

Nguyen Phuong Mai; Vu, Thi Minh Hien; Luu, Thi Minh Ngoc Luu; Thi Huong Dang

Article

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Factors affecting digital banking services acceptance: An empirical study in Vietnam during the COVID-19 pandemic

Phuong Mai Nguyen, Thi-Minh-Hien Vu, Thi-Minh-Ngoc Luu, Thi Huong Dang

ABSTRACT

Objective: The objective of this article is to examine some factors that affected the acceptance of digital banking services among consumers in Vietnam during the COVID-19 pandemic.

Research Design & Methods: A research model was proposed based on the unified theory of acceptance and use of technology (UTAUT). Multivariate data analysis techniques were used alongside partial least squares structural equation modelling (PLS-SEM). The survey data were collected from 779 respondents who have been using digital banking services in Vietnam. Those respondents were recruited through convenience sampling.

Findings: The results show that performance expectancy, effort expectancy, social influence, facilitating conditions, trust, and the perceived risk of COVID-19 affect the acceptance of digital banking services. Furthermore, the perceived risk of COVID-19 has the most significant impact on the acceptance of digital banking services, followed by effort expectancy, performance expectancy, social influence, and trust.

Implications & Recommendations: Therefore, banks have to enhance the quality of services as well as improve their advertising to help customers acknowledge the benefits of the financial services in question.

Contribution & Value Added: This study is among few studies that apply the unified theory of acceptance and use of technology (UTAUT) in the Vietnamese context of the banking industry, particularly during the COVID-19 pandemic. Thus, this study fills in the gap of the topic in a developing country context like Vietnam.

Article type: research article

Keywords: COVID-19; digital banking services; digital banking acceptance; UTAUT; Vietnam

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INTRODUCTION

In our rapidly evolving technological world, digital banking has emerged as a fundamental cornerstone of modern-day financial management. This revolutionary shift from traditional banking methods to digital platforms signifies a new era of convenience, accessibility, efficiency, and financial inclusion. The advent of digital banking has brought about substantial changes in both commercial operations and personal financial management (Jünger, 2019). The prevalence of online transactions, mobile banking, and financial automation indicates that digital banking is not only a transient phenomenon but rather an essential component of our socio-economic framework. It propels us towards a cashless society, reducing our dependency on physical currency, and has the potential to completely reshape the global economic landscape. Therefore, the importance of digital banking cannot be overstated; its role in promoting financial literacy, fostering transparency, and stimulating economic growth is pivotal in this digital age.

For banks that must devise strategies to attract customers, digital banking offers opportunities and challenges. For instance, digital banking has improved the efficiency and cost-effectiveness of technology-enabled service delivery processes. It has shifted the managerial focus toward enhancing the efficiency of digital channel operations to reduce operational costs. Adopting digital banking can intensify

rivalry among financial institutions, leading incumbents to prioritize previously neglected niches to maintain stable income streams. Overall, digital banking has democratized financial services, making them accessible, convenient, and more personalized than ever before. However, it has also introduced new challenges. Notably, cybersecurity threats are one of the most significant concerns as hackers' sophistication increases and banks deal with the increasing complexity of managing digital platforms securely. This poses a risk of financial loss and tarnishing the reputation of financial institutions. Moreover, there is a digital divide that leaves a portion of the population behind due to a lack of access to technology or digital literacy. Moreover, the continuous need for technological upgrades and maintenance can be costly and labour-intensive. The rapid pace of changing technology might render current digital banking platforms obsolete, necessitating continuous innovation and change that can be unwieldy. Finally, regulatory issues and the need for worldwide standardization are also a challenge since regulations may not keep pace with the speed of digital innovation. These are some of the challenges that banks and regulators must constantly address. Thus, research on the factors that impact the acceptance of digital banking services is crucial to promoting banks' competitive advantages of the banks.

The advent of digital banking has empowered banks to provide clients with immediate services via several distribution channels (Tam & Oliveira, 2017). The majority of scholarly investigations in this field focus primarily on the examination of consumers. Some major behavioural models have been applied to explain factors influencing the behaviour of consumers in the digital banking context such as the technology acceptance model (TAM) and the unified theory of acceptance and use of technology (UTAUT). Numerous research using the technology acceptance models have been conducted in developed and developing countries, including Bachoo (2017), Egala and Mensah (2021), Ghani *et al.* (2022), Juma (2014), Lavanya and Rajkumarb (2023), Lavanya and Rajkumarb (2023), Zhang *et al.* (2018), Khan (2022), and Anggraeni *et al.* (2021), just to name a few. These studies have provided both consistent and controversial findings about the determinants of digital banking in different research contexts.

Nowadays, it is undeniable that digitalization has become a strategic priority for the banking industry worldwide. Particularly, in the course of the Fourth Industrial Revolution and the complicated and unpredictable situation of the COVID-19 pandemic, the world witnessed the significant expansion and growth of digital banking. The necessity of digital technology for banks increased tremendously in early 2020. According to Allison Beer, a director of technology at JPMorgan Chase, the pandemic demonstrated that digital banking services are necessary for consumers of all ages to manage their finances confidently. A survey of 1500 JPMorgan Chase & Co. consumers showed that 5% had used digital tools to complete transactions during the pandemic (JPMorgan Chase & Co., 2020). The increase in digital banking services is inevitable, and consumers have continued to use digital banking to meet the demands of everyday life (JPMorgan Chase & Co., 2020). Galileo Financial Technologies surveyed banks in 2021, and 62% of consumers indicated that they were somewhat or highly likely to switch to a digital-only bank. The proportion of such users among millennials was 77%. The corresponding ratios of Generation Z and Generation X consumers were 72% and 55%, respectively (Galileo Financial Technologies, 2021).

