An empirical analysis of factors affecting the intention of using digital wallets in Vietnam

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Abstract

This study investigates factors affecting consumers' behavioral intention of using digital wallets in Vietnam. The research model consists of 5 independent variables, namely performance expectancy, effort expectancy, social influence, facilitating conditions, and perceived risks. The sample size of this study is 280. This study confirms that performance expectancy, effort expectancy, social influence, and facilitating conditions positively influence the behavioral intention of using digital wallets. Importantly, performance expectancy and effort expectancy are the most significant determinants of behavioral intention. Perceived risks are found to negatively affect the behavioral intention of using digital wallets. These findings indicate that service providers ought to focus on enhancing digital wallets' user-friendliness, features, and functions to improve financial transactions via digital wallets. The security system of digital wallets also needs improving to reduce risks, thereby encouraging Vietnamese consumers to utilize the service.

Keywords: Behavioral intention, Digital wallet

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1. Introduction

Technological advances have resulted in the digitalization of monetary transactions (Hagberg *et al.*, 2016). As a result, the electronic payment system has gradually replaced traditional payment methods (Hagberg *et al.*, 2016; Nam and Trang, 2020). Levitin (2018) argues that digital wallets were poised to transform the world of consumer payments and commerce. They are computer software applications that store and transmit payment authorization data for one or more credit or deposit accounts. By storing payment authorization data, digital wallets function analogously to physical wallets that contain multiple payment cards used to transmit payment authorization data (Levitin, 2018).

According to the State Bank of Vietnam (2019), up to two-thirds of licensed non-bank payment intermediary services provide digital wallets in Vietnam. It is reported that the digital wallet market has approximately 30 service providers but is dominated by only 4 of them. Prominent players in the digital wallet market include MoMo, ViettelPay, ZaloPay, and Moca, among which MoMo has established itself as the indisputable leader with about 10 million users (Fintechnews Vietnam, 2019).

There are a large number of studies on the behavioral intention of using digital wallets in developed countries, where the use of such a payment method has become common. Given that digital wallets have just been introduced in Vietnam in recent years, a handful of studies on Vietnamese consumers' behavioral intention of using digital wallets have been carried out.

Regarding existing studies on factors affecting behavioral intent of using digital wallets in Vietnam, most of them utilize quantitative methods. Various models and theories for examining behavioral intention have been used in prior research such as the Technology Acceptance Model (TAM) model (Gia-Shie and Pham, 2016), the Theory of Reasoned Action (TRA) (Nguyen *et al.*, 2018), and the Unified Theory of Acceptance and Use of Technology (UTAUT) model (Bui and Bui, 2018). As aforementioned, the UTAUT model is the most comprehensive model for analyzing determinants of behavioral intention. Nonetheless, prior studies that adopt this model have only partially utilized it. More specifically, only a handful of studies utilize all constructs of the UTAUT model. For example, Bui and Bui (2018) exclude facilitating conditions from their research model. Furthermore, many other factors are manipulating Vietnamese consumers' behavioral intention of using digital wallets that the aforementioned models fail to include, such as the perceived risks. The impact of the factors on the behavioral intention of using digital wallets in Vietnam has not been examined. In consideration of Vietnamese consumers' caution about risks associated with cashless payment methods, perceived risks must be examined in connection with consumers' intent to use digital wallet services in Vietnam.

Understanding determinants of consumers' intent to use digital wallets are of great importance for service providers. This research employs the modified version of the UTAUT proposed by Venkatesh *et al.* (2003). In consideration of characteristics of e-commerce and Vietnamese

consumers' risk-averse attitudes towards e-payment methods, perceived risks are integrated into the UTAUT model. The paper determines 5 main constructs: performance expectancy, effort expectancy, social influence, facilitating conditions, and perceived risks by customers.

This study is divided into 6 sections: (1) Introduction, (2) Literature review, (3) Research framework, (4) Methodology, (5) Research findings and discussion, (6) Conclusion and recommendations.

2. Literature review and hypothesis development

2.1 Digital wallets as an e-payment method

A digital wallet is a software-based system that securely stores users' payment information and passwords for numerous payment methods and websites (Widodo *et al.*, 2019). It has become an upcoming way of purchasing goods and services without any physical movement of cash. The main objective of digital wallets is to make quick transactions, thereby discouraging people to use cash. This boom is the after-effects of demonetization (Chauhan and Shingari, 2017). Digital wallet is an umbrella term that covers online wallets and mobile wallets. Online wallets are digital wallets that are accessed through laptops or computers. These wallets allow consumers to store their online shopping information like log-in credentials, shipping and delivery addresses, credit card details like card number, expiry date, and card verification values (Thu and Nhung, 2019). Mobile wallets are digital wallets that are accessed through a mobile device. It is a system that allows consumers to make payments through handheld devices. The payment process for mobile wallets is the same as that of online wallets (Nair *et al.*, 2016).

