Hypothesis	Path Coefficients	β	SE	R^2	Outcomes
H1	Convenience → ATM	−0.048	0.189	0.743	Rejected
H2	Financial benefits → ATM	0.176***	0.005		Supported
H3	Enjoyment → ATM	0.085***	0.006		Supported
H4	Social Benefits → ATM	−0.018	0.577		Rejected
H5	Health Benefits → ATM	0.196***	>0.001		Supported
H6	Ease of Use → ATM	0.787***	>0.001		Supported
H7	Trust in Government → ATM	0.011	0.823		Rejected
H8	Risk → ATM	−0.033	0.223		Rejected
H9	Situational Condition→ ATM	0.077	0.031		Supported
H10	ATM → COI	0.741***	>0.001	0.616	Supported
H11	ATM → HAU	0.076	0.188	0.770	Rejected

*p = 0.05, **p = 0.01, ***p = 0.001.

4.4. GOF index

GOF index was calculated to verify the structural model and establish its fit to the empirical data. GOF indices range from 0 to 1, where threshold values of 0.10, 0.25, and 0.36 indicate low, medium, and good fit, respectively (Tenenhaus, Vinzi, Chatelin, & Lauro, 2005). Following the recommendations from the literature (e.g., Gbongli, Xu, & Amedjonekou, 2019; Wetzels, Odekerken-Schröder, & Van Oppen, 2009), the chi-squared (χ^2), absolute fit indices, and incremental fit indices were adopted in this study to evaluate model fit. The findings are reported in Table 3.

In extant studies, the standardized root mean square residual (SRMR) is typically also calculated to establish how well the theoretical model fits the empirical data, where SRMR $\leq$0.08 indicates a good fit, and values close to 0 imply a perfect fit (Hair et al., 2019; Hu & Bentler, 1999; Hussain, Fangwei, Siddiqi, Ali, & Shabbir, 2018). For the current model, an SRMR value of 0.069 was obtained. In

addition, χ^2 and its associated p-value were used to measure the fitness between the observed and estimated covariance metrics, where χ^2/df (CMIN/DF) $\leq$ 3 and p > 0.05 indicate that the estimated model can be accepted (Hair, Black, Babin, & Anderson, 2010). In the present case, χ^2/df = 2.982 and p = 0.000 confirmed the suitability of the proposed model. According to West, Taylor, and Wu (2012), the p-value is sensitive to a large sample size; thus, it should not be statistically significant if there is a good model fit. In addition, the normed fit index (NFI), comparative fit index (CFI), and Tucker−Lewis index (TLI) were used to test the incremental fit of the estimated model, and all were found to be acceptable levels.

4.5. Hypothesized structural model

The results obtained when testing the study hypotheses are reported in Table 5. The significance of each hypothesis was determined using standardized beta (β) values, where a greater

value indicates a more substantial effect on the manifest latent construct. In addition, the associated p-values were considered, where *p = 0.05, **p = 0.01, and ***p = 0.001 were adopted for two-tailed significance. The full structural model's causality path, including the standardized parameter estimates, is shown in Fig. 2.

To meet the study's objectives, the influence of the perceived benefits and external factors on consumer attitude toward m-payment was first evaluated. We found that financial benefits, enjoyment, health benefits, ease of use, and situational conditions affected the study participants' attitudes toward m-payment significantly and positively: (1) financial benefits → attitude toward m-payment ($\beta = 0.176$, p = 0.005), supporting H2; (2) enjoyment → attitude toward m-payment ($\beta = 0.085$, p = 0.006),

supporting H3; (3) health benefits → attitude toward m-payment ($\beta = 0.196$, p < 0.001), supporting H5; (4) ease of use → attitude toward m-payment ($\beta = 0.787$, p < 0.001), supporting H6; and (5) situational condition → attitude toward m-payment ($\beta = 0.077$, p = 0.031), supporting H9.