In Vietnam, McKinsey reported that Vietnamese banks offer the fastest digital banking applications in the region. Nowadays, around 30 million individuals use online banking every day in Vietnam (McKinsey & Company, 2021). The growth rate of mobile banking is 200% (Fiin Research, 2022). The results show that Vietnam is a market that offers many opportunities for developing digital banking. Meanwhile, according to a survey by the State Bank of Vietnam in 2021, 95% of credit institutions in the country are developing and implementing digital transformation strategies, new technical solutions, and technologies such as artificial intelligence (AI), machine learning, and big data (Tran Thuy, 2022). Regarding the COVID-19 pandemic, it somehow motivated banks in Vietnam to become more proactive, adaptive, and innovative (Fiin Research, 2022).

From the practitioners' perspective, it is observed that digital banking in Vietnam has been tremendously growing in the context of the COVID-19 pandemic with the rising demand of consumers. However, from the academic viewpoint, there is not much research on factors that explain how the Vietnamese people adopt digital banking. A variety of factors that may affect the behaviours of Vietnamese bank consumers have not yet been adequately investigated. In this regard, this study aims

to examine factors affecting the acceptance of digital banking services by Vietnamese bank consumers during the COVID-19 pandemic. The article consists of five sections. Section 1 will introduce the topic. Section 2 will present the literature review and hypothesis development. Section 3 will demonstrate the research methods. Section 4 will elaborate on the research results. Finally, section 5 will mention implications and limitations.

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Digital Banking and Digital Banking Services

Digital banking is a new banking service that simplifies procedures through the utilization of technology to conduct banking transactions smoothly and conveniently (Sardana & Singhania, 2020). It transforms all banking activities and services in the digital environment (Sharma *et al.*, 2017). Digital banking is a high-tech solution that includes innovative financial services for consumers and commercial customers who use mobile services and digital tools, AI, and technology distribution channels (Sharma *et al.*, 2017).

The notion of digital banking may be defined as the transformation of traditional banking services and products from offline to online platforms, enabling clients to access them remotely rather than just through physical bank branches. In digital banking, banks use financial technology to supply financial products and services to the public, intensifying competition between suppliers and boosting their reputation (Thakor, 2020).

The notion of digital banking encompasses the creation of a virtual platform that facilitates the provision and distribution of financial products and services (Cuesta, 2015). This technological advancement enables banks to gain a deeper understanding of their customers and promptly address their requirements. Furthermore, digital banking serves as an omni-channel solution, allowing customers to directly engage with their bank through mobile devices and the Internet.

Digital banking has many outstanding features, including an around-the-clock service, with all transactions conducted via the Internet and applications. Digital banking could be considered not to have banking agencies or auto banking (Scardovi, 2017). The foundation of digital banking is based on the exchange of information technology and the implementation of transactions between banks, consumers, and services (Wewege, 2017). The entire process is carried out with digital equipment. Consumers do not have to attend physical branches to conclude transactions. Likewise, bank employees do not have to meet customers. The provision of a digital banking service entails a combination of advanced financial technology and changes in internal and external relationships that improve customer service effectiveness. It is essential to promote adaptation to the competitive environment and to develop business management capabilities in the short term (Bachoo, 2017).

In a practitioner's opinion, digital banking is financial services delivered through mobile phones, personal computers, the Internet, or cards linked to a reliable digital banking system (Ozili, 2018). Digital banking services are activities that banks provide for customers with bank accounts, *e.g.* the ability to access an Internet connection via smart devices, such as laptops, personal computers, mobile phones, or tablets, to use digital banking products and services. Digital banking services include money deposits and transfers, downloadable bank statements, cash withdrawals, financial services, and account monitoring.

Unified Theory of Acceptance and Use of Technology (UTAUT) and Digital Banking Services Acceptance

The unified theory of acceptance and use of technology (UTAUT) is a technology acceptance model formulated by Venkatesh *et al.* (2003). The UTAUT aims to explain user intention to use an information system and subsequent usage behaviour. The theory holds four fundamental constructs: performance expectancy, effort expectancy, social influence, and facilitating conditions.

The UTAUT model was developed through a review and consolidation of the constructs of eight models that earlier research had employed to explain information systems usage behaviour. They are the theory of reasoned action, technology acceptance model, motivational model, theory of planned behaviour, a combined approach of planned behaviour and technology acceptance model, model of

personal computer use, diffusion of innovations theory, and social cognitive theory. Subsequent validation by Venkatesh *et al.* (2003) of UTAUT in a longitudinal study found it to account for 70% of the variance in behavioural intention to use (BI) and about 50% in actual use (Venkatesh *et al.*, 2003).

The UTAUT model has been widely used in many studies and then was modified to the UTAUT2 model with more factors to examine the behaviour intention of individuals in different research contexts, including e-learning (Marchewka & Kostiwa, 2007), online shopping (Yu, 2012), information technology adoption (Attuquayefio & Addo, 2014; Rozmi *et al.*, 2019, Frans & Pather, 2022), e-government services (AlAwadhi & Morris, 2008), and particularly, digital banking services (Lavanya & Rajkumarb, 2023; Zhang *et al.*, 2018; Khan, 2022).

In the context of digital banking, Sathye (1999) showed that six factors affect digital banking acceptance, including a lack of security concerns, convenience, perceived service benefits, pricing, sustainability, and infrastructure. The results also demonstrate that anxiety over security and failure to recognize the benefits of online banking hampered its adoption in Australia. Grabner-Kräuter and Faullant (2008) studied the impact of trust in the Internet on risk perceptions and consumer attitudes to online banking. Trust, risk perceptions, familiarity with the Internet, and attitudes to online banking positively influenced its use. Nguyen (2020) and Frans and Pather (2022) suggested that perceived utility, awareness of the ease with the service usage, trust, risk, and convenience affect the acceptance of digital banking.