Digital wallets are an e-payment method. Digital wallets are easy to use and easy to access (Nair *et al.*, 2016). They facilitate instant payments and synchronization of data from multiple platforms. Digital wallets are a more advanced and convenient method of payment. Hence, digital wallets can support the development of e-commerce because they enhance the consumer experience in online shopping (Nair *et al.*, 2016).

2.2 Behavior intention

Intention can be defined as an individual's decision to try to utilize something new, especially technology innovations (Wungwanitchakorn, 2002). Behavioral intention suggests that an individual is intending to take an action whereas use behavior suggests that the individual has already taken an action. Fishbein and Ajzen (1975) explain that "behavioral intention" refers to "a person's subjective probability that he will perform some behaviors". Nevertheless, Warshaw and Davis (1985) argue that this definition characterizes behavioral intentions as behavioral expectations rather than their meaning in everyday language. Hence, "behavioral intention" is described as "the degree to which a person has formulated conscious plans to perform or not perform some specified future behavior" (Warshaw and Davis, 1985). In other words, a high level of behavioral intention indicates an individual's decision to act in the future.

2.3 Factors affecting consumers' intention of using digital wallets

This study applied the Unified Theory of Acceptance and Use of Technology (UTAUT model) proposed by Venkatesh *et al.* (2003) to identify the factors affecting the consumers' intention to use technological devices as digital wallets. The UTAUT model has been applied to a large number of technology adoption and diffusion studies. The model is a combination of major models and theories in technology acceptance and adoption including TRA (theory of reasoned action), TAM (technology acceptance model), the Motivational Model, Theory of Planned Behavior (TPB), Innovation Diffusion Theory, and Social Cognitive Theory (Williams *et al.*, 2015). Hence, it can be implied that the UTAUT model is one of the most comprehensive models for analyzing technology adoption. The UTAUT model suggests that user behavior is affected by behavioral intention, which is determined by 4 main constructs including performance expectancy, effort expectancy, social influence, and facilitating conditions (Venkatesh *et al.*, 2003).

2.3.1 Performance expectancy

First of all, performance expectancy is based on perceived usefulness, which is a construct in Davis' TAM model. Performance expectancy represents "the degree to which an individual believes that using a particular system would enhance his or her performance" (Venkatesh *et al.*, 2012). Within the domain of high-tech services, many studies have confirmed the importance of performance expectancy in determining consumers' behavioral intentions, although evidence of a direct linkage with use behavior remains mixed (Gefen, 2000).

In the context of digital payment, smooth transactions such as online utility bill payment, transferring money, online shopping, and ticket booking are indicators of system usefulness. Thanks to digital wallets, users can make instant payments and transfer money anytime. They also offer synchronization of data from various platforms. Bank accounts, debit cards, credit cards, mobile bills, and accounts are integrated, thus users can manage their finance more efficiently (Nair *et al.*, 2016). These services help users save lots of time as bill payments and shopping can be done with one click. Furthermore, money transfers via digital wallets are much faster than other methods (Nguyen *et al.*, 2018).

Before the adoption of new technology, total benefits from the adoption are critically assessed. The impact of user-centric and characteristics of system on digital payment usage across different types of users reveals that performance expectancy positively affects the usage of digital wallets (Kim *et al.*, 2010). Performance expectancy has been empirically validated as a significant antecedent of the behavioral intention of new technology (Apanasevic *et al.*, 2016; Arvidsson, 2014).

In a study conducted by Gia-Shie and Pham (2016), it is found that perceived usefulness, which is equivalent to performance expectancy, has a significantly positive impact on Vietnamese consumers' intention to adopt digital wallet services. This suggests that if users recognize digital wallets' usefulness, they are likely to adopt these services.

2.3.2 Effort expectancy

Effort expectancy, which is based on perceived ease of use in the Technology Acceptance Model (TAM), is found to have a positive impact on consumers' behavioral intention of digital wallet services. Effort expectancy is the degree to which an individual can utilize a system effortlessly (Venkatesh *et al.*, 2003). Consumers will be more willing to utilize digital wallets if digital wallets are easy to use. Also, the consumer will assess whether the digital wallet requires lots of effort or not from the registration procedures (Megadewandanu, 2016).

Effort expectancy's impact on behavioral intention has been confirmed in many empirical studies on the behavioral intention of digital payment and mobile wallets (Oliveira *et al.*, 2016). In a study on digital wallets in India, it is revealed that payment can be made in one click without entering passwords and card numbers. Digital wallets can also be recharged at any time without entering the details for each time (Nair *et al.*, 2016). Similarly, Gia-Shie and Pham's (2016) findings reveal that Vietnamese consumers are more likely to adopt digital wallets if they find them easy or effortless to use.

2.3.3 Social influence

Nysveen *et al.* (2005) define social influence as "the person's perception that most people who are important to him think he should or should not perform the behavior in question". Mobile services are utilized in a public social context. In this context, users observe other people's activities and adapt to others' interactions. Additionally, the impact of social influence on behavioral intention has been consistently found in previous studies (Shin, 2009; Wei *et al.*, 2009).

