Journal of Global Information Management
Volume 31 • Issue 1

Understanding the Determinants of Customer Intention to Use Mobile Payment: The Vietnamese Perspective

Chuleeporn Changchit, Texas A&M University, Corpus Christi, USA*
Charles Changchit, Texas A&M University, Corpus Christi, USA
Robert Cutshall, Texas A&M University, Corpus Christi, USA
Long Pham, Texas A&M University, Corpus Christi, USA
Mohan Rao, Texas A&M University, Corpus Christi, USA
https://orcid.org/0000-0002-5805-0989

ABSTRACT

Previous studies on the intention to use mobile payment were mainly conducted using traditional technology acceptance models, which focus on positive factors and ignore negative factors influencing the intention to use mobile payment in both developed and developing countries. This study is conducted in a newly emerging country, Vietnam – a trusted destination for multinational companies to do business and reposition their global supply chains. With the integration of positive and negative factors into an extended research model to examine their influence on the intention to use mobile payment, the results show that perceived privacy and perceived security contribute to overall perceived risk. Moreover, perceived risk and perceived compatibility are two determinants of intention to use mobile payment. Theoretical and managerial implications are drawn and directions for future research are outlined.

KEYWORDS

Compatibility, Intention to Use, Mobile Payment, Perceived Risk, Privacy, Security, Vietnam

INTRODUCTION

Nowadays, the use of mobile/smartphones has become an indispensable habit in people's daily life (Bui et al., 2020; Pan et al., 2022). The tremendous developments in information, communication, and Internet technologies are contributing to the integration of many new functions and utilities into mobile phones, making them a driver for mobile commerce's growth (Moghavvemi et al., 2021; Shankar, 2022). Mobile commerce is an evolutionary form of e-commerce in which transactions and interactions between customers and businesses can be conducted anywhere, anytime (Lee &

DOI: 10.4018/JGIM.319740 *Corresponding Author

Rha, 2016). Mobile commerce can be represented by mobile advertising, mobile gaming, mobile entertainment services, mobile education, mobile offices, and mobile payment (Gao & Waechter, 2017). Mobile payment is considered the catalyst for mobile commerce's other applications to grow and develop (Liébana-Cabanillas et al., 2014).

Mobile payment can be understood as any payment in which a mobile device, such as a mobile phone, personal digital assistant, tablet or any other device connected to the wireless Internet is used to initiate, authenticate, and confirm a transaction of financial value in exchange for goods and services (Chandra et al., 2010). In other words, mobile payment is not limited by space and time, facilitating interactions and exchanges of goods and services between entities in the economy (Shankar & Datta, 2018). The purchase and sale and exchange of services related to music, movie, travel, hotel, restaurant, entertainment, and others can be completed in a convenient, efficient, effective, and easy way with the support of mobile payment (Thakur, 2013).

Mobile payment is also referred to as mobile, virtual, digital or mobile wallets (Koenig-Lewis et al., 2015). Mobile payment tends to gradually replace other forms of payment, such as cash, checks, credit cards, and debit cards (Oliveira et al., 2016). Mobile payment can be distinguished from several other services, such as: Mobile ordering, where a mobile device is used to initiate an order, but not for payment; mobile delivery, where a mobile device is used to receive digital services; mobile authentication, where a mobile device is used to authenticate a user; mobile banking, in which a mobile device is used to access mobile banking functions, to pay bills related to electricity, water, insurance or account transfers (Humbani & Melanie, 2019).

Benefits of Mobile Payment

Mobile payment can bring benefits to both customers and businesses (Li, 2018). For customers, the first benefit is that customers can buy goods and services without being limited by space and time. The second benefit is that the costs associated with using mobile payment are very low in comparison to using other forms of payment. The third benefit is the convenience and simplicity of making and completing payment transactions, requiring only a mobile device with a mobile data service.

For businesses, the first benefit is that using mobile payment does not require a large initial investment in comparison to the investment in traditional forms of payment (e.g., credit card payment). The second benefit is that using mobile payment can help businesses increase their customer base, creating favorable conditions for enhancing revenue and profit, because mobile payment can be conducted anytime, anywhere, not limited by space and time. The third benefit is the speed and convenience of mobile payment; in other words, after a customer purchases goods and services and makes a payment, the money will immediately show up in the business's account, enabling it to be used for other profitable purposes.

Mobile payment not only brings benefits to customers and businesses, but it is also a driving force for governments of countries around the world to accelerate the speed of digital transformation, towards forming smart governments, smart cities, smart citizens, and modern communication and information technology infrastructures to make all economic and noneconomic transactions transparent. Mobile payment is also one of the factors that help reduce and gradually eliminate corruption in some countries, because, with the implementation of mobile payment, cash transactions and exchanges will quickly disappear in societies, even in remote areas where bank branches have not yet reached. Societies in general and economic, and noneconomic activities, in particular, will become transparent with the implementation of mobile payment.

The future of mobile payment seems to be very bright. According to the Global System for Mobile Communications Association (GSMA) (2022), by the end of 2021, there were about 316 types of mobile payment deployed in 98 countries, with 1.35 billion registered accounts. Mobile money transfer agents have seven times more reach than ATMs and 20 times more than bank branches. The total transaction value amounted to US$1 trillion, up 31% over the previous year. Forecasts indicate

that the economic scale of mobile payment could reach US$12.06 billion by 2027, with an annual growth rate at 30.1% (Allied Market Research, 2022).

Statistical indicators also show that the Asia-Pacific region had the highest growth rate in the world in 2021, with 158 million accounts, of which 60 million are regularly active accounts, 29% higher than in the same period the previous year (GSMA, 2022). The coverage of telecommunications services, together with factors such as a large population, an increasing number of mobile subscribers, and dynamism in the financial technology market, have all contributed to the growth of mobile payment (GlobeNewswire, 2022).

Research Gap and Study Contributions

Many studies have been carried out on mobile payment, especially on the factors affecting the acceptance and use of mobile payment by individuals (Moghavvemi et al., 2021). These studies examined the acceptance and use of mobile payment from different perspectives, such as technological characteristics, demographic characteristics, and trust (Xin et al., 2015). In general, several theories have been used to explain the acceptance of new technologies, such as the diffusion of innovation theory, the theory of reasoned action, the technology acceptance model (TAM), the theory of planned behavior (TBP), and the institutional theory (Shankar & Datta, 2018).

A comprehensive and rigorous review of previous research on mobile payment acceptance shows that many of the studies were based on the TAM with a factor or two added as its extension. While studies have been conducted in both developed and developing countries, the majority have taken place in developed countries. The number of studies in developing or newly emerging countries is much lower than the number of studies in developed countries, given the rapid growth of mobile payments in developing economies. The rapid growth of mobile payments in developing countries and the rapidly changing mobile technologies can easily render previous studies out-of-date, as new factors become more important to consumers in their decision to utilize mobile payments. Many studies have shown that cultural differences among countries can influence the decision to accept new technology (Changchit et al., 2018; Changchit et al., 2021; Lonkani et al., 2020). Therefore, the factors affecting mobile payment acceptance shown in the context of developed countries need to be tested empirically in the contexts of developing and newly emerging countries, which are experiencing rapid technological growth, to see whether their effects are consistent. The authors conducted this study in the Vietnamese context.

Vietnam is a newly emerging country with a population of about 100 million, a stable political system, and a high rate of economic growth (Bui et al., 2020). Moreover, Vietnam is located in a strategic location in Southeast Asia (Pham et al., 2019). There is a wave of shifting supply chains of multinational companies to Vietnam. More than 70% of Vietnam's population owns a mobile (smart) phone and more than 40% of mobile phone uses is for daily e-commerce purposes. Vietnam is enjoying a positive mobile payment trend, with an impressive growth rate.

Most of the world's modern forms of mobile payment are already present in Vietnam, from banks' mobile banking services to e-wallets, QR code payment, and Samsung Pay. According to Statista, mobile payment in Vietnam will explode in the next five years, with an average annual growth rate of 75.4%, bringing the market size to US$170 million in 2021, 100 times more compared to 2015 (Doanhnhansaigon, 2021). In order to increase the number of mobile payment users in Vietnam and realize the potential of mobile payment, it is necessary to identify the factors affecting the mobile payment acceptance of Vietnamese customers.

While a number of studies on mobile payment have been conducted in Vietnam, it is unfortunate that these studies only considered the influencing factors in isolation, without placing them in an integrated research model to enhance their explanatory power for intention to use mobile payment. Furthermore, as the authors noted above, telecommunications, information, and Internet technologies have undergone revolutionary evolutions that have changed the way consumers perceive and pay for mobile payment, leading to the need to consider additional factors in the integrated research model.

In this study, the authors fill the research gap by adding additional factors which have high potential to impact the mobile payment adoption and make the model more comprehensive.

This study makes significant contributions to the literature. First, the proposed research model has extended the previous model to include additional constructs which have high potential to impact consumers' intention to use mobile payment, such as technology competency, perceived compatibility, perceived privacy, perceived security, and perceived risk. Second, although many studies have examined the factors affecting consumers' intention to use mobile payment, the impacts of these is subject to change, given the rapid evolution of mobile technologies and mobile payment technology. Therefore, conducting this study in the Vietnamese context can help to verify and confirm whether the effects of the factors are consistent as mobile technology evolves. Vietnam is an attractive destination for multinational companies to come to do business or to even relocate their supply chains. Identifying the factors affecting the intention to use mobile payment in Vietnam will help stakeholders develop policies to promote the acceptance and use of mobile payment in Vietnam. The growth and development of mobile payment, in turn, will likely contribute to the enhancement of mobile commerce activities of multinational companies or their supply chain partners in Vietnam.

This paper is structured as follows. The next section describes the concept of mobile payment, the current situation of mobile payment in Vietnam, current theories explaining mobile payment acceptance, and previous studies on this topic. Subsequently, the authors present research model, methodology, and results with a discussion of the results, and theoretical and managerial contributions. Finally, the researchers draw conclusions and suggest future research directions.

