

Applying Structural Equation Modeling for Accessing Mobile Banking Service Quality and Customer Satisfaction: A Case Study in Vietnam

Nguyen Quoc Huy¹, Lu Phi Nga², Phan Thanh Tam^{3,*}

¹ Faculty of Finance - Accounting, Lac Hong University (LHU), Vietnam

^{2,3} Faculty of Postgraduate Studies, Lac Hong University (LHU), Vietnam

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Abstract

Mobile Banking allows customers to use mobile devices and smartphones to transact anytime, anywhere. On the other hand, Mobile banking is a service product that brings high business efficiency, does not cost much, creates initiative for users, reduces pressure on over-the-counter transactions, and has little risk, so developing mobile banking services brings excellent benefits to banks. Therefore, scientific and technological achievements, particularly information technology, electronics, and telecommunications, have significantly impacted daily life, the economy, and society, changing people's awareness and production and business methods in various fields and industries, including financial banking services. To address the aforementioned analytical concerns, the authors surveyed 650 individual consumers who use mobile banking services at ten commercial banks in Vietnam. The article used structural equation modeling and data processing tools SPSS 20.0, Amos. According to the findings, customer satisfaction is influenced by five elements: dependability, responsiveness, empathy, competence, and tangibles. The article's findings had a significant reliability influence on individual customer satisfaction, with a significance level of sig 0.01. Finally, the study's contributions have validated customer satisfaction, service quality ideas, and the need to flexibly implement customer satisfaction research policies. The research results are scientific evidence to help the banking industry continue to perfect, upgrade, and enhance utilities and service quality for the national payment infrastructure and automatic clearing payment system to serve customers retail transactions in the direction of providing online payment services, instant processing, and 24/7 continuous operation for all people and businesses.

Keywords: Mobile, Banking, Service, Quality, Individual and Customer Satisfaction

1. Introduction

Today, information technology and the Internet have helped banks build effective global multi-channel integrated distribution strategies from communications, marketing, sales, customer care, and service provision... Electronic banking services are considered an inevitable trend and a competitive advantage for commercial banks in international competition and integration. In addition, the increasing number of Internet users has created opportunities for the banking industry to develop electronic banking services. However, when using electronic banking services, customers often fear the security of personal information. Therefore, for electronic banking services, customer satisfaction is essential in business operations, helping commercial banks retain old customers, attract potential customers, contribute to growth service revenue, and gain competitive advantage [1][2]

In addition, the Internet is getting more popular worldwide in the 4.0 age. More than 4.5 billion individuals will utilize the Internet globally by the beginning of 2023. There are 145.8 million mobile customers in Vietnam, accounting for 150% of the highly developed Vietnamese population, and 68.17 million Internet users. Vietnamese individuals own 94% of mobile devices, 65% of laptops/desktops, and 32% of tablets. People spend the most time in a day utilizing electronics, such as the Internet, social networks, and watching television. This demonstrates how deeply the Internet has penetrated Vietnamese people's daily lives.

Besides, the banking industry faces a significant challenge to quickly access technology to participate in digital transformation to improve competitiveness in service provision. To expand business activities in the direction of diversifying products and services associated with technology, banks have focused on bringing more and more

*Corresponding author: Phan Thanh Tam (tampt@lhu.edu.vn)

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information technology application content into the provision and management of services and management clients [3]. Digital transformation today is becoming a trend not only for state-owned banks but also for private banks. Electronic services applying technology is a strategic development direction of many banks with the desire to increase market share, create convenience for customers, improve the organization, and create a new management model associated with the specialization of human resources. Mobile banking service is one of the technology products and services that help customers make money transfers and e-commerce payments anywhere, anytime, just utilizing personal information. This applicable technology service is preferred by customers thanks to its convenience. Commercial banks have recently launched Mobile Banking (MB) services for individual customers, showing high business efficiency and meeting customer wait expectations.

In the current context of commercial banks, customers' consumption behavior has significantly changed in Vietnam. Customers tend to approach the more convenient online. In addition, the technology applied to banking services is increasingly diverse and complex, with a wide range of activities and spread to the whole society because our country's economy is synchronously transitioning to a digital economy. In 2022, the State Bank issued a plan to implement projects and programs to promote digital transformation in banking activities, such as the digital transformation plan of the State Bank in 2021. Operation plan of the Banking Sector Digital Transformation Steering Committee in 2024: The objective of the banking sector is to coordinate with the Ministry of Information and Communications to implement the scheme to determine the index to evaluate the level of the digital transformation of enterprises. At the same time, review, develop, and guide the implementation of legal regulations to establish payment and facilitate digital transformation.

To meet the service needs of customers through the satisfaction of using mobile banking services - a current essential product of commercial banks - identifying factors affecting customer satisfaction customers for MB services at banks in the current business situation is critical. This study will help the Board of Directors and department heads. The relevant management board realizes that the strengths and weaknesses must be improved to enhance the quality of mobile banking services for individual customers, which is the focus of commercial banks. This study will focus on identifying and evaluating factors affecting personal customer satisfaction with MB service quality at commercial banks, which suggests governance implications.

2. Literature Review

2.1. Mobile banking service quality (MB)

The capacity of a service to accomplish its tasks, including overall durability, reliability, accuracy, simplicity of operation, ease of maintenance, and other desirable attributes, is characterized as service quality. Furthermore, the quality of commercial banks' Mobile Banking services can be understood as a concept to refer to the outstanding characteristics, features, or elements of Mobile Banking services to satisfy different needs and expectations of customers, requiring questions about providing timely, accurate information and ensuring safety for both the bank and customers' operations [3][4][5]. The service quality is the difference between consumers' expectations and perceptions of the service when they use it. Researchers in a variety of domains use the above definition of Parasuraman [25]. Quality is viewed and judged by customers according to this technique. Customer satisfaction with a service is the difference between the customer's opinion of utilizing the service and their expectations before consuming it [5]. While service quality focuses on individual service components, client satisfaction is a broader notion that expresses satisfaction while drinking a service. Thus, service quality is determined by what consumers see and judge rather than what service providers say. In other words, the amount of customer perception or perception measures the business's service quality. As a result, customer satisfaction depends on service quality [6]. Thus, mobile banking service is based on current information technology and telecommunications, allowing consumers to complete transactions without directly contacting bank workers or other middlemen. This is a sort of mobile commerce used in the banking industry. Customers who use mobile banking services do not need to go to the bank but may still conduct transactions via various technological means.

