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User Intentions to Adopt Mobile Payment Services: A Study of Early Adopters in Thailand

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Abstract

The adoption and use of M-payment services has become critical for entities involved in the mobile commerce industry in Asian countries. This paper reports on research that investigated the factors affecting consumer intentions to adopt mobile payment (M-payment) services in Thailand. The study developed a model based on an extended version of the technology acceptance model (TAM) that was modified using constructs that were explained in terms of Hofstede's cultural dimensions allowing the findings to be reported in context using the Thai national setting. Arguably, the alignment of cultural dimensions with the extended TAM constructs is one that distinguishes the contribution of the paper from previous studies. Responses from 256 early adopters of M-payment services were empirically analyzed using structural equation modelling (SEM) to test a set of research hypotheses. The results indicate that consumer adoption of M-payment services in Thailand was determined by four factors—compatibility, subjective norm, perceived trust, and perceived cost. Surprisingly, the construct of perceived risk and the two major TAM constructs—perceived usefulness (PU) and perceived ease of use (PEOU) were found not to have a direct effect on behavioral intention.

Keywords: **Mobile payment services, behavioral intention, TAM, structural equation modelling, cultural dimensions**

INTRODUCTION

As the use of mobile phone technology has become increasingly common in everyday life, there has also been a rapid expansion of services using mobile phone technology as the primary delivery platform. M -payment is one such service that allows mobile phone owners to easily and conveniently undertakes payments and transfer funds using their phones. The transaction conducted through this channel is charged in different ways, such as monthly mobile subscription bills, debit or credit card, separate M-payment account or deducted from prepaid airtime or bank accounts (Mallat *et al.*, 2004).

M-payment services cover different types of payment, such as downloaded digital mobile content services (e.g. games, music, news, logos, ringtones, and mobile applications), fares for taxis, trains or buses, parking fees, and tickets for flights, movies or concerts. Indeed, M-payment services have received a great amount of attention from the banking industry given the recent advent of the internet-enabled smart phone as a ubiquitous communication item (Zhang & Dodgson, 2007). Global technology research firm Gartner (2012) predicts that the gross value of transactions conducted through some form of M-payment service will reach over USD730 billion by 2016. Arguably, the predicted expansion of M-payment services provides a convincing argument for stakeholders to invest and expand the use of such a service.

M-payment services offer significant cost-benefit advantages for consumers, business groups and national governments over traditional cash and/or financial card transactions. However, Thailand, where there is a high rate of mobile phone adoption, M-payment services have not reached a critical stage of diffusion— even though significant benefits would result. Furthermore, significant resources have been invested in building and developing an M-payment infrastructure so as to provide opportunities for Thai consumers to use their mobile devices to conduct everyday financial transactions (Bank of Thailand, 2012). Given this investment regime, relatively low M-payment adoption rates have been noted. Indeed, the National Statistical Office (2013) reports that a relatively small proportion of the 44.1 million Thai mobile phone users conduct financial transactions using a mobile device.

It is unclear as to why M-payment services have lagged behind the relatively high mobile phone use in Thailand given the significant advantages M-payment services bring in terms of convenience and flexibility, especially for people who have no internet connection (Lim, 2008). M-payment services have been available in the market for quite a number of years; however, they have not been able to gain high market share or generate interest among the Thai public. The reason for this relatively low adoption of M-payment services is not clear and needs to be ascertained.

Several studies have advanced the theory that consumer behavior plays an important role in the adoption of new payment systems, particularly electronic payment modes where consumer attitudes towards the adoption of new payment systems have been recorded as an important issue (D' Silva, 2009; Dahlberg *et al.*, 2008; Evans & Schmalensee, 2009; Litan & Baily, 2009; Zhang & Dodgson, 2007). Noting the mismatch between Thai government investment and low consumer adoption of M-payment services, this paper develops and subsequently tests a theoretical model that encapsulates consumer intentions to adopt M-payment services within a Thai context.

The research model for this study was formulated on the basis of the well-documented technology acceptance model (TAM). However, in light of suggestions made by previous studies (Kim & Garrison, 2009; Sun *et al.*, 2009; Zarmpou *et al.*, 2012), the TAM was modified by incorporating relevant construct that have an influence on a consumer's intention to adopt M-payment services. Hofstede's (Hofstede & Hofstede, 2005) framework that documented the cultural dimensions for Thailand was used to argue that the model's constructs also reflected cultural characteristics in the Thai setting.

Accordingly, the research model for this study consisted of two major constructs (perceived usefulness and perceived ease of use) associated with traditional TAM and five additional constructs (compatibility, subjective norm, perceived trust, perceived risk, and perceived cost). These constructs were theoretically justified to have a direct effect on people's behavioral intention to adopt M-payment services. The alignment of cultural dimensions to the constructs used in this study is a distinguishing contribution of the paper when compared to previous publications on TAM. Previous studies, such as that of McCoy *et al.* (2007) and Teo *et al.* (2008) have examined TAM's fundamental constructs of PU and PEOU in regards to national cultural however, such studies do not include additional and relevant constructs that are argued as reflecting components of culture.

The outcomes of this study are expected to contribute to theoretical and practical

knowledge about M-payment services adoption. From a theoretical perspective, we modified traditional TAM by incorporating additional constructs which reflect Thai cultural characteristics and technology adoption. Therefore, the research model proposed in the paper can potentially be applied to other societies that are culturally similar to Thailand in predicting the adoption of new or emerging technologies. From a practical perspective, the research is informative for the Thai M-payment services industry—particularly mobile network operators (MNOs), financial institutions, and payment service providers. The results can be used to assist entities in the M-payment industry to implement appropriate service strategies and design suitable business models to improve the uptake of M-payment services.

The remainder of this paper is organized as follows. Section 2 includes a literature review followed by a presentation of the research hypotheses and the conceptual framework in section 3. The research methods and results of data analysis are presented in sections 4 and 5. Section 6 provides the discussion of these results followed by the theoretical and managerial implications and the limitations of this study.

LITERATURE REVIEW

Various innovation adoption theories have frequently been applied in research studies to predict an individual's intention to adopt recent innovations and/or technologies. These theories included innovation diffusion theory (IDT), the theory of reasoned action (TRA), the theory of planned behavior (TPB), and the technology acceptance model (TAM). IDT explains the likelihood and the rate of an innovation being adopted by examining the process by which innovation is communicated through certain channels over time among the members of a social system (Rogers, 2003). The theory highlights the importance of the innovation decision process, the determinants of adoption, and that there are various categories of adopters.

The TRA was proposed by Fishbein and Ajzen (1975) and it suggests that a person's actual behavior is determined by his/her behavioral intentions to perform a particular activity. Behavioral intention is shaped and influenced by the individual's attitude and subjective norms, which are in turn shaped by their beliefs associated with motivations and the evaluation of beliefs. TRA was later extended to the TPB by adding an additional variable to the model, namely, perceived behavioral control in order to reflect the parameter of control beliefs that relate to one's abilities, situation, and resources (Ajzen, 1991). Finally, the TAM indicates that the two individual beliefs—perceived usefulness (PU) and perceived ease of use (PEOU) are the major determinants influencing an individual's behavioral intentions and actual behavior when considering new technology (Davis, 1989).