Furthermore, the theories of reasoned action and planned behavior indicate that social influence significantly affects behavioral intention (Lucas and Spitler, 2000; Venkatesh and Morris, 2000). In collectivist societies like Vietnam, social influence is a significant determinant of people's intentions and behavior (Tu, 2019). The research shows that social influence has a positive impact on Vietnamese consumers' behavioral intention to adopt mobile wallets (Tu, 2019).

2.3.4 Facilitating conditions

Facilitating conditions are known as the degree to which individuals who believe in the existence of structural and technical infrastructure to support them to use the system (Venkatesh *et al.*, 2003). This construct is a combination of different constructs, i.e. subjective norm, social factors, and image, of the theory of reasoned action, the theory of planned behavior, and the innovation diffusion theory (Lim *et al.*, 2019). Facilitating conditions are found to have a significant impact on behavioral intention in previous empirical research on mobile technology adoption (Yu, 2012; Slade *et al.*, 2015). More importantly, facilitating conditions have a greater influence than performance expectancy and other factors on behavioral intention (Nisha *et al.*, 2015). Nonetheless, many researchers argue that the impact of facilitating conditions on the behavioral intention of mobile wallets is insignificant (Megadewandanu, 2016; Gaitan *et al.*, 2015).

2.3.5 Perceived risks

Given that the UTAUT model integrates various technology acceptance and adoption models and theories, it offers a more all-inclusive framework to assess factors affecting users' behavioral intention of using new technology. Nevertheless, in the context of e-commerce, the UTAUT model fails to examine consumers' perceptions of risks associated with e-payment methods such as digital wallets. As a result, many studies on consumers' intention of adopting an e-payment system have integrated perceived risks into the UTAUT model (Taiwo *et al.*, 2012; Lee and Song, 2013; Nguyen and Huynh, 2017). Moreover, Choi and Do (2018) argue that Vietnamese consumers have serious risk-averse attitudes towards non-traditional methods of payment. This implies that perceived risks are a significant determinant of Vietnamese consumers' intention of using digital wallets. The modified UTAUT model is proposed as follows.

There is a large body of literature indicating that perceived risks significantly influence consumers' intention to utilize digital wallets. Most studies demonstrate that consumers are most afraid of losing their money and/or having their privacy violated via digital payment methods. Ashok *et al.* (2012) discover that the safety and security of payment, in comparison to traditional methods, act as one of the driving forces for the adoption of mobile wallets. Security perception plays a significant role in the adoption of mobile wallets. Perceived security and privacy define the extent to which consumers assume that digital wallet payment method is safe and secure (Yadav, 2017). Similarly, Dahlberg and Mallat (2002) argue that security and privacy factors were the major concerns for consumers, which affect the adoption of digital payment solutions. In short, low security and financial risks will encourage consumers to adopt digital wallets. On the other hand, consumers will refrain from adopting this technology if perceived risks are high.

Despite the abundance of studies on the impact of perceived risks on behavioral intention to adopt e-payment methods, including digital wallets (Phan *et al.*, 2020; Gia-Shie and Pham, 2016; Nguyen and Huynh, 2017), studies on this area in Vietnam is still limited. From the preceding discussion, the following hypotheses are put forth.

Venkatesh *et al.* (2003) argue that performance expectancy has a positive impact on people's intent to adopt a new system/technology. In other words, the more users believe in a system's capabilities of enhancing their performance, the more likely they are to adopt the technology.

H1: Performance expectancy (PE) positively affects consumers' behavioral intention (BI) of using digital wallets.

Nguyen *et al.* (2018) argue that Vietnamese consumers refrain from utilizing digital wallets due to a lack of understanding about how to use the system (Nguyen *et al.*, 2018). This indicates the positive correlation between effort expectancy and behavioral intention. A large number of previous studies have also confirmed the positive and significant impact of effort expectancy on people's intention to adopt new technology. Thus, the below hypothesis is proposed.

H2: Effort expectancy (EE) positively affects consumers' behavioral intention (BI) of using digital wallets.

Social influence positively affects people's intention to adopt new technology (Venkatesh *et al.*, 2003). Nguyen and Huynh (2017) argue that social influence has a significant positive impact on consumers' intention to adopt e-payment methods in Vietnam. This suggests that social influence can positively affect consumers' behavioral intention of digital wallets which are a form of e-payment.

H3: Social influence (SI) positively affects consumers' behavioral intention (BI) of using digital wallets.

Facilitating conditions have a positive impact on behavioral intention to adopt digital wallets (Lim *et al.*, 2019). Although this construct is originally examined in conjunction with user behavior in the UTAUT model, it is developed upon the perceived behavioral control construct in the TPB model, which directly influences behavioral intention (Lim, Ahmad, & Talib, 2019). A large number of studies have also confirmed the positive impact of facilitating conditions on behavioral intention (Naranjo-Zolotov *et al.*, 2019; Rahi *et al.*, 2018). Nonetheless, in a study conducted by Do *et al.* (2020), the impact of facilitating conditions on behavioral intention is rejected. This indicates mixed results that need further examination. Given that this factor's impact on consumers' intention to adopt digital wallets in Vietnam has not been examined, it is hypothesized that facilitating conditions positively affect the behavioral intention of digital wallets.

