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Critical Factors Affecting Consumer Intention of Using Mobile Banking Applications During COVID-19 Pandemic: An Empirical Study from Vietnam*

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Abstract

The study analyzes the factors affecting the intention and recommendation to use the mobile banking applications of 314 customers from Vietnam. The study analyzes 7 factors affecting the intention and recommendation to use the mobile banking applications of customers from Vietnam, including (i) Perceived risk; (ii) Perceived ease of use; (iii) Perceived usefulness; (iv) Attitude; (v) Perceived trust; (vi) Social image; and (vii) Innovativeness. Besides, the study also analyzes 4 variables that reflect the customer's demographics, including gender, age, education, and occupation, and 6 variables describing the behavior of customers using mobile banking applications. The study findings indicate that the following factors (i) Innovativeness; (ii) Attitude; (iii) Perceived risk; (iv) Perceived ease of use, and (v) Perceived trust have the most significant impact on customers' behavior of using mobile banking applications in emerging markets such as Vietnam in the context of prolonged pandemic and continuous lockdown in many provinces and cities. The study is also of great value to studies on behavior changes among customers using mobile banking applications after the COVID-19 pandemic in Vietnam. The study will provide additional empirical evidence useful to bank administrators in motivating customers to use mobile banking applications, helping develop a digital economy in Vietnam.

Keywords: Consumer Intention, Mobile Banking Application, Customer Recommendation, Vietnam

JEL Classification Code: G10, G18, G20, G21, G24

1. Introduction

Technological advances help banks gradually consolidate online banking platforms, bringing many benefits to both banks themselves and customers. Among online banking platforms, mobile banking is a key foundation in the growth strategy of the banking industry (Goswami & Raghavendran, 2009). Mobile banking application in the banking business helps commercial banks improve their capabilities in better customer care, more effective capital management, enhanced competitiveness, and package offerings for customers through cross-selling products and services such as consumer loans, credit cards, and consulting portfolios management, etc.

Mobile banking can also be leveraged as a product to improve the competitiveness of each bank's brand. The bank can build credibility and trust among customers through its innovative mobile banking channel, a long-term vision, and modern product offerings. Moreover, banks can utilize their first-mover advantage by proactively forming technology standards based on their competitive edges in the process of developing and launching mobile banking. Mobile banking application makes it possible for banks to offer their services in remote geographical areas without investing in setting up branches and hiring more staff, which presents both an opportunity and a challenge for the banks. Thus, mobile banking application helps commercial banks maintain and strengthen their competitive position (Dapp, 2017).

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Besides benefits to the bank, mobile banking application also brings benefits to customers using the service. Customers will have their transaction needs to be served in a large geographical area where mobile phone signal is more quickly and conveniently available. Customers do not have to wait in line to access ATMs or branches for banking services. This will better facilitate customers' financial planning and transaction reviewing anytime, anywhere. Compared to other forms of e-banking services, mobile banking provides customers with a safer transaction channel.

The most significant advantage that mobile banking offers to banks is cost efficiency when selecting channels to provide products and services to customers. Furthermore, with mobile banking applications, customers can use banking services anytime, anywhere, making banking services readily available to customers in an emergency. In addition, the mobile banking application helps the bank to provide value-added services tailored to the individual preferences of each customer corresponding to their current geographical location (Al-Otaibi et al., 2018; Çera et al., 2020). However, a successful mobile banking application requires many users and the ability to change user habits, embedding mobile banking applications in customers' daily habits (Laukkanen, 2007; Goswami & Raghavendran, 2009).

The COVID-19 pandemic has changed customers' behaviors and habits in accepting and recommending mobile banking applications (Nair et al., 2021). The study was conducted to analyze 7 factors affecting the intention and recommendation to use the mobile banking applications of customers from Vietnam during the COVID-19 pandemic, including (i) Social image; (ii) Perceived ease of use; (iii) Perceived usefulness; (iv) Attitude; (v) Perceived trust; (vi) Perceived risk and (vii) Innovativeness. Besides, the study also analyzes 4 variables that reflect the customer's demographics, including gender, age, education, and occupation, and 6 variables describing the behavior of customers using mobile banking applications. The study will provide additional empirical evidence on behavior changes among customers using mobile banking applications after the COVID-19 pandemic in Vietnam.