However, convenience, social benefits, trust in government, and perceived risk were found to not exert significant influence on Thai consumers' attitudes toward m-payment: (1) convenience → attitude toward m-payment ($\beta = -0.048$, p = 0.189), rejecting H1; (2) social benefits → attitude toward m-payment ($\beta = -0.018$, p = 0.577), rejecting H4; (3) trust in government → attitude toward m-payment ($\beta = 0.011$, p = 0.823), rejecting H7; and (4) risk → attitude toward m-payment ($\beta = -0.033$, p = 0.233), rejecting H8.

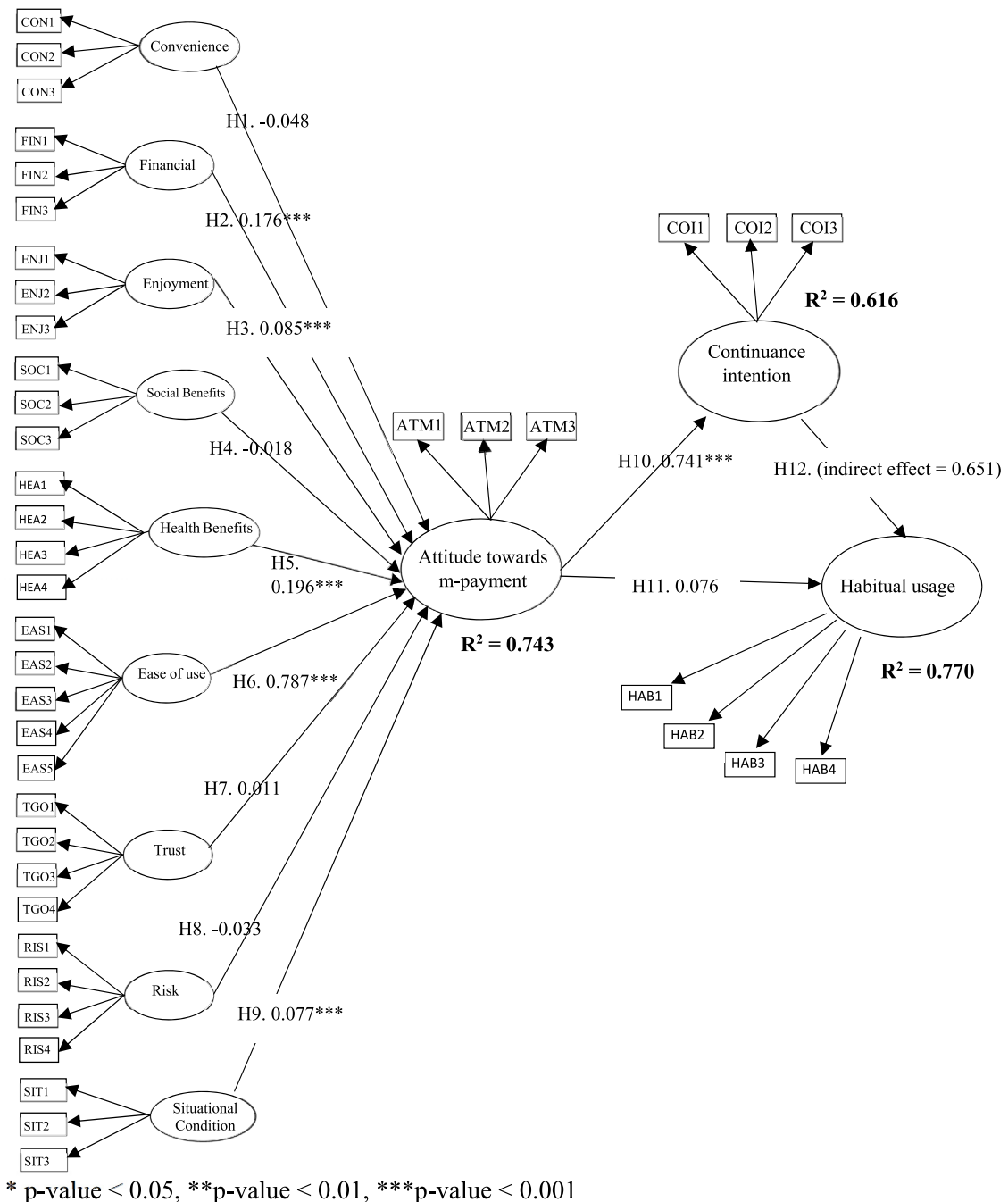* p-value < 0.05, **p-value < 0.01, ***p-value < 0.001

Fig. 2. Assessment of structural equation model and hypotheses test.