LITERATURE REVIEW

Mobile Payment

Mobile payment is seen as a natural evolution from online payment (Yang et al., 2012). In other words, it is a form of online payment in which transactions of unknown entities can be carried out through a mobile network (Shaw, 2014). Mobile payment is a process in which at least one stage of a transaction is conducted using a mobile device capable of securely processing a financial transaction over a mobile network or the wireless Internet (Yan & Yang, 2015). A mobile device can be a mobile (smart) phone, personal digital assistant, tablet or any other portable device (Liu et al., 2015).

Mobile payment is defined as any payment made using a mobile device to initiate, authenticate, and confirm an exchange of financial value in return for goods or services (Chang et al., 2021; Dahlberg et al., 2008). Mobile payment is considered a type of payment in which the payer uses mobile communication technology to initiate, authorize, and complete transactions (Ghezzi et al., 2010; Wang et al., 2020). Conceptually, mobile payment is a form of value exchange, which is similar to other forms of payment that customers can use, but it is based on the advanced features of mobile/smartphones to complete transactions (Slade et al., 2013).

There are two types of mobile payment: Remote and proximity (Chandra et al., 2010). Remote mobile payment, as the name implies, is a remote transaction, characterized by no direct interactions between customers and companies' point-of-sale systems. Proximity mobile payment involves interactions between customers and companies' point-of-sale systems, otherwise known as contactless payment. Customers are required to register and download apps to use remote mobile payment (Gupta & Narayan, 2020). For proximity mobile payment, customers must present a mobile device at the payment terminal. The payment process is supported by near-field communication (NFC).

Specifically, mobile payment falls into four categories (Moghavvemi et al., 2021), including carrier billing, NFC, applications, and card readers.

Carrier billing is a form of mobile payment in which an invoice is charged directly to the phone user's bill. This form of mobile payment is often used to purchase digital content, such as buying apps on the Apple Store or Google Play or buying songs on iTunes.

The second type of mobile payment is NFC, called mobile point-of-sale or mobile contactless payment. It provides a lightning-fast checkout flow that is convenient and secure. NFC has revolutionized the payment process, for example reducing interaction/transaction time between customers and companies. Another example of NFC is that customers can scan the barcode of an invoice and the transaction is completed instantly (Singh & Sinha, 2020).

Apps are arguably the most popular form of mobile payment and have the highest number of users. Many banks and companies offer mobile banking through mobile applications, for example, mobile wallets (Teo et al., 2015).

The fourth form of mobile payment is the card reader, which is considered a relatively new type and is supported by giant mobile payment companies, such as PayPal or MasterCard (Leong et al., 2013). The specific manifestation of this form of mobile payment is that a hand-held credit card reader is installed into mobile devices to complete transactions quickly and conveniently (Pham & Ho, 2015).

Previous Studies on Mobile Payment

Although many studies on mobile payment have been carried out, compared to other fields, such as online commerce, mobile commerce, online banking, mobile banking, or other traditional payment methods, the research on mobile payment acceptance can still be classified as infancy (Oliveira et al., 2016). The rapid development of the Internet, information, and communication technologies is revolutionizing the field of mobile payment (Pham et al., 2019). Many researchers believe that the mobile payment form (i.e., NFC) will become a popular form of mobile payment in the future (Tan et al., 2014).

Studies have been carried out to show the factors affecting mobile payment acceptance (Leong et al., 2013). The conceptual foundation for these studies includes behavioral decision theories and behavioral intention models. Scholars have used Fishbein and Ajzen's (1975) theory of rational action (TRA) to explain the behavior of individuals. The TRA emphasizes two types of explanatory variables for intention, namely, the attitude towards behavior and the consumer's subjective norm. Ajzen's (1991) TPB suggests that beliefs have an impact on behavioral perceptions and actual behavior. The TPB includes behavioral beliefs that influence attitudes, standard beliefs, which influence subjective norms, and control beliefs, which influence behavioral control.

Davis et al.'s (1989) TAM is an adaptation of Fishbein and Ajzen's (1975) TRA and Ajzen and Fishbein's (1980) general TRA model. The TAM is used to explain the adoption of information technology. This model includes two important abstract variables, namely, perceived usefulness and perceived ease of use, which can affect the adoption of information technology.

Mobile payment studies often rely on individual models, a combination of the models or adding other important factors to explain the consumer acceptance of mobile payment. For example, the trust factor is added to increase the explanatory power of mobile payment acceptance (Dahlberg et al., 2003). Factors such as perceived transaction convenience, perceived transaction speed, security concerns, privacy concerns, and compatibility are considered to be determinants of mobile payment acceptance (Chen, 2008).

Schierz et al. (2010) emphasized that compatibility, individual mobility, and subjective norm affect the intention to use mobile payment. Zhou (2011) focused on behavioral beliefs, social influences, and personal characteristics that influence mobile payment acceptance and use. This is also present in Yang et al.'s (2012) study. Leong et al. (2013) indicated that perceived risk, perceived cost, compatibility, relative advantage, and subjective norm have an impact on the intention to use mobile payment. Peng et al. (2012) pointed out that outcome expectations and social influences are the driving forces for mobile payment adoption, while costs and perceived risks are barriers.

After a comprehensive and systematic review of previous studies, the authors found research studies on mobile payment to have been carried out in the world in general and in Vietnam in particular. However, these studies only considered the influencing factors in isolation, without placing them in an integrated research model to enhance their explanatory power toward the intention to use mobile

payment. Furthermore, as the authors noted above, telecommunication, information, and Internet technologies are constantly evolving leading to changes in the way that consumers perceive and pay for goods and services. This leads to the need to consider additional factors as part of an integrated research model.

Current Situation on Mobile Payment in Vietnam

Vietnam is a newly emerging country with a population of about 100 million and great potential for economic growth and development (Van et al., 2020). Vietnam is attracting significant foreign investment (Nguyen et al., 2020). Located in a strategic location in Asia, specifically Southeast Asia, Vietnam is expected to become an economic center where multinational companies will come to do business (Pham et al., 2019). Moreover, with a stable political system, the supply chains of multinational companies are shifting to Vietnam to reduce supply chain risks as they face more uncertainty, especially the trade war between the U.S. and China in recent years.

The success of the Vietnamese economy is rooted in its economic reforms and transformations, initiated in 1986 (Huy et al., 2019). The overarching goal of these reforms and transformations is to convert Vietnam from an economy characterized by subsidized bureaucracy to an economy operating according to the market mechanism (Pham et al., 2018). Vietnam is also a country with good Internet infrastructure, telecommunications, and communication technology (Chau et al., 2021; Van et al., 2021). More than 70% of Vietnam's population owns a mobile phone and more than 40% of daily mobile phone uses is for e-commerce purposes. Vietnamese consumers own about 145 million mobile devices connected to the Internet (Vnetwork, 2021).

E-commerce in Vietnam reached US$11.8 billion in 2021, accounting for 5.5% of the country's total retail sales of consumer goods (Tuoitre, 2021). Vietnam is in the Top 3 Southeast Asian countries with the highest retail growth rate in the region (Vneconomy, 2021). Vietnam is experiencing a positive trend in mobile payment growth. Most of the world's modern forms of mobile payment are already present in Vietnam, from banks mobile banking services to e-wallets, QR code payment, and Samsung Pay (Cafef, 2021). According to Statista, mobile payment in Vietnam will explode in the next five years, with an average annual growth rate of about 30.2% (Doanhnhansaigon, 2021).

Importantly, even with the rapid increase in mobile payment adoption, not all Vietnamese consumers embrace this payment channel. Although prior studies identified a wide range of factors influencing the consumer acceptance of mobile payment, most of these studies were conducted in developed countries, and a smaller number of studies were conducted in developing and newly emerging countries, including Vietnam. The main characteristic of these prior studies is that they examined the factors in isolation and not as part of an integrated research model. In addition, the significant advances in information, communications, and wireless Internet technologies require the consideration of additional factors that are expected to influence the intention to use mobile payment, such as technology competency, perceived compatibility, perceived privacy, perceived security, and perceived risk.

Given the rapid growth of mobile technologies and the availability of mobile payment in the rapidly growing context of Vietnam (third in the world in terms of mobile payment usage, just behind China and Korea), it is necessary to integrate the unified theory of acceptance and use of technology (UTAUT) (developed based on a number of other theories) with technology competency, perceived compatibility, perceived privacy, perceived security, and perceived risk to increase the power of explaining intention to use mobile payment in Vietnam. Vietnam is as attractive destination for multinational companies to do business or to even relocate their supply chains. Identifying the factors influencing the intention to use mobile payment in Vietnam will help businesses develop policies to promote the acceptance and use of mobile payment. Thus, this will create favorable conditions for multinational companies and their supply chain networks to smoothly conduct business in Vietnam.

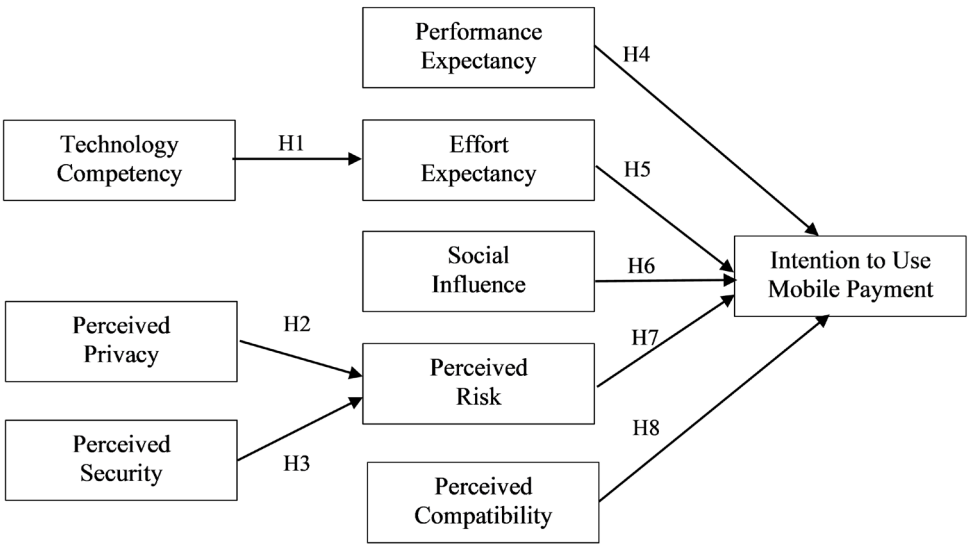
THEORETICAL BACKGROUND, RESEARCH MODEL, AND HYPOTHESES

Venkatesh et al. (2003) conducted a comprehensive review of prominent models used to predict behavior. Then, Venkatesh et al. (2013) developed a UTAUT. This model consists of four basic factors: Performance expectancy, effort expectancy, social influence, and facilitating conditions. Since the inception of this model, it has mainly been used to explain technology adoption in organizational contexts.

