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Customer experience for digital banking service quality in Vietnam

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Abstract

In the context of the 4.0 Industrial Revolution, the financial banking sector in Vietnam is undergoing a significant digital transformation. Digital banking has become an inevitable development trend, bringing numerous benefits to both banks and customers. This paper investigates the factors affecting the service quality of digital banking in Vietnam and how these factors impact customer experience. The study is based on a sample of 392 customers using digital banking services in Vietnam. The collected data were analyzed using the PLS-SEM method. The research results indicate that employee-customer interaction, functional quality, and overall service quality all positively impact customer experience. However, the innovation of digital banking does not affect service quality. These findings provide important insights for banks to focus on key factors to enhance service quality and improve customer experience in the digital era.

Keywords: Customer Experience; Digital Banking; Service quality; PLS-SEM

1. Introduction

In the Industrial Revolution 4.0 context, the finance-banking sector is undergoing a strong digital transformation. Digital banking has become an inevitable development trend, bringing many benefits to both banks and customers. According to the report by the State Bank of Vietnam SBV (2023), by the end of 2022, more than 95% of commercial banks in Vietnam had implemented digital transformation strategies.

In Vietnam, the development of digital banking is driven by several factors. Firstly, there is a rapid increase in the number of internet and smartphone users. According to DataReportal (2024), as of early 2024, there are 78.44 million internet users in Vietnam, with an internet penetration rate of 79.1% of the population. Secondly, the explosion of FinTech has also created significant competitive pressure. The report by Ernst & Young (2024) shows that Vietnam is one of the fastest-growing FinTech markets in Southeast Asia, with an average annual growth rate of 179% from 2017-2021. However, with this rapid development, digital banking also faces many challenges. According to a survey by PwC (2023), 65% of banking customers in Vietnam are concerned about information security when using digital banking services. Additionally, the disparity in digital experience among different customer groups is also a notable issue.

In this context, studying customer experience regarding the quality of digital banking services in Vietnam becomes imperative. This research aims to evaluate the quality of digital banking services in Vietnam and analyze customer experiences when using these services. The research results will provide deep insights into customer needs and expectations, thereby helping banks improve service quality and enhance competitiveness in the digital era. This research will focus on answering the following questions: Q1. What is the current quality of digital banking services in Vietnam? Q2. What factors influence customer experiences when using digital banking services? The research will focus on customers using digital banking services in Vietnam. The research period will extend from January to June 2024, with surveys and interviews conducted in two major cities, Hanoi and Ho Chi Minh City.

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2. Literature reviews

2.1. Concept and characteristics of digital banking

Digital banking is defined as providing banking products and services through electronic channels without the physical presence of customers at branches (King, 2018). According to Gomber et al. (2017), digital banking has key characteristics such as high automation, real-time interaction, and the ability to personalize services. Additionally, Liébana et al. (2013) emphasize that digital banking allows customers to perform financial transactions anytime, anywhere through electronic devices. Chahal & Dutta (2015) also point out that digital banking creates a new business model where banks can reach customers and provide services at a lower cost than the traditional model. Thus, digital banking changes how customers transact and create new opportunities for banks to access and serve customers more efficiently (Chahal & Dutta, 2015). Adopting digital banking has helped reduce operational costs and enhance service quality, bringing many benefits to banks and customers (Chahal & Dutta, 2015).

2.2. Digital banking service quality

The quality of digital banking services is evaluated based on various factors. The ES-QUAL model for assessing the quality of electronic services by Parasuraman et al. (2005) proposes key factors such as reliability, responsiveness, service competence, empathy, and tangible elements. In the context of digital banking, these factors are specified through criteria such as transaction processing speed, 24/7 service accessibility, user-friendly interface, and information security, which are collectively referred to as functional quality (Keisidou et al., 2013; Jun & Palacios, 2016). The study by George & Kumar (2014) emphasizes the importance of reliability and responsiveness in evaluating the quality of electronic banking services. Additionally, Mbama et al. (2018) propose that the interaction between employees and customers during service delivery and complaint handling is crucial in assessing the quality of digital banking services. Furthermore, digital banking innovations, such as interactive service innovations (Dootson et al., 2016) and better transaction methods for customers to improve performance (Fairooz & Wickramasinghe, 2019), have also been shown to impact digital banking service quality.

2.3. Customer experience in digital banking

Klaus & Maklan (2013) define customer experience as the customer's overall assessment of all interactions with an organization throughout the service usage process. In the field of digital banking, Mbama et al. (2018) point out that customer experience includes factors such as convenience, functionality, perceived value, and satisfaction. Meanwhile, Lemon & Verhoef (2016) emphasize that customer experience is a multi-dimensional process, encompassing the stages before, during, and after using digital banking services. Sayed & Sayed (2020) add that customer experience in digital banking also includes emotional and social factors, not just limited to the functional aspects of the service. According to Chauhan et al. (2022), customer experience in digital banking is synthesized from the following factors: (i) functional factors (functional quality, reliability, and convenience), (ii) mechanical factors (website attributes, website design, perceived usability), and (iii) human factors (customer complaint handling).