Then, the relationships between attitude toward m-payment and continuance intention and habitual usage were examined. The results revealed that, despite the significant and positive link between attitudes toward m-payment and continuance intention ($\beta = 0.741$, p < 0.001), thereby supporting H10, m-payment attitudes did not influence habitual usage ($\beta = 0.076$, p = 0.188), thereby rejecting H11. Finally, the mediation effect of continuance intention (H12) was tested using the standardized effect generated by AMOS. As shown in Table 4, although the total effect of attitude toward m-payment on continuance intention was 0.785, this effect was exerted solely directly, with 0.000 obtained for the indirect effect. These results confirm the significant and direct impact of attitude toward m-payment on continuance intention. In addition, the total effect of attitude toward m-payment on habitual use was 0.712, where 0.061 and 0.651 accounted for the direct and indirect effect, respectively. These results suggest that attitudes toward m-payment exert a great impact on habitual usage through continuance intention, thereby supporting H12.

5. Discussion

The findings obtained in the present study reveal that ease of use, health benefits, financial benefits, enjoyment, and situational conditions exert a positive and substantial effect on the consumer attitudes toward m-payment ($R^2 = 0.743$), which in turn positively and substantially affect their intention to continue to use this technology ($R^2 = 0.616$). In addition, the continuance intention was found to strongly mediate (with effect size of 0.651) the relationship between attitude toward m-payment and habitual usage.

In terms of promoting favorable customer positive attitudes toward the m-payment system introduced with the government's co-payment scheme, ease of use was found to exert the most profound impact. Note that this finding is in line with the results reported in related literature (e.g., Kim et al., 2010; Liebana-Cabanillas et al., 2021; Wei et al., 2021). However, it counters the observations made by Koenig-Lewis et al. (2015), which indicated that ease of use does not exert significant influence on consumer attitudes toward m-payment. The present study was conducted during the COVID-19 pandemic; thus, this discrepancy is unsurprising given that under government-imposed restrictions, more consumers were required to adopt non-contact payment methods, thereby rendering ease of use particularly relevant.

As expected, health and financial benefits were found to significantly and positively influence consumer attitudes toward m-payment because this study focused on the Thai government's scheme to combat the effects of the COVID-19 pandemic. These results are consistent with those reported in the literature (e.g., Aji et al., 2020; Wu et al., 2017). However, the pandemic is ongoing; thus, technology adoption under these unprecedented conditions is still being investigated. Nonetheless, in most countries, residents were advised to reduce the use of cash to prevent virus transmission. Under the Thai government's scheme, consumers obtained both health benefits and monetary gains, i.e., 50% of their expenses were reimbursed through the rebate scheme. Therefore, health and financial benefits, as well as situational factors, were expected to positively influence the attitude toward m-payment adoption. However, the effect of situational conditions was found to be negligible, which counters previously reported results (e.g., Immanuel & Dewi, 2020; Kroenung & Eckhardt, 2015). This discrepancy can be attributed to the fact that consumers did not have all payment options at their disposal during the pandemic; thus, the role of situational conditions was minimized.

In addition, counter to the hypotheses considered in this study, perceived convenience, social benefits, trust in government, and perceived risk did not exert significant influence on consumer attitudes toward m-payment, thereby countering the results reported in the literature (e.g., Daştan & Gürler, 2016; De Kerviler et al., 2016; Mondego & Gide, 2020; Oliveira et al., 2016). However, it is worth noting that, in extant research, risk related to the loss of personal information was typically considered (Koenig-Lewis et al., 2015). In contrast, in the current study, it pertained to a specific government scheme. In a similar context, Tsui (2019) found no association between trust in the Taiwanese government and willingness to adopt e-government services. These results offer support for the findings obtained in the current study, indicating that consumers are more concerned with other factors, e.g., financial and health benefits, when participating in a mobile co-payment program.