Consistent with previous studies using a UTAUT, this study also focuses on performance expectancy, effort expectancy, social influence, and facilitating conditions to explain the intention to use mobile payment in Vietnam. Mobile payment is an evolutionary form of online payment in that it can be conducted anywhere, anytime (Gao & Waechter, 2017). As a form of payment using technology, the level of technology competency of the consumer should be considered in determining the intention to adoption mobile payment. Perceived compatibility should also be considered, given that consumers will be more willing to participate in activities that match their social image and lifestyle. In addition, the risks related to privacy and security are higher than for other forms of payment. Thus, the factors such as perceived privacy risk, perceived security risk, perceived compatibility, and technology competency are incorporated into a UTAUT as they may influence mobile payment acceptance like they have been found to influence e-commerce and mobile commerce acceptance (Bui et al., 2020; Pham et al., 2019). Figure 1 shows the integrated research model, which the authors used to analyze the intention to use mobile payments of Vietnamese consumers.

It is important to note that mobile commerce is an evolved form of online commerce (Bui et al., 2020). Furthermore, mobile payment is the most powerful manifestation of mobile commerce (Gao & Waechter, 2017). For mobile commerce in general and mobile payment in particular, interactions and transactions can be conducted anywhere and anytime. In other words, consumers can buy goods and services and make payments without being limited by space and time. Therefore, the risks in mobile commerce and mobile payment are higher than in online commerce and online payment. It makes sense to add perceived privacy risk and perceived security risk to the research model. Furthermore, the addition of technology competence and perceived compatibility is also supported by previous studies on mobile payment acceptance (Koenig-Lewis et al., 2015). The following paragraphs discuss the authors' research hypotheses.

Figure 1.
Research Model



Technology Competency

Technology competency is viewed as consumers' assessment of their ability to use technology in a wide range of situations (Changchit et al., 2020; Mun et al., 2006). Consumers with high technical ability are generally highly motivated to use technology to accomplish different tasks (Kuo & Yen, 2009; Thakur, 2013). Instead, mobile payment can be considered as applying technology in payment; it is not difficult for consumers with a moderate to high level of technology competency to learn how to use mobile payment. In terms of accepting mobile payment, consumers with high perceived technology competency will likely believe that using mobile payment does not require great effort (Oliveira et al., 2016). On the other hand, consumers with a low perceived technology competency will likely believe that using mobile payment requires higher effort. Therefore, the authors propose the following hypothesis:

Hypothesis One (H1): A negative relationship exists between technology competency and effort expectancy.

Perceived Privacy and Perceived Security

Adoption of new technologies can involve perceived risk (Lee & Rha, 2016). Previous TAMs ignored the concept of perceived risk. Evidence from empirical studies in the field of online commerce, online banking, online payment, and mobile commerce shows that perceived risk is an important factor affecting customer acceptance of these technologies (Pham et al., 2019). Perceived risk exists when consumers are faced with uncertainties, which can produce negative outcomes (Van et al., 2020). The two main components of perceived risk are perceived privacy and perceived security (Hien et al., 2020).

The intangibility of mobile payment hinders consumers from evaluating mobile payment services in advance, making them worry about privacy and security issues (Oliveira et al., 2016). Mobile payment is not limited by time and space, so consumers may worry that their personal and financial information could be used or sold to third parties without their consent. They may also worry about their bank accounts or accounts on mobile payment apps being hacked (Van et al., 2021).

Empirical studies also show that perceived security and privacy risks make a significant contribution to perceived risk (Xin et al., 2015). Consistent with these studies, under the Vietnamese context, the authors propose the following hypotheses:

Hypothesis Two (H2): A positive relationship exists between perceived privacy and perceived risk.
Hypothesis Three (H3): A positive relationship exists between perceived security and perceived risk.

Performance Expectancy

Performance expectancy is understood as the extent to which technology will provide perceived usefulness to its users–consumers (Vankatesh & Blaskovich, 2012). Perceived usefulness or expected benefits are generated by performing certain activities (Venkatesh et al., 2003). Consumers' perception that using mobile payment can bring them benefits can influence their intention to use mobile payment (Oliveira et al., 2016). Therefore, the authors propose the following hypothesis:

Hypothesis Four (H4): A positive relationship exists between performance expectancy and intention to use mobile payment.

Effort Expectancy

Effort expectancy is considered the degree to which it is simple to use a technology (Vankatesh & Blaskovich, 2012). In other words, effort expectancy is seen as whether or not the use of technology requires significant effort (Miltgen et al., 2013). Effort expectancy is an important factor influencing

the adoption of technology. When consumers perceive that mobile payment is easy to use and does not require significant effort, they will have the intention to use mobile payment (Chandra et al., 2010). Therefore, the authors propose the following hypothesis:

Hypothesis Five (H5): A positive relationship exists between effort expectancy and intention to use mobile payment.

Social Influence

Social influence is defined as the degree to which consumers perceive that those who are important to them, such as friends, family members or colleagues at their work, believe that they should or should not use a certain technology (Vankatesh & Blaskovich, 2012). It can also be seen as the effects of environmental factors, in particular the attitudes of these individuals, on consumers' intention to use a technology (Liébana-Cabanillas et al., 2014). When attitudes about mobile payment are positive, consumers' intention to use mobile payment are enhanced (Oliveira et al., 2016). Therefore, the authors propose the following hypothesis:

Hypothesis Six (H6): A positive relationship exists between social influence and intention to use mobile payment.

Perceived Risk

Perceived risk refers to situations in which consumers are faced with undesirable outcomes (Nguyen et al., 2020). In a traditional commercial environment, customers deal directly with company employees. In an e-commerce environment, customers transact with the company's website (Al-Qirim et al., 2022; Hazarika & Mousavi, 2021; Rashidin et al., 2022). Mobile commerce is the natural evolution of e-commerce. In mobile commerce, mobile payment is one of the most vivid manifestations. With mobile payment, buying, selling, interacting, and exchanging goods and services take place anytime, anywhere, so perceived risk is a factor that cannot be ignored (Bui et al., 2020). Studies have shown that perceived risk is a factor that hinders the adoption of a technology or an innovation (Van et al., 2020). Consistent with previous studies, the authors propose the following hypothesis in the mobile payment environment:

Hypothesis Seven (H7): A negative relationship exists between perceived risk and intention to use mobile payment.

Perceived Compatibility

In the mobile payment environment, perceived compatibility refers to the degree to which the characteristics of mobile payment align and are consistent with users' intrinsic characteristics (Phonthanukitithaworn et al., 2016). The intrinsic characteristics of a user often reflect their social image, values, lifestyle, experiences or requirements (Yang et al., 2012). For example, a person who, due to their job nature, must travel often will prefer mobile payment over other forms of payment, as it would better fit into their lifestyle and match their social image. Perceived compatibility is a factor influencing the intention to adopt a technology or an innovation (Chen, 2008). If there is a compatibility between a person's intrinsic characteristics and attributes of mobile payment, they will likely increase their intention to use mobile payment. Consistent with previous studies, the authors propose the following hypothesis:

Hypothesis Eight (H8): A positive relationship exists between perceived compatibility and intention to use mobile payment.

RESEARCH METHODOLOGY

Development of Measurement Instrument

The survey instrument the authors developed for this research modified the UTAUT's instrument with six additional factors. The authors adapted the questions they used to assess the factors of performance expectancy, effort expectancy, and social influence from Venkatesh et al.'s (1996), Venkatesh et al.'s (2003), and Venkatesh et al.'s (2013) work; they adapted the questions they used to assess perceived risk from Pavlou's (2003) study; they adapted the questions they used to assess perceived privacy and perceived security from Nguyen et al.'s (2020) research; they adapted the questions they used to assess technology competency and perceived compatibility from Phonthanukitithaworn et al.'s (2016) work. Additionally, the authors created survey items explicitly to measure the antecedents to consumers' intention to use mobile payment.

A mobile payment expert who was fluent in both English and Vietnamese translated the questionnaire into Vietnamese. Another mobile payment expert who was also fluent in both English and Vietnamese translated back the Vietnamese version of the questionnaire into English to evaluate the consistency level of both English and Vietnamese versions. Two mobile payment researchers who were fluent in both English and Vietnamese examined these English and Vietnamese versions of the questionnaire independently; the results indicated that the translation content was consistent and accurate. The authors performed several assessments to substantiate and validate the suitability of the survey items included in their measurement model. The Data Analysis section provides details about these tests.

The survey instrument was comprised of two sections. The first section collected data on the subjects' mobile payment perceptions and intention to use. The second section of the survey collected demographic data. To confirm the veracity of the survey items, three professors and two research assistants provided feedback after reading through the questionnaire. The authors made adjustments to the questionnaire items based on the feedback they received to improve the validity.

The Appendix summarizes the questions the authors designed to assess the respondent's attitude toward mobile payment perceptions and intention to use and eight antecedents thought to impact their intentions. All items utilized a five-point Likert scale (1-strongly disagree and 5-strongly agree) as the beginning and ending points.

Data Collection

The authors collected the data with the help of marketing research company in Vietnam. The sampling framework of this study included mobile payment users. The researchers informed the subjects that their participation was voluntary and that they could withdraw at any time. The researchers also informed the participants that they were collecting the data anonymously and that there would be no way to identify any participant in the study.