2. Literature Review

Mobile banking is defined as using a mobile device through a telecommunications network to connect with a financial institution or bank to help customers make service requests. Mobile banking is a distribution channel of modern banking products and services through the mobile information network. With mobile banking, customers can perform most of their financial transactions like at a traditional bank branch; that is why Mobile banking and other forms of e-banking are also known as branchless banking (Kochar, 2018; David-West et al., 2019; Mangani et al., 2019). In a broad sense, Mobile banking is understood as the use of a mobile device through a telecommunications network to connect with a financial institution or bank to help customers make service requests.

Mobile banking application in the banking business helps commercial banks improve their capabilities in better customer care, more effective capital management, enhanced competitiveness, and package offerings for customers through cross-selling products and services such as consumer loans, credit cards, and consulting portfolios management, etc.

Banks design a mobile banking application to help customers connect with banks and make service requests through mobile devices. With the mobile banking application, customers can perform most of the basic financial transactions like at a traditional bank branch. Analysis of the factors affecting the intention and recommendation to use mobile banking applications will lay the groundwork for banks to propose solutions to increase the share of customers using mobile banking applications.

Theory of Technology Acceptance Model (TAM) (Davis, 1989) is a model developed based on the Theory of Reasoned Action (TRA). The TAM model is widely recognized and applied to test the acceptance level of users for information technology systems and applications. The TAM model, designed based on the Theory of Reasoned Action, or TRA (Ajzen & Fishbein, 1980) for the purpose of making predictions about the acceptance and use of new information technology and systems by identifying the characteristics that lead to the success of the company's information systems and their adaptability to work-related needs (Davis, 1989). TAM has been considered the most powerful, relevant, and influential model for innovation acceptance behavior (Davis, 1989), and therefore, is considered as the grounds of this study. The two core elements of the TAM model are: (i) Perceived Usefulness (PU) means the degree to which customers believe that if they use an IT-led product or service, the effectiveness of this product or service will increase; (ii) Perceived Ease of Use (PEOU) means the degree to which people believe that it will not be challenging to learn how to use a new technology product or service (Table 1).

Venkatesh and Davis (2000) published the extended TAM model (TAM2), which builds upon the TAM model. The TAM2 model explains in more detail why users perceive IT-led products and services as more useful than when they do not have such products or services. Furthermore, TAM2 focuses on additional factors affecting the usefulness of information technology products and services and simulates the results after customers use those products and services (Venkatesh & Davis, 2000). The expectation for TAM2 is to keep the original TAM structures and add the perceived usefulness and intention-to-use structure of TAM while exploring how these factors' impacts on the target system change with the user's experience improvement over time.

Table 1: Factors that Influence Customer Behavior in a Mobile Banking Application

ID	Items	Source
1	Perceived risk	Muñoz-Leiva et al. (2017); Singh et al. (2020)
2	Perceived ease of use	Venkatesh & Davis (2000); Liébana-Cabanillas et al. (2018); Muñoz-Leiva et al. (2017); Singh et al. (2020)
3	Perceived usefulness	Venkatesh & Davis (2000)Liébana-Cabanillas et al. (2018); Muñoz-Leiva et al. (2017); Singh et al. (2020)
4	Attitude	Muñoz-Leiva et al. (2017); Singh et al. (2020); Amin et al. (2021)
5	Perceived trust	Pham & Ho (2015); Slade et al. (2015); Muñoz-Leiva et al. (2017); (Ramli et al., 2021)
6	Innovativeness	Liébana-Cabanillas et al. (2018); Singh et al. (2020)
7	Social image	Venkatesh & Davis (2000); Muñoz-Leiva et al. (2017); Navavongsathian et al. (2020); Singh et al. (2020)