H4: Facilitating conditions (FC) positively affect consumers' behavioral intention (BI) of using digital wallets.

As aforementioned, the impact of perceived risk on consumers' behavioral intention to utilize digital wallets in Vietnam has not been examined thoroughly in prior studies. It is found that Vietnamese consumers are discouraged to adopt e-payment methods, which include digital wallets if they perceive high levels of risk associated with the adoption (Nguyen and Huynh, 2017). Therefore, the below hypothesis is put forward.

H5: Perceived risks (PR) negatively affect consumers' behavioral intention (BI) of using digital wallets.

3. Research framework

This research model is based on the UTAUT model proposed by Venkatesh *et al.* (2003). The moderating factors of the UTAUT model are excluded from this research model to simplify the model. Nevertheless, perceived risk (PR) that may greatly influence Vietnamese consumers' behavioral intention is added to this research model.

The proposed research model consists of 5 independent and one dependent variable. 5 independent variables include performance expectancy (PE), effort expectancy (EE), social influence (SI), facilitating conditions (FC), and perceived risk (PR). One dependent variable is the behavioral intention of using a digital wallet (BI).
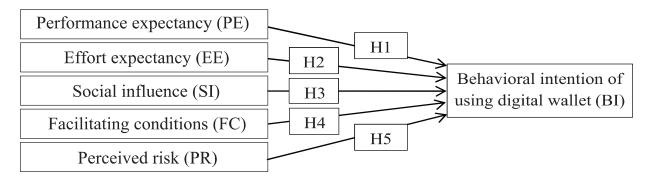
Figure 1. The proposed research model with hypotheses

Source: Proposed by the authors

4. Research methodology

4.1 Scales and questionnaire design

In consideration of variables identified in the research model, the questionnaire is designed based on the following measuring scales. Each statement or question represents an observed variable.

The questionnaire consists of 2 parts. The first part serves the purpose of gathering demographic information of the respondents including age, sex, level of education, level of income, and experience in utilizing digital wallets. The second part of the questionnaire consists of 25 questions that are designed based on the research model's constructs.

This study employs the 5-point Likert scale to design the questionnaire including 1-Strongly disagrees, 2- Disagree, 3- Undecided, 4- Agree, and 5- Strongly agree. Specifically, respondents are requested to rate their level of agreement on numerous statements which can be either positive or negative.

Table 1. Measuring scales of factors impacting the behavioral intention of using digital wallets in Vietnam

Constructs	Code	Description	Source
Performance expectancy (PE)	PE1	Digital wallets would be useful in my day-to-day activities.	Zhou *et al.* (2010), Im *et al.* (2011), Zhou (2012), and Martins *et al.* (2014)
	PE2	Digital wallets would speed up my financial transactions.	
	PE3	Digital wallets would help me save time to perform other tasks.	
	PE4	I can obtain more incentives from digital wallet services than traditional payment methods.	
Effort expectancy (EE)	EE1	It is easy to access digital wallet apps.	Zhou *et al.* (2010), Im *et al.* (2011), and Zhou (2012)
	EE2	I can easily sign up for digital wallet services.	
	EE3	Learning how to use digital wallets is easy for me.	
	EE4	Digital wallets are user-friendly.	
	EE5	Payments via digital wallets are done easily.	
	EE6	I find it easy to use digital wallets.	

Table 1. Measuring scales of factors impacting the behavioral intention of using digital wallets in Vietnam *(continued)*

Constructs	Code	Description	Source
Social influence (SI)	SI1	People that influence my behavior think that I should use digital wallets.	Venkatesh *et al.* (2003)
	SI2	My family/relatives/friends think that I should use digital wallets.	
	SI3	People who are important to me can help me use digital wallets (when available).	
Facilitating conditions (FC)	FC1	I have the necessary resources to use digital wallets.	Venkatesh *et al.* (2003)
	FC2	I have the necessary knowledge to use digital wallets.	
	FC3	I have a bank account ready to be connected with a digital wallet.	
	FC4	Professionals are available to help me use digital wallets.	
Perceived risk (PR)	PR1	I wouldn't feel completely safe when providing personal information for digital wallet services.	Abrahao *et al.* (2016)
	PR2	I think other people may have access to my data if I use digital wallets.	
	PR3	I don't feel protected when sending confidential information via the digital wallet system.	
	PR4	The likelihood that something wrong will happen with the digital wallet system is high.	
Behavioral intention (BI)	BI1	I will have the intention to use digital wallet services if I have access to them.	Abrahao *et al.* (2016)
	BI2	I will use digital wallets more often in the future.	
	BI3	Making payments via digital wallets is better than the traditional payment method.	
	BI4	I will introduce the digital wallet service to my friends.	