The authors conducted a Web-based survey using Qualtrics, in this study. They transmitted a solicitation letter by email to 4,130 subjects selected at random from an email list maintained by a marketing research firm. The email message described the purpose of the survey and invited each recipient to participate in the survey. The authors asked sample members willing to participate in the survey to click on the Qualtrics-based survey link provided in the invitation email. A total of 1,287 emails were returned as undeliverable. In this situation, the actual nondelivery rate was 1,157/4,130, about 28%, which was similar to other studies, for example 26% in Sheehan and Hoy (2000). Four hundred and twenty-five (425) participants responded to the online survey. However, quite a few responses were incomplete and thus were discarded. The valid sample size was 372 mobile payment users. Thus, the effective sample size was 372, representing the final rate of response 372/2973, or 12.5%. Table 1 provides the subjects' demographics.

Table 1.
Subjects' Demographics (N=372)

Gender					
Male: 77 (20.70%)			Female: 295 (79.30%%)		
Age (in years)					
18-25	26-35	36-45		46-55	56-65
87 (23.39%)	120 (32.26%)	107 (28.76%)		58 (15.59%)	0 (0.00%)
Employment					
Full-time: 291 (78.23%)		Part-time: 49 (13.17%)		Not employed: 32 (8.60%)	
Online orders last month					
0	1-2	3-5	6-9	10-20	>20
81 (21.77%)	137 (36.83%)	76 (20.43%)	35 (9.41%)	25 (6.72%)	18 (4.84%)
Online orders last year					
0	1-2	3-5	6-9	10-20	>20
49 (13.17%)	68 (18.28%)	51 (13.71%)	41 (11.02%)	63 (16.94%)	100 (26.88%)
Having credit or debit card					
Yes	No				
193 (51.88%)	179 (48.12%)				

DATA ANALYSIS

The authors used SPSS 25.0 and AMOS 24.0 to analyze the data.

Reliability Test

The authors performed a reliability test to check the internal consistency of the survey instrument constructs. They calculated the reliability for each of the constructs in the research model. Table 2 shows the results of the reliability test; they were all above the recommended value of 0.70 (Nunnally 1978). Thus, the internal consistency of the constructs is acceptable.

Kaiser-Meyer-Olkin Test for Sampling Adequacy and Bartlett's Test

The authors performed the Kaiser-Meyer-Olkin (KMO) test for sampling adequacy and Bartlett's test to evaluate the degree of unidimensionality of the scales (Table 3). The sphericity test showed a p-value of 0.000. The sampling adequacy was also supported by the value of 0.931.

Common Method Bias

The authors used Harman's single-factor test to ensure that the model is free from common method bias. They used the SPSS to derive the result by conducting an unrotated single-factor constraint factor analysis. As Table 4 shows, the highest variance explained by one factor was 45.224%, indicating no concern with common method bias.

Analysis of Factor Loadings

To evaluate the factors' convergent validity, the authors verified the factor loadings to determine that each survey item loaded onto the appropriate factor (Table 5). The results provide evidence that

Table 2.
Reliability Test*

Constructs	Measurement items	Cronbach's α
Technology Competency	TC1, TC2, TC3, TC5	0.919
Performance Expectancy	PE1, PE2	0.861
Effort Expectancy	EE1, EE2, EE3, EE4	0.912
Social Influence	SI2, SI3, SI4, SI5	0.886
Perceived Privacy	PP1, PP2, PP3, PP4, PP5	0.957
Perceive Security	PS3, PS4, PS5	0.819
Perceived Risk	PR2, PR3, PR4, PR5	0.969
Perceived Compatibility	PC1, PC2, PC4, PC5	0.950
Intention to Use Mobile Payment	INT1, INT2, INT3	0.918

Note. * Items with factor loadings < 0.7 were removed.

Table 3.
KMO and Bartlett's Test

KMO and Bartlett's test		
KMO sampling adequacy measurement		.931
Sphericity test	Approx. chi-square	12693.708
	Degree of freedom	528
	Significance	.000

the 28 survey items loaded onto nine factors, explaining 77.185% of the total variance. The authors removed the items with factor loadings below the suggested level of 0.5 (Hair et al. 2009), when they analyzed the data.

Multicollinearity Test

Since multicollinearity can have harmful effects, the authors assessed multicollinearity in the research model (Cenfetelli & Bassellier 2009). Table 6 shows the variance inflation factor (VIF) ranging from 1.069 to 2.776, and all are less than 10, indicating that multicollinearity is not a concern in this dataset.

Structural Equation Model

The authors used SPSS AMOS 24.0 to examine the research model. They assessed the seven SEM fit measurements to ensure the overall goodness of fit of the model. All goodness of fit indices falls within the acceptance levels (Table 7), indicating that the model demonstrated a good fit with the data (Bentler & Bonett, 1980; Hu & Bentler, 1999; Tucker & Lewis, 1973).

Hypothesis Testing

Figure 2 shows the properties of the causal paths including standardized path coefficients. Table 8 presents the results of the hypothesis testing.

Table 4.
Total Variance Explained

Total variance explained						
Components	**Initial eigenvalues**			**Extraction sums of squared loadings**		
	Total	**Variance %**	**Cumulative %**	**Total**	**Variance %**	**Cumulative %**
1	14.924	45.224	45.224	14.924	45.224	45.224
2	3.575	10.833	56.057	3.575	10.833	56.057
3	2.399	7.268	63.325	2.399	7.268	63.325
4	1.887	5.719	69.044	1.887	5.719	69.044
5	1.252	3.793	72.837	1.252	3.793	72.837
6	1.049	3.178	76.015	1.049	3.178	76.015
7	.968	2.933	78.948	.968	2.933	78.948
8	.858	2.601	81.548	.858	2.601	81.548
9	.792	2.402	83.950	.792	2.402	83.950
10	.569	1.725	85.675			
11	.468	1.418	87.093			
12	.427	1.294	88.387			
13	.366	1.109	89.496			
14	.315	.953	90.449			
15	.306	.927	91.376			
16	.287	.870	92.246			
17	.269	.815	93.062			
18	.239	.724	93.786			
19	.228	.692	94.478			
20	.214	.647	95.125			
21	.204	.619	95.744			
22	.194	.588	96.331			
23	.169	.512	96.843			
24	.159	.481	97.324			
25	.144	.438	97.762			
26	.131	.396	98.157			
27	.119	.362	98.519			
28	.111	.335	98.855			
29	.095	.286	99.141			
30	.089	.271	99.412			
31	.073	.221	99.633			
32	.065	.197	99.829			
33	.056	.171	100.000			

Table 5.
Factor Analysis*

	Components								
Constructs	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
PE1	.174	.048	.242	.134	.247	.202	.193	.137	**.762**
PE2	.188	.019	.250	.102	.215	.277	.177	.123	**.773**
EE1	.200	.015	.269	.214	**.734**	.216	.127	.106	.215
EE2	.256	.019	.197	.131	**.725**	.144	.314	.122	.074
EE3	.265	.081	.182	.211	**.769**	.215	.165	.029	.128
EE4	.266	.094	.334	.179	**.719**	.162	.087	.088	.154
SI2	.110	.093	.063	**.733**	.148	.204	.090	.116	.168
SI3	.186	.050	.089	**.808**	.171	.150	.085	.170	.088
SI4	.184	.063	.213	**.775**	.134	.075	.112	.199	-.028
SI5	.229	.101	.156	**.791**	.123	.109	.112	.235	.028
PP1	**.778**	.101	.171	.210	.171	.116	.131	.197	.107
PP2	**.830**	.090	.121	.202	.181	.190	.099	.131	.101
PP3	**.834**	.048	.140	.130	.156	.178	.181	.149	.082
PP4	**.889**	.062	.132	.122	.197	.146	.114	.122	.062
PP5	**.841**	.077	.159	.167	.179	.148	.076	.163	.097
PS3	.199	.103	.140	.191	.128	.228	.001	**.742**	-.034
PS4	.213	.064	.108	.287	.059	-.008	.215	**.725**	.215
PS5	.285	.099	.056	.316	.073	.172	.105	**.751**	.126
PR2	.041	**.938**	.071	.015	.047	.073	.005	.037	-.016
PR3	.099	**.947**	.029	.108	.043	.032	-.008	.069	.019
PR4	.083	**.955**	.041	.063	.023	.004	.020	.080	.057
PR5	.047	**.952**	.061	.072	.030	.017	.025	.030	.011
PC1	.251	.060	.306	.170	.252	**.710**	.171	.073	.230
PC2	.286	.074	.272	.160	.281	**.741**	.157	.158	.164
PC4	.259	.020	.259	.224	.178	**.731**	.250	.192	.107
PC5	.206	.055	.347	.244	.166	**.734**	.223	.152	.183
TC1	.203	.089	**.773**	.112	.268	.250	.111	.093	.078
TC2	.125	.070	**.723**	.143	.214	.289	.206	.084	.220
TC3	.181	.078	**.828**	.115	.239	.202	.155	.104	.071
TC5	.188	.049	**.736**	.224	.151	.169	.240	.084	.213
INT1	.272	.030	.274	.173	.189	.223	**.730**	.169	.231
INT2	.199	-.001	.318	.209	.261	.312	**.715**	.086	.131
INT3	.226	.010	.280	.160	.343	.252	**.710**	.134	.152

Note. *Rotation method: Varimax with Kaiser normalization. The items with factor loadings less than 0.7 were removed from data analysis.