Comparisons between innovation adoption theories show that TAM appears to have greater advantages over TPB and IDT as a simpler, easier-to-apply model with greater efficiency in predicting and explaining an individual's adoption intentions and actual behavior. Many studies used to investigate M-payment services adoption have adopted TAM over other theories because it has been shown to allow a causal validation of variables (Chandra *et al.*, 2010; Chen, 2008; Kim *et al.*, 2010; Schierz *et al.*, 2010; Yan *et al.*, 2009; Zhou, 2011). Even though TAM has been found to be a parsimonious model

(Venkatesh & Davis, 2000), its ease of applicability and simplicity, as well as any negative consequence of its conceptualization can be rectified by incorporating additional constructs to increase its predictive power (Shin, 2010). Many empirical studies on the M-payment services adoption have used various forms of extended TAM models to amplify its predictive and explanatory power and authors recommend this approach in future mobile technology studies (Chen, 2008; Kim *et al.*, 2010; Shin, 2010). Therefore, based on the inherent superiority of TAM, as well as the recommendations of past studies, this study modified the TAM model by maintaining the major constructs of PU, PEOU, and behavioral intention—whilst extending the model with other relevant constructs.

EXTENDED TAM AND ISSUES ASSOCIATED WITH THAI CULTURE AND TECHNOLOGY ADOPTION

According to the review of previous studies on M-payment services adoption (Chandra *et al.*, 2010; Chen, 2008; Goeke & Pousttchi, 2010; Keramati *et al.*, 2011; Kim *et al.*, 2010; Peng *et al.*, 2012; Schierz *et al.*, 2010; Shin, 2010; Yan *et al.*, 2009; Zhou, 2011), there are a number of possible constructs that can be employed in this study.

However, in most instances the constructs are not aligned with the cultural characteristics of the country where they are conducted and which may potentially affect outcomes. This is supported by Smith *et al.* (2011) who observed that transnational studies commonly adopt frameworks that have been based on Western research, which are then applied to a culturally different setting. Chau *et al.* (2002) suggest that the cultural environment in different countries may influence the way people behave and plays a significant role in the way people use technology. This notion is consistent to Mallat (2007) who noted that the adoption of M-payment services in different countries could depend on cultural differences and market conditions. For instance, Japan and Korea are both widely recognized as global leaders and users of digital technology and M-payment services. People from these countries may perceived technology to be more useful and easy to use than people from countries where technology is underdeveloped (Zhang & Dodgson, 2007). As a result, the extended TAM used in this study took into account cultural aspects of the Thai society using Hofstede's cultural dimensions (Hofstede & Hofstede, 2005) as a guideline to inform relevant additional constructs specific to Thai cultural settings in an endeavor to align them to factors that may have an impact on the use of M-payment in Thailand. Although several cultural frameworks have been proposed in the literature, Hofstede's (Hofstede & Hofstede, 2005) framework elaborating different dimensions of culture is of particular interest to this study because the framework has been frequently used and validated, generally in a variety of management research projects (Myers & Tan, 2002), as well as in information technology research (Steenkamp, 2001).

Hofstede's (Hofstede & Hofstede, 2005) five dimensions have been shown to be applicable to different features that can distinguish national culture. These dimensions include a power distance index (PDI), individualism versus collectivism (IDV), the country's uncertainty avoidance index (UAI), masculinity vs femininity (MAS), and whether a culture has a long-term orientation (LTO) that values plans for future outcomes. Many national scores for each cultural dimension have been calculated by Hofstede and Hofstede (2005) that also include those relating to Thailand. In respect of

these cultural dimension scores—Thai society is noted as being characterized as having a relatively high power distance index (score 64), high long-term orientation (score 56), and a high uncertainty avoidance index (score 64). Thai society, on the other hand, has scored relatively low with respect to individualism (score 20) and masculinity (score 34).

Power distance is defined as 'the extent to which the less powerful members of institutions and organizations within a country expect and accept that power is distributed unequally' (Hofstede & Hofstede, 2005) p. 46. In other words, this dimension refers to the extent to which a member of a society passively accepts that the power controlled and authorized in institutions is distributed equally among individuals in the society. In societies with a high power distance index, such as Thailand, status and authority are very important. As a high power distance society, Thais may be more willing to accept a technology when they are directed to do so, since they are inclined to show respect for authority and conform to the expectations of superiors. Gong *et al.* (2007) found that individuals in societies with a high power distance index tended to show less initiative in considering and discussing the introduction of new products and technologies. Individuals in high power distance societies generally wait for signals from authority figures or opinion leaders. Given that authority plays a key role in high power distance cultures, people are likely to follow the behavior of their leaders and adopt new products or services when they see their superiors adopting these entities. This notion is parallel to the concept of subjective norm that is defined as 'the person's perception that most people who are important to him think he should or should not perform the behavior in question' (Fishbein & Ajzen, 1975, p. 302) p. 302. Jaruwachirathanakul and Fink (2005) employed subjective norm as a cultural factor, and suggested this construct could be used to assess adoption of new technology in cultures that have a high power distance index.

Individualism prevails in 'societies in which the ties between individuals are loose: everyone is expected to look after himself or herself and his or her immediate family' (Hofstede & Hofstede, 2005) p. 76. On the other hand, *collectivism* is the feature of 'societies in which people from birth onward are integrated into strong, cohesive in-groups, which throughout people's lifetimes continue to protect them in exchange for unquestioning loyalty' (Hofstede & Hofstede, 2005) p. 76. In other words, collectivist cultures emphasize qualities such as loyalty, solidarity, interdependence, conflict avoidance, and identification with others that form part of a group. Thai society has a low score when it comes to individualism in Hofstede's framework, with investigations showing that Thailand is a collectivist instead of individualist society. Several researchers, such as Lee and Green (1991), state that collectivist culture is also related to the notion of subjective norm. Subjective norm implies that people's opinions play an important role in affecting an individual's behavior. In collectivist cultures, such as Thailand, an individual is inclined to adopt an idea, product or technology if his/her wider group or society also adopts the idea, product or technology. Arguably, people are more likely to adopt new technology when the whole group decides that it is a good idea. People in collectivist societies tend to build and maintain relationships with people within their social structure or group; therefore, the level of communication among the members of these societies is likely to be higher (Mooij, 2004). This implies that there is a parallel between collectivist culture and the construct of subjective norm.

Masculinity/femininity refers to the extent to which the general disposition of individuals in a society is characterized by assertiveness, nurturance and the extent to which they adhere to societal expectations of gender roles. Hofstede and Hofstede (2005) p. 120 explain that 'A society is called masculine when emotional gender roles are clearly distinct: men are supposed to be assertive, tough, and focused on material success, whereas women are supposed to be more modest, tender, and concerned with the quality of life', whereas 'A society is called feminine when emotional gender roles overlap: both men and women are supposed to be modest, tender, and concerned with the quality of life'. Masculine cultures value achievement, heroism, assertiveness, and material success and follow rigid gender norms, while feminine cultures value relationships, caring, preserving the environment, equality, and are not structured around rigid gender roles. According to Hofstede and Hofstede (2005), Thailand can be categorized as a feminine culture. This implies that Thais value relationships, caring, preserving the environment, and equality to others and tend to be service-oriented and have a strong people orientation. Jaruwachirathanakul and Fink (2005) suggest that personal relationships and face-to-face conversations are important in the Thai culture. They further observe that personal interaction when conducting a banking transaction in Thailand is considered as value-addition to customer service. This is consistent with a notion advanced by Sammapan (1996) that Thais prefer informal and personal relationship-based communication. But the strong human orientation in Thai society may possibly make the self-service approach of electronic financial services somewhat unattractive. Since M-payment services tend to reduce physical interaction and are based on a self-service mode of operation, Thai people may find this type of payment inconsistent with their customary behavior and lifestyle. Arguably, Thais might find payment modes with face-to-face interaction such as counter services, or human communication such as telephone banking more compatible than the anonymous self-service mode of M-payment services. From another point of view, the masculine/feminine characterization of a society may also be related to the concept of compatibility encountered in innovation diffusion theory by Rogers (2003). Compatibility reflects the degree to which the adopters perceive that an innovation is consistent with their requirements—requirements that are shaped by their values, beliefs, past experiences and habits. These inherent individual requirements associated with compatibility are also apparent in masculine or feminine orientations of a culture that direct certain future behaviors based on established lifestyles and values.