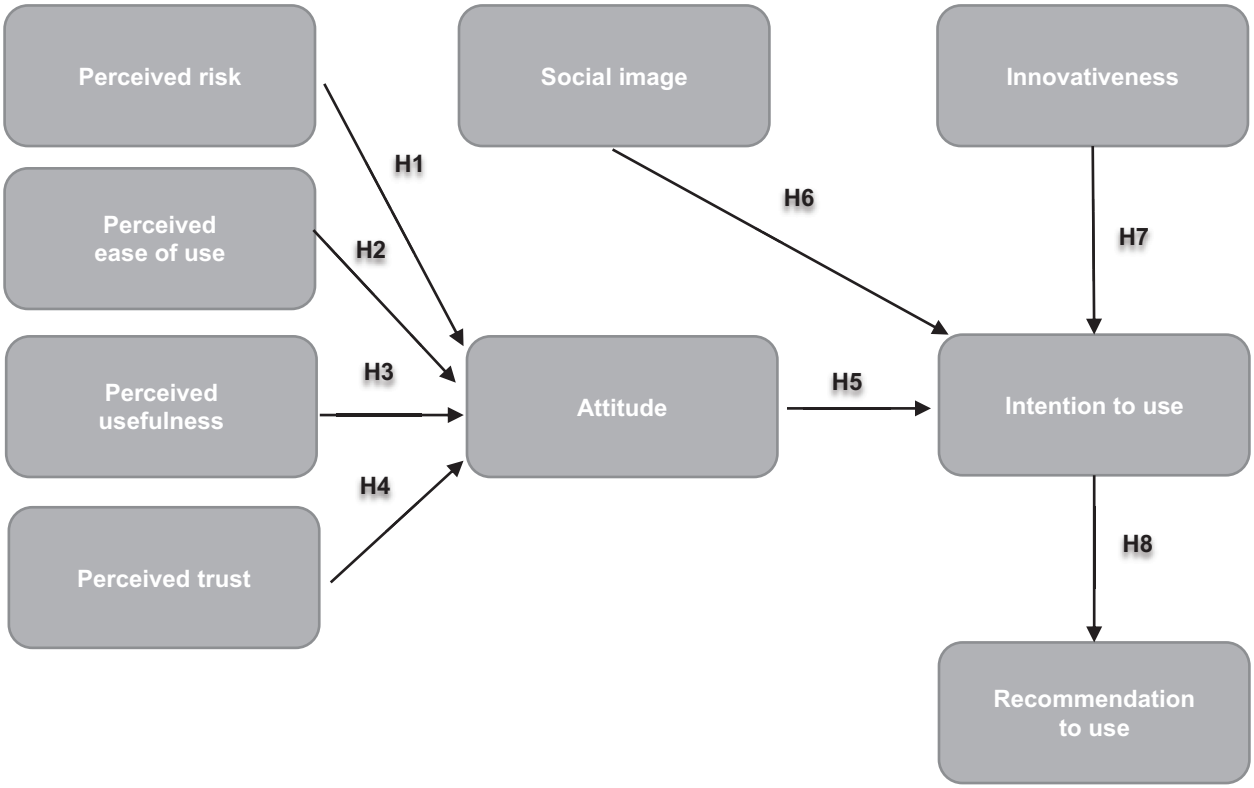

Figure 1: The Mobile Banking Application Adoption Model

The Unified Theory of Acceptance and Use of Technology (UTAUT) was developed by Venkatesh et al. (2003) for testing technology acceptance and using a more uniform approach. The UTAUT model can be considered a combination of 8 previous theoretical models based on the most common perspective of studying the user's acceptance of a new IT-led product or service. The UTAUT model builds upon the following models (Figure 1): (i) TRA Theory of Reasoned Action); (ii) TAM (Technology Acceptance Model); (iii) MM (Motivation Model); (iv) TPB (Theory of Planned Behavior); (v) C-TAM-TPB (A model combining TAM and); (vi) MPCU (Model of PC Utilization); (vii) IDT (Innovation Diffusion Theory); and (viii) SCT (Social Cognitive Theory).