Table 6.
Multicollinearity Test

Coefficients[a]							
Model	Unstandardized coefficients		Standardized coefficients	t	Sig.	Collinearity statistics	
	B	Std. error	Beta			Tolerance	VIF
(Constant)	.965	.155		6.211	<.001		
Performance Expectancy	.134	.039	.151	3.414	<.001	.522	1.917
Effort Expectancy	.188	.046	.203	4.103	<.001	.418	2.395
Social Influence	.048	.041	.050	1.152	.250	.535	1.869
Perceived Privacy Risk	.051	.032	.071	1.602	.110	.519	1.925
Perceived Security Risk	.054	.040	.059	1.333	.183	.532	1.879
Perceived Compatibility	.183	.042	.235	4.395	<.001	.360	2.776
Technology Competency	.175	.040	.217	4.399	<.001	.424	2.359
Perceived Risk	-.042	.024	-.059	-1.787	.075	.935	1.069

Note. A. Dependent variable: Intention

Table 7.
Fit Indices for the Models

Indices of fit	Value recommended	Model value
df/Chi-square	≤3.00	0.671
Goodness of fit	≥0.90	0.998
Adjusted goodness of fit	≥0.80	0.982
Root mean square error of approximation	≤0.06	0.012
Comparative fit index	≥0.93	1.000
Tucker Lewis index	≥0.90	1.007
Normed fit index	≥0.90	0.998

RESULTS AND DISCUSSION

The path coefficient of technology competency to effort expectancy is 0.572 (t-value, 16.711; p-value < 0.001). This indicates that H1 (i.e., a positive relationship exists between technology competency and effort expectancy) is statistically supported. This result is similar to Phonthanuketithaworn et al.'s (2016) results.

The path coefficient of perceived privacy to perceived risk is 0.117 (t-value, 1.925; p-value < 0.1), indicating that H2 (i.e., a positive relationship exists between perceived privacy risk and perceived risk) is statistically supported. This result is similar to that of Nguyen et al. (2020).

The path coefficient of perceived security risk to perceived risk is 0.199 (t-value, 2.563; p-value < 0.001), indicating that H3 (i.e., a positive relationship exists between perceived security and perceived risk) is statistically supported. This result is similar to that of Van et al. (2021).

The path coefficient of performance expectancy to intention to use mobile payment is 0.011 (t-value, 0.078; p-value = 0.938), indicating that H4 (i.e., a positive relationship exists between performance expectancy and intention to use mobile payment) is not statistically supported.

Figure 2.
Path Analysis of Structural Equation Model

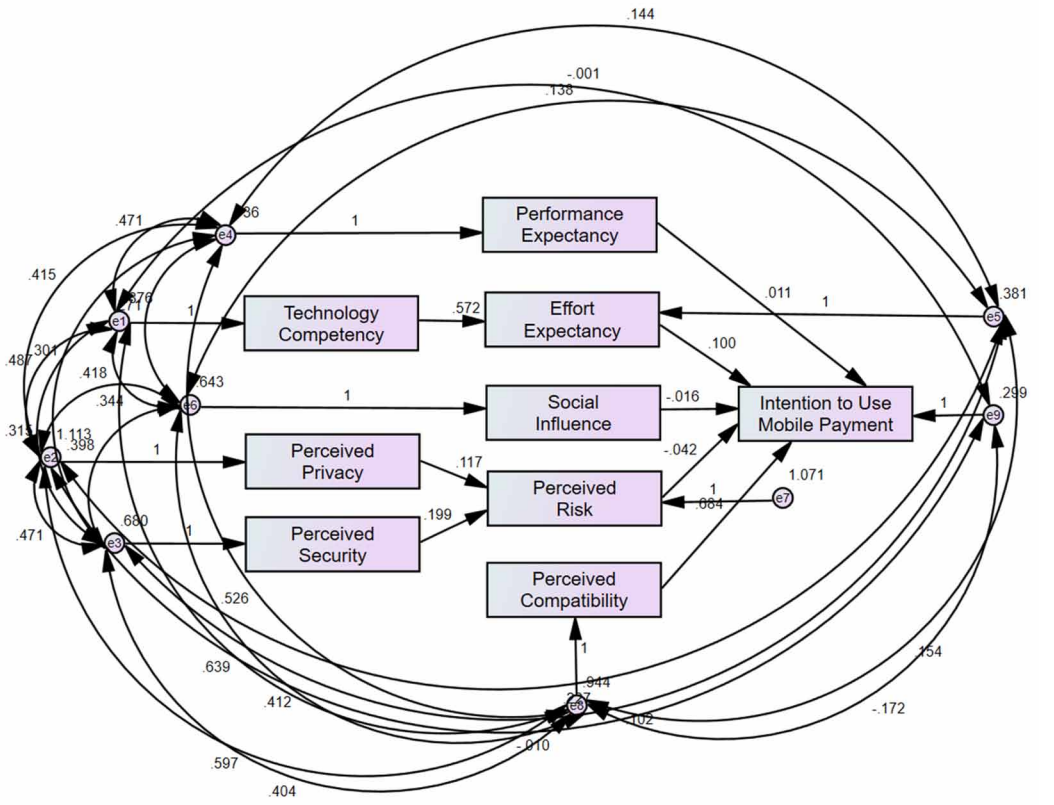


Table 8.
Hypothesis Testing

H#	Hypothesis testing			Standardized estimate (β)	Critical ratio	p-value
1	Technology Competency	→	Effort Expectancy	0.572	16.711	***
2	Perceived Privacy	→	Perceived Risk	0.117	1.925	0.054*
3	Perceived Security	→	Perceived Risk	0.199	2.563	***
4	Performance Expectancy	→	Intention to Use Mobile Payment	0.011	0.078	0.938
5	Effort Expectancy	→	Intention to Use Mobile Payment	0.100	1.563	0.118
6	Social Influence	→	Intention to Use Mobile Payment	-0.016	-0.154	0.878
7	Perceived Risk	→	Intention to Use Mobile Payment	-0.042	-1.815	0.070*
8	Perceived Compatibility	→	Intention to Use Mobile Payment	0.684	2.729	***

Note. *** indicates significance level < 0.001; * indicates significance level < 0.1

The path coefficient of effort expectancy to intention to use mobile payment is 0.100 (t-value, 1.563; p-value, 0.118), indicating that H5 (i.e., a positive relationship exists between effort expectancy and intention to use mobile payment) is not statistically supported.

The path coefficient of social influence to intention to use mobile payment is -0.016 (t-value, -0.154; p-value, 0.878), indicating that H6 (i.e., a positive relationship exists between social influence and intention to use mobile payment) is not statistically supported.

The path coefficient of perceived risk to intention to use mobile payment is -0.042 (t-value, -1.815; p-value < 0.1), indicating that H7 (i.e., a negative relationship exists between perceived risk and intention to use mobile payment) is statistically supported. This result is consistent with that of Van et al. (2020).

The path coefficient of perceived compatibility to intention to use mobile payment is 0.684 (t-value, 2.729; p-value < 0.001), indicating that H8 (i.e., a positive relationship exists between perceived compatibility and intention to use mobile payment) is statistically supported. This result is in line with that of Phonthanukitithaworn et al. (2016).

This study has unique contributions to the relevant research field because it is one of the systematic and comprehensive studies on the influence of factors on the intention to use mobile payment in Vietnam–a newly emerging country. Previous studies often considered the influence of positive factors on the intention to use mobile payment separately from the influence of negative factors. This study integrates both types of factors into an extended research model. Specifically, the extended research model considers eight constructs (i.e., technology competency, performance expectancy, effort expectancy, social influence, perceived compatibility, perceived privacy, perceived security, and perceived risk), the relationships among them, and their influence on the intention to use mobile payment.

It is interesting that in the Vietnamese research setting, traditional constructs in TAMs, such as performance expectancy, effort expectancy, and social influence, have no effects on the intention to use mobile payment. This result is different from the results of many previous studies in developed countries. It is very likely that previous studies on the intention to use mobile payment focused on the early stages or segments of the mobile payment cycle; in other words, this stage of mobile payment was not yet ripe. Now, mobile payment is becoming more and more popular as technologies, such as wireless Internet technology and information and communication technologies, are at the most complete and modern stage, promoting the growth and development of mobile payment. Therefore, traditional constructs no longer play a significant role in the intention to use mobile payment.

The unsupported hypothesis H4 and H5 can be explained through the prism of the TAM. When applying the TAM to explain intention to use a technology or innovation, there have been inconsistent results regarding the role of perceived ease of use (Bui et al., 2020). In this study, effort expectancy can be viewed as the perceived ease of use factor in the TAM. The ease of use factor seems to be most important at the outset of a new technology but loses its importance as the usage of the technology increases. In Vietnam, the use of smartphones is in the top 10 globally (Ministry of Information and Communications, 2021). Mobile payment is based in part on the smartphone technology, so the ease of use factor is likely not significant to Vietnamese consumers since they are familiar with using smartphone technology. In addition, Vietnamese consumers already understand the usefulness of smartphone technology, since the Vietnamese consumer's smartphone is often the only means of access that they have to the Internet.

Mobile payment is an evolutionary form of online payment. In other words, mobile payment is no longer limited by space and time. Consumers can buy goods and services anytime, anywhere through mobile payment. Therefore, perceived compatibility plays an important role in affecting the intention to use mobile payment. Perceived compatibility is demonstrated by customers due to their work requirements or frequent commuting habits, and thus are more suitable for mobile payments than customers who sit in corporate offices or at home.

In addition, because mobile payment takes place anytime, anywhere, not limited by space and time, the risk level is considered higher than other forms of payment, such as online payment. Therefore, perceived privacy and perceived security influence perceived risk, and, in turn, perceived risk hurts the intention to use mobile payment. The significant contribution of this study is to show

that perceived compatibility, perceived privacy, perceived security, and perceived risk have effects on the intention to use mobile payment in a newly emerging country, Vietnam. Due to the similarity in culture and demographics between Vietnam and other Southeast Asian countries, the results of this study may be generalizable across other Southeast Asian countries with developing economies. This is important, since the Southeast Asian region is the one of the world's fastest growing regions in terms of economic growth and telecommunications and Internet technologies acceptance (Pham et al., 2019). In addition, there are striking similarities between Southeast Asian countries and Latin American countries in terms of digital growth (Cento, 2021). Thus, this study's results may be generalizable to some Latin American developing countries.

STUDY IMPLICATIONS

Theoretical Implications

From the theoretical perspective, the results of this study provide several implications for researchers on technology adoption. First, most of the previous research has mainly focused on the positive aspects of technology and its influence on the intention to use it. Ignoring the negative factors associated with technology use will not provide a complete understanding of the intention to use the technology. This study integrates both positive and negative factors into an extended research model to examine their influence on the intention to use mobile payment.