Source: Complied by the authors

4.2 Data collection and analysis

This research mainly utilizes primary data, which is collected by conducting a questionnaire designed and distributed via Google forms. The target respondents of this research include Vietnamese people qualified to open a bank account, which is indispensable for registering a digital wallet. This study aims at the general public rather than a specific digital wallet group of customers. To reach the target respondents, a link to the questionnaire is posted on social media, namely, groups of digital wallet users, users of apps connected with digital wallets such as Now, Grab, and Tiki, and college students on Facebook.

To analyze the quantitative data, this study applies descriptive statistics to analyze a demographic profile of respondents, such as age, gender, levels of income, and education levels. Besides, Cronbach's Alpha reliability coefficient is calculated and examined in the reliability analysis to determine if the measuring scales were designed for factors affecting the intention of using digital wallets. The Exploratory Factor Analysis (EFA) is then carried out to discover the underlying structure of measured variables in the research model. Lastly, the regression analysis testifies the hypotheses.

5. Research findings and discussion

5.1 Research findings

5.1.1 Demographics of respondents

The questionnaire is uploaded on Google forms and distributed via social media on 1 May 2020. Within a couple of weeks, the questionnaire that has been delivered to 295 participants received 280 responses. The demographic profile of respondents including gender, age, education levels, income levels, and experience in using digital wallets are presented in Table 2.

Table 2. Demographic profile of respondents

Category	Frequency	Percentage (%)	Source
Gender	Female	247	88
	Male	33	12
Age	< 18	6	2
	18-25	195	70
	26-35	72	26
	36-45	4	1
	> 45	3	1
Education levels	High school	15	5
	Bachelor	239	85
	Master	10	4
	Doctorate	14	5
	Other	2	1
Income levels	< 7 million	199	71
	7-15 million	27	10
	15-30 million	32	11
	30-50 million	20	7
	> 50 million	2	1
Use digital wallets	Yes	255	91
	No	25	9

Source: Authors' calculation

Female respondents account for 88% of the total number of respondents. Up to 70% of the respondents belong to the age group of 18- 25. About 26% of the respondents are of ages from 26 to 35. Respondents who do not have a college degree only account for 5% of the total. About 85% of the total number of respondents has bachelor's degrees. Regarding income levels, respondents whose earnings are less than 7 million Vietnamese dong per month account for 71%. Furthermore, it is found that 91% of the respondents utilize digital wallets.

Figure 2 depicts respondents' choices of digital wallets. Most respondents reported having used MoMo. This digital wallet appears to have the largest customer base, as up to 78.2%

of the respondents use this digital wallet. Airpay comes second as more than half of the respondents reported having used this digital wallet. ZaloPay and Moca appear to have a far more restricted customer base. Regarding "Other", a handful of respondents reported that they utilize other digital wallets such as PayPal and Samsung Pay.
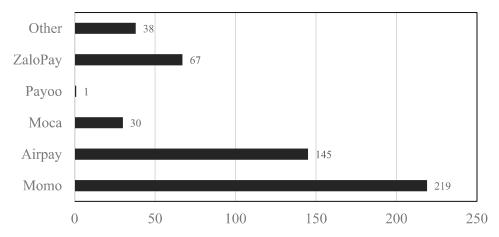

Figure 2. Digital wallet services commonly used in Vietnam

Source: Collected by the authors

5.1.2 Reliability analysis of variables

A measuring scale is deemed reliable if its Cronbach's Alpha coefficient has the minimum value of 0.7 and does not exceed 0.95 (Nunnally and Bernstein, 1994). The higher the Cronbach's Alpha is, the greater the reliability of a construct's measuring scale is. Nevertheless, a Cronbach's Alpha coefficient with a value greater than 0.95 is an indicator of redundant observed variables (Nunnally and Bernstein, 1994).

Table 3. Results of variables' reliability

Variables	Cronbach's Alpha
Performance expectancy (PE)	0.745
Effort expectancy (EE)	0.868
Social influence (SI)	0.818
Facilitating conditions (FC)	0.756
Perceived risk (PR)	0.811
Behavioral intention (BI)	0.833

Source: Authors' calculation

From the calculation, the Cronbach's Alpha of the data is over 0.7 as presented in Table 3. The measuring scales of all constructs are deemed reliable. Additionally, the observed variable FC4 is removed from the research model to enhance the reliability of facilitating conditions' measuring scale. More importantly, the measuring scales of effort expectancy, social influence, perceived risks, and behavioral intention are highly reliable since their Cronbach's Alpha values are higher than 0.8.

This finding confirms the factors impacting the behavioral intention of using digital wallets are appropriate and reliable. Therefore, all observed variables can be used in the next step of EFA analysis.