Uncertainty avoidance is defined as 'the extent to which the members of a culture feel threatened by ambiguous or unknown situations' (Hofstede & Hofstede, 2005) p. 167. A culture with a low uncertainty avoidance index exhibits greater tolerance for risk with people in such societies being more innovative, entrepreneurial and more willing to try new things (Hofstede & Hofstede, 2005). On the other hand, countries such as Thailand exhibit high uncertainty avoidance value security, clear rules, and a formality to the structure of life. Hence, Thai citizens can be viewed as being generally more resistant to change from established behavioral patterns and tend to focus on risk avoidance and reduction. Due to high uncertainty avoidance in Thai society, M-payment services could be seemingly regarded by Thais as a high-risk payment method when compared to traditional face-to-face payments. Indeed, money, products and recipients are not part of M-payment transactions— hence, Thais may feel insecure about this scenario and become reluctant to change from using their existing payment methods. This environment of uncertainty avoidance can also be argued as being related to the

construct of perceived risk. Perceived risk is explained as the feeling of uncertainty regarding possible negative consequences of using a product or service (Bauer, 1967). According to Featherman and Pavlou (2003), perceived risk is related to perceived trust and together these constructs can reflect how the level of risk increases or decreases when a person trusts other parties involved in a transaction. Trust appears to be an important determinant that overcomes personal fears associated with risk and uncertainty. In e-commerce studies, trust is explained as the subjective probability with which consumers believe that a particular transaction will occur in a manner consistent with their expectations (Chellappa & Pavlou, 2002). If an individual senses a lack of trust, they may refuse to give their personal information such as a telephone number or credit card number to banks, mobile service providers or third parties involved in the transaction. Hence, perceived risk and perceived trust are proposed as important determinants in the adoption of electronic payment systems. For instance, Mallat (2007) suggests that perceived trust positively influences a consumer's intention to use M-payment services. Similarly, Schierz *et al.* (2010) indicate that consumers are less motivated to adopt new payment methods when they perceive that the risk of adopting them is greater than using existing methods. Arguably, the issues of perceived risk and perceived trust in the adoption of M-payment services will be associated with societal expectations encountered in a high UAI culture, as exists in Thailand. High UAI cultures try to avoid ambiguous situations and are rule-orientated, directing people to behave in a particular manner. High UAI cultures are also change resistant, people being traditional in their outlook, with change being associated with risk—risk avoidance being a feature of such cultures (Hofstede & Hofstede, 2005). In Thai society, perceived risk and perceived trust of new payment services will invariably be influenced by these high UAI features of risk avoidance, opposition to change and traditional rules that govern financial payment behavior.

Long-term/short-term orientation refers to the attitudes and beliefs held by people of different cultural groups with regard to the future, and this determines how they act. As Hofstede and Hofstede (2005) p. 210 explain, long-term orientation shows 'the fostering of virtues oriented toward future rewards—in particular, perseverance and thrift' whereas, short-term orientation emphasizes 'the fostering of virtues related to the past and present—in particular, respect for tradition, preservation of "face", and fulfilling social obligations'. Thailand is a long-term orientation culture where Thais tend to emphasize thrift and saving for the future and prefer investment in projects with long-term benefit (Hofstede & Hofstede, 2005). Hofstede (1993) also found that individuals who value thrift also tend to be cost-conscious. Similarly, in their study on household technology adoption in a global marketplace, Zhang and Maruping (2008) noted that people associated with LTO cultures had a preference for future planning and cost saving. Their study also suggests that people in this type of culture not only seek information about new technology for present needs, but also want to know about its future potential, longevity and continued relevance. By focusing on the future, people were found to want to learn about the longevity of the technology, as well as its value for money. Zhang and Maruping (2008) also noted that if the life cycle of a new technology is short, or the current price is expensive and expected to fall in the short term, this will negatively influence their intention to buy the product. From this perspective, it can be seen that the issue of the cost of acquiring technology is associated with an individual's behavioral intention to adopt the technology in LTO cultures. Incorporating this insight into the context of M-payment adoption in Thailand, it can be asserted that a new payment

system, such as M-payment, with little history of use or adoption, is likely to be viewed with caution by Thais. Arguably, Thais would be potentially hesitant about the cost associated with using M-payment services, as well as signing up for such a service. As noted earlier, M-payment services are accompanied by additional costs associated with a transaction fee, a new headset and access or subscription fees (Luarn & Lin, 2005). Belonging to an LTO culture, Thais may find M-payment services to be an unattractive and unnecessary option, if there are additional costs involved or the benefits of using M-payment services do not offer personal value. This notion is consistent with some empirical studies conducted in Asian countries on the issue. In their study on mobile banking in Taiwan, Luarn and Lin (2005) found that perceived cost, or the extent to which an individual believes that using a service will incur extra costs, can act as a factor inhibiting consumer decision-making. In Malaysia, Wei *et al.* (2009) also found that perceived cost was a barrier to the adoption of m-commerce in the country. Cheong and Park (2005) also found perceived cost to be an influential factor in predicting the behavioral intention of customers using m-commerce in Korea. They suggest extending the theoretical model of TAM by incorporating the construct of perceived cost. Given the overwhelming evidence in the empirical research and the categorization of Thailand as a cost-conscious LTO culture, perceived cost is a justified construct that can be used to measure behavioral intention to adoption M-payment services in Thailand.

In summary, this study modified the TAM model by maintaining the major constructs of PU, PEOU, and behavioral intention—whilst extending the model with several other relevant constructs. The selection of the extended constructs of subjective norm, compatibility, perceived risk and trust, and perceived cost, were argued as aligning well with Hofstede's cultural dimensions likely to be encountered in the typical Thai setting. For instance, subjective norm was argued to reflect the dimensions of high power distance and collectivism; compatibility reflects the feminine dimension; perceived risk and trust were argued to be affiliated with the dimensions of uncertainty avoidance; and perceived cost reflects cultures that have a long-term orientation.