Furthermore, Anggraeni *et al.* (2021) examined factors that influence consumers' intention and usage of digital banking in Indonesia. These authors used the UTAUT2 model and confirmed that habit, hedonic motivation, and social influence affected the behavioural intention and behaviour of Indonesian people when using digital banking services. Similarly, Aria and Sacco (2023) built a model based on UTAUT and the technology acceptance model (TAM) to measure the factors affecting consumer satisfaction, retention levels towards digital banking, and financial services. In Vietnam, few studies using UTAUT have been conducted to examine factors affecting the intention to adopt digital banking services, including Nguyen *et al.* (2020) and Pham (2022).

Particularly, some studies have considered the context of COVID-19 that affects digital banking acceptance. For example, Riza (2021) applied the UTAUT2 model to examine the factors that drive the adoption of digital banking of Islamic banks during the COVID-19 pandemic. This author confirmed that people have trust, acceptance and satisfaction with the digital banking service of Islamic banking technology. Meanwhile, Musyaffi *et al.* (2021) examined factors that determine digital payment usage during the COVID-19 pandemic in Indonesia. Musyaffi *et al.* (2021) asserted that some factors in the UTAUT model positively affected behavioural intention to use digital banking but social influence did not affect behavioural intention. Some studies also tested the influence of factors in the UTAUT model on the digital banking usage of enterprises (Ahmed & Sur, 2021), and digital banking effectiveness (Ghani *et al.*, 2022). In several studies, some variables have been added to the UTAUT model to investigate their impact on digital banking acceptance, such as habit, satisfaction (Ibrahim *et al.*, 2022), perceived risk, trust (Ali *et al.*, 2022), and credibility (Yuliana & Aprianingsih, 2022).

Research Model and Hypotheses

In this study, the research model was premised on the UTAUT (Venkatesh *et al.*, 2003) and adopted from the research of Kim and Gim (2017), Nguyen (2020), and other studies. The main factors in the research model were selected from UTAUT. They included (1) performance expectancy, (2) effort expectancy, (3) social influence, (4) facilitating conditions, and (5) trust in consumer behaviour research during the COVID-19 pandemic, to which the author added (6) perceived risk that affects the acceptance of the technology among consumers (Aji *et al.*, 2020; Hu *et al.*, 2019) (Figure 1).

Performance expectancy (PE) is defined as the expectation of accomplishments and results, the 'degree to which an individual believes using the system will enable him/her to attain gains in job performance' (Venkatesh *et al.*, 2003). Previous studies, including Kim and Gim (2017), Martins *et al.* (2014), Egala *et al.* (2021), and Musyaffi *et al.* (2021) showed that PE positively influences digital banking adoption. In light of the previous research on the impact of performance expectancy on the acceptance of technology, we hypothesised:

H1: Performance expectancy positively correlates with bank consumers' UA.

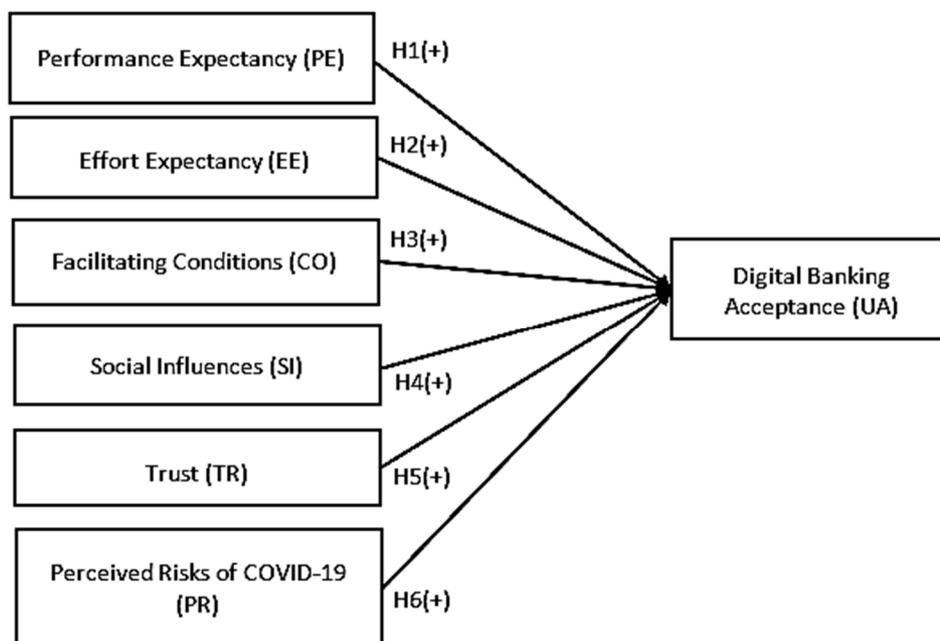


Figure 1. Research model

Source: own elaboration.

Venkatesh *et al.* (2003) showed that effort expectancy (EE) is the degree of ease of using a system. An effort is necessary to use any system, whether complicated or simple. User-friendly technology can be accepted and applied easily by users. Most users prefer technology because of its flexibility and usefulness and because they are aware of the ease with which it may be used. According to Giesing (2005), effort expectancy is a significant factor that impacts the decision to use a service. In the banking industry, Anggrani *et al.* (2021), Riza (2021), and Musyaffi *et al.* (2021) confirmed that EE has a positive impact on digital banking adoption. Thus, we developed the following hypothesis.