5.1.3 Validation analysis of variables

Table 4. Exploratory factor analysis

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		**0.857**
Bartlett's Test of Sphericity	Approx. Chi-Square	2311.118
	df	190
	Sig.	**0.000**

Rotated Component Matrix					
Components					
	Effort Expectancy (EE)	Perceived Risk (PR)	Performance Expectancy (PE)	Social Influence (SI)	Facilitating Conditions (FC)
EE4	0.787				
EE2	0.765				
EE6	0.763				
EE3	0.699				
EE1	0.678				
EE5	0.647				
PR1		0.827			
PR2		0.826			
PR3		0.814			
PR4		0.704			
PE3			0.784		
PE2			0.743		
PE4			0.666		
PE1			0.565		
SI2				0.863	
SI1				0.836	
SI3				0.788	
FC1					0.835
FC2					0.785
FC3					0.724

Extraction of sums of squared loadings
Cumulative %: 65.076

Source: Authors' calculation

The findings of the EFA analysis are summarized in Table 4. The component matrix is only rotated once. Regarding the KMO and Bartlett's Test, the KMO value is 0.857, which is greater than 0.8. According to Kaiser (1974), the KMO value should be at least 0.5. Nonetheless, KMO values above 0.5 are still deemed low. KMO values below 0.5 indicate the lack of observations. In other words, it indicates the insufficient sample size to perform the EFA analysis (Kaiser, 1974). Field (2013) argues that the KMO value should be at least 0.5. Nevertheless, KMO values above 0.8 are ideal (Field, 2013). Thus, it is concluded that the sample size is adequate for conducting a factor analysis.

EFA analysis results for factors impacting on the behavioral intention of using digital wallet service extracted is 5 including effort expectancy (EE) (5 items), perceived risk (PR) (4 items), performance expectancy (PE) (4 items), social influence (SI) (3 items), and facilitating conditions (FC) (3 items). Details are presented in Table 4. The convergent value of the measured variables is acceptable through a total variance extracted of 65.076%, which is greater than 50%, meaning that these 5 factors explain 65.076% of the observed variables and all factor loadings of the factors in each factor group are above 0.5.

5.1.4 Multiple regression analysis

5.1.4.1 Pearson product-moment correlation test

The Pearson 2-tailed correlation coefficient is used to find out the degree of association among the variables. The results presented in Table 5 show that all independent variables are significantly correlated with the dependent variable, which is behavioral intention (BI), at a 1% significance level.

Table 5. Pearson correlations analysis

	BI	PR	EE	SI	FC	PE
Pearson correlation	1	-0.206**	0.524**	0.381**	0.444**	0.622**
Sig. (2-tailed)		0.001	0.000	0.000	0.000	0.000
N		280	280	280	280	280

Note: ** indicates that the correlation is significant at the 0.01 level (2-tailed)

Source: Authors' calculation

5.1.4.2 Multiple linear regressions

The multiple linear regression analysis is to predict the value of a dependent variable outcome, which is behavioral intention (BI), based on the value of 5 independent variables, and to measure the cause and effect relationship between independent and dependent variables. Results from the multiple linear regression analysis are stated in Table 6.

Table 6. Multiple regression analysis

Model		Standardized coefficients	t	Sig.	Collinearity statistics	
		beta			Tolerance	VIF
	(Constant)		2.310	0.022		
	PR	-0.183	-4.265	0.000	0.977	1.023
	EE	0.134	2.406	0.017	0.586	1.706
1	SI	0.171	3.668	0.000	0.835	1.197
	FC	0.183	3.743	0.000	0.760	1.317
	PE	0.403	7.417	0.000	0.612	1.634

Notes: The predictors include performance expectancy (PE), effort expectancy (EE), social influence (SI), facilitating conditions (FC), and perceived risk (PR). The dependent variable is behavioral intention (BI).

Source: Authors' calculation

First of all, the result provides the adjusted R^2 reflecting the goodness of fit of the model and the Durbin-Watson coefficient indicating the likelihood of autocorrelation or serial correlation. The adjusted R^2 is 0.496. This shows that 49.6% of the variability in behavioral intention is explained by independent variables.

To examine the probability of multicollinearity, VIF and Tolerance statistics need to be analyzed. As shown in Table 6, VIF statistics are above 1 and below 2. According to Klimberg and McCullough (2012), VIF values within the range of 1-5 indicate the absence of significant multicollinearity (Klimberg and McCullough, 2012). The VIF values in Table 6 are greater than 1 but smaller than 2, suggesting that there is no multicollinearity problem.

The standardized beta indicates fluctuations of the standard deviation of the dependent variable following a unit of change in a particular independent variable. The standardized beta helps identify the predictor with the strongest correlation with the dependent variable. Using the standardized beta coefficient, the regression equation is formed as follows.

$$BI = -0.183*PR + 0.134*EE + 0.171*SI + 0.183*FC + 0.403*PE$$

The regression equation shows that performance expectancy with the estimated coefficient of 0.403 is the most significant determinant of behavioral intention. This is followed by facilitating conditions (0.183), social influence (0.171), effort expectancy (0.134), and perceived risks (-0.183).

Based on the results of the EFA test and regression model development, several major findings are acknowledged. In conjunction with stated research hypotheses, initial conclusions are shown in Table 7.