RESEARCH MODEL AND HYPOTHESES

The literature review enabled a research model and set of hypotheses to be developed (see Figure 1). The model consists of the independent variables (perceived usefulness, perceived ease of use, subjective norm, compatibility, perceived risk, perceived trust, and perceived cost) and dependent variables (behavioral intention to adopt M-payment services).
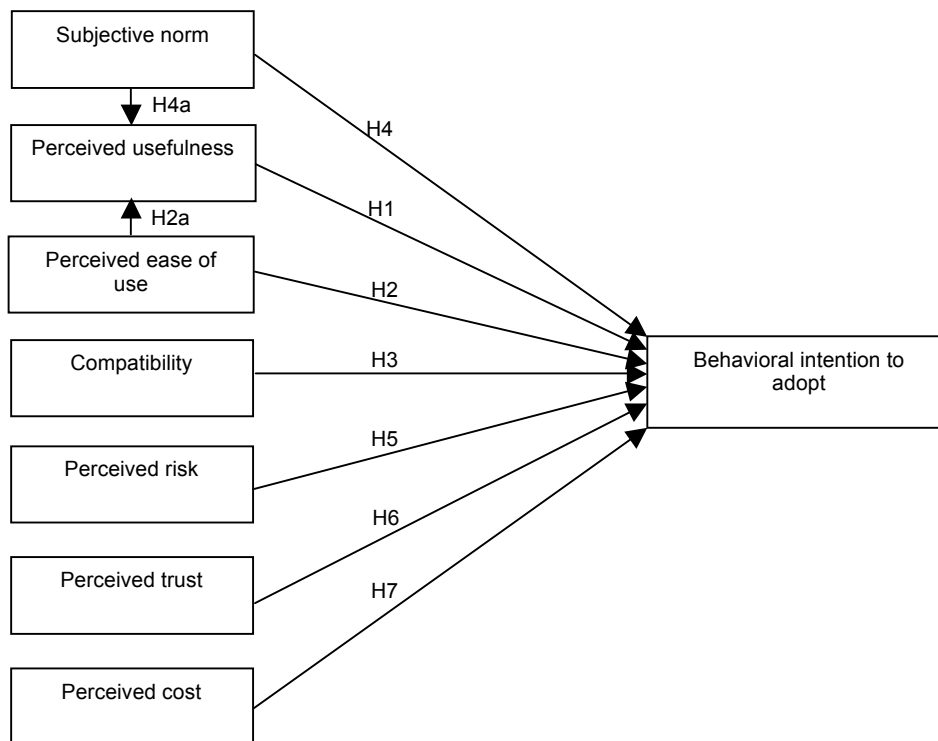
Figure 1: Research Model

RESEARCH MODEL AND HYPOTHESES

Perceived usefulness (PU)

According to Davis (1989) p. 320, PU is defined as 'the degree to which a person believes that using a particular system would enhance his or her job performance. However, PU in the context of M-payment services can be explained as the extent to which an individual believes that using M-payment services will enhance his or her productivity and performance in conducting payment transactions. PU also captures how M-payment can help users to achieve task-related goals, such as being more effective and efficient in activities. For instance, a consumer may feel that M-payment services will allow him/her to pay via their mobile phone at anytime from anywhere. The effect of PU on behavioral intention to adopt and use new technology has been empirically validated in many existing studies (Davis, 1989; Kuo & Yen, 2009; Peng *et al.*, 2012; Sun *et al.*, 2009; Venkatesh & Davis, 2000; Zarmpou *et al.*, 2012). There is also a certain amount of empirical evidence that has noted PU as an important factor influencing consumer intention to adopt M-payment services. For instance, an empirical study by Kim *et al.* (2010) indicated PU as a strong predictor of intention to use M-payment services in Korea and noted that users will adopt M-payment when they find the service to be useful for their transaction needs or financial issues. Therefore, we hypothesize that PU will exert a positive effect on the intention to use M-payment.

H1. Perceived usefulness will have a positive effect on the behavioral intention to adopt M-payment services.

Perceived ease of use (PEOU)

Although individuals believe that using a particular application is useful, they might find that the system is difficult to utilize (Davis, 1989). Davis (1989) refers PEOU to the

degree to which an individual believes that using a particular system will be free of effort. PEOU is related more to the assessment of the intrinsic characteristics of using information technology. This suggests that an individual's perception of PEOU is based on the assessment of ease of use and ease of learning, flexibility, and clarity of the interface and the processes involved in using it. For instance, some people may find that conducting a payment transaction through a mobile device is difficult since there are several steps involved, such as registering with a service provider and initializing and authorizing the transaction. PEOU has been empirically validated in a number of studies and found to have a positive effect on people's intention either directly or indirectly through its effect on the PU construct (Chandra *et al.*, 2010; Chen, 2008; Keramati *et al.*, 2011; Kim *et al.*, 2010; Peng *et al.*, 2012; Zarmpou *et al.*, 2012). For instance, an empirical study by Chen (2008) found PEOU to have a direct impact on individuals' intentions to adopt M-payment services among US consumers. Furthermore, a study by Chandra *et al.* (2010) indicated PEOU to be an important antecedent to PU in adopting M-payment services in Singapore. Therefore, the hypothesis used for this study with regard to perceived ease of use is twofold and is proposed as:

H2. Perceived ease of use will have a positive effect on the behavioral intention to adopt M-payment services.
H2a. Perceived ease of use will have a positive effect on the perceived usefulness.

Compatibility (COM)
Compatibility is a foundational construct in IDT and it refers to the consumers' evaluation of the extent to which a new technology will be consistent with their needs, habits, past experiences, existing values, and personal beliefs (Rogers, 2003). A significant number of studies have shown that compatibility is an important aspect of innovation adoption and that it has a strong influence on a person's intention to adopt new technology, not only in the general IT/IS context, but also in the mobile phone services context (Chen, 2008; Mallat & Tuunainen, 2008; Schierz *et al.*, 2010; Wu & Wang, 2005). Chen (2008) proposed that M-payment services are likely to be adopted when people perceive that using the services is compatible with their purchasing behaviors and lifestyle, which in turn also enhances their social image. Given the feminine character of Thai culture, Thai people value personal interaction and human contact (Sammapan, 1996). Therefore, they may find the self-service mode of M-payment services with its reduced human interaction inconsistent with the way they like to conduct a financial transaction. In this scenario, the construct of compatibility can help identify the extent to which M-payment is consistent or not with existing lifestyles and values in the Thai setting. Therefore, the hypothesis used for this study with regard to compatibility is proposed as:

H3. Compatibility will have a positive effect on the behavioral intention to adopt M-payment services.

Subjective norm (SN)
SN is an important construct that helps to measure the influence of important peers and/or social groups on an individual's behavior. SN refers to the degree to which an individual pays attention to and is influenced by the opinions of people who are important to him/her while considering a particular activity (Fishbein & Ajzen, 1975). SN has been employed in TRA and TBP but has tended to be excluded in TAM because researchers found that it was not only a complex construct to measure, but it was difficult to identify

whether it actually had a direct or indirect effect on behavioral intention (Davis *et al.*, 1989). However, SN is employed in the extended TAM model for this study where it was argued to be relevant and reflect the cultural dimensions of high power distance and collectivism in Thai society. Several studies such as that of Chong *et al.* (2012) also suggest a direct association of SN to behavioral intention. At the same time, the opinions of important people in the society could be the basis for an individual's feelings about the utility of the technology (Yi *et al.*, 2006), which in a society like Thailand would be influenced by high power distance as well as a low IDV factors. If a leader, superior, or peer proposes that a particular innovation might be useful, the suggestion could affect the individual's perception towards the usefulness of the innovation (Schepers & Wetzels, 2007). Therefore, the hypothesis used for this study with regard to subjective norm is proposed as:

H4. Subjective norm will have a positive effect on the behavioral intention to adopt M-payment services.
H4a. Subjective norm will have a positive effect on perceived usefulness.

Perceived risk (PR)
PR is a construct that reflects feelings of uncertainty among consumers regarding the possible negative consequence of using new technology that may dissuade adoption (Bauer, 1967; Featherman & Pavlou, 2003). PR can lower consumers' intention to use M-payment services, as consumers are not likely to engage in M-payment transactions if they perceive this type of service to involve a high level of risk. For instance, the study by Schierz *et al.* (2010) and Chen (2008) indicated PR to have a negative effect on user intention to adopt M-payment services and suggested that consumers are less motivated to adopt new payment methods if they think there is a greater risk in adopting them over using older methods of payment. In addition, PR was argued to correspond to the characterization of Thai society as a culture oriented towards high uncertainty avoidance. Thai people may regard M-payment services as a high-risk payment method compared to a cash-based payment method since money, products, and recipients are not evident while conducting a transaction. They might feel uncertain about the money being transferred, the security of electronic networks, and merchant guarantees that promise products or services. A lack of familiarity with the new technology could also generate uncertainty around M-payment services and eventually cause its under-utilization. In this scenario, perceived risk can be used as an appropriate construct to reflect the high uncertainty avoidance culture in Thai society with regard to the adoption of M-payment services. Therefore, the hypothesis used for this study with regard to perceived risk is proposed as:

H5. Perceived risk will have a negative effect on the behavioral intention to adopt M-payment services.