H2: Effort expectancy positively correlates with bank consumers' UA.

The notion of facilitating conditions (CO) captures the degree to which an individual believes that organizational and technical infrastructure exists to support the use of the system (Venkatesh *et al.*, 2003). Furthermore, Kim and Gim (2017), Senthya (1999), Nguyen (2020), and Thomas *et al.* (2023) suggested that facilitating conditions have a positive correlation with the acceptance of digital banking services. From those arguments, in this study, we proposed hypothesis H3:

H3: Facilitating conditions positively correlate with bank consumers' UA.

Social influence (SI) captures the degree to which an individual perceives that important others (colleagues, relatives, and subordinates) in their social circle believe that they should use the new system (Venkatesh *et al.*, 2003) such as the digital banking system (Osatuyi & Turel, 2019). In this context, the term 'social circle' pertains to the customer's subjective evaluations of the critical elements associated with digital banking, as influenced by those within their personal network, such as family members, coworkers, or friends. To gain acceptance within their social milieu, consumers conform to the prevailing group or societal standards (Osatuyi & Turel, 2019). Some studies have proved that SI positively impacts the usage of a technology-based system (Kunz & Santomier, 2020; Talukder *et al.*, 2019; Musyaffi *et al.*, 2021). Therefore, in the banking industry context, we formulated the following hypothesis.

H4: Social influence positively correlates with bank consumers' UA.

Trust (TR) depends on whether customers can feel secure when using a service without having to preoccupy themselves with risks or other issues (Gefen *et al.*, 2003). As far as the acceptance of digital banking is concerned, trust impacts attitudes and acceptance among potential consumers

(Page & Luding, 2003). Similarly, some researchers have shown that customer trust plays a vital role in the acceptance of digital banking services (Basak *et al.*, 2016; Hanafizadeh *et al.*, 2014; Koksas, 2016). In this study, we also assumed the positive effect of trust on the digital banking acceptance of Vietnamese consumers. Thus, we hypothesised:

H5: Trust positively correlates with bank consumers' UA.

Most previous studies have focused exclusively on perceived privacy, security, or financial risks. Few contributions focus on the perceived risk of disease as a factor that impacts consumers' intention to use digital payments. Likewise, digital payments are considered to be a preventive health measure that mitigates the risks of contracting COVID-19 (Sreelakshmi & Prathap, 2020). Using cash and other payments that involve close physical contact could accelerate the spread of COVID-19. The WHO encourages consumers to use digital and contactless payments (Durr, 2020). Some studies on digital banking during the COVID-19 pandemic showed that the perceived risk (PR) of COVID-19 was associated with an increase in the use of digital wallets (e-wallets) for financial activities. For instance, Aji *et al.* (2020) reported that the outbreak of COVID-19 negatively impacted consumers' intention to use cash in Indonesia and Malaysia. Moreover, Daragmeh and colleagues (2021) showed that PR positively impacts the acceptance of financial technology (Daragmeh *et al.*, 2021). Thus, we developed hypothesis H6 as follows.

H6: Perceived risk positively correlates with bank consumers' UA.

RESEARCH METHODOLOGY

Measurements

We adopted and adapted the measurements of the present study from existing literature related to UTAUT application in various contexts, including the studies of Kim and Gim (2017), Sathye (1999), Venkatesh *et al.* (2003), Nguyen (2020), Aji *et al.* (2020), and Sreelakshmi and Prathap (2020). We selected six measurement items, which are performance expectancy (four items), effort expectancy (four items), facilitating conditions (five items), social influences (four items), trust (four items), and perceived risk of COVID-19 (four items).

Before the official survey, to verify the appropriateness of the research model and measurements in the Vietnamese context, we discussed the research model and the measurement scales with medical and economic experts and with banking consumers in Hanoi and Ho Chi Minh City (five economics experts, two medical experts, and five banking consumers). The results of the discussions and the interviews indicated that the acceptance of digital banking is affected by the following factors: (1) performance expectancy, (2) effort expectancy, (3) social influence, (4) facilitating conditions, (5) trust, and (6) the perceived risk of COVID-19. Specifically, the perceived risk of COVID-19 exerted a large influence on consumer acceptance of digital banking services during the pandemic. Experts and interviewees agreed that all 25 measurement items are suitable for the research context in Vietnam. Table 1 shows the items in the measurements. In each question, we asked the respondents to express their opinions about the impact of various factors on the acceptance of digital banking services on a five-point Likert scale, with response options ranging from 1= 'totally disagree' to 5 = 'totally agree.'

Sample and Data Collection

We conducted an experimental study before the official quantitative research to ensure that all questionnaires were understandable and to provide information appropriate for the research goals. We prepared the questionnaire in Vietnamese so that the banking consumers could fully understand the meaning of each question. The pilot sample consisted of 50 Hanoi and Ho Chi Minh City banking consumers. Due to the severe COVID-19 pandemic in mid-2020 in Vietnam, we could not approach the respondents in person. Thus, our research team posted the call for the survey in social groups and forums. Some active banking consumers answered our call in the groups and forums. Then, we approached them directly with instant messages and phone calls. Upon receiving the agreement of the 50 advocates for our pilot test, the questionnaires were sent to them to complete, and they were interviewed directly via phone calls or Zoom meetings. After a week, we added 41 valid responses

(provided by 22 women and 19 men) to SPSS 24.0 software for analysis. The reliability results showed that Cronbach's alpha coefficient of the independent variables was greater than 0.6 and that KMO = 0.881, which exceeded 0.5 with a significance of 0.000. Therefore, we concluded that the measurements are reliable for the official survey. We used Harman's single-factor test to assess the potential risk of common method variance. We subjected all categories to exploratory factor analysis using principal component analysis and varimax rotation. The first factor accounted for 37.37% of the total variance. Thus, common method bias was not a potential problem in this study.