Table 7. Results of tested hypotheses

Hypothesis	Beta coefficient	Sig.	Conclusion
H1: Performance expectancy (PE) positively affects consumers' behavioral intention (BI) of using digital wallets.	0.403	0.000	Accepted
H2: Effort expectancy (EE) positively affects consumers' behavioral intention (BI) of using digital wallets.	0.134	0.017	Accepted
H3: Social influence (SI) positively affects consumers' behavioral intention (BI) of using digital wallets.	0.171	0.000	Accepted
H4: Facilitating conditions (FC) positively affect consumers' behavioral intention (BI) of using digital wallets.	0.183	.000	Accepted
H5: Perceived risks (PR) negatively affect consumers' behavioral intention (BI) of using digital wallets.	-0.183	0.000	Accepted

Source: Authors' calculation

Results of the data analysis show that all hypotheses are accepted. Besides, performance expectancy has the most positive significant impact on consumers' intention of using digital wallets. This is followed by facilitating conditions, social influence, and effort expectancy. Furthermore, it is noted that perceived risks negatively influence consumers' intention of using digital wallets.

5.2 Discussion of empirical results

5.2.1 Performance expectancy (PE) and behavioral intention (BI) of using digital wallets

Performance expectancy is found to have the most significant positive impact on behavioral intention because it has the highest standardized beta coefficient. From an academic viewpoint, this finding supports prior research's findings on determinants of Vietnamese consumers' intention to adopt digital wallet services (Gia-Shie and Pham, 2016). A large number of studies on acceptance of e-payment methods and digital wallets also show that this factor is the most significant determinant of consumers' use intention (Intarot and Beokhaimook, 2018).

Performance expectancy refers to how consumers feel that the use of digital wallets will help and give an advantage in conducting online transactions, such as speed, security, and convenience of transacting (Gholami *et al.*, 2010; Venkatesh *et al.*, 2003). This finding suggests that consumers will have the intention to adopt digital wallet services if they recognize the services' usefulness in terms of enhancing their performance. Specifically, consumers need to believe in digital wallets' usefulness in daily activities (PE1), their capabilities of speeding up financial transactions (PE2), saving time for users (PE3), and provision of abundant incentives (PE4).

5.2.2 Effort expectancy (EE) and behavioral intention (BI) of using digital wallets

Effort expectancy has a positive impact on the behavioral intention with a standardized beta coefficient of 0.134. This finding is consistent with prior research, of which findings confirm

the positive impact of effort expectancy on behavioral intention (Intarot and Beokhaimook, 2018; Shafie *et al.*, 2018). Nonetheless, in this study, effort expectancy has the least significant impact on behavioral intention, whereas, in prior studies, effort expectancy is among the most significant predictors of consumers' intention to adopt digital wallets (Gia-Shie and Pham, 2016). This finding suggests that Vietnamese consumers are encouraged to use digital wallets when they find it effortless to use the system. More specifically, digital wallets need to have easy access (EE1), simple registration procedures (EE2), and be easy to learn (EE3) and user-friendly (EE4). Additionally, payments via digital wallets should be made easily (EE5) and overall, consumers need to perceive the easiness of using these (EE6).

5.2.3 Social influence (SI) and behavioral intention (BI) of using digital wallet

Social influence is also found to have a positive impact on behavioral intention with a standardized beta coefficient of 0.171. This finding suggests that if consumers are encouraged to use digital wallets by people that influence their behavior (SI1) and family and friends (SI2) as well as receive support from important people in their lives to use the services (SI3), they will be more likely to have the intention to adopt digital wallets. According to Tu (2019), prior studies on consumers' behavioral intention of using digital wallets also show that Vietnamese consumers are heavily affected by social influence.

5.2.4 Facilitating conditions (FC) and behavioral intention (BI) of using digital wallets

In this study, facilitating conditions are found to have a positive impact on consumers' intention to use digital wallets, thus the hypothesis H5 is accepted. Nevertheless, prior studies show mixed results regarding the impact of facilitating conditions on use intention. Widodo *et al.* (2019) argue that facilitating conditions have a significantly positive impact on consumers' intention to use digital wallets. On the other hand, studies conducted by Intarot and Beokhaimook (2018) show that this factor has no impact on behavioral intention (Intarot and Beokhaimook, 2018). This can result from differences in levels of technology adoption among countries. For example, knowledge and resources to use various e-payment methods are common and easily accessed in developed countries. Hence, the impact of facilitating conditions may be insignificant or non-existent. On the other hand, consumers in developing countries with limited resources like Vietnam may acknowledge the higher impact of this factor.

It is noted that facilitating conditions have a positive impact on behavioral intention. Therefore, the availability of resources (FC1), knowledge (FC2), and a bank account (FC3), which are necessary to facilitate the use of digital wallets, will encourage consumers to adopt these services. Nair *et al.* (2016) explain that consumers who lack the skills and knowledge required to make efficient use of electronic devices such as computers and mobiles tend to refrain from using digital wallets because they do not know how to install and use these services. Additionally, digital wallets must be connected with an existing bank account. In other words, users must have a debit card or credit card to use digital wallets (Nair *et al.*, 2016).