2.2. Customer satisfaction (SAT)

Customer satisfaction is a person's reaction to the results of consuming products/services compared to their expectations. The discrepancy between received and expected results determines satisfaction. Customers are dissatisfied when tangible outcomes fall short of expectations. Consumers are satisfied if accurate results equal expectations; if actual results exceed expectations, consumers are happy [7][25]. Customers create expectations based on previous purchasing experiences, recommendations from friends and colleagues, and information from vendors and rivals. According to the author, customer satisfaction with a service is the state of emotion that clients experience because the service satisfies or does not match their expectations. In other words, customer satisfaction is determined by whether or not the service meets the consumer's demands [8].

2.3. Reliability (REL)

Compared with traditional banking services, mobile banking services focus on transaction and information functions on the bank's website or via mobile phones rather than direct service activities of tellers. This is a factor related to modern technical processes. Customers will feel dissatisfied when there are times when they cannot access the bank website, or it takes a certain amount of time to access. This requires consistency in service performance and honoring customer commitments and promises [9][10][25]. Besides, reliability is the ability to perform services as committed to customers and keep information and secure customer assets through electronic transactions. Reliability has a positive correlation with customer satisfaction. When customers evaluate mobile banking services' reliability, customer satisfaction will increase and vice versa. Thus, the authors gave hypotheses H1 and H2.

H1: Reliability positively affects the quality of mobile banking service.

H2: Reliability positively affects the customer satisfaction.

2.4. Responsiveness (RES)

This element assesses banks' capacity to deliver mobile banking services. When a consumer conducts an online transaction, the bank must offer immediate confirmation when the order is executed or when a specific transaction is performed for the first time. In developed nations, when a consumer completes a bill payment, they can print it off as documentation for other personal use. In other words, responsiveness refers to the service provider's reaction to the consumer's desires [11][12][25]. Employee responsiveness refers to their desire and willingness to give prompt service to consumers. Customer satisfaction is positively connected with responsiveness. When clients evaluate the bank's empathy for mobile banking services, customer happiness rises, and vice versa. Thus, the authors gave hypotheses H3 and H4.

H3: Responsiveness positively affects the quality of mobile banking service.

H4: Responsiveness positively affects the customer satisfaction.

2.5. Empathy (EMP)

There are many commercial banks due to the initial cost savings in purchasing technology rights, or due to limited technical human resources, it is not possible to Vietnamese online transaction interfaces, information integration, and sharing. Therefore, it has caused difficulties in actual implementation between service providers and users. Sympathy is considerate customer care, helping them feel that they are the bank's top customers and are always warmly welcomed by all customers anytime and anywhere. The human factor is the core part of this success, and the more the bank's attention to customers, the more empathy increases [13][14][25]. Empathy is the care and concern for the customers of the staff. The bank staff are friendly and enthusiastic and treat all customers fairly. Thus, the authors gave hypotheses H5 and H6.

H5: Empathy positively affects the quality of mobile banking services.

H6: Empathy positively affects the customer satisfaction.

2.6. Competence (COM)

The Bank's readiness to serve promptly responds to customers' inquiries. For example, customers do not know how to register for online consulting services or find it awkward to go through many steps and fill in a lot of information to complete a transaction. So, what will they expect from the bank? Usually, customers wish to be notified by the bank by email quickly through the internal mailbox established between the bank and the customer or by the bank staff to call directly to inform the cause of the problem. Service capacity is demonstrated through professional qualifications to perform services [15][25]. Service capacity is positively correlated to customer satisfaction. When the bank's service capacity on mobile banking services is assessed by customers to increase, the level of customer satisfaction will increase and vice versa. Thus, the authors gave hypotheses H7 and H8.

H7: Competence positively affects the quality of mobile banking services.

H8: Competence positively affects the customer satisfaction.

2.7. Tangibles (TAN)

Security technology demonstrations must continually improve and evolve, and electronic transactions impose extraordinary demands on security and safety. Banks must prioritize this issue since developing secure and safe technology will foster consumer confidence, providing them comfort and peace of mind while working with the bank. The outward image of the facility, staff attitude, papers, manuals, and the bank's communication system are all factors to consider [17][18][25]. The richness of web/apps, such as information, graphics, colors, photos, and screen windows, represents tangible media. Customer pleasure is positively related to tangible means. When clients appreciate the practical standards of mobile banking service, customer happiness rises, and vice versa. Thus, the authors gave hypotheses H9 and H10.

H9: Tangibles positively affect the mobile banking service quality.

H10: Tangibles positively affect the customer satisfaction.

2.8. Mobile banking service quality affecting individual customer satisfaction.

All activities are digitized and carried out through internet banking and mobile banking. Customers can perform all transactions on the bank's website and mobile application. Using digital banking brings maximum convenience and a variety of devices: Computers, laptops, smartphones, etc., with an Internet connection. All activities performed at traditional transaction counters are digitized and integrated into a digital banking application, so customers do not have to go to conventional transaction counters. Besides, activities such as risk management, capital resources, and product development are also digitized. The concepts of mobile banking and customer satisfaction are closely interconnected within the field of service research. Based on empirical study, service quality is the foremost determinant of customer satisfaction. Consequently, when a supplier delivers high-quality products that match the expectations of its clients, they might be said to have achieved first success. Therefore, to enhance client satisfaction, service providers must improve the quality of their services [19][20][25]. A strong interconnection exists between service quality and customer satisfaction, whereby service quality is established and evaluated based on client contentment. Establishing a causal association between these two elements is vital in most studies about customer satisfaction.

H11: Mobile banking service quality positively affecting customer satisfaction

3. Methodology

The research combines the use of qualitative and quantitative research methods. Use a Likert scale with 5 levels for survey questions about factors affecting consumer satisfaction: (1) Strongly disagree; (2) Disagree; (3) Normal; (4) Agree; (5) Completely agree. Use a nominal scale for questions about the respondent's personal information: gender, age, education level, and income.