Perceived trust (PT)
Trust is an important element that affects consumer intention to adopt new technologies. Mayer *et al.* (1995) defined trust as the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trust or irrespective of the ability to monitor or control that other party. For the purpose of this study, the construct of PT was used to reflect the level of trust that the consumer believes he/she can invest in the parties involved in the M-

payment process (such as banks, mobile operators, merchants, and third parties) to perform expected activities without taking advantage of the consumers. In order to use M-payment services, consumers are first, and foremost, required to register with M-payment entities in order to set up an account. Arguably, if consumers sense a lack of trust in M-payment entities, they may refuse to provide them with their personal information, such as telephone number, date of birth, address, credit card number, and so on. Shin (2010), Yan *et al.* (2009), and Kim *et al.* (2009) suggest that having trust in service providers is an important factor influencing consumer intention to conduct an online transaction and the lack of consumer trust being an impediment to the adoption of electronic payment systems, including M-payment services. Like PR, PT is aligned with high uncertainty avoidance culture as might be encountered in Thai society. The hypothesis used for this study with regard to perceived trust is proposed as:

H6. Perceived trust will have a positive effect on the behavioral intention to adopt M-payment services.

Perceived cost (PC)
The concept of perceived cost has been suggested as a factor in determining consumer intention to adopt a new technology by Luarn and Lin (2005), who argue that high pricing structures can be a major barrier to the adoption. Using M-payment services involves costs such as headset fees, subscription fees, service fees, and communication fees. Consumers may find M-payment services to be an unattractive and unnecessary option if the additional costs involved are found to be expensive or the benefits of using M-payment services do not offer value for money. Several studies suggest that perceived cost could be a major barrier to the adoption of new technologies in mobile phone services (Cheong & Park, 2005; Kuo & Yen, 2009; Luarn & Lin, 2005; Wang *et al.*, 2006; Wei *et al.*, 2009; Zhou, 2011). For instance, Luarn and Lin (2005) reveal that the 'cost of use' is one of the most significant factors influencing the adoption of m-banking in Taiwan. The finding is consistent with a study by Wei *et al.* (2009) that shows that cost is a barrier against the adoption of m-commerce in Malaysia. Furthermore, Zhou (2011) has suggested that high usage costs associated with using M-payment services such as communication and transaction fees may make this type of service prone to under-utilization. Given the evidence of the importance of perceived cost, it has been suggested that perceived cost could be incorporated as an extended construct in TAM (Cheong & Park, 2005; Kuo & Yen, 2009). In addition, the issue of cost was argued to also be associated with the long-term orientation of the Thai national culture. Since people associated with this type of culture value thrift and saving for the future, they tend to be cost-conscious (Hofstede, 1993; Hofstede & Hofstede, 2005; Zhang & Maruping, 2008); hence perceived cost could be an important factor inhibiting M-payment adoption among Thais. Therefore, the hypothesis used for this study with regard to perceived cost is proposed as:

H7. Perceived cost has a negative effect on the behavioral intention to adopt M-payment services.

METHODOLOGY

A survey questionnaire was used to test the hypotheses in this study. The measurement items for each construct in the questionnaire were adopted from valid and reliable

measures derived from the existing literature on technology adoption and M-payment adoption (see Appendix A). The questions for these measurement items were formulated on a seven-point Likert scale, asking respondents to indicate their agreement with the statements from 1 (strongly disagree) to 7 (strongly agree).

Since this study focused on Thai consumers, the questionnaire was translated into the Thai language and then a back translation (to English) was performed to ensure consistency. The questionnaire in the Thai version was pretested with ten native Thai mobile phone users who were invited to join a group discussion and were asked to give suggestions on the questionnaire in terms of question content, wording, sequence, form, layout, question difficulty, and instructions (Veal, 2005). Results of the pretesting revealed minor instances of ambiguous wording and the need for additional information of some items that were subsequently revised to improve the clarity and understandability.

A total of 256 survey responses were collected from mobile phone users who had experienced using M-payment services in the Bangkok metropolitan area that is fully supported by wireless and M-payment infrastructures. The demographic profile of the 256 respondents is summarized in Appendix B. In brief, the majority of respondents were young adults (between 20 and 39 years old) who had a bachelor's degree or higher degree in terms of educational qualifications. Furthermore, company employees (47%) and students (41%) constituted the majority of respondents in this study, with the average monthly income of below THB 30,000 per month.

DATA ANALYSIS AND RESULTS

Structural equation modelling (SEM) using maximum likelihood estimation was used to test the proposed model. SEM techniques examine the covariance structure and relationships between and among latent variables, including the effects of direct, indirect, reciprocal and spurious causal relationships (Byrne, 2000). We first examined the measurement model to test whether the intended constructs were indeed measured by the underlying latent variables, with no significant cross loading on other factors. This step is also known as a confirmatory factor analysis (CFA) model. We subsequently examined the structural model to investigate the relationships between the theoretical constructs and proposed hypotheses. In this study, AMOS version 21 was the software used to assess the measurement and the structural model.

Measurement model assessment
The measurement model was tested using CFA in order to assess reliability and validity. The model included 25 items describing eight latent constructs: perceived usefulness (PU), perceived ease of use (PEOU), compatibility (COM), subjective norm (SN), perceived risk (PR), perceived trust (PT), perceived cost (PC), and behavioral intention (BI). According to Hair et al. (2010), the model's overall goodness-of-fit was assessed using the following combination of common model-fit measures: normed chi-square (χ2/df), goodness-of-fit (GFI), adjusted goodness-of-fit (AGFI), comparative fit index (CFI), normalized fit index (NFI), standardized root mean-square residual (SRMR), and root mean-square error of approximation (RMSEA). Table 1 lists the criterion cut-off used to evaluate the goodness-of-fit relative to the observed data (Hair *et al.*, 2010; Kline, 2010). As illustrated in Table 2, the measurement model exhibited a good fit of

data to the model. Thus, we could proceed to evaluate the psychometric properties of the measurement model in terms of convergent validity and discriminant validity.

Table 2: The model-fit índices

Fit indices	x^2/d.f.	GFI	AGFI	CFI	NFI	SRMR	RMSEA
Recommended value	< 3	> 0.90	> 0.80	> 0.90	> 0.90	< 0.05	< 0.08
CFA model	1.369	0.908	0.879	0.983	0.941	0.035	0.038
Structural model	1.402	0.905	0.876	0.981	0.939	0.037	0.040

The convergent validity was assessed using the attributes of factor loading, average variance extracted (AVE), and construct reliability (CR). As illustrated in Table 3, the item loadings of the measurement model show that all the scale items are highly loaded with respect to their constructs, all factor loadings being above the threshold value of 0.70 (Kline, 2010). The high loadings suggest that the indicators converge on a common point and the indicators are strongly related to their associated constructs. Moreover, the AVE values of each construct fall between 0.711 and 0.808, indicating good convergence (rule of thumb at 0.50 or higher) (Kline, 2010). Finally, construct reliability of each indicator had scores above 0.80, suggesting that the measures consistently represent the same latent construct.