5.2.5 Perceived risks (PR) and behavioral intention (BI) of using digital wallets

Perceived risks have a negative beta coefficient of -0.183 at a 5% significance level. Hence, the hypothesis H4 is accepted. This shows that perceived risks impact negatively on consumers' intention of using digital wallets. In other words, Vietnamese consumers' perception of digital wallets' lack of safety and security to protect their personal information will discourage them from using the system. A large number of previous studies have also confirmed the negative impact of perceived risks on consumers' intention to adopt e-payment methods including digital wallets (Phan *et al.*, 2020; Gia-Shie and Pham, 2016; Nguyen and Huynh, 2017).

Data transmission across mobile networks is the least secure method, and transactions using a digital wallet will be subject to the risks inherent in any mobile transaction (Hotspot Shield, 2020). There is also the risk of losing mobile phones, jeopardizing users' personal and financial information. The largest risk associated with digital wallets is a personal liability in the event of fraud. Most consumers, who use debit or credit cards for purchasing, have a level of protection from their bank because cardholders are not held liable for fraudulent purchases on their credit cards. Nonetheless, such fraud insurance is not available for consumers using digital wallets (Hotspot Shield, 2020).

6. Conclusion and recommendations

6.1 Recommendations for digital wallet service providers

First of all, to enhance performance expectancy and effort expectancy, it is recommended that digital wallet providers attempt to share the same infrastructure. According to Thanh (2019), digital wallets' connection with e-commerce shopping platforms to facilitate digital payment is restricted. For example, people who use now to order food can only use the digital wallet Airpay to make payments. On the other hand, Moca is the only digital wallet accepted by Grab (Thanh, 2019). In short, this practice makes it more time-consuming and frustrating for consumers to adopt digital wallets because they have to register multiple digital wallets and switch wallets when using different systems. Therefore, it is recommended that digital wallet providers to partner with more e-commerce shopping platforms. This will improve their payment systems' usefulness and make it easier for users to make payments.

Furthermore, to raise consumers' awareness of digital wallets' functions and benefits, marketing and promotion programs should be conducted. The benefits of digital wallets should be taught to consumers. Discount offers and rewards for installing digital wallets should be provided. For non-users who do not acknowledge the benefits of using digital wallets, awareness campaigns to promote features of digital wallets are necessary. Specifically, in such campaigns, demonstration of how to use digital wallets for paying bills, ticket booking, and shopping should be popularized.

To stimulate social influence, it is recommended that service providers focus on online platforms to promote their payment system. Service providers should pay attention to the capability of these communication channels of triggering electronic word-of-mouth. The

advertisement's message will be spread to family members, friends, or colleagues of the person who viewed the advertisement. When the customer's social audiences see them sharing content related to digital wallets, they will be more inclined to learn about it. Similarly, to reduce consumers' perceptions of risks associated with digital wallets; service providers should emphasize the aspects of security and privacy to reduce consumers' perceived risks in their marketing strategies.

From a view of enhancing the security system of digital wallets, providers need to offer a strong customer authentication procedure to protect consumers' privacy and money. Specifically, a password or facial recognition, or fingerprint recognition should be applied to ensure that other people do not have access to the users' digital wallets. For transactions whose value is insufficient, a password should be adequate for authorizing payment. Nevertheless, transactions with sufficient amounts, for example, 500,000 VND, should be authorized by OTP, which stands for one-time password, to avoid theft. Furthermore, digital wallet providers need to equip their users with adequate knowledge about tips and techniques for the best security.

6.2 Conclusion

To sum up, this research has found 5 factors affecting consumers' behavioral intention of digital wallets in Vietnam, namely performance expectancy, effort expectancy, social influence, facilitating conditions, and perceived risks. Performance expectancy is found to be the most significant determinant of consumers' behavioral intention. This is followed by facilitating conditions, perceived risks, social influence, and effort expectancy.

It is noted that perceived risks have a significantly negative impact on consumers' behavioral intentions. In other words, the higher the risks associated with adopting digital wallets are, the more likely consumers refrain from adopting the system. On the other hand, performance expectancy, facilitating conditions, social influence, and effort expectancy have positive effects on behavioral intention. Therefore, increasing performance expectancy, facilitating conditions, social influence, and effort expectancy will encourage consumers to adopt digital wallets. Moreover, digital wallet service providers should focus on stimulating the factor performance expectancy because it is the most correlated with behavioral intention.

Based on the findings of this study, service providers are encouraged to enhance the usefulness and ease of use of the system by sharing infrastructure. More specifically, digital wallet service providers should partner with multiple e-commerce shopping platforms, so that consumers do not have to register various digital wallets. A proper marketing plan should be designed and employed to enhance the popularity of digital wallets as well as equip users with adequate information to protect their personal and financial information while using the system. Digital wallet providers should focus on online platforms such as social media to promote the system. Furthermore, to reduce risks associated with digital wallets, providers ought to enhance their security system by using passwords, facial recognition, and fingerprint

recognition. This will prevent other people from accessing users' digital wallets. Additionally, for transactions whose values are sufficient, more stringent security mechanisms such as OTP, which is a one-time payment, should be employed.

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