Quantitative research data was collected using the convenient sampling method for the survey; the survey subjects were customers using mobile banking services conducted in-depth interviews with 31 individual customers of 10

commercial banks, including Vietcombank, VietinBank, Techcombank, BIDV, MB, VPB, Agribank, TPBank, and VIB. Top 10 prestigious Vietnamese commercial banks built on scientific and objective principles. Conduct interviews to collect survey data to analyze factors affecting the quality of mobile banking services. This study's sample size was 650, and the survey was conducted from 1/2023 to 2/2023. Besides direct surveys through questionnaires distributed at branches, indirect surveys through sending questionnaires via online links are also used. Quantitative research: The observed variables in the survey questionnaire are built based on qualitative research results. The scale of individual customer satisfaction is used from the 5-level Likert scale. The software used includes SPSS 20.0 and Amos. Sampling method: Sampling in this study is non-probability (convenience). the sample size for the estimation method used in the equation structural model is divided into three levels: a small sample size ≤ 100 , the average sample from 100 to 200, and a large sample ≥ 200 . This study's sample size was 650, and the survey was conducted from 1/2023 to 2/2023. Thus, the magnitude has basically met the requirements of the analytical method [16].

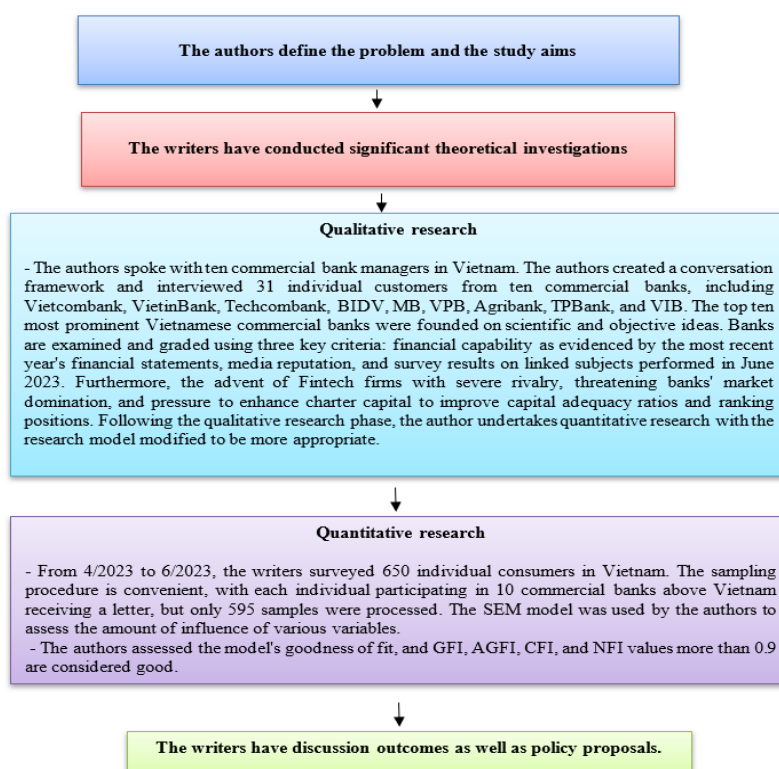


Figure 1. The process of mobile banking service quality affects individual customer satisfaction

Qualitative research methods are used to build research content and models, explore components, and build a preliminary scale through expert interviews and group discussions to correct and supplement scales and questionnaires used for interviews. Preliminary research results are the official questionnaire used for research, generalizing the official ranking with the following components: (1) Reliability (REL) has 5 observed variables; (2) Responsiveness (RES) has 4 observed variables; (3) Competence (COM) has 4 variables; (4) Empathy (EMP) has 4 variables; (5) Tangible (TAN) has 4 variables; (6) Mobile Banking Service Quality (MB) is a dependent variable with 3 observed variables and (7) customer satisfaction (SAT) is a dependent variable with 4 observed variables.

To do exploratory factor analysis, data must be collected with at least 5 samples per observed variable, ideally more than 10 samples. However, the aim is to increase sample quality and dispersion to assure generalization. There are 27 observed variables in the study model. The needed sample size is $n = 27 \times 5 = 135$ if the criterion of 5 samples per observed variable is followed. To satisfy the sample size, the sample size is 650. The minimum needed is 135 people. Following data collection, the data is statistically evaluated using SPSS 20.0 and Ammos software for data processing, analysis, statistics, and hypothesis testing. The essay discusses theoretical concerns concerning service, customer happiness, and an overview of the quality of mobile banking services. Simultaneously, the study presents a measuring

model with a hypothetical system on the parameters influencing individual consumer satisfaction with the quality of mobile banking services provided by the ten commercial banks listed below.

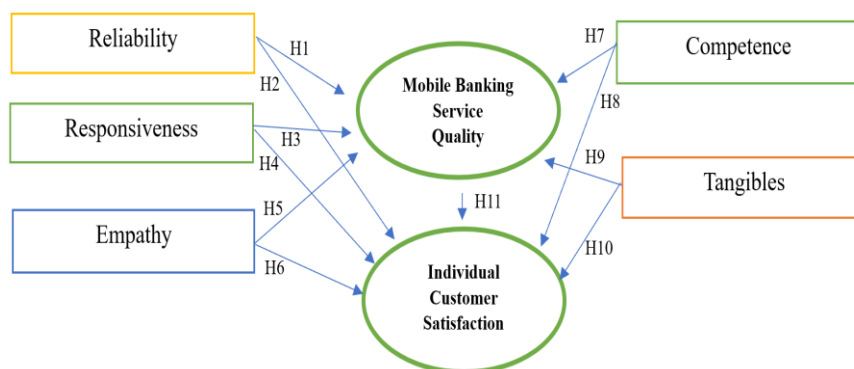


Figure 2. Research model for mobile banking service quality affecting individual customer satisfaction

The critical factors affecting mobile banking service quality and individual customer satisfaction are presented (Figure 2). The results showed five factors: reliability, responsiveness, empathy, competence, and tangibles. These factors were new in the research model.