Table 3: Standardized item loadings, AVE and CR

Factor	Item	Standardised item loading	AVE	CR
Perceived usefulness	PU1	0.827	0.777	0.913
	PU2	0.923		
	PU3	0.892		
Perceived ease of use	PEOU1	0.876	0.734	0.892
	PEOU2	0.824		
	PEOU3	0.869		
Compatibility	COM1	0.865	0.743	0.897
	COM2	0.873		
	COM3	0.848		
Subjective norm	SN1	0.883	0.779	0.913
	SN2	0.873		
	SN3	0.891		
Perceived trust	PT1	0.834	0.794	0.920
	PT2	0.920		
	PT3	0.917		
Perceived risk	PR1	0.813	0.733	0.891
	PR2	0.887		
	PR3	0.866		
Perceived cost	PC1	0.787	0.711	0.907
	PC2	0.877		

Factor	Item	Standardised item loading	AVE	CR
	PC3	0.863		
	PC4	0.842		
Behavioral intention	BI1	0.940	0.808	0.927
	BI2	0.899		
	BI3	0.856		

To evaluate the discriminant validity, the AVE values were compared with the squared correlation estimates. As listed in Table 4, for each factor the AVE values (shown as parentheses on the diagonal) are significantly larger than its squared correlation estimates with other factors, indicating that a satisfactory level of discriminant validity has been achieved. In other words, all the constructs in the measurement model are statistically different from each other. Therefore, the measurement model of this study exhibits the sound reliability and validity necessary for further testing of the research hypotheses.

Table 4: The AVE and squared correlation estimates

Variables	PU	PEU	COM	SN	PT	PR	PC	BI
PU	(0.777)							
PEU	0.666	(0.734)						
COM	0.579	0.669	(0.743)					
SN	0.110	0.314	0.288	(0.779)				
PT	0.282	0.516	0.480	0.482	(0.794)			
PR	0.196	0.236	0.210	0.079	0.159	(0.733)		
PC	0.051	0.127	0.058	0.194	0.119	0.253	(0.711)	
BI	0.360	0.482	0.517	0.367	0.464	0.198	0.164	(0.808)

Structural model assessment and hypotheses testing
The results of the full structural model showed that there was a good fit of data to the model (Table 2). This study tested each hypothesis by examining the path significance. Figure 2 illustrates the path diagram with the resulting completely standardized structural parameter estimates included on the paths. All the constructs explained 63% of variance in consumers' intention towards adoption of M-payment services.
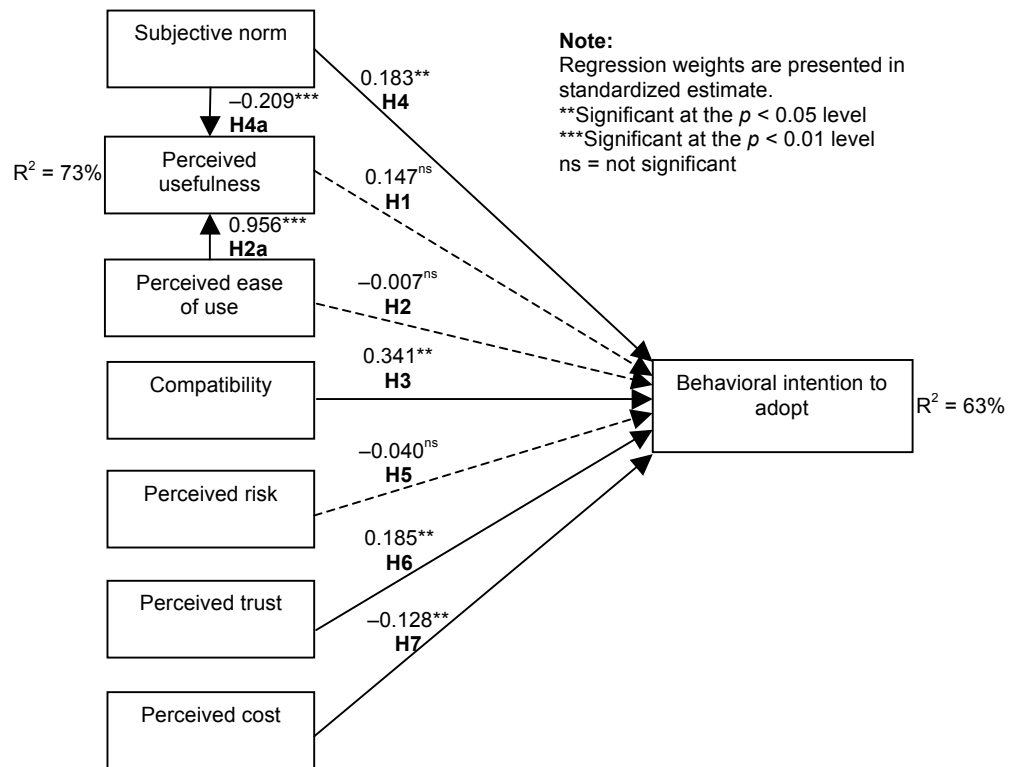
Figure 2: Results of structural path analysis for the research model and hypotheses testing

The estimation of the structural model indicates that six hypotheses (H2a, H3, H4, H4a, H6 and H7) were supported and three (H1, H2 and H5) were rejected (Table 5). In other words, consumers' intention to adopt M-payment services was determined by four factors—compatibility, subjective norm, perceived trust, and perceived cost. Equally important, the consumers' perceptions of perceived ease of use and subjective norm were revealed to have a direct effect on perceived usefulness of M-payment services. The variance in consumers' perceptions about the usefulness of the M-payment service was explained at the rate of 73% by perceived ease of use and subjective norm. However, it was found that perceived usefulness was not a mediating variable in the relationships between perceived ease of use and behavioral intention or between subjective norm and behavioral intention.

Table 5: Path coefficients and t-values of hypotheses

Hypothesis	Relation	Estimate	S.E.	t-value	P	Results
H1	PU→BI	0.156	0.115	1.354	0.176	Not Supported
H2	PEOU → BI	0.007	0.187	0.037	0.970	Not Supported
H2a	PEOU → PU	0.960	0.071	13.528	<0.01	Supported
H3	COM → BI	0.380	0.124	3.077	<0.05	Supported
H4	SN → BI	0.172	0.072	2.379	<0.05	Supported
H4a	SN → PU	0.185	0.051	3.607	<0.01	Supported
H5	PR → BI	-0.043	0.067	-0.653	0.514	Not Supported
H6	PT → BI	0.180	0.081	2.219	<0.05	Supported
H7	PC → BI	-0.138	0.066	-2.102	<0.05	Supported

DISCUSSION AND IMPLICATIONS

In response to the research question of this study—what factors influence Thai consumers' intention to adopt M-payment services and which factors have the greatest influence on Thai consumers' intention, this study proposed a research model that allowed the investigation of factors affecting consumers' intention to adopt M-payment services in Thailand. The analysis for the model of factors affecting consumers' intention to adopt M-payment services in Thailand revealed that the consumers' perceptions towards usefulness, ease of use and the risk of adopting M-payment services had no statistically significant relationship in regard to the behavioral intention towards M-payment adoption. Meanwhile, the factor of compatibility was found to be the most important with regard to people's intention to adopt M-payments, followed by perceived trust, subjective norm, and perceived cost. Furthermore, consumers' perceptions of perceived ease of use and subjective norm were found to have a direct effect on perceived usefulness of M-payment services.