Table 1. List of measurement items

Observed variables	Factors	Sources
Performance expectancy (PE)	Using digital banking services saves me time.	Kim & Gim (2017); Sathye (1999); Venkatesh <i>et al.</i> (2003)
	Using digital banking services helps me manage my financial plan efficiently.	
	Using digital banking services helps me make transactions easier.	
	Using digital banking services helps me save money.	
Effort expectancy (EE)	Signing up for digital banking services is extremely simple.	Giesing (2005); Kim & Gim (2017); Sathye (1999); Venkatesh <i>et al.</i> (2003)
	Digital banking functions are easy to use.	
	I spend little time getting used to digital banking services.	
	I spend little time retrieving my transaction history data.	
Facilitating conditions (CO)	Installing digital banking applications on mobile devices is easy and quick.	Kim & Gim (2017); Sathye (1999)
	Digital banking services satisfy my demand thanks to 24/7 availability.	
	The bank has a system to promptly respond to users' requests.	
	The bank provides me with many incentives to use the products and services of its partners.	
	Digital banks help me connect to online financial services (payment of expenses, invoices, etc.).	
Social influences (SI)	When I use digital banking services, I think people will appreciate me.	Kim & Gim (2017); Venkatesh <i>et al.</i> (2003)
	Others who use digital banking services significantly impress me.	
	My family thinks that I should use digital banking services.	
	My colleagues believe that digital banking services are beneficial.	
Trust (TR)	The websites and apps of the prestigious banks are reliable.	Hu <i>et al.</i> (2019); Nguyen (2020)
	Digital banks always try to benefit customers.	
	Banks comply with the announcements of digital banks.	
	Digital banks carry out what banks commit to their customers.	
Perceived risk of COVID-19 (PR)	I am worried about being infected with COVID-19 when I use cash and financial services that require in-person interaction.	Aji <i>et al.</i> (2020); Sreelakshmi & Prathap (2020)
	I am worried about being infected with COVID-19 when there are microscopic droplets on the surface of banknotes.	
	Using digital banking services helps me avoid contact with crowds.	
	I do not feel comfortable when paying in cash during financial transactions.	
Usage acceptance (UA)	I agree to use digital banking services even without the COVID-19 pandemic.	Kim & Gim (2017); Sathye (1999); Venkatesh <i>et al.</i> (2003)
	I agree to recommend digital banking services to others.	
	Digital banking will be a method that will completely replace direct transactions at banks.	

Source: own study.

We collected the data in the official sample through the convenience sampling method. Using social networks and forums, the author team sent the questionnaire to consumers in large cities, including Hanoi, Ho Chi Minh, Da Nang, Hai Phong, Ha Long, Hue, and Can Tho. We started the online survey with friends in our social network. We successfully approached 30 early advocates of our survey and encouraged them to spread our survey among other members of their social network.

We conducted the online poll over three months. After eliminating invalid responses, we analysed 779 valid ones. Table 2 summarises the results.

Table 2. Sample demographics

Information	Features	Number	Percentage
Gender	Male	282	36.3%
	Female	497	63.7%
Age	Aged 18-22	105	13.47%
	Aged 23-30	242	31.06%
	Aged 31-40	221	28.34%
	Aged 41-50	122	15.66%
	Aged 51-60	87	11.11%
	Above 60	2	0.36%
Names of banks	Vietcombank	152	19.51%
	BIDV	179	22.97%
	Techcombank	137	17.58%
	Vietinbank	81	10.4%
	MSB	24	3.2%
	VPBank	78	10.1%
	MB Bank	73	9.4%
	TP Bank	18	2.3%
	Agribank	12	1.6%
Others	25	2.94%	
Income per month	Under 5 million VND	34	4.36%
	5-10 million VND	134	17.20%
	10-15 million VND	176	22.59%
	15-20 million VND	195	25.03%
	Above 20 million VND	240	30.82%
Occupation	Civil servants	173	22.20%
	Students	76	9.75%
	Office staff	231	29.65%
	Businessman	257	32.99%
	Workers	28	3.59%
	Freelancers	14	1.82%
Academic degree	High school	42	5.39%
	Trade school	72	9.24%
	College	156	20.02%
	University	238	30.55%
	Postgraduate	271	34.8%

Source: own study.

Data Analysis

We tested the reliability and validity of measurements in SmartPLS 3.3.9. We also evaluated the factors that affected the acceptance of digital banking services among Vietnamese consumers during the COVID-19 pandemic using partial least squares path modelling (PSL-PM) and partial least squares structural equation modelling (PLS-SEM). We chose PLS-SEM for numerous reasons. Firstly, PLS-SEM allowed researchers to measure complex models with many constructs, indicator variables, and structural paths without imposing distributional assumptions on the data. Secondly, PLS-SEM is a causal-predictive approach to SEM that emphasizes prediction in estimation; that is, it is designed to provide causal explanations. Thirdly, PLS-SEM is also helpful for small samples. In this research, the number of respondents, 779, was much smaller than the national population. Therefore, PLS-SEM was suitable for the study.

RESULTS AND DISCUSSIONS

Research Results

The reliability of the scales was tested in SmartPLS by reference to many factors, including Cronbach's alpha and composite reliability (CR). Furthermore, the validity of the items was measured by reference to the variance inflation factor (VIF), average variance extracted (AVE), the Fornell-Larcker criterion, adjusted R^2 , and SRMR. Both $R^2 = 0.698$ and $SRMR = 0.069$ were below 0.08 at a significance level of 0.000, which demonstrates the appropriateness of the model. Concluding, 68% of the variability in consumer acceptance can be explained by the six independent variables in the model. The remainder (32%) is explained by other variables (Table 3).