4. Results and Discussion

4.1. Current Situation of Vietnam's mobile banking services

From its starting point as a small-scale field with many application potentials, the financial technology (Fintech) market has been developing vigorously and comprehensively, contributing to the development of the financial sector worldwide. According to the Fintech Asean 2022 report, the outbreak and prolongation of the Covid-19 pandemic from 2020-2021, along with the global energy crisis due to the Russia-Ukraine conflict as well as the continuous increase in base interest rates In recent years, fighting inflation has had a significant impact on economies through accelerating the pace of digitalization. Not out of the general trend, Vietnam's Fintech industry is also rising. Besides, the digital transformation of the Banking industry under the impact of the 4th Industrial Revolution has brought many positive changes. Along with that, thanks to the advantage of a young population and the effect of the Covid-19 pandemic, the digital transformation process in the banking sector is strongly promoted. Besides favorable conditions, digital banking activities of commercial banks in Vietnam also face significant difficulties and challenges. This article researches the current status of digital banking in Vietnam, exploring the driving forces for development, challenges, and problems facing the digital transformation process in this field.

Timo Digital Bank - Vietnamese Version: This is Vietnam's first digital bank that works as a phone application, with numerous excellent benefits such as free transactions, quick and easy enrollment, and enticing incentives... VCB Digibank Vietcombank: The VCB Digibank digital banking application has superseded the earlier Internet Banking and Mobile Banking services. Customers of Vietcombank may use this program to effortlessly track transactions, bank account balances, and online savings on VCB Digibank. Techcombank - Live Digital Bank: Techcombank's Live Digital Bank is a unique 24/7 online transaction model that enables consumers to conduct financial transactions without requiring a physical branch. Register or download any applications. The digital bank of MB Bank: The MB Bank app has recently received a significant overhaul, providing more benefits and convenience than ever. Customers who have previously used MB bank's services should continue to use MB bank.

Table 1. Descriptive statistics for factors affecting individual customer satisfaction

Code	N	Minimum	Maximum	Mean	Std. Deviation
RES1	595	1.00	5.00	3.1311	1.03619
RES2	595	1.00	5.00	3.1126	1.05525

RES3	595	1.00	5.00	3.1546	1.01485
RES4	595	1.00	5.00	3.1227	1.04933
EMP1	595	1.00	5.00	3.3311	0.91174
EMP2	595	1.00	5.00	3.4874	1.03039
EMP3	595	1.00	5.00	3.2555	1.03570
EMP4	595	1.00	5.00	3.3378	0.95619
COM1	595	1.00	5.00	3.0824	1.02245
COM2	595	1.00	5.00	3.0908	1.02420
COM3	595	1.00	5.00	3.1345	0.98579
COM4	595	1.00	5.00	3.1210	1.02106
REL1	595	1.00	5.00	3.0840	0.99477
REL2	595	1.00	5.00	3.0739	1.01234
REL3	595	1.00	5.00	3.1109	0.97673
REL4	595	1.00	5.00	3.1227	0.98648
TAN1	595	1.00	5.00	2.4101	0.64346
TAN2	595	1.00	5.00	2.4084	0.62463
TAN3	595	1.00	5.00	2.4286	0.64054
TAN4	595	1.00	5.00	2.4723	0.70148
MB1	595	1.00	5.00	3.3866	0.99247
MB2	595	1.00	5.00	3.3613	0.97382
MB3	595	1.00	5.00	3.2958	1.00331
SAT1	595	1.00	5.00	2.3798	0.64895
SAT2	595	1.00	5.00	2.3782	0.63021
SAT3	595	1.00	5.00	2.4017	0.64745
SAT4	595	1.00	5.00	2.4134	0.68447

Source: Authors collected and processed from SPSS 20.0.

Table 1 shows the results of testing descriptive statistics for factors affecting mobile banking service quality and individual customer satisfaction, such as minimum and maximum mean values of 1.0, 5.0, and 3.0. The standard deviation was around 1.0. Developing mobile banking services: an increase in quantity and/or improvement in quality and advancement of services to better meet customer needs. With this perspective, developing Mobile Banking services is approached from two aspects: (1) Developing Mobile Banking services extensively means increasing the scale and number of Mobile Banking services through opening additional services. New Mobile Banking is associated with diversifying types of commercial banking services. (2) Developing Mobile Banking service in depth means perfecting the existing Mobile Banking service, associated with improving the quality of service that Mobile Banking service can bring to customers. Viettel Pay digital bank: Many people trust and prefer Viettel Pay digital bank since it was founded by a telecommunications firm rather than a traditional bank. As a result, customers may be confident in the authenticity and security of this digital bank. Compared to 2021, transaction volume on the mobile banking channel climbed by over 48% in 2022, and transaction value increased by more than 1.328%, from VND 811,717 billion to VND 10,868,458 billion. The quantity and value of transactions on the mobile banking channel grew by 100%. This is the consequence of the bank's digital transformation process, which has transformed the behavior of clients who use

financial services, accelerating the banking mobile process. Besides, table 1 shows mobile banking services improve customers' self-service capabilities, helping to eliminate time and space constraints in banking activities, ensuring comfort and convenience for customers. In addition, mobile banking services help banks provide more efficient services with faster and more efficient processing times, improving the flexibility of transactions and reducing personnel costs.

Table 2. Testing Cronbach's alpha for factors affecting the mobile banking service quality and individual customer satisfaction

Code	Items	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Responsiveness (RES): Cronbach's Alpha is 0.961		-	-
RES1	Customers' challenges, queries, and concerns are always satisfactorily resolved by the bank	0.941	0.939
RES2	Customers wait time for electronic transactions is minimal	0.867	0.960
RES3	Simple steps for doing electronic transactions at the bank	0.888	0.954
RES4	The bank operates a 24-hour helpline	0.924	0.943
Empathy (EMP): Cronbach's Alpha is 0.948		-	-
EMP1	Bank employees make every effort to cultivate positive connections and attend to the requirements of each client	0.710	0.799
EMP2	Customers are greeted enthusiastically by bank systems	0.717	0.793
EMP3	All consumers are treated fairly by bank workers	0.608	0.842
EMP4	Every holiday or personal event, the bank always inquires, congratulates, and gifts customers	0.719	0.793
Competence (COM): Cronbach's Alpha is 0.956		-	-
COM1	Employees do business properly, rapidly, and efficiently	0.907	0.938
COM2	Bank employees have the expertise and professional competence to advise and respond to clients' concerns	0.877	0.947
COM3	Bank employees are always kind, respectful, and friendly to clients	0.886	0.945
COM4	The ability to use the internet system is exceptional	0.902	0.940
Reliability (REL): Cronbach's Alpha is 0.971		-	-
REL1	When you use mobile banking, you feel safe	0.924	0.962
REL2	The transaction is carried out correctly and without faults by the bank	0.899	0.970
REL3	The bank maintains accurate client information	0.931	0.961
REL4	Banks provide the service when they say they will	0.955	0.954
Tangibles (TAN): Cronbach's Alpha is 0.918		-	-
TAN1	Customers can visit the bank's website to choose a roomy and comfortable office	0.850	0.880
TAN2	The bank has advanced technology and equipment	0.874	0.873
TAN3	The forms and vouchers used in the Bank's transactions are intended to be simple and straightforward	0.754	0.912