The impact of compatibility as the most significant factor affecting behavioral intention implies that if consumers perceive M-payment services to be consistent with their needs, lifestyles, values and past experiences, they are more likely to adopt these services. This finding is not only in accordance with previous studies (Chen, 2008; Keramati *et al.*, 2011; Lu *et al.*, 2011; Schierz *et al.*, 2010; Yang *et al.*, 2012) but can also be attributed to the feminine culture in Thai society. As previously noted, Thailand has been rated a feminine culture where people value relationships, caring, preserving the environment and equality and therefore they tend to be service-focused with strong people orientation (Hofstede & Hofstede, 2005). Due to this characteristic, it could be assumed that Thais may find the self-service mode associated with M-payment services unattractive as it tends to reduce human interaction and is seen as being inconsistent with the way Thai people like to conduct financial transactions (Sammapan, 1996). The finding from the research in this study tends to go against this notion. This suggests that the issue of reduced physical contact and human interaction in M-payment does not deter Thai consumers. This could reflect a change of consumer perception in Thai society that is normally seen as being a society oriented towards human interaction and face-to-face contact. Perhaps the inundation of technology and mediated forms of interaction in all spheres of everyday life, from entertainment to business, have increased the comfort level of Thais with new technology and reduced their need to rely on face-to-face contact in business transactions.

Subjective norm is another construct that was found to have a significant influence on Thai consumers' intention to adopt M-payment services and the perception of the usefulness of the services. This finding is consistent with previous studies that have concluded that the influence of friends, parents, and colleagues can become a critical determinant in both the decision-making process of users in adopting M-payment services (Keramati *et al.*, 2011; Schierz *et al.*, 2010; Shin, 2010; Yan *et al.*, 2009; Yang *et al.*, 2012) and people's feelings about the utility of the innovation (López-Nicolás *et al.*, 2008; Schepers & Wetzels, 2007; Yi *et al.*, 2006). The significance of subjective norm as a determinant of behavioral intention and the perception of usefulness in the Thai context can also be aligned with the cultural characteristics of Thai society. Subjective norm is premised on the opinion of people in their social group playing an important role in an individual's behavior, and this can be seen as being related to the relatively high power distance and collectivist culture commonly found in Thai society (Hofstede &

Hofstede, 2005). As a high power distance culture, Thai citizens tend to accept and comply with the unequal distribution of power in society. As a collectivist culture, Thais also emphasize qualities such as loyalty, solidarity, interdependence, and tend to identify with other citizens and avoid conflicts with them. Since subjective norm is implicated with the extent to which an individual conforms to the opinions of others, the high power distance index and collectivist culture of Thai society show a strong inclination towards embodying subjective norm features. This relationship between subjective norm and cultural characteristics of a society has also been previously noted by Yang *et al.* (2012) and Schepers and Wetzels (2007) who suggested that subjective norm played an important role in an individual's behavior to adopt and use new technology in non-Western culture due to society's relatively strong collectivist culture.

Perceived trust was another factor affecting people's intention to adopt M-payment services. This finding is only in line with prior M-payment adoption studies (Chandra *et al.*, 2010; Lu *et al.*, 2011; Mallat, 2007; Shin, 2010; Yan *et al.*, 2009; Zhou, 2011) but also suggests that M-payment service providers (e.g. banks, mobile network operators, and third parties) need to pay attention to engaging consumer trust. The construct of trust in this study was argued as being related to the high uncertainty avoidance dimension noted in Thai society. According to Hofstede's national cultural framework, Thailand can be characterized as a society with a high uncertainty avoidance culture (Hofstede & Hofstede, 2005). People in this society value security, clear rules, and a formality to the structure of life. As a high uncertainty avoidance culture, Thais place a lot of concern on security and procedural norms, even more so with M-payment, as money, products, and recipients are not physically visible or present during an M-payment transaction. They may also be concerned about whether M-payment entities offer a secure transaction system that protects their personal information such as credit card details and passwords from external and internal fraud or criminal use. In this situation, perceived trust is indeed a construct that can have a significant effect on the behavioral intention of consumers in a high uncertainty avoidance culture such as Thailand.

Perceived cost was also a factor that was found to influence the adoption of M-payment services in the Thai market. This finding is consistent with many studies (Cheong & Park, 2005; Keramati *et al.*, 2011; Lu *et al.*, 2011; Luarn & Lin, 2005; Wei *et al.*, 2009; Wu & Wang, 2005) and suggests that high usage costs associated with using M-payment services such as headset fees, subscription fees, service fees, and communication fees may make this type of service prone to under-utilization. The significance of perceived cost as a determinant of behavioral intention resonates with the long-term orientation culture in Thai society where people associated with this type of culture value saving for the future and tend to be cost-conscious (Hofstede, 1993; Hofstede & Hofstede, 2005; Zhang & Maruping, 2008).

Perceived usefulness and perceived ease of use are constructs associated with TAM, and they have been found to affect user intentions to adopt new technology-enabled products and services in numerous empirical studies. Surprisingly, the results of this study revealed no significant effect of perceived usefulness on behavioral intention, which is inconsistent with many of the findings reported in prior studies on M-payment services adoption based on the TAM approach (Chandra *et al.*, 2010; Chen, 2008; Goeke & Pousttchi, 2010; Keramati *et al.*, 2011; Kim *et al.*, 2010; Lu *et al.*, 2011; Yang *et al.*, 2012; Zhou, 2011). Seemingly, the usefulness of M-payment services in terms of

being a convenient method for conducting a payment transaction did not emerge as a significant factor that could convince Thai consumers to use this type of service. Yan *et al.* (2009) note that the possible reason of insignificant between perceived usefulness and behavioral intention to adopt M-payment services is that individuals might still have found the existing payment methods, such as cash or credit card, more useful than mobile-based payment methods. Given this into the established payment alternatives existing in Thai market, cash-based payment, card-based payment, and internet-based payment are still preferred methods for payment among Thai consumers (Bank of Thailand, 2013). Thus, it is more likely that Thai consumers tend to overlook or be unaware of the usefulness of M-payment as they perceive traditional methods of payment to be more useful.

Furthermore, perceived ease of use in this study was also found to be not significant in influencing the adoption of M-payment services. While this result is also inconsistent with previous work associated with M-payment services adoption undertaken by Chen (2008), Goeke and Pousttchi (2010), Keramati *et al.* (2011), Kim *et al.* (2010), Schierz *et al.* (2010), and Shin (2010), this study's findings are in accordance with recent studies by Yan *et al.* (2009) in Malaysia and Wu and Wang (2005) in Taiwan. As Gefen and Straub (2000) note, there is a certain dynamic between the influence of perceived ease of use and the amount of time that the technology has been in the market. When users have not yet used a particular technology or are still in doubt about it, perceived ease of use could have a significant effect on behavioral intention to adopt that technology. But the effect of perceived ease of use will get weaker when users are more familiar and comfortable with the technology over time. Therefore, the insignificant effect of perceived ease on behavioral intention in this study can be related to the respondents of this study. As the respondents of this study are M-payment adopters who are familiar and comfortable with the service, this construct may not have been seen to be an important factor for them.

In addition, the findings of this study also revealed a lack of a significant relationship between perceived risk and behavioral intention to adopt M-payment services. This finding is inconsistent with previous studies (Chen, 2008; Schierz *et al.*, 2010; Shin, 2010; Yang *et al.*, 2012) that found perceived risk to influence the adoption of M-payment. However, the non-significance of perceived risk on intentional behavior can be potentially explained by the respondent characteristic in this study. Since the respondents in this study are individuals who experienced using M-payment services, they might not be so concerned with the risk associated with M-payment transactions, as they understand the entire M-payment process, procedures, and security through the actual use of this type of payment method.