Second, previous studies using common TAMs (e.g., TRA, TPB, TAM, and DOI) were conducted in developed countries. However, there are differences between developed and developing countries (especially, newly emerging ones). Therefore, the results of previous studies should be validated in research contexts in emerging countries to see if there are inconsistencies and if this study contributes to such efforts.

Third, this study initially shows that the traditional constructs in popular TAMs do not seem to play an important role in the intention to use technology, namely, the intention to use mobile payments in a newly emerging country. Specifically, in this study, performance expectancy, effort expectancy, and social influence have no impact on the intention to use mobile payment. This can be explained that mobile payment users have perceived usefulness, ease of use, and social impact. What they care about is compatibility and perceived risk associated with using mobile payment.

Practical Implications

The results of this study show that perceived compatibility has a positive relationship with the intention to use mobile payment. In the context of mobile payment services, perceived compatibility is seen as the degree to which mobile payment-related behaviors are orchestrated and consistent with the users' intrinsic characteristics. The users' intrinsic characteristics include lifestyles, beliefs, social images, personal experiences, and values. Mobile payment may be preferred by people whose lifestyles and images are compatible with this service. In other words, people are interested in whether using mobile payment is consistent with their needs. The effect of perceived compatibility on the intention to use mobile payment in this study is an interesting result because most popular technology adoption models ignore this factor.

From the practical perspective, the results of this study provide important implications for entities involved in the provision of mobile payment services in Vietnam in terms of developing strategies and policies toward an increasing number of mobile payment users. Mobile payment service providers must carefully consider issues related to mobile payment service compatibility with Vietnamese customers because this study indicates that perceived compatibility has a positive influence on the intention to use mobile payment. Therefore, entities involved in the provision of mobile payment services should ensure that the services provided are responsive to their needs, lifestyle, values, and social image.

The study results also reveal that perceived risk has a negative relationship with the intention to use mobile payment. Perceived risk refers to situations in which clients are faced with uncertain outcomes. Perceived risk in mobile commerce is higher than in online commerce. Likewise, perceived risk in mobile payment is higher than in online payment, as buying/selling and paying for goods and services can happen anytime, anywhere. Perceived risk is measured through perceived privacy and perceived security. Therefore, to increase the intention to use mobile payment, mobile payment service providers need to have strategies and policies in place to reduce perceived privacy and perceived security risks.

Perceived security in mobile payment refers to situations, conditions or events where unauthorized destruction, modification, disclosure, and use of customer data could result in monetary and nonmonetary losses to customers. Mobile payment users expect a high level of perceived security when deciding to engage in mobile payment activities.

In addition to a perceived security, perceived privacy is also a factor related to overall perceived risk. Perceived privacy refers to situations, conditions or events in which entities involved in providing mobile payment services collect customers' personal information for illegal or unethical use (e.g., selling to third parties for profit).

To increase perceived trust in mobile payment, mobile payment service providers (i.e., banks, telecommunications companies, and wireless Internet service providers) must invest in the mobile payment technology infrastructure and software packages which are encrypted with advanced algorithms, digital signatures, and firewalls to ensure that mobile payment transactions are made quickly and precisely. Marketing and communication strategies must be implemented effectively to convey the clear message that the capabilities and reputation of the actors involved in providing mobile payment services are embodied in mobile payment technologies and that these technologies are reliable and always available to meet the users' expectations and needs.

Investing in mobile payment technology infrastructure should be an ongoing and continuous process to protect mobile payment users against the destruction of their personal and financial information, unauthorized disclosure, modification or illegal use, resulting in financial and nonfinancial losses. Deploying means and tools aimed at enhancing perceived security and perceived privacy will give mobile payment users the feeling that mobile payment is reliable and secure.

Findings in this study also suggest that actors involved in providing mobile payment services need to build a sustainable business culture in which the interests of customers and users are always put first. This means that, in any interaction, transaction or exchange, if the customer is not satisfied with the mobile payment service, the fault must first lie with the mobile payment service providers. By doing so, customers will inevitably experience higher levels of perceived security and privacy, resulting in enhanced intention to use mobile payment.

CONCLUSION, LIMITATIONS, AND FUTURE RESEARCH DIRECTIONS

This study can be considered one of the comprehensive and systematic studies on the relationships between the factors affecting the intention to use mobile payment in a newly emerging country, namely Vietnam. Specifically, the authors integrated performance expectancy, effort expectancy, social influence, technology competency, perceived risk, perceived privacy risk, perceived security risk, and perceived compatibility into an extended research model to explain the intention to use mobile payment.

The results indicate that, while some traditional factors (from common technology adoption models) influence intention to use mobile payments in developed countries, they do not play an important role in a newly emerging country, that is, Vietnam. Specifically, there is no statistical evidence to support the relationships between performance expectancy, effort expectancy, social influence, and intention to use mobile payment. A possible explanation is that mobile payment users

have perceived usefulness, ease of use, and social impact. What they care about are compatibility and perceived risk associated with using mobile payment.

While most popular technology acceptance models ignore negative factors, this study shows that perceived compatibility, perceived privacy, and perceived security play an important role in influencing the intention to use mobile payment. This is understandable because a newly emerging country like Vietnam is witnessing an explosion of mobile/smartphone usage and e-commerce, and the risks associated with mobile payment are not to be dismissed, especially when the mobile payment technology infrastructure is gradually being enhanced.

Vietnam is a newly emerging country, located in a strategic location in Southeast Asia, and is a reliable destination for multinational companies to do business or reposition their global supply chains. This study makes a significant contribution to the relevant research field and provides valuable information for the actors involved in providing mobile payment services to develop strategies and policies to further promote the growth and development of mobile commerce in general and mobile payment in particular. Like other studies, this study has some limitations.

First, the authors conducted this study in Vietnam, so the conclusions drawn for other developing or newly emerging countries may be different, because Vietnam may not be representative of such countries. Future studies need to be conducted in other developing or newly emerging countries to confirm the results of this study.

Second, in this study the authors did not examine if influencing factors that determine the intention to use mobile payment differ between a developing/newly emerging country and a developed country. Future research can be conducted in these two groups of countries to get a comprehensive picture of the different determinants of mobile payment intention.

Last but not least, this study focused on only two types of risk, namely perceived security and perceived privacy, as contributing factors to overall perceived risk. Future studies may further investigate the role of other types of risk such as financial risk, social risk, time risk, and performance risk in influencing overall perceived risk and intention to use mobile payment.

REFERENCES

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, *50*(2), 179–211. doi:10.1016/0749-5978(91)90020-T

Al-Qirim, N., Rouibah, K., Abbas, H., & Hwang, Y. (2022). Factors affecting the success of social commerce in Kuwaiti microbusinesses: A qualitative study. *Journal of Global Information Management*, *30*(1), 1–31. doi:10.4018/JGIM.313944

Allied Market Research. (2022). *Mobile payment market outlook- 2027*. Allied Market Research. https://www.alliedmarketresearch.com/mobile-payments-market

Bentler, P. M., & Bonnet, D. G. (1980). Significance tests and goodness-of-fit in the analysis of covariance structures. *Psychological Bulletin*, *88*(3), 588–606. doi:10.1037/0033-2909.88.3.588

Bui, N., Pham, L., Williamson, S., Mohebbi, C., & Le, H. (2020). Intention to use mobile commerce: Evidence from emerging economies. *International Journal of Enterprise Information Systems*, *16*(1), 1–30. doi:10.4018/IJEIS.2020010101

Cafef. (2021, August 16). *Thanh toán di động Việt Nam xếp thứ 3 thế giới về tỷ lệ người dùng, song vẫn là cuộc chiến 'dài hơi' cho doanh nghiệp [Mobile payment Vietnam ranks 3rd in the world in terms of user ratio, but it is still a 'long-term' battle for business].* https://cafef.vn/thanh-toan-di-dong-viet-nam-xep-thu-3-the-gioi-ve-ty-le-nguoi-dung-song-van-la-cuoc-chien-dai-hoi-cho-doanh-nghiep-20210816094720513.chn

Cento. (2021). *Digital SE Asia compared to Latin America*. Cento Ventures. https://www.cento.vc/latinamerica/

Chandra, S., Srivastava, S. C., & Theng, Y. L. (2010). Evaluating the role of trust in consumer adoption of mobile payment systems: An empirical analysis. *Communications of the Association for Information Systems*, *27*(1), 561–588. doi:10.17705/1CAIS.02729

Chang, V., Chen, W., Xu, Q. A., & Xiong, C. (2021). Towards the customers' intention to use QR codes in mobile payments. *Journal of Global Information Management*, *29*(6), 1–21. doi:10.4018/JGIM.20211101.oa37

Changchit, C., Klaus, T., & Treerotchananon, A. (2021). Using customer review systems to support purchase decisions: A comparative study between the U.S. and Thailand. *Journal of Global Information Management*, *29*(6), 1–24. doi:10.4018/JGIM.20211101.oa51

Changchit, C., Lonkani, R., & Sampet, J. (2018). Determinants of mobile banking adoption: A comparative study between U.S. and Thailand. *Journal of Global Information Management*, *26*(4), 158–184. doi:10.4018/JGIM.2018100109

Chau, N. T., Deng, H., & Tay, R. (2021). A perception-based model for mobile commerce adoption in Vietnamese small and medium-sized enterprises. *Journal of Global Information Management*, *29*(1), 44–67. doi:10.4018/JGIM.2021010103

Chen, L. D. (2008). A model of consumer acceptance of mobile payment. *International Journal of Mobile Communications*, *6*(1), 32–52. doi:10.1504/IJMC.2008.015997

Dahlberg, T., Mallat, N., Ondrus, J., & Zmijewska, A. (2008). Past, present, and future of mobile payments research: A literature review. *Electronic Commerce Research and Applications*, *7*(2), 165–181. doi:10.1016/j.elerap.2007.02.001

Dahlberg, T., Mallat, N., & Öörni, A. (2003). Trust enhanced technology acceptance model- consumer acceptance of mobile payment solutions: Tentative evidence. *Stockholm Mobility Roundtable, 22*(1), 145.

Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: A comparison of two theoretical models. *Management Science*, *35*(8), 982–1003. doi:10.1287/mnsc.35.8.982

Doanhnhansaigon. (2021, August 16). Việt Nam xếp thứ ba thế giới về tỷ lệ thanh toán di động [Vietnam ranks third in the world in terms of mobile payment rates]. *Doanhnhansaigon*. https://doanhnhansaigon.vn/thoi-su-trong-nuoc/viet-nam-xep-thu-ba-the-gioi-ve-ty-le-thanh-toan-di-dong-1106397.html

Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention, and behavior: An introduction to theory and research*. Addison-Wesley.

Fishbein, M., & Ajzen, I. (1980). Predicting and understanding consumer behavior: attitude behavior correspondence. In I. Ajzen & M. Fishbein (Eds.), *Understanding attitudes and predicting social behavior* (pp. 149–172). Prentice Hall.

Gao, L., & Waechter, K. A. (2017). Examining the role of initial trust in user adoption of mobile payment services: An empirical investigation. *Information Systems Frontiers*, *19*(3), 525–548. doi:10.1007/s10796-015-9611-0

Ghezzi, A., Renga, F., Balocco, R., & Pescetto, P. (2010). Mobile payment applications: Offer state of the art in the Italian market. *Info*, *12*(5), 3–22. doi:10.1108/14636691011071130

Global System for Mobile Communications Association. (2022). *State of the industry report on mobile money*. GSM Association. https://www.gsma.com/sotir/wp-content/uploads/2022/03/GSMA_State_of_the_Industry_2022_English.pdf

GlobeNewswire. (2022, October 11). *Asia-Pacific Mobile payment methods analysis report 2022: Mobile payment use grows post-pandemic, with consumers inclining towards mobile wallets*. Research and Markets. https://www.globenewswire.com/en/news-release/2022/10/11/2531502/28124/en/Asia-Pacific-Mobile-Payment-Methods-Analysis-Report-2022-Mobile-Payment-Use-Grows-Post-Pandemic-With-Consumers-Inclining-Towards-Mobile-Wallets.html

Gupta, B. B., & Narayan, S. (2020). A survey on contactless smart cards and payment system: Technologies, policies, attacks, and countermeasures. *Journal of Global Information Management*, *28*(4), 135–159. doi:10.4018/JGIM.2020100108

Hazarika, B. B., & Mousavi, R. (2021). Review of cross-border e-commerce and directions for future research. *Journal of Global Information Management*, *30*(2), 1–18. doi:10.4018/JGIM.20220301.oa1

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, *6*(1), 1–55. doi:10.1080/10705519909540118

Humbani, M., & Wiese, M. (2019). An integrated framework for the adoption and continuance intention to use mobile payment apps. *International Journal of Bank Marketing*, *73*(2), 646–664. doi:10.1108/IJBM-03-2018-0072

Huy, L. V., Nguyen, P. T. H., Pham, L., & Berry, R. (2019). Technology readiness and satisfaction in Vietnam's luxury hotels. *International Journal of Management and Decision Making*, *18*(2), 183–208. doi:10.1504/IJMDM.2019.098648

Koenig-Lewis, N., Marquet, M., Palmer, A., & Zhao, A. L. (2015). Enjoyment and social influence: Predicting mobile payment adoption. *Service Industries Journal*, *35*(10), 537–554. doi:10.1080/02642069.2015.1043278

Kuo, Y. F., & Yen, S. N. (2009). Towards an understanding of the behavioral intention to use 3G mobile value-added services. *Computers in Human Behavior*, *25*(1), 103–110. doi:10.1016/j.chb.2008.07.007

Lee, J. M., & Rha, J. Y. (2016). Personalization-privacy paradox and consumer conflict with the use of location-based mobile commerce. *Computers in Human Behavior*, *63*, 453–462. doi:10.1016/j.chb.2016.05.056

Leong, L. Y., Hew, T. S., Tan, G. W. H., & Ooi, K. B. (2013). Predicting the determinants of the NFC-enabled mobile credit card acceptance: A neural networks approach. *Expert Systems with Applications*, *40*(14), 5604–5620. doi:10.1016/j.eswa.2013.04.018

Li, Y. (2018). The strategic decision on mobile payment: a study on Merchant's adoption. In *Proceedings of the Conference Adoption and Diffusion of Information Technology, AMCIS 2018*, 5.

Liébana-Cabanillas, F., Sánchez-Fernández, J., & Muñoz-Leiva, F. (2014, June). Antecedents of the adoption of the new mobile payment systems: The moderating effect of age. *Computers in Human Behavior*, *35*, 464–478. doi:10.1016/j.chb.2014.03.022

Liu, J., Kauffman, R. J., & Ma, D. (2015). Competition, cooperation, and regulation: Understanding the evolution of the mobile payments technology ecosystem. *Electronic Commerce Research and Applications*, *14*(5), 372–391. doi:10.1016/j.elerap.2015.03.003

Lonkani, R., Changchit, C., Klaus, T., & Sampet, J. (2020). A comparative study of trust in mobile banking: An analysis of U.S. and Thai customers. *Journal of Global Information Management*, *28*(4), 95–119. doi:10.4018/JGIM.2020100106

Miltgen, C. L., Popovič, A., & Oliveira, T. (2013, December). Determinants of end-user acceptance of biometrics: Integrating the "Big 3" of technology acceptance with privacy context. *Decision Support Systems*, *56*, 103–114. doi:10.1016/j.dss.2013.05.010

Ministry of Information and Communications. (2021, June 3). *Vietnam smartphone use in top 10 globally*. MIC. https://english.mic.gov.vn/Pages/TinTuc/147433/Vietnam-smartphone-use-in-top-10-globally.html

Moghavvemi, S., Mei, T. X., Phoong, S. W., & Phoong, S. Y. (2021, March). Drivers and barriers of mobile payment adoption: Malaysian merchants' perspective. *Journal of Retailing and Consumer Services*, *59*, 102364. doi:10.1016/j.jretconser.2020.102364

Mun, Y. Y., Jackson, J. D., Park, J. S., & Probst, J. C. (2006). Understanding information technology acceptance by individual professionals: Toward an integrative view. *Information & Management*, *43*(3), 350–363. doi:10.1016/j.im.2005.08.006

Nguyen, H., Pham, L., Williamson, S., & Hung, N. D. (2020). Individual investors' satisfaction and loyalty in online securities trading using the technology acceptance model. *International Journal of Management and Decision Making*, *19*(2), 239–266. doi:10.1504/IJMDM.2020.108233

Oliveira, T., Thomas, M., Baptista, G., & Campos, F. (2016, August). Mobile payment: Understanding the determinants of customer adoption and intention to recommend the technology. *Computers in Human Behavior*, *61*, 404–414. doi:10.1016/j.chb.2016.03.030

Pan, B., Guo, H., You, X., & Xu, L. (2022). Privacy rating of mobile applications based on crowdsourcing and machine learning. *Journal of Global Information Management*, *30*(3), 1–15. doi:10.4018/JGIM.20220701.oa5

Peng, R., Xiong, L., & Yang, Z. (2012). Exploring tourist adoption of tourism mobile payment: An empirical analysis. *Journal of Theoretical and Applied Electronic Commerce Research*, *7*(1), 21–33. doi:10.4067/S0718-18762012000100003

Pham, L., Nguyen, P. T. H., & Luse, D. (2018). Technology readiness and customer satisfaction in luxury hotels: A case study of Vietnam. *International Journal of Entrepreneurship*, *22*(2), 1–23.

Pham, L., Williamson, S., Mohebbi, C., Nguyen, B., & Nguyen, H. (2019). The mediating role of perceived value in the effect of multi-dimensional risk in mobile banking. *International Journal of Enterprise Information Systems*, *15*(4), 1–25. doi:10.4018/IJEIS.2019100101

Pham, T. T. T., & Ho, J. C. (2015, November). The effects of product-related, personal-related factors, and attractiveness of alternatives on consumer adoption of NFC-based mobile payments. *Technology in Society*, *43*, 159–172. doi:10.1016/j.techsoc.2015.05.004

Phonthanukitithaworn, C., Sellitto, C., & Fong, M. W. (2016). A comparative study of current and potential users of mobile payment services. *SAGE Open*, *6*(4). doi:10.1177/2158244016675397

Rashidin, M. S., Gang, D., Javed, S., & Hasan, M. (2022). The role of artificial intelligence in sustaining the e-commerce ecosystem: Alibaba vs. Tencent. *Journal of Global Information Management*, *30*(8), 1–25. doi:10.4018/JGIM.304067

Schierz, P. G., Schilke, O., & Wirtz, B. W. (2010). Understanding consumer acceptance of mobile payment services: An empirical analysis. *Electronic Commerce Research and Applications*, *9*(3), 209–216. doi:10.1016/j.elerap.2009.07.005

Shankar, A. (2022). Impact of mobile banking application interactivity on consumer engagement: An experiment-based investigation. *Journal of Global Information Management*, *30*(5), 1–18. doi:10.4018/JGIM.290368

Shankar, A., & Datta, B. (2018). Factors affecting mobile payment adoption intention: An Indian perspective. *Global Business Review*, *19*(3, suppl), S72–S89. doi:10.1177/0972150918757870

Shaw, N. (2014). The mediating influence of trust in the adoption of the mobile wallet. *Journal of Retailing and Consumer Services*, *21*(4), 449–459. doi:10.1016/j.jretconser.2014.03.008

Sheehan, K. B., & Hoy, M. G. (2000). Dimensions of privacy concern among online consumers. *Journal of Public Policy & Marketing*, *19*(1), 62–73. doi:10.1509/jppm.19.1.62.16949

Singh, N., & Sinha, N. (2020, January). How perceived trust mediates merchant's intention to use a mobile wallet technology. *Journal of Retailing and Consumer Services*, *52*, 101894. doi:10.1016/j.jretconser.2019.101894

Slade, E. L., Williams, M. D., & Dwivedi, Y. (2013). Extending UTAUT2 To explore consumer adoption of mobile payments. *UKAIS, 36*. https://aisel.aisnet.org/ukais2013/36/