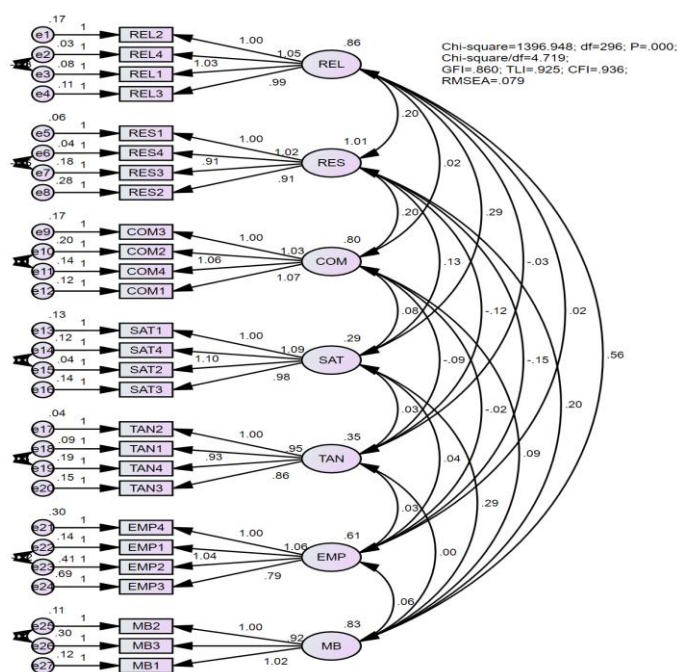
TAN4	When engaging with consumers, the bank's website is quite professional	0.775	0.908
Mobile banking service quality (MB): Cronbach's Alpha is 0.939		-	-
MB1	You are confident when using mobile banking services	0.863	0.921
MB2	You continue to use mobile banking in the future	0.919	0.877
MB3	In general, you completely believe in the quality of mobile banking services	0.842	0.937
Customer satisfaction (SAT): Cronbach's Alpha is 0.923		-	-
SAT1	You are assured of the quality of mobile banking services	0.795	0.910
SAT2	You recommend to your friends and family to use mobile banking	0.890	0.878
SAT3	You continue to use mobile banking in the future	0.783	0.913
SAT4	Overall, you are delighted with the mobile banking service	0.826	0.899

Source: Authors collected and processed from SPSS 20.0

The results presented in Table 2 indicate that the Cronbach's Alpha coefficient for the tangibles construct (TAN) is 0.918; however, the Cronbach's Alpha coefficient for the reliability construct (REL) is 0.971. Moreover, it is noteworthy that all Cronbach's Alpha coefficients exceeded the threshold of 0.7, indicating high internal consistency. Additionally, the correlation coefficients among the total variables surpassed the threshold of 0.4, suggesting a strong relationship between the variables. Furthermore, Cronbach's Alpha coefficients were all below 0.6, meeting the necessary criteria for acceptance. Consequently, all observed variables were deemed suitable and included in the Testing confirmatory factor analysis (CFA) to examine the factors influencing mobile banking service quality and individual customer satisfaction. The Mobile Banking service has two components: the Mobile App and the Mobile Web. A mobile application, sometimes called a mobile app, is a financial service accessed and utilized through a software program installed on mobile phones operating on the iOS and Android platforms. Mobile Web is a financial service conveniently accessed using a mobile phone's Internet browser. Utilizing a particular gadget type or operating system is unnecessary; instead, a phone with an Internet connection suffices.

In addition, when asked about transactions using mobile banking services at commercial banks, the survey results showed that transactions including money transfers, phone top-ups, 3G data, and payment services (electricity, water, Internet, shopping...) account for more than 50%. In addition, transactions such as opening accounts, online savings, and periodic insurance premium payments are also selected by customers when using mobile banking services.

4.2. Testing factors affecting mobile banking service quality and individual customer satisfaction



Source: Authors collected and processed from SPSS 20.0

Figure 3. Testing research model for factors affecting mobile banking service quality

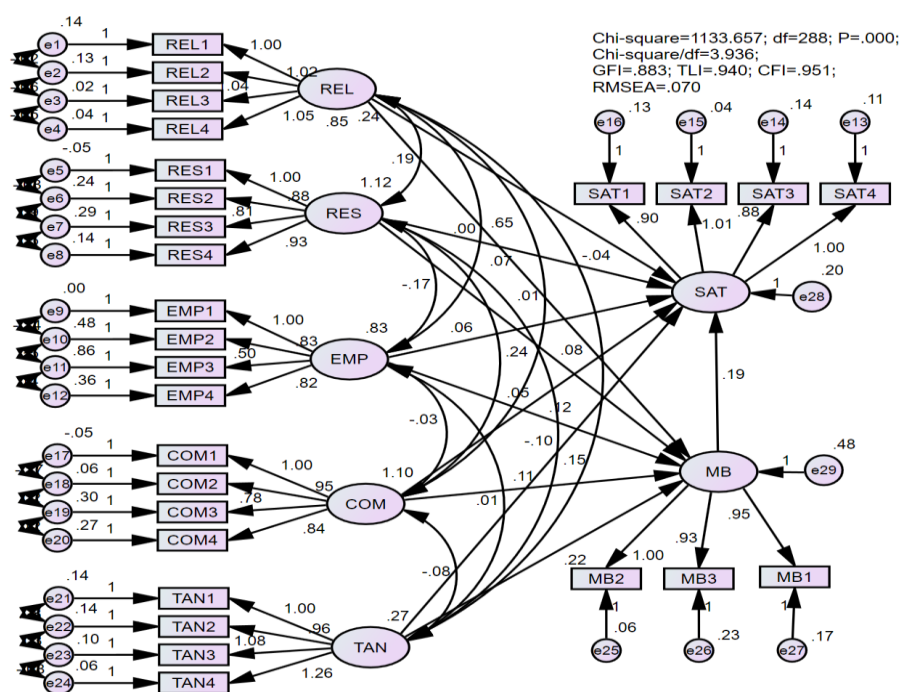
Table 2 shows the testing factors affecting mobile banking service quality and individual customer satisfaction with a significance threshold of $\text{sig} < 0.01$. The indicators in the model meet the requirements and are the scientific basis for the authors to continue analyzing the equation structural model.