Table 3. Results of tests of the appropriateness of the research model

Constructs	Item	Loading	VIF	Cronbach'salpha	CR	AVE
Use acceptance (UA)	UA1	0.910	2.609	0.857	0.913	0.778
	UA2	0.908	2.558			
	UA3	0.826	1.779			
Facilitating conditions (CO)	CO1	0.868	2.264	0.881	0.912	0.676
	CO2	0.795	1.853			
	CO3	0.837	2.362			
	CO4	0.760	1.854			
	CO5	0.845	2.365			
Performance expectancy (PE)	PE1	0.904	3.012	0.846	0.894	0.681
	PE2	0.757	1.874			
	PE3	0.882	2.851			
	PE4	0.745	1.835			
Effort expectancy (EE)	EE1	0.896	3.022	0.912	0.938	0.792
	EE2	0.928	3.955			
	EE3	0.897	3.095			
	EE4	0.836	2.177			
Perceived risk of COVID-19 (PR)	PR1	0.853	2.494	0.833	0.890	0.670
	PR2	0.862	2.732			
	PR3	0.857	2.023			
	PR4	0.690	1.387			
Trust (TR)	TR1	0.875	2.426	0.881	0.918	0.738
	TR2	0.877	2.652			
	TR3	0.891	2.725			
	TR4	0.791	1.760			
Social influences (SI)	SI1	0.771	1.851	0.828	0.886	0.660
	SI2	0.843	0.190			
	SI3	0.834	0.860			
	SI4	0.799	0.663			

Note: Adjusted $R^2 = 0.698$; $SRMR = 0.069$; $F = 64.181$; $Sig = 0.000^b$

Source: own study.

The results also show that the overall reliability scores of the scales were larger than 0.7 and that convergent validity was larger than 0.6 (Table 5), which means that all values met the test requirements. Moreover, $VIF < 5$ indicates that multicollinearity might not affect the results significantly. We tested discriminant validity by reference to the Fornell-Larcker criterion and the heterotrait-monotrait ratio of correlations (HTMT). Table 4 displays the results for the Fornell-Larcker criterion.

The results for the Fornell-Larcker criterion show that all values were also in the square, with values from 0.812 to 0.890 for all structures (bolded values), and they were more significant than any correlation coefficients horizontally and vertically pixels. Overall, the constructs of the research appeared to be valid.

Table 4. Results for Fornell-Larcker criterion

Variables	UA	CO	PE	EE	PR	TR	SI
UA	0.882						
CO	0.568	0.822					
PE	0.598	0.406	0.825				
EE	0.665	0.543	0.500	0.890			
PR	0.675	0.385	0.445	0.481	0.819		
TR	0.635	0.486	0.477	0.500	0.511	0.859	
SI	0.507	0.322	0.284	0.364	0.416	0.405	0.812

Source: own study.

Table 5 shows the results of the test of the heterotrait-monotrait ratio of correlations (HTMT). The results show that the value was less than 0.79, which was acceptable.

Table 5. Test of the heterotrait-monotrait ratio of correlations

Variables	UA	CO	PE	EE	PR	TR	SI
UA							
CO	0.638						
PE	0.674	0.451					
EE	0.746	0.586	0.548				
PR	0.791	0.436	0.491	0.549			
TR	0.722	0.544	0.531	0.555	0.586		
SI	0.592	0.379	0.333	0.418	0.497	0.466	

Source: own study.

At the same time, the results also showed that $p < 0.05$, which indicates that the relationship under observation was significant (Table 2).