6. Conclusion

In this study, researchers integrate two theories, TAM and MAT, with a widely used technology adoption model. The proposed model in this present study offers an integrative perspective that encourages researchers and practitioners to focus on the interdependence of various aspects and is shown to be useful for evaluating and predicting the behavioral intention of m-payment by considering various perspectives, including benefits from m-payment, benefits from government incentives, epidemic situations, and trust in government. The findings of this study may add to the expanding body of knowledge about the usage of mobile payment systems in pandemic situations. A number of significant consequences for theory and practice result from the current investigation.

6.1. Theoretical implications

Given that limited research has been conducted on integrating the TAM (Davis, 1986) and MAT (Thaler, 1985), our findings indicate that a research model based on these theories can be used to explain the causal relationship between consumer attitudes toward m-payment and habitual usage. In addition, when developing the research model, the commonly considered perceived benefits of m-payment were augmented with external factors specifically related to the COVID-19 pandemic because the goal of this study was to ascertain customer attitudes toward the Thai government's mobile co-payment campaign. Using the SEM technique, the mediating effect of continuance intention was also tested, and the results support the notion that continuance usage is a key mediator to turn customer attitude into habit (e.g., Law, 2020; Park et al., 2019). While this study focused on a highly specific context, its findings can be of practical value to researchers attempting to identify factors that can promote habitual technology use in other contexts.

6.2. Practical implications

The primary goal of this research was to identify the socioeconomic and situational factors that influence consumer attitudes toward m-payment that can potentially lead to habitual usage of the technology. As mentioned previously, when technology is intended for a broad range of consumers, its design should be simple, and consumers should be able to appreciate the benefits derived from its adoption. Especially specific to some groups of the population, technology adoption is known to be challenging with older people who have tendency to be uncomfortable with new technology. Since there is a rise in elderly members of society, the introduction of new technology should not be difficult to understand and age-restricted. Ease of use and enjoyment features can help diminish anti-adoption behaviors and negativism relative to the adoption of new technologies.

In the context of a pandemic, it is essential to clearly communicate the health benefits that can be acquired using an m-payment system. In addition, once a public health crisis is over, as people and businesses adapt to the "new normal," they are more likely to continue to rely on contactless payment methods, thereby promoting habitual technology usage.

These observations can be considered by policy makers when balancing financial benefits and the cost of new technologies in collaboration with the private sector. In particular, in circumstances such as the current pandemic, when contactless payments should be encouraged, consumers should gain tangible benefits from their compliance, thereby motivating habitual usage of m-payments.

6.3. Study limitations and suggestions for future research

The goal of this study was to identify factors that influence m-payment adoption by Thai consumers as a part of the government scheme. The Thai government introduced the 50:50 co-payment method to limit direct contact and prevent the spread of the COVID-19 virus; thus, its primary goals were to sustain the economy while protecting public health. Nonetheless, going forward, citizens are expected to continue using m-payment services because they will appreciate the benefits afforded by such systems.

However, certain limitations must be acknowledged when interpreting the findings of this study. One of the main limitations of the study's focus on an innovative m-payment system was the temporary 50% rebate promotion offered by the Thai government. It would be beneficial to replicate the present study with different conditions such as with different rebates amounts. Future inter-country comparative studies in different conditions will also contribute to more comprehensive understanding of this issue. In addition, the payment innovation initiative was government-sponsored, and results may differ if it was introduced by private entities. Furthermore, it would be meaningful to examine the influence of other factors, e.g., personality traits, willingness to take risks, and technology-related aptitudes, on the adoption of mobile payment methods. In addition, this study focused solely on trust in government; thus, it would be beneficial to incorporate different government policies in future studies, e.g., policies pertaining to online consumer protection and transaction transparency, because such factors are expected to increase consumer confidence in m-payment systems.

Declaration of competing interest

None.

Acknowledgments

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