Table 3. Testing SEM model for factors affecting mobile banking service quality and individual customer satisfaction

Relationships			Standardized estimate	S.E	C.R	P	Results
MB	<---	TAN	0.118	0.058	3.706	***	H9 has been accepted
MB	<---	COM	0.120	0.028	3.791	***	H7 has been accepted
MB	<---	EMP	0.113	0.035	3.342	***	H5 has been accepted
MB	<---	RES	0.093	0.029	2.864	0.004	H4 has been accepted
MB	<---	REL	0.636	0.034	18.953	***	H1 has been accepted
SAT	<---	REL	0.365	0.029	8.165	***	H2 has been accepted
SAT	<---	RES	0.118	0.019	3.451	***	H3 has been accepted
SAT	<---	EMP	0.096	0.023	2.776	0.005	H6 has been accepted
SAT	<---	COM	0.087	0.018	2.698	0.007	H8 has been accepted
SAT	<---	TAN	0.126	0.039	3.737	***	H10 has been accepted
SAT	<---	MB	0.295	0.029	6.363	***	H11 has been accepted

*** Significant at 1 percent level.

Table 3 shows the regression results showing that the normalized beta coefficients positively impact customer satisfaction with the quality of mobile banking services. However, the normalized beta reflects the priority when implementing governance implications. The highest to lowest standardized beta coefficients are reliability (0.636), Competence (0.120), tangibles (0.118), empathy (0.113), and responsiveness (0.093), respectively. That is, when the recommendation is made, priority is given to reliability and responsiveness. This result suggests that mobile banking opens a new development channel for banking services. Banks can quickly expand their operations and reach customers anytime, anywhere, without limited space and time through mobile banking services. To promote the banking industry's digital transformation, coordination, cooperation, and contributions from relevant ministries, branches, and units must be coordinated, especially in removing difficulties and obstacles in the banking industry implementation and practical application process. Besides, to ensure the whole system has sustainable development, safety, diverse, modern, and convenient services to meet the increasing requirements of customers and the entire economy, the banking industry needs to Identify clear, specific directions, such as reforming procedures and business processes, perfecting the legal framework are essential factors; Innovation, increased experience, and meeting customer needs are measures of the effectiveness of digital transformation; Ensuring security, safety, and protecting the legitimate rights and interests of customers is the top goal to enhance reputation and maintain customer trust.



Source: Authors collected and processed from SPSS 20.0, Amos

Figure 4. Testing research model for factors affecting mobile banking service quality and individual customer satisfaction

The findings presented in Figure 3 illustrate the evaluation of various factors influencing the quality of mobile banking services and the resulting satisfaction of individual customers across 10 commercial banks in Vietnam. The results indicate that the Comparative Fit Index (CMIN/DF) value is 3.936, which is below the threshold of 5.0. Additionally, the Goodness of Fit Index (GFI) value is 0.883, surpassing the minimum requirement of 0.800. The Tucker-Lewis Index (TLI) value is 0.940, exceeding the desired threshold of 0.900. Furthermore, the Comparative Fit Index (CFI) value is 0.951, higher than the recommended value of 0.900. Lastly, the Root Mean Square Error of Approximation (RMSEA) value is 0.070, falling below the critical importance of 0.08. The study's objective was to identify the variables influencing the quality of mobile banking services and the degree of satisfaction among individual customers, with a significance threshold of $\text{sig} < 0.01$. The obtained outcome aligns with the empirical evidence and is corroborated by applying this finding in commercial banking.

Table 4. Testing Bootstrap for factors affecting mobile banking service quality and individual customer satisfaction

	Parameter		SE	SE-SE	Mean	Bias	SE-Bias	C.R
MB	<---	TAN	0.068	0.001	0.208	-0.008	0.005	1.600
MB	<---	COM	0.032	0.001	0.101	-0.007	0.007	1.000
MB	<---	EMP	0.044	0.001	0.109	-0.008	0.006	1.333
MB	<---	RES	0.032	0.002	0.080	-0.002	0.002	1.000
MB	<---	REL	0.038	0.001	0.647	-0.003	0.002	1.500
SAT	<---	REL	0.031	0.002	0.232	-0.004	0.003	1.333
SAT	<---	RES	0.022	0.001	0.062	-0.005	0.003	1.667
SAT	<---	EMP	0.023	0.002	0.056	-0.007	0.004	1.750
SAT	<---	COM	0.025	0.001	0.048	-0.002	0.006	0.333
SAT	<---	TAN	0.046	0.001	0.140	-0.006	0.005	1.200
SAT	<---	MB	0.035	0.001	0.190	0.004	0.003	1.333

Source: Authors collected and processed from SPSS 20.0, Amos

Table 4 showed that testing Bootstrap with 30000 samples for factors affecting mobile banking service quality and individual customer satisfaction, with a significance level of 0.01. Bootstrap test results with the number of observations repeated 30000 times are presented in Table 4. Accordingly, the absolute values of the C.R column do not exceed 2, showing that the deviation of the estimates is tiny and not statistically significant at 1%. Thus, the estimated results of the model are reliable. This result has reinforced the conclusions about factors affecting mobile banking service quality and individual customer satisfaction. Empirical research results show that mobile banking service quality positively impacts customer satisfaction at commercial banks. Besides, the study shows that five aspects effectively measure mobile banking service quality. Therefore, to improve customer satisfaction with mobile banking services in the coming time, the study proposes several recommendations based on the factors that constitute mobile banking service quality.