3. Methods and Data

The survey questionnaire of the study is adapted from the Technology Acceptance Model 3 (TAM 3) (Venkatesh & Bala, 2008), adding two more factors of Social Image and Innovativeness (Aldás-Manzano et al., 2009). Thus, the dataset describes 7 factors affecting the intention and recommendation to use the mobile banking application of 314 customers from Vietnam surveyed during May-June 2021 when Vietnam was under lockdown due to a new wave of COVID-19 pandemic.

The dataset was collected through online survey questionnaires sent via email and Facebook groups of students and alumni in Vietnam during May and June 2021. The sampling technique in this dataset is convenience sampling. A total of 326 responses have been received, but only 314 of which are valid, which will be used for the next analysis steps. Each customer who completes the survey shall receive an electronic set of documents on economics, finance, and banking stored on Google drive.

The study adopted the questionnaires from previous studies, including 37 questions, 4 of which are about customer demographics, 6 questions are about behavior of using mobile banking application, and the other 27 questions are designed on a 5-point Likert scale (1- Strongly disagree; 2-Disagree; 3-Neutral; 4-Agree; 5- Strongly agree).

All responses were entered into Excel software before analysis with SPSS 23 software. Before analysis, variables were coded, and data were verified to ensure the validity of each question. After removing invalid responses, the final dataset contains 314 valid responses.

The linear structural model was used to test the research hypothesis. The SEM model combines all the techniques such as multivariate regression, factor analysis, and correlation analysis (between elements in the network diagram) to enable us to examine the complex relationship in the model. Unlike other statistical techniques that only allow estimation of the partial relationship of each pair of factors (elements) in the classical model (measurement model), SEM allows the simultaneous estimation of the elements in the overall model, estimate the causal relationship between the latent constructs through indicators that combine both measurement and structure of the theoretical model, measure the recursive and non-recursive relationships, measure direct and indirect effects, including measurement error and residual correlation. This study applies Partial Least Squares Structural Equation Modeling because this method is widely used in current studies on intention and recommendation to use mobile banking (Khan et al., 2021; Geebren et al., 2021; Çera et al., 2020; Karim et al., 2020). PLS-SEM is used to simultaneously estimate the measurement model and structural model of the proposed research model. The tools used to perform the analysis are SPSS 23 software for descriptive statistics and SmartPLS 3.2.7 software for PLS-SEM analysis.

4. Results

The statistical results show that up to 71.30% of customers taking the survey are female, mostly aged between 18–30 years old, accounting for 74.20% of the total 314 respondents. In terms of education attainment, 77.10% of the respondents have undergraduate degrees, and 22.90% have graduate degrees. Regarding occupation, 55.10% of customers have stable jobs, and 41.40% of customers are students (Table 2).

Table 2: Descriptive Statistics of Demographic Variables

Socio-Demographic Characteristics		**Frequency (*N* = 314)**	**Percentage**
What is your gender?	Male	90	28.70
	Female	224	71.30
What is your age?	18–30	233	74.20
	31–40	80	25.50
	41–50	1	0.30
	More than 50	0	0.00
What is the highest level of education you have completed?	University	242	77.10
	Postgraduate	72	22.90
Which one of the following best describes you?	Employed	173	55.10
	Employed part-time	3	1.00
	Not currently employed	2	0.60
	Student	130	41.40
	Self-employed	6	1.90

Table 3 describes the customer's behavior of using the mobile banking application, including the last time access, frequency, significant transactions, types of mobile device users and manufacturers, operating system used on mobile devices to install the mobile banking application.