2.4. The relationship between digital banking service quality and customer experience

Many studies have shown a close relationship between service quality and customer experience in digital banking. For example, the study by Chahal & Dutta (2015) in India shows that service quality positively impacts customer experience and satisfaction. Similarly, Amin (2016) asserts that factors such as reliability, responsiveness, and ease of use of digital banking services significantly influence the overall customer experience. In another study, Tam & Oliveira (2017) emphasize that system quality and information quality in mobile banking strongly impact customer satisfaction and their intention to continue using the service. In agreement, Karjaluoto et al. (2019) also point out that the quality of digital banking services not only directly affects customer experience but also indirectly enhances customer loyalty.

In Vietnam, the study by Nguyen (2020) shows that trust and perceived benefits are the two most important factors influencing Vietnamese users' acceptance of digital banking services. Meanwhile, Le et al. (2020) emphasize the role of convenience and security in enhancing the customer experience with mobile banking services. Additionally, the study by Huy et al. (2023) points out that the quality of digital banking services, especially ease of use and reliability, strongly impacts Vietnamese customers' satisfaction.

Thus, although there have been many studies on service quality and customer experience in digital banking, some gaps still need further exploration. Specifically: (1) There is a lack of in-depth studies on how specific factors of digital banking service quality (e.g., functional quality, staff interaction with customers, etc.) affect different aspects of customer experience; (2) More research is needed on the impact of digital banking innovations (e.g., new technologies like artificial intelligence (AI), chatbots, etc.) in enhancing service quality and customer experience. These technologies

have the potential to revolutionize digital banking but have yet to be fully evaluated for their effectiveness and implementation in practice.

From these gaps, this study will focus on a detailed assessment of service quality and customer experience in digital banking in Vietnam. The research will improve theory and provide practical solutions for banks in the increasingly digitalized context.

3. Research model and hypothesis

3.1. Digital banking innovation

Innovation in digital banking is a crucial factor determining the quality of services that banks provide in the context of the Fourth Industrial Revolution. According to Gomber et al. (2017), this innovation includes high automation, real-time interaction, and service personalization. Advanced technologies such as artificial intelligence (AI), machine learning, and chatbots enhance operational efficiency and improve customer experience through fast and accurate services (Sayed & Sayed, 2020). According to Dootson et al. (2016), innovation in interactive services positively impacts the quality of digital banking services. Fairooz & Wickramasinghe (2019) show that providing new and improved transaction methods not only enhances performance but also increases customer satisfaction. Tam & Oliveira (2017) emphasize that system and information quality enhanced by new technologies strongly impact customer satisfaction and their intention to continue using the service. Karjaluoto et al. (2019) point out that innovation not only directly affects customer experience but also indirectly enhances their loyalty. Based on the above studies, hypothesis H1 is proposed as follows:

Hypothesis H1: *Digital banking innovation positively impacts digital banking services quality.*

3.2. Employee customer interaction

Interaction between employees and customers plays a key role in evaluating the quality of digital banking services. Mbama et al. (2018) emphasize that effective communication and timely support from staff can increase customer satisfaction. The study by George & Kumar (2014) also indicates that the reliability and responsiveness of staff are important factors in enhancing the customer experience. Additionally, Chahal & Dutta (2015) assert that bank employees need to have professional knowledge and show empathy and understanding towards customer needs. This is particularly important in digital banking, where direct interaction is minimized but requires higher service quality. Studies by Dootson et al. (2016) and Fairooz & Wickramasinghe (2019) show that staff training and skill development can significantly improve service quality. At the same time, support from staff in handling complaints is also considered an important factor, contributing to building customer trust and loyalty (Mbama et al., 2018). Based on these studies, hypothesis H2 is proposed as follows:

Hypothesis H2: *Employee customer interaction positively impacts digital banking service quality.*

3.3. Functional quality

Technology and systems are crucial foundations in providing high-quality digital banking services. According to Tam & Oliveira (2017), the quality of technology and systems directly affects customer satisfaction and their intention to continue using the service. Modern systems with high-security features, fast processing speeds, and user-friendly interfaces are key factors that help digital banks attract and retain customers. Gomber et al. (2017) point out that the adoption of advanced technologies such as artificial intelligence (AI) and machine learning not only improves operational performance but also enhances the level of service personalization, better meeting the needs of individual customers. The study by Karjaluoto et al. (2019) also emphasizes that technological innovation can increase customer loyalty by enhancing the user experience. Additionally, Sayed & Sayed (2020) show that reliable and secure transaction systems are important factors in building customer trust in digital banking. Ensuring information security and minimizing risks are also urgent requirements to enhance service quality (Fairooz & Wickramasinghe, 2019). Based on these studies, hypothesis H3 is proposed as follows:

Hypothesis H3: *Functional quality positively impacts digital banking services quality.*

3.4. Digital banking service quality and customer experience

The quality of digital banking services plays an important role in shaping customer experience. Stable transaction systems, fast processing speeds, and high information security create trust and peace of mind for users, thereby

enhancing the overall experience (Tam & Oliveira, 2017). Gomber et al. (2017) add that technological innovation and service personalization are key factors in improving customer experience. Karjaluoto et al. (2019) assert that a positive customer experience not only increases satisfaction but also promotes loyalty and the intention to continue using digital banking services. High-quality services and continuous process improvement, with timely and effective support from staff, will create a competitive edge and retain customers (Dootson et al., 2016; Fairooz & Wickramasinghe, 2019). In the context of digital banking, where competition is increasing, and customers have more choices than ever, improving service quality is very important to enhance customer experience (Sayed & Sayed, 2020). Based on these studies, hypothesis H4 is proposed as follows:

Hypothesis H4: *Digital banking service quality positively impacts customer experience.*

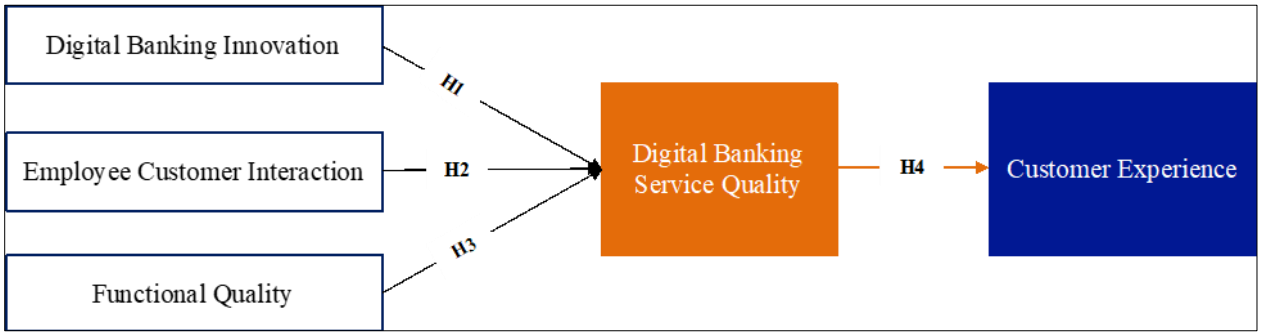

Figure 1 The conceptual model

4. Methodology

We use PLS-SEM (Partial Least Squares Structural Equation Modeling) to estimate the parameters of the research model. First, the observed variables of all constructs in the model are adjusted based on previous studies to ensure validity and reliability (Chin, 1998; Sarstedt et al., 2021). Then, a real-world survey is conducted to collect data from the research subjects, using systematic random sampling to ensure representativeness (Saunders et al., 2009). Finally, the collected data is analyzed using SmartPLS 4.0 software (Ringle, 2015). The analysis process includes assessing the reliability of the observed variables through Cronbach's Alpha and Composite Reliability (CR(rho_c)), examining the convergent and discriminant validity of the constructs through AVE and correlation analysis between constructs (Fornell & Larcker, 1981), checking for multicollinearity among the predictor variables (Kline, 2023), testing the model hypotheses, and conducting multi-group structural analysis (Hair et al., 2011).

4.1. Develop a scale to measure observed variables

We have selected multiple scales from different studies to measure the variables in the research model. Specifically, digital banking innovation with 4 items extracted from Gomber et al. (2017) and Sayed & Sayed (2020); we have adjusted the wording to fit the context of this study, an example of which is: "Creating innovative digital banking services." Employee customer interaction includes 4 items developed based on Mbama et al. (2018), with a slightly modified, an example of which is: "Always helping customers." Quality of functions includes 4 items extracted from Tam & Oliveira (2017), with modified wording, for example: "User-friendly, simple interface." Assessment of digital banking service quality includes 3 items based on the research of Gomber et al. (2017) and Karjaluoto et al. (2019), for example: "Providing perfect services." Measuring customer experience has 3 items extracted from Karjaluoto et al. (2019) and Fairooz & Wickramasinghe (2019), for example: "The digital banking service I am using is perfect." Demographic factors are adjusted by Sayed & Sayed (2020).

4.2. Pilot survey

At this stage, we designed a preliminary questionnaire to conduct a