4.3. Research result discussion

The following analytical methodologies were used to measure consumer satisfaction with commercial banks' mobile banking services: Cronbach's alpha was utilized to examine the scale's reliability, and the structural linear regression model was employed to test the correlations with the dependent variable of customer satisfaction. The structural linear regression analysis findings verified five characteristics influencing customer satisfaction and the quality of mobile banking services: tangibles, responsiveness, empathy, dependability, and service capacity. The study's findings highlight the factors influencing customer happiness and service quality. This finding underscored the need for a flexible research strategy to assess consumer satisfaction with mobile banking services. Here are some further in-depth examinations of the study model's variables.

First, reliability (REL) with a standardized estimate of 0.636 and sig. < 0.01 (Table 3). Reliability: there is a positive relationship between customer satisfaction and the quality of mobile banking services at commercial banks at the 1% significance level. This result accepts hypotheses H1 and H2 (Table 2 & 3). The customer feels secure when using mobile banking with an average of 3.0840; the bank executes the transaction correctly, without errors, had an average of 3.0739; The bank keeps good customer information with 3.1109; Banks deliver the service at the time they promised with 3.1227. The average reliability is 3.0979, around a 3.0 value (Table 1). These results are consistent with practice and previous studies [20]-[23]. This study gave reliability the ability to perform services as committed to customers,

keep information, and secure customer assets through electronic transactions. Reliability has a positive correlation with customer satisfaction. When customers evaluate mobile banking services' reliability, customer satisfaction will increase and vice versa [24]. This result is scientific basic information to help bank leaders improve reliability. Moreover, banking security and mobile service safety are always questions customers ask when approaching a bank and choosing new services, including mobile services (Table 2 & 4). The level of customer perception or perception measures the service quality of the business [25]-[26]. Set up specialized groups and departments in charge of mobile banking services. These groups and departments will consult, operate, and answer questions for each case where customers have questions while using the service. The bank needs to create absolute trust with customers to ensure the confidentiality of information provided by customers. Credit officers must always be honest and not make mistakes in dealing with customers, always keeping their promises as committed to customers.

Secondly, competence (COM) with a standardized estimate of 0.120 and sig. < 0.01 (Table 3). Competence: has a positive relationship with customer satisfaction about the quality of mobile banking services at commercial banks at the 1% significance level. This result accepts hypotheses H7 and H8 (Table 2 & 3). Employees handle the business correctly, quickly, and efficiently had an average of 3.0824; Bank staff have sufficient knowledge and professional capacity to advise and answer customers' inquiries had an average of 3.0908; Bank staff are always polite, considerate, and welcoming to customers had average with 3.1345; The ability to handle the online system is outstanding had average with 3.1210. The average competence is 3.1071, around a 3.0 value (Table 1). The results are consistent with practice and previous studies [27]-[29]. This result is scientific basic information to help bank leaders improve their competence. Moreover, website construction software: The mobile website building must meet the criteria of beautiful form, eye-catching colors, modernity, ease of use, and reasonable arrangement and layout (Table 2 & 4). Banks can hire external design firms to do better design. However, ensuring the bank's brand identity is necessary to avoid confusing or blurred brand details. The bank creates a feeling of safety and comfort for customers when they come to do transactions. Bank staff are polite, cheerful, and respectful and quickly solve customers' needs and questions. Bank staff must be trained to have sufficient professional knowledge to advise customers on information related to the bank's loan products. Finally, employees need to handle transactions correctly, quickly, and effectively for customers when there is a problem in the transaction [30]. Banks must regularly evaluate and reward bank employees through evaluation sheets in the form of secret customers. If an employee does not meet the requirements for expertise, communication skills, and problem-solving skills, they will not be rewarded, must be retrained, or even transferred to another job or laid off. Regular inspection and evaluation will increase the quality of human resources for mobile banking services and is a factor that has a significant influence on customers' use of mobile banking services. Service capacity is demonstrated through professional qualifications to perform services. When the bank's service capacity for mobile banking services is assessed by customers to increase, customer satisfaction will increase and vice versa [31].

Thirdly, tangibles (TAN) with a standardized estimate of 0.118 and sig. < 0.01 (Table 3). This result accepts hypotheses H9 and H10 (Table 2 & 3). The bank web has a spacious and convenient office for customers, with an average of 2.4101. The bank's modern equipment and machinery had an average of 2.4084; The forms and vouchers used in the Bank's transactions are designed to be simple and straightforward, had an average of 2.4286; The bank website has a very professional manner when communicating with customers had average with 2.4723. Besides, the average of tangibles is 2.4298, undervalue of 3.0 (Table 1). Customers feel dissatisfied when there are times when they cannot access the bank website or it takes a certain amount of time to access. This requires consistency in service performance and honoring customer commitments and promises [32]. The results are consistent with practice and previous studies; when the tangible standards of mobile banking service are appreciated by customers, customer satisfaction increases and vice versa [33]. This result is scientific basic information to help bank leaders improve the tangibles. Moreover, any product or mobile service must ensure both form and content. For mobile banking services, the structure is mainly shown in the device, software, and website. Thus, the recommendations here aim to attract and satisfy customers using the service through the attractiveness of devices, software, and websites (Table 2 & 4). There should be a combination of all three departments: Marketing, information technology support, and design services to ensure the elements are beautiful, modern, easy to use, suitable for the information system, and dislodge the brand. The mobile banking is fully equipped with facilities; the bank's equipment is convenient and eye-catching; Bank employees dress politely;

Documents related to loan products and leaflets are neatly arranged and convenient to use spacious and convenient parking, neat and well-decorated reception desks and chairs. Finally, to strengthen the material and technical foundations step by step by building, renovating, and upgrading. Continue to promote investment in equipment, machinery, and equipment for transactions, focusing on regularly upgrading the internal transaction system to improve processing speed and avoid transaction bottlenecks to shorten transaction time with customers. The critical point here is to change the cash payment habits of customers so that they realize that mobile banking is very convenient to save costs and time. Therefore, the bank's top policy is to guide and create customer trust in this service.

Fourthly, empathy (EMP) with a standardized estimate of 0.113 and sig. < 0.01 (Table 3). Empathy: has a positive relationship with customer satisfaction about the quality of mobile banking services at commercial banks at the 1% significance level. This result accepts hypotheses H5 and H6 (Table 2 & 3). Bank staff always try to build good relationships and pay attention to each customer's needs had an average of 3.3311; Bank systems are enthusiastic and friendly to customers had an average of 3.4874; Bank employees serve all customers relatively had an average of 3.2555; The bank always inquires, congratulates, and gives gifts to customers every holiday or personal event had average with 3.3378. Besides, the average empathy is 3.3529, around a value of 3.0 (Table 1). Responsiveness is the desire and willingness of employees to provide timely service to customers. The level of responsiveness is positively correlated with customer satisfaction [33][34].