Tan, G. W. H., Ooi, K. B., Chong, S. C., & Hew, T. S. (2014). NFC mobile credit card: The next frontier of mobile payment? *Telematics and Informatics*, *31*(2), 292–307. doi:10.1016/j.tele.2013.06.002

Teo, A. C., Tan, G. W. H., Ooi, K. B., Hew, T. S., & Yew, K. T. (2015). The effects of convenience and speed in m-payment. *Industrial Management & Data Systems*, *115*(2), 311–331. doi:10.1108/IMDS-08-2014-0231

Thakur, R. (2013). Customer adoption of mobile payment services by professionals across two cities in India: An empirical study using modified technology acceptance model. *Business Perspectives and Research*, *1*(2), 17–30. doi:10.1177/2278533720130203

Tucker, L. R., & Lewis, C. (1973). The reliability coefficient for maximum likelihood factor analysis. *Psychometrika*, *38*(1), 1–10. doi:10.1007/BF02291170

Tuoitre. (2021, January 24). *Thương mại điện tử Việt Nam đạt 11,8 tỉ USD, tăng ấn tượng 18% [Vietnam e-commerce reached 11.8 billion USD, an impressive increase of 18%].* Tuoitre. https://tuoitre.vn/thuong-mai-dien-tu-viet-nam-dat-11-8-ty-usd-tang-an-tuong-18-20210124163408234.htm

Van, H. N., Pham, L., Williamson, S., Chan, C. Y., Thang, T. D., & Nam, V. X. (2021). Explaining intention to use mobile banking: Integrating perceived risk and trust into the technology acceptance model. *International Journal of Applied Decision Sciences*, *14*(1), 55–80. doi:10.1504/IJADS.2021.112933

Van, H. N., Pham, L., Williamson, S., Huong, V. T., Hoa, P. X., & Trang, P. L. H. (2020). Impact of perceived risk on mobile banking usage intentions: Trust as a mediator and a moderator. *International Journal of Business and Emerging Markets*, *12*(1), 94–118. doi:10.1504/IJBEM.2020.106202

Venkatesh, R., & Blaskovich, J. (2012). The mediating effect of psychological capital on the budget participation-job performance relationship. *Journal of Management Accounting Research*, *24*(1), 159–175. doi:10.2308/jmar-50202

Venkatesh, V., Brown, S. A., & Bala, H. (2013). Bridging the qualitative-quantitative divide: Guidelines for conducting mixed methods research in information systems. *Management Information Systems Quarterly*, *37*(1), 21–54. doi:10.25300/MISQ/2013/37.1.02

Venkatesh, V., & Davis, F. D. (1996). A model of the antecedents of perceived ease of use: Development and test. *Decision Sciences*, *27*(3), 451–481. doi:10.1111/j.1540-5915.1996.tb01822.x

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *Management Information Systems Quarterly*, *27*(3), 425–478. doi:10.2307/30036540

Vneconomy. (2021, August 14). Việt Nam có tỷ lệ người dùng thanh toán qua di động cao thứ ba thế giới [Vietnam has the third highest percentage of users paying via mobile in the world]. *Vneconomy*. https://vneconomy.vn/viet-nam-co-ty-le-nguoi-dung-thanh-toan-qua-di-dong-cao-thu-ba-the-gioi.htm

Vnetwork. (2021, February 19). *Thống kê Internet Việt Nam 2020* [Vietnam Internet Statistics 2020]. Vnetwork. https://www.vnetwork.vn/news/thong-ke-internet-viet-nam-2020?jskey=tAQiZCbw0w1UHtQarXzytcyuLFb%2BGdlnW8jxtbFRtF8C

Wang, F., Shan, G. B., Chen, Y., Zheng, X., Wang, H., Mingwei, S., & Haihua, L. (2020). Identity authentication security management in mobile payment systems. *Journal of Global Information Management*, *28*(1), 189–203. doi:10.4018/JGIM.2020010110

Xin, H., Techatassanasoontorn, A. A., & Tan, F. B. (2015). Antecedents of consumer trust in mobile payment adoption. *Journal of Computer Information Systems*, *55*(4), 1–10. doi:10.1080/08874417.2015.11645781

Yan, H., & Yang, Z. (2015). Examining mobile payment user adoption from the perspective of trust. *International Journal of u-and e-Service. Science and Technology*, *8*(1), 117–130.

Yang, S., Lu, Y., Gupta, S., Cao, Y., & Zhang, R. (2012). Mobile payment services adoption across time: An empirical study of the effects of behavioral beliefs, social influences, and personal traits. *Computers in Human Behavior*, *28*(1), 129–142. doi:10.1016/j.chb.2011.08.019

Zhou, T. (2011). The effect of initial trust on user adoption of mobile payment. *Information Development*, *27*(4), 290–300. doi:10.1177/0266666911424075

APPENDIX

Table 9.
Research Questionnaire

Technology Competency (TC)	
My skills with technology are good.	
I am not afraid of using technology.	
My ability to learn new technology is good.	
I am always interested in new technology.	
I enjoy working with technology.	
Performance Expectancy (PE)	
Mobile payment is useful to purchase products or services.	
Mobile payment makes it easier to conduct transactions.	
Mobile payment enables me to buy products or services faster.	
Mobile payment saves me time.	
Mobile payment makes my life easier.	
Effort Expectancy (EE)	
Learning to use mobile payment is easy.	
It does not require much effort to learn how to use mobile payment.	
It is easy to perform the steps required to use mobile payment.	
It is easy to become skillful at using mobile payment.	
Conducting transactions via mobile payment is easier than using other payment methods.	
Social Influence (SI)	
People who are important to me find using mobile payment beneficial.	
People who are important to me use mobile payment.	
People who are important to me think I should use mobile payment.	
People who are important to me encourage me to use mobile payment.	
People who are important to me enjoy using mobile payment.	
Perceived Privacy (PP)	
I believe that mobile payment providers will protect the privacy of my personal data.	
I believe that mobile payment systems will not disclose my personal data.	
I believe that mobile payment systems will keep transactions confidential.	
I believe that mobile payment systems will keep my information confidential.	
I believe that mobile payment systems will prevent others from looking at my data.	
Perceived Security (PS)	
Using mobile payment enable me to conduct transaction securely.	
I feel confident about the security of mobile payment system.	
I am not worried about the security of mobile payment.	
I believe that mobile payment systems protect me from unauthorized transactions.	
I believe that the transactions conducted via mobile payment are secured.	

continued on following page

Table 9.
Continued

Perceived Risk (PR)	
Overall, considering all sorts of factors combined, it would be risky if I used mobile payment.	
Using mobile payment would be risky.	
Mobile payment is dangerous to use.	
Using mobile payment would add uncertainty to my transactions.	
Using mobile payment exposes me to an overall risk.	
Perceived Compatibility	
Mobile payment fits my lifestyle.	
Mobile payment is compatible with my shopping behavior.	
Mobile payment is compatible with my busy schedules.	
Mobile payment is suitable for me.	
Mobile payment is compatible with my lifestyle.	
Intention to Use Mobile Payment (INT)	
I like to use mobile payment to purchase products and services.	
I feel comfortable using mobile payment.	
I intend to use/continue using mobile payment.	
I like paying via mobile payment.	
I will choose mobile payment if it is available.	

Chuleeporn Changchit is a Professor of Management Information Systems at Texas A&M University-Corpus Christi. She holds a Ph.D. in Decision Sciences and Information Systems from the University of Kentucky. Dr. Changchit is actively engaged in the scholarly activities. She has published articles in many journals such as Decision Support Systems, Information Systems Journal, Expert Systems with Applications, the Journal of Computer Information Systems, and International Journal of Intelligent Systems in Accounting, Finance, and Management. She also serves as a former Editor-in-Chief for the Journal of Information Privacy and Security (JIPS), serves as an Associate Editor for the Journal of Organizational Computing and Electronic Commerce (JOCEC) and the Journal of Electronic Commerce in Organization (JECO), and serves on editorial review board for several journals.

Charles Changchit is an Adjunct Professor at Texas A&M University-Corpus Christi. He holds a Ph.D. in Industrial Engineering from Oklahoma State University. His research interests are in the areas of production research and applied mathematics. He has published articles in many journals such as International Journal of Production Research, Computers & Industrial Engineering, and Applied Mathematical Modelling.

Robert Cutshall is currently a Professor of Management Information Systems at Texas A&M University-Corpus Christi. His research interests are in the areas of social commerce, mobile payment, culture and technology acceptance. His research has appeared in journals such as the Journal of Computer Information Systems, Journal of Internet Commerce, and Journal of Electronic Commerce in Organizations. In addition, he has made numerous presentations at regional, national, and international conferences.

Long Pham graduated with a bachelor's degree in Commercial Banking in 1998 from National Economics University in Vietnam and bachelor's degree in English in 1999 from Hanoi University in Vietnam. He earned MBA in international business in 2003 from the University of Thai Chamber of Commerce in Bangkok, Thailand. He graduated from New Mexico State University in 2011 with two degrees - PhD in Management with concentration on operations management and master's degree in Applied Statistics. Before joining Texas A&M University-Corpus Christi, Dr. Long Pham taught at several universities, including National Economics University (Vietnam), Minot State University (U.S.), New Mexico State University (U.S.), and University of Louisiana at Monroe (U.S.). Dr. Long Pham has research articles published in international journals, including Decision Support Systems, European Journal of Operational Research, International Journal of Educational Technology in Higher Education, to name a few.

Mohan Rao is Professor of Decision Sciences at the Texas A&M University-Corpus Christi. He holds a Ph.D. in Business Administration from the University of Alabama and a master's degree in Management Sciences from the University of Waterloo, Canada. He is a Certified Fellow in Production and Inventory Management. He teaches primarily Operations Management and Data Analytics. He has been an active member of the Decision Sciences Institute for over 30 years. Recently, he has served as the Vice President of DSI for Member Services. His research interests are in performance measurement and management, and data analytics. He has over 70 refereed journal publications and proceedings. Some of his articles have appeared in the International Journal of Production Economics, Management Science, Expert Systems with Applications, and the International Journal of Operations & Production Management.