Statistical results show that most customers use mobile banking applications on the day of the survey and 1–7 days before that, accounting for 87.3% of customers taking the survey. This reflects the popularity of mobile banking applications in Vietnam. Regarding the frequency of use, the number of customers using mobile banking applications several times a week accounted for the largest proportion of 40.10%. The most common transaction when customers use the mobile banking application is to view the account statement, representing 85.40%. The rate of customers using mobile banking applications on smartphones is up to

Table 3: Descriptive Statistics of Respondents' Mobile Banking Application Usage Behavior

Variables		**Frequency (*N* = 314)**	**Percentage**
When was the last time you used a mobile banking application?	Today	135	43.00
	1–7 days ago	139	44.30
	1–2 weeks ago	10	3.20
	3–4 weeks ago	6	1.90
	More than 1 month ago	24	7.60
How often have you used the mobile banking application in the past 3 months?	Less than once a week	58	18.50
	About once each week	62	19.70
	Several times each week	126	40.10
	About once each day	22	7.00
	Several times a day	46	14.60
What is the most popular service you use on mobile banking applications?	View account balance	268	85.40
	View account activity	2	0.60
	Pay a bill	25	8.00
	Transfer money	17	5.40
	Find a nearby branch or ATM	0	0.00
	Check loan or interest rates	0	0.00
	View other services	1	0.30
	Check transaction right after a purchase	1	0.30
What type of mobile device do you use most frequently to access the mobile banking application?	Smart Phone	312	99.40
	Tablet	2	0.60
Who is the manufacturer of your device?	Samsung	74	23.60
	Apple	165	52.50
	Huawei	8	2.50
	BBK Electronics (OPPO, VIVO)	35	11.10
	Nokia	5	1.60
	Xiaomi	16	5.10
	Other	11	3.50
What is the operating system of your device?	Android	149	47.50
	IOS	165	52.50

99.40%; Apple and IOS are the most popular brands and operating systems used by 52.50% of customers to access mobile banking applications.

Table 4 includes detailed descriptive statistics of 9 groups variables, namely (i) Social image; (ii) Perceived ease of use; (iii) Perceived usefulness; (iv) Attitude; (v) Perceived trust; (vi) Perceived risk; (vii) Innovativeness (viii) Intention to use and (ix) Recommendation to use.

The structural equation modeling (SEM) method by SmartPLS software was used to validate the research model. In order to test the convergent validity, the study uses Cronbach's Alpha coefficient, composite reliability (CR)

Table 4: Descriptive Statistics of 9 Variables

Variables	*N*	Minimum	Maximum	Mean	Std. Deviation
Social image (SI) (Cronbach's Alpha = 0.75)					
SI1	314	1	5	3.27	1.26
SI2	314	1	5	3.84	1.05
SI3	314	1	5	3.46	1.26
Perceived ease of use (PEOU) (Cronbach's Alpha = 0.83)					
PEOU1	314	1	5	4.43	0.68
PEOU2	314	1	5	4.43	0.70
PEOU3	314	1	5	4.22	0.81
Perceived usefulness (PU) (Cronbach's Alpha = 0.87)					
PU1	314	1	5	2.61	1.19
PU2	314	1	5	2.92	1.16
PU3	314	1	5	2.37	1.18
Attitude (ATT) (Cronbach's Alpha = 0.81)					
ATT1	314	1	5	4.27	0.90
ATT2	314	1	5	4.59	0.62
ATT3	314	1	5	4.37	0.74
Perceived trust (TRU) (Cronbach's Alpha = 0.90)					
TRU1	314	1	5	4.06	0.87
TRU2	314	1	5	4.00	0.87
TRU3	314	1	5	4.07	0.80
Perceived risk (PR) (Cronbach's Alpha = 0.84)					
PR1	PR1	PR1	PR1	PR1	PR1
PR2	PR2	PR2	PR2	PR2	PR2
PR3	PR3	PR3	PR3	PR3	PR3
Innovativeness (INNO) (Cronbach's Alpha = 0.90)					
INNO1	314	1	5	4.21	0.80
INNO2	314	1	5	4.31	0.76
INNO3	314	1	5	4.22	0.85
Intention to use (IU) (Cronbach's Alpha = 0.86)					
IU1	314	1	5	4.35	0.83
IU2	314	1	5	4.37	0.85
IU3	314	1	5	4.25	0.87
Recommendation to use (RECOM) (Cronbach's Alpha = 0.85)					
RECOM1	314	1	5	4.33	0.77
RECOM2	314	1	5	4.40	0.79
RECOM3	314	1	5	4.06	0.99