THEORETICAL AND MANAGERIAL IMPLICATIONS

From a theoretical standpoint, the findings of this study hold several implications for scholars in the field of technology adoption. Firstly, this study successfully modified the original TAM in accordance with suggestions from previous studies, as well as the research undertaken in the context of M-payment. The extended version of TAM used in this study, when applied to M-payment services adoption in the Thai context, explains 63% of the variance in behavioral intention. This illustrates an improvement of explanatory power in behavioral intention to adopt new technology when compared to

typical TAM studies—where the non-extended model explains some 40% of the variance (Venkatesh & Davis, 2000). Secondly, the extended TAM took into account cultural aspects of Thai society using five of Hofstede's cultural dimensions. It was argued that the constructs examined in the extended TAM were associated with certain dimensions reflecting Thai national culture. This assisted in explaining the important role of cultural values specific to Thailand in affecting the behavioral intention to adopt new technology. The results of model testing indicate that compatibility, subjective norm, perceived trust and perceived cost are significant factors affecting consumer intention to adopt M-payment services in Thailand. Therefore, the model with its constructs is well suited to be a primary research framework or can be further refined to explore and predict technology adoption in a Thai context. It is contended that the paper's alignment of cultural dimensions to the constructs used to extend TAM is a significant distinguishing contribution of the paper when compared to previous publications that use TAM.

The findings of this study also hold important implications for the practical context of popularizing and managing the M-payment industry in Thailand. Firstly, service providers should carefully consider issues of compatibility of the service with Thai consumers. Arguably, service providers need to ensure that the services offered to customers meet their current values, needs, and lifestyle and should be seamlessly integrated into consumers' purchasing process without requiring extraneous processes, equipment and training. Moreover, the significant factor of subjective norm in behavioral intention suggests that individual social connections and the social status of group affiliation, such as family members, friends and colleagues, lead to the adoption of M-payment services in Thailand. The service providers potentially need to consider people's social connections and status to increase the degree of adoption of M-payment services. Accordingly, promoting M-payment services through the social and community network may be useful for increasing the level of adoption in Thailand. Equally important is building consumer trust. Since Thailand has the characteristic of high uncertainty avoidance, people are more likely to adopt M-payment services when they consider M-payment providers to be reliable and trustworthy. Finally, the negative impact of perceived cost suggests that high cost may be a burden for many users since they have to bear the cost of usage. Hence, M-payment service providers should consider offering a reasonable fee and ensure charge transparency. Implementing free or discount strategies may encourage the adoption of this type of payment.

LIMITATIONS AND DIRECTIONS FOR FUTURE RESEARCH

All research inevitably confronts limitations. First, this study has focused only on M-payment adopters. A comparative study could be conducted between non-adopters and current adopters of M-payment. This could help to further inform the insights on M-payment adoption to determine whether the factors that influence behavior differ between these two groups. Second, given the innovative nature of M-payment services and the early stage of M-payment implementation, this study merely focused on behavioral intention as the dependent variable to interpret the theory-driven actual behavior in the early adoption stage. Therefore, further study may consider improving measurement reliability by employing additional methods, such as a field study and/or longitudinal study, to more closely observe and investigate the difference between users and non-users in the later stages of M-payment implementation. Finally, there may have been other variables that could have affected the behavioral intention to adopt M-

payment services. Thus, future research using a richer research methodology combining quantitative and qualitative methods is called for.

This paper reports on research that investigated M-payment adoption in Thailand. The proposed model was empirically validated with survey data gathered from 256 Thai M-payment users. The study's results suggest that consumers' perceptions of compatibility should underpin any strategy to promote the uptake of M-payment services. Notably, the M-payment industry should ensure that the services offered to consumers meet their current values, needs, and lifestyles. Moreover, promoting M-payment services through the social and community network may be useful for increasing the level of adoption in Thailand. Equally important is building consumer trust. Since Thailand has the characteristic of high uncertainty avoidance, people are more likely to adopt M-payment services when they consider M-payment providers reliable and trustworthy. In terms of its practical implications, these findings will assist managers in mobile and electronic payment industries to implement appropriate service strategies and business models for their current and future markets.

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Appendix A Demographic characteristics of the respondents

Demographics		Frequency	Per cent (%)
Gender	Male	106	41.4%
	Female	150	58.6%
Age	Below 20	22	8.6%
	20–29	160	62.5%
	30–39	44	17.2%
	40–49	27	10.5%
	50 or above	3	1.2%
Education	High school or less	17	6.7%
	College	16	6.3%
	University	186	72.7%
	Master/PhD	37	14.5%
Occupation	Government staff	25	9.8%
	Private company staff	90	35.2%
	Self-employed/Business owner	28	10.9%
	Student	113	44.1%
Monthly income (THB)	10,000 or less	53	20.7%
	10,001–20,000	110	43.0%
	20,001–30,000	48	18.8%
	30,001–40,000	23	9.0%
	40,001–50,000	14	5.5%
	More than 50,000	8	3.1%

Appendix B Measurement scales and items

Perceived usefulness (PU) adapted from Davis (1989)

PU1   I believe that using M-payment will enable me to pay more quickly.
PU2   I believe that using M-payment will enhance my payment effectiveness (e.g. using M-payment will enable me to conduct a payment transaction whenever I want).
PU3   I believe that I will find M-payment useful.

Perceived ease of use (PEOU) adapted from Davis (1989)

PEU1   I believe that when I use M-payment, the process will be clear and understandable.
PEU2   I believe that it will be easy for me to become skilful at using M-payment.
PEU3   I believe that M-payment is easy to use.

Compatibility (COM) adapted from Chen (2008), Moore and Benbasat (1991), Schierz *et al.* (2010)

COM1   I believe that using M-payment will fit well with my lifestyle.
COM2   I believe that using M-payment will fit well with the way I like to conduct my payment transactions.
COM3   I believe that using M-payment will be completely compatible with my current situation.

Subjective norm (SN) adapted from Taylor and Todd (1995), Fishbein and Ajzen (1975)

SN1   People who are important to me think I should use M-payment (e.g. I think my parents would like me to use M-payment).
SN2   People whose opinions I value will prefer me to use M-payment.
SN3   People who are important to me (e.g. family members, close friends, and colleagues) will support my use of M-payment.

Perceived trust (PT) adapted from Pavlou (2003)

PT1   I believe that M-payment parties are honest.
PT2   I believe that M-payment parties will keep my best interests in mind.
PT3   I believe that M-payment parties will offer a secure M-payment service.

Perceived risk (PR) adapted from Featherman and Pavlou (2003)

PR1   Compared to traditional payment methods, I believe that using M-payment is riskier.
PR2   I believe that there will be high potential for loss associated with using M-payment (for instance, loss of my financial details to thieves).
PR3   I believe that there will be too much uncertainty associated with using M-payment (for instance, money does not get through to the receiver due to a network problem).

Perceived cost (PC) adapted from Luarn and Lin (2005), Wei *et al.* (2009)

PC1   I believe that the cost of equipment (e.g. mobile device) for using M-payment will be high.
PC2   I believe that the transaction fees for using M-payment will be high.
PC3   I believe that the communication or access fees for using M-payment will

be high.

PC4   Overall, I believe that using M-payment will cost me a lot of money.

Behavioural intention (BI) adapted from Venkatesh and Davis (2000)

BI1   I predict I will use M-payment in the next 6 months.
BI2   I plan to use M-payment in the next 12 months.
BI3   I think that in the future I will use M-payment rather than any other available payment method to conduct a transaction.