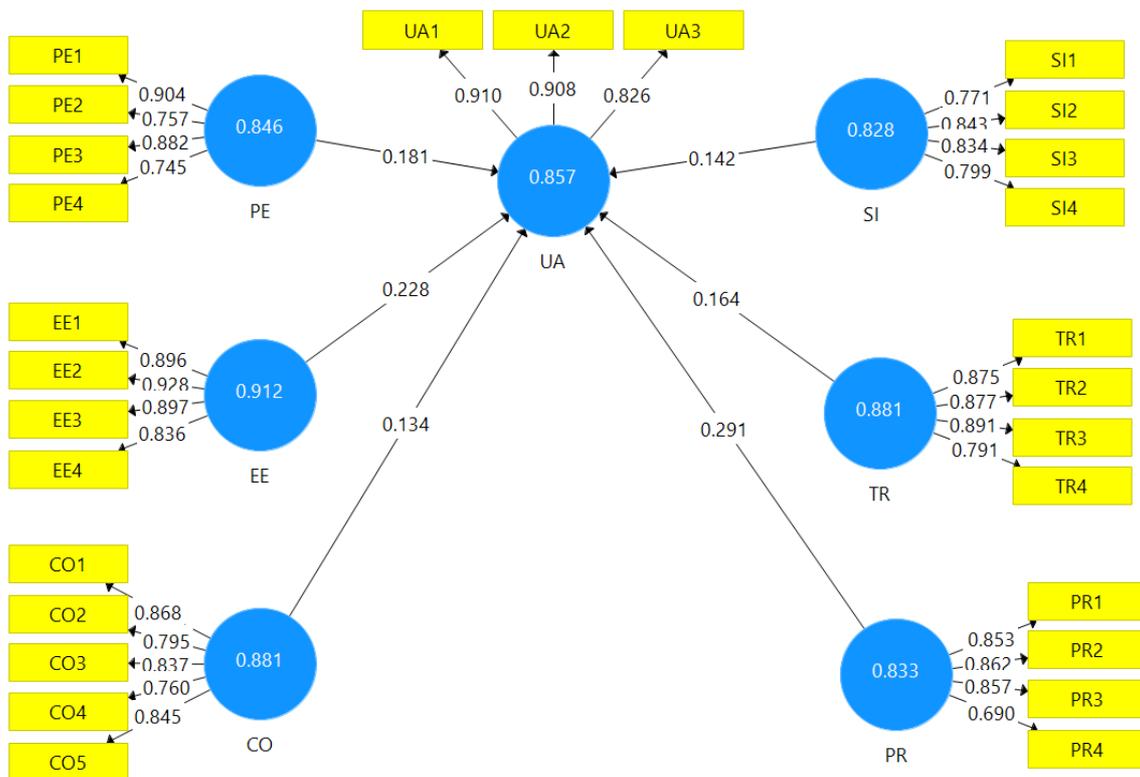


Figure 2. Structural model analysis results

Source: own elaboration in SmartPLS.

As illustrated in Figure 2, PR had the most significant impact on the acceptance of digital banking services ($\beta = 0.291$; $t = 5.570$; $p = .000$), followed by EE ($\beta = 0.228$; $t = 4.126$; $p = 0.000$), PE ($\beta = 0.181$; $t = 3.370$; $p = 0.001$), and TR ($\beta = 0.164$; $t = 2.962$; $p = 0.003$). Two factors, *i.e.* CO ($\beta = 0.134$; $t = 2.573$; $p = 0.011$) and SI ($\beta = 0.142$; $t = 2.696$; $p = 0.008$), had a small impact on the acceptance of digital banking. Thus, H1, H2, H3, H4, H5, H6 were accepted. All factors in the model had regression coefficients $\beta > 0$. Therefore, these factors positively impacted the acceptance of digital banking services. The results indicated that the regression equation for Vietnamese consumers' acceptance of digital banking services during the pandemic may be written as follows:

$$UA=0.076+0.181*PE+0.228*EE+0.134 *CO+0.142*SI+0.164*TR+0.291*PR$$

Discussion

The results show that six factors, which are (1) performance expectancy (PE), (2) effort expectancy (EE), (3) social influence (SI), (4) facilitating conditions (CO), (5) trust (TR), and (6) perceived risk of COVID-19 (PR), positively influenced Vietnamese bank consumers' acceptance of digital banking services during the COVID-19 pandemic. Our results cohere with other findings on the acceptance of digital banking services in Vietnam and globally such as Pham (2022), Anggraeni *et al.* (2021), Riza (2021), Musyaffi *et al.* (2021), and some others.

Interestingly, PR was the most important factor influencing digital banking acceptance in Vietnam. This finding is attributed to the research period when we were suffering from the disruption of all industries due to the COVID-19 pandemic. Moreover, in a cash-based transaction country like Vietnam, people are reluctant to using non-cash payments. We may consider the COVID-19 pandemic as a trigger that dramatically changed the conventional payment methods in Vietnam. Coronavirus preventive measures pushed Vietnamese bank consumers to use online payment more than ever before. Other studies in Malaysia, Indonesia, Pakistan, and India on digital banking usage during the COVID-19 pandemic provide findings similar to ours. They include Riza (2021), Jena (2023), and Yan *et al.* (2021). For example, Ali *et al.* (2022) investigated 254 Pakistanese people and found that PR moderates the relationship between UTAUT elements and bank consumers' intention to use digital banking services. However, some studies did not confirm the positive relationship between PR and intention to use digital banking services.

Furthermore, in our study, trust (TR) was very critical in determining the Vietnamese bank consumers' digital banking acceptance. This finding may be explained based on the specific context of Vietnam, a collectivist country. As our culture is characterized by collectivism, Vietnamese people are believed to be strongly influenced by referent others when making decisions in their lives, including the digital banking adoption. Our finding was in compliance with previous studies by Ibrahim *et al.* (2022), Juma (2014), Zhang *et al.* (2018).

Finally, our study confirmed that four main factors, *i.e.* PE, EE, CO, SI, have a positive impact on Vietnamese bank consumers' acceptance of digital banking services, indicating the the UTAUT model is suitable in the Vietnamese context. Our findings are in line with several studies, *e.g.* Yuliana and Aprianisih (2022), Pham (2022), and Ibrahim *et al.* (2022). However, the study of Anggraeni *et al.* (2021) showed that effort expectancy, facilitating conditions, performance expectancy and price value do not have a significant relationship. The controversial findings about the impact of UTAUT factors on digital bank acceptance reveal that there should be more empirical research on this topic and the contextual factors might play their role as moderators.

CONCLUSIONS

Theoretical and Practical Implications

In terms of theory, the contributions of this study have two aspects. Firstly, this study confirms the application of UTAUT in an Asian emerging context (Vietnam), which is a new research context with few studies on digital banking acceptance. Thus, it provides more evidence of how effective UTAUT is in explaining the behaviour of individuals in various contexts. Secondly, we added two new variables,

i.e. trust and perceived risk of COVID-19, to the UTAUT model to test their impact on digital banking acceptance in the Vietnamese banking industry. Particularly, the perceived risk of the COVID-19 pandemic is a contextual factor that has been fully considered and added to the research framework. In our study, we demonstrated that the adaptation of UTAUT with new variables is a valid variant.