coefficient, and Average Variance Extracted (AVE). Among these, the values of Cronbach's Alpha and the CR coefficient must be higher than 0.7 (Chin, 1998; Hair et al., 2013). In addition, the component loading of each factor must be higher than 0.5, as given by (Hair, 2011). For discriminant validity, the study uses the Average Variance Extracted (AVE), on the general rule that the AVE value is greater than or equal to 0.50 (Hair et al., 2013) (Table 5).

The results of the PLS-SEM model presented in Figure 2 show that the model has a Chi-square statistical value of 1094,483 with p-value = 0.000 < 0.005. However, according to Hulland (1999), if the model receives an SRMR value of

Table 5: Cronbach's Alpha, Composite Reliability and Average Variance Extracted

Construct Variables	Cronbach's Alpha	Composite Reliability	Average Variance Extracted (AVE)
Attitude	0.81	0.89	0.73
Innovativeness	0.90	0.94	0.84
Perceived ease of use	0.83	0.90	0.75
Perceived risk	0.84	0.90	0.76
Perceived usefulness	0.87	0.91	0.78
Social image	0.75	0.86	0.67
Trust	0.90	0.94	0.83
Intention to use	0.86	0.91	0.78
Recommendation to use	0.85	0.91	0.77

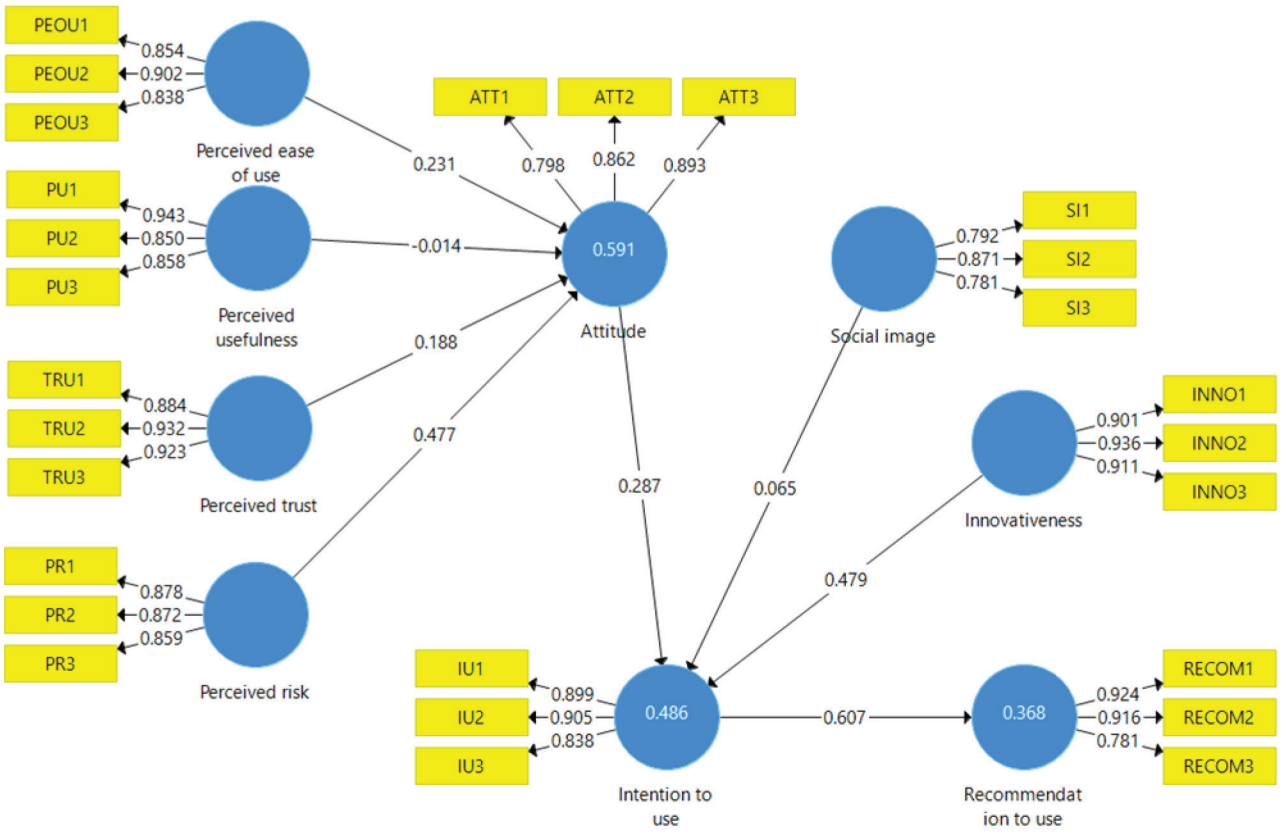

Figure 2: The PLS-SEM Model Results

less than 0.1, it is considered to be consistent with the actual data. Thus, with the value SRMR = 0.051 < 0.1, the research model is concluded to be consistent with the actual behavior of using mobile banking applications in Vietnam.

In order to generalize the research findings, the model needs to be validated for reliability. The study uses bootstrapping technique with a re-sampling technique on 500 observations (n = 500) with an initial sample size of 314 observations. Estimation results from 500 observations show that the original weights are significant with bootstrap weights because all weights are within the 95% confidence interval. Therefore, the estimates in the model can be concluded to be reliable.