The results are consistent with practice and previous studies and is scientific basic information to help bank leaders improve empathy. Moreover, increasing personnel for the development of mobile banking services at the branch, currently the number of staff working on mobile banking services is still tiny, with 03 teams at the counter with concurrent duties professionals have not been trained in depth in skills to sell products and mobile services, so they cannot meet the needs of customers in terms of time and speed of processing information about products and mobile services (Table 2 & 4). Answer questions more professionally and quickly, and directly support the system to receive, respond, and handle customer complaints to manage problems arising on time, thereby taking corrective action to adjust accordingly. Banks credit officers always put customers' interests first and must consider applying favorable policies for customers when the bank's conditions are satisfied. The bank has special programs to show attention to customers, always pay attention to customers' wishes, and arrange transaction time to ensure convenience for customers to make transactions. Finally, increasing the website's attractiveness directly impacts the perception of online service quality. The bank's website needs a more harmonious layout and vivid colors and sounds, so there are flash guides for each online service. The information displayed should not be too much to distract the customer, so there should be an arrangement of priority appearing according to the usefulness of the data. In addition, to increase convenience and enjoyment for customers, the website should be designed to be more flexible so that users can customize the font size and brightness of colors according to their individual needs.

Finally, responsiveness (RES) with a standardized estimate of 0.093 and sig. < 0.01 (Table 3). Responsiveness: there is a positive relationship between customer satisfaction and the quality of mobile banking services at commercial banks, with a significance level of 1%. This result accepts hypotheses H3 and H4 (Table 2 & 3). The bank always satisfactorily solves all difficulties, questions, and complaints for customers, with an average of 3.1311; Customer waiting time for electronic transactions is short, with an average of 3.1126; Simple procedures for making electronic transactions at the Bank had an average of 3.1546; The bank has a hotline for 24/7 service had average with 3.1227. Besides, the average responsiveness is 3.1303, around 3.0 (Table 1). The results are consistent with practice and previous studies [35]. This result is scientific basic information to help bank leaders improve responsiveness. Moreover, enhancing customer satisfaction when using all services at commercial banks and meeting the convenience of customers is indispensable (Table 2 & 4). The human factor is the core part of this success, and the more the bank's attention to customers, the more empathy will increase [25]. Empathy is the care and concern for the customers of the staff. Simplify registration for mobile banking services in many ways: Banks can choose internet banking as the leading service, from which all other services, such as mobile banking, SMS banking, and mobile banking, can be activated or impacted based on internet banking. Credit officers must review loan applications quickly, objectively, and on time. Mobile banks must continue simplifying loan procedures, appraisal, approval, and disbursement, ensuring lending safety. Bank staff must help customers complete documents enthusiastically and quickly carry out functions. Finally, the bank must

satisfactorily resolve all customer difficulties, questions, and complaints. In particular, it is necessary to bring many promotions in non-cash payment on applications or e-commerce platforms. Also, the transaction time must be improved to be faster and more accurate. At the same time, applications of mobile banking services must also ensure that they can make statistics on spending activities and provide summarized information about the transaction market or prices to help customers manage personal finances and capture information. Moreover, branches can integrate more games or challenges through mobile banking applications to accumulate reward points based on customer transactions.

5. Conclusion

Within the context of global economic integration and trade liberalization, the digital revolution in the banking sector presents several prospects and concealed complexities and obstacles for each bank. To effectively capitalize on possibilities and surmount problems in the realm of growth, the banking sector must rely on the internal endeavors of banks. The authors have recommendations on commercial banks. There is a need to enhance investment in technological innovation to optimize company processing and transaction procedures. This will result in time and cost savings, enabling prompt fulfillment of client requirements. There is a need to enhance rules and implement robust policies to safeguard client information. Banks are obligated to recruit and train personnel with expertise in information technology, the necessary qualifications to effectively run and navigate technological systems, or have a direct affiliation with the field of information technologies. The digitization of work tools involves using digital tools to enhance the accessibility of information inside an organization. This includes implementing self-service digital technologies for workers, business partners, and other entities, emphasizing integrating technology into banking operations. This study aims to research and develop a strategic plan for digitalizing financial services while determining the necessary allocation of resources for investment in innovative technologies. Facilitate the expeditious advancement of bank digitization and cultivate the establishment of a fully digital banking framework.

In particular, research results provided a more comprehensive understanding of the study's implications banks need to enhance the security of the mobile banking system. Commercial banks need to continue to research and apply modern technology and payment methods; Software needs to be updated regularly, using advanced security authentication methods to ensure user safety; Strengthen payment supervision to ensure safe and effective operations in mobile transactions. In addition, commercial banks need to focus on training staff who are good at technology and capable of managing and preventing cybersecurity risks. On the other hand, commercial banks must protect customers' personal and financial information and absolutely not share customers' personal information with other banks or organizations.

Because the research time was relatively short and the sample size was not really large, the representativeness of the whole population was limited. Future research needs to increase the observation sample size and consider other factors that can impact the quality of mobile banking services and customer satisfaction in domestic and other banks with foreign investment.

6. Declarations

6.1. Author Contributions

Conducted conception and methodology and employed academic methods: N.Q.H; Resource utilization, data curation, and original draft production: L.P.N.; Reviewed, drafted, and revised the work: P.T.T.; All authors have read and agreed to the published version of the manuscript.

6.2. Data Availability Statement

The data given in this study may be found in the publication and the data collected by the authors.

6.3. Funding

The research conducted in this study received financial assistance from Lac Hong University (LHU), located in Vietnam.

6.4. Institutional Review Board Statement

Not applicable

6.5. Informed Consent Statement

Not applicable

6.6. Declaration of Competing Interest

The authors stated that there are no conflicts of interest in the publication of this paper. Furthermore, the ethical concerns encompass other aspects such as plagiarism, informed consent, research misconduct, data fabrication, data falsification, adherence to proper authorship guidelines for publishing and submission, and redundancy avoidance.

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