In terms of practice, this study has some implications for commercial banks in Vietnam. Our research findings indicate that, during the COVID-19 pandemic, the perceived risk of contracting the disease (PR) was tolerable and that it had a sizable impact on the acceptance of digital banking services. Although the pandemic affected the lives of Vietnamese individuals and enterprises negatively, it has also promoted the transformation and modernization of traditional business techniques and the use of technology in commerce. In the past, businesses and citizens were anxious about e-commerce and online payments. After the pandemic, online shopping became common. As a result, the use of cash declined while that of online payments increased significantly. According to the State Bank of Vietnam, as of April 2022, the number of cashless payments had increased by 69.7%, and their value had risen by 27.5% (Tran Thuy, 2022). Likewise, the number and volume of online transactions had increased by 48.39% and 32.76%, respectively. The number of payments via QR code had risen by 56.52%, and their total value had increased by 111.62% relative to the same period in 2021. The total number of active e-wallets was 10.7% higher than in 2021 (Tran Thuy, 2022). Online payment is considered a means of enabling retail businesses to overcome the difficulties that the outbreak of the pandemic created.

From our findings, we can identify the trends in digitalization and cashless payments in Vietnam. We found a positive impact of the UTAUT factors and two contextual factors. Therefore, digital banking services will grow considerably soon. In such a context, commercial banks in Vietnam must improve and innovate in line with customer demands while benefiting from government support to expand the market and see it grow. Firstly, digital banks should update and upgrade their software. Simplifying work processes, enhancing supporting features that improve the consumer experience, and ensuring the reliability and security of the service should also be prioritized.

Secondly, the cost of using the service should be optimized. Cost of usage is one factor that is decisive for consumer expectations about effectiveness. Most consumers can change their banking habits if all interactions are digitized. However, the cost could hinder acceptance. Thus, banks must introduce numerous promotion programs, decrease the costs of online payments, provide services tailored to the particularities of online transactions, support businesses when they encounter adversity, and guarantee social security benefits.

Thirdly, the registration process should be simplified. Furthermore, personal data should be incorporated into identifier codes. Finally, banks should change their procedures to create a convenient user experience.

Fourthly, marketing campaigns should be deployed to advertise digital banking services. Strategic approaches should be formulated and the market should be expanded via word-of-mouth marketing. Customer appreciation strategies should be developed to strengthen the relationship between consumers and digital banks.

Fifthly, connections should be enhanced by setting up an ecosystem associated with consumer services. Developing cooperation with businesses and launching incentives encouraging consumers to make digital payments would be helpful. The digital payment of bills for utilities, such as water, electricity, telecommunications, and such, should be promoted. Virtual assistants should be used to support consumers when they make online payments.

Sixthly, information technology infrastructures should be upgraded. Artificial intelligence AI should be used to store and handle work. Information should be encrypted, and, as far as modes of authentication are concerned, the use of virtual assistants should increase to avoid operational problems and minimize dependence on bank staff. Network security should be enhanced and risks should be controlled.

Limitations and Future Research Suggestions

This study has some limitations. Firstly, the research model was limited to the UTAUT framework and added only two new variables. Thus, the results show that the adjusted R^2 of the model was 0.68, indicating that 68% of the variation in the acceptance of digital banking services was explained by six

variables which were performance expectancy, effort expectancy, social influence, facilitating conditions, trust, and perceived risk of COVID-19. However, many other factors may affect the acceptance of digital banking services, but we did not mention them in this article. Furthermore, the convenience sampling method is not optimal, because it might cause potential biases in the sample and findings.

For the limitations mentioned above, we suggest that future research expands the research model with more variables as moderators and mediators. For example, if the research context can be extended to other countries in Asia, national culture might be considered a mediating variable in the research model. Moreover, we suggest that future studies expand the sample size to increase the ability to generalize the research results to the whole population. Furthermore, as AI applications have been becoming more popular recently in the banking industry, we also suggest that future research might consider examining digital banking services in the AI-driven and tailor-made consumer approach.

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Authors

The contribution share of authors is equal and amounted to 25% for each of them.

Phuong Mai Nguyen

PhD in Business Administration, International School, Vietnam National University Hanoi, Vietnam. Her research interests include sustainable development, consumer behaviour, and digital transformation in business.

Correspondence to: Phuong Mai Nguyen, 144 Xuan Thuy Street, Cau Giay District, Hanoi 10000, Vietnam, e-mail: mainp@vnu.edu.vn

ORCID  <http://orcid.org/0000-0002-2704-9707>

Thi-Minh-Hien Vu (Corresponding author)

PhD in Management and Business, University of Economics and Business, Vietnam National University Hanoi, Vietnam. Her research interests include marketing and e-commerce.

Correspondence to: Thi-Minh-Hien Vu, 144 Xuan Thuy Street, Cau Giay District, Hanoi 10000, Vietnam, e-mail: hienvuminh@vnu.edu.vn

ORCID  <http://orcid.org/0000-0002-6829-4864>

Thi-Minh-Ngoc Luu

PhD in Business Administration, International School, Vietnam National University Hanoi, Vietnam. Her research interests include e-commerce, consumer behaviour, entrepreneurship, and human resource management.

Correspondence to: Thi-Minh-Ngoc Luu, 144 Xuan Thuy Street, Cau Giay District, Hanoi 10000, Vietnam, e-mail: ltmngoc@vnu.edu.vn

ORCID  <http://orcid.org/0000-0002-5972-7752>

Thi Huong Dang

PhD in Business Administration, University of Economics and Business, Vietnam National University Hanoi, Vietnam. Her research interests include human resource management, and corporate culture.

Correspondence to: Thi Huong Dang, 144 Xuan Thuy Street, Cau Giay District, Hanoi 10000, Vietnam, e-mail: huongdth@vnu.edu.vn

ORCID  <http://orcid.org/0000-0003-0431-2928>

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Conflict of Interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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