5. Discussion

The findings presented in Table 6 show that hypotheses H1, H2, H4, H5, and H7 are supported. Hypotheses H3 and H6 are not supported. Hypothesis H1, H2, and H4 are supported, and it is confirmed that the factors of Perceived risk, Perceived ease of use, Perceived trust have a positively correlated impact on Attitude. Hypothesis H5 (β = 0.287, t-stats = 5.495) and H7 (β = 0.287, t-stats = 5.495) show that the factors of Attitude and Innovativeness impact the customers' Intention to use mobile banking applications.

Hypothesis H8 (β = 0.607, t-stats = 9.619) confirms that the Intention to use factor is significant and positively impacts the customers' Recommendation to use mobile banking application factor in Vietnam in the context of the COVID-19 pandemic.

The results of hypothesis validation in Tables 6 and 7 of the study show that the following factors: (i) Innovativeness; (ii) Attitude; (iii) Perceived risk; (iv) Perceived ease of use; and (v) Perceived trust affect customers' behavior of using mobile banking applications in Vietnam in the context of the COVID-19 pandemic.

First, concerning the Innovativeness factor, the research findings show that Innovativeness has the most substantial

Table 6: Hypotheses Testing Results

Hypothesis	Relationship	β	t-stats	P-values	Decision
H1	Perceived risk → Attitude	0.477	8.031	0.000	Supported
H2	Perceived ease of use → Attitude	0.231	4.143	0.000	Supported
H3	Perceived usefulness → Attitude	−0.014	0.486	0.627	Not supported
H4	Perceived trust → Attitude	0.188	3.965	0.000	Supported
H5	Attitude → Intention to use	0.287	5.495	0.000	Supported
H6	Social image → Intention to use	0.065	1.204	0.229	Not supported
H7	Innovativeness → Intention to use	0.479	7.382	0.000	Supported
H8	Intention to use → Recommendation to use	0.607	9.619	0.000	Supported

Table 7: Results of the Indirect Effects

Hypothesis	Relationship	β	t-stats	P-values	Decision
9	Attitude → Recommendation to use	0.17	4.15	0.00	Supported
10	Innovativeness → Recommendation to use	0.29	4.74	0.00	Supported
11	Perceived ease of use → Intention to use	0.07	3.12	0.00	Supported
12	Perceived ease of use → Recommendation to use	0.04	2.68	0.01	Supported
13	Perceived risk → Intention to use	0.14	4.57	0.00	Supported
6	Perceived risk → Recommendation to use	0.08	3.60	0.00	Supported
14	Perceived trust → Intention to use	0.05	3.31	0.00	Supported
15	Perceived trust → Recommendation to use	0.03	2.90	0.00	Supported
16	Perceived usefulness → Intention to use	0.00	0.46	0.65	Not supported
17	Perceived usefulness → Recommendation to use	0.00	0.44	0.66	Not supported
18	Social image → Recommendation to use	0.04	1.27	0.21	Not supported

impact on the intention and recommendation to use the mobile banking application of customers in Vietnam during the COVID-19 pandemic. Furthermore, the research findings also show that amidst the pandemic, customers in Vietnam appreciate innovativeness and are willing to adopt new technologies, which is quite similar to previous studies of Tan et al. (2014), Pham & Ho (2015), Ramos-de-Luna et al. (2016) and Liébana-Cabanillas et al. (2018).

Second, Attitude is the second most influential factor on the customers' behavior of using mobile banking applications in Vietnam in the pandemic context. This finding is consistent with previous studies (Ramos-de-Luna et al., 2016; Liébana-Cabanillas et al., 2017; Muñoz-Leiva et al., 2017; Singh et al., 2020). The research findings also show that the factors of Perceived risk, Perceived ease of use, and Perceived trust directly impact Attitude.

Third, Perceived risk directly impacts the intention and recommendation to use the mobile banking application of customers in Vietnam during the COVID-19 pandemic. Technology developments also entail greater security risks, making customers more and more concerned about privacy and personal data protection (Tan et al., 2014; Pham & Ho, 2015; Slade et al., 2015; Muñoz-Leiva et al., 2017; Singh et al., 2020).

Fourth, Perceived ease of use directly impacts the Attitude factor and indirectly impacts customers' behavior of using mobile banking applications in Vietnam. In the context of the COVID-19 pandemic, customers find that greater ease of using mobile banking applications will lead to greater intention to use because of its convenience and usefulness (Ramos-de-Luna et al., 2016; Liébana-Cabanillas et al., 2017; Muñoz-Leiva et al., 2017; Liébana-Cabanillas et al., 2018; Singh et al., 2020).

Finally, Perceived trust has important implications for the customers' behavior of using mobile banking applications in Vietnam. Following the extended social distancing and lockdown orders during the COVID-19 pandemic, the trust factor directly influences the customer's attitude, thereby affecting the customer's behavior of using the mobile banking application in Vietnam. The previous studies of Pham & Ho (2015), Slade et al. (2015), Muñoz-Leiva et al. (2017) also support this conclusion.

6. Conclusion

The study has made some interesting findings when providing more empirical evidence on how the factors of (i) Innovativeness; (ii) Attitude; (iii) Perceived risk; (iv) Perceived ease of use; (v) Perceived trust have an impact on customers' behavior of using mobile banking applications in emerging markets such as Vietnam. In addition, the study also analyzes demographic data and data describing the behavior of customers using mobile banking applications in Vietnam in the context of a prolonged pandemic. Thus, the study provides additional important empirical evidence on the changes in customers' behavior of using mobile banking applications across different parts of the world, especially developing countries like Vietnam in the context of the COVID-19 pandemic. The study will also serve as a useful reference source for commercial banks in Vietnam in motivating customers to use mobile banking applications, contributing to a digital economy in Vietnam.

However, certain limitations remain in the study. Firstly, the study was carried out mainly in the Ho Chi Minh City area and restricted its representativeness. Second, the study adopts the convenience sampling method, which focuses the research sample on customers with a high level of education attainment (undergraduate degree or higher), making the customers' behavior not representative of all groups in Vietnam. Finally, the sample size of only 314 customers is too small to represent the entire study population in Vietnam.

In the context of the COVID-19 pandemic in Vietnam and the prevalence of social distancing and lockdown, the demands for mobile banking applications for payment tend to surge, so commercial banks need to have a suitable mobile banking application development strategy to cater to this fast-growing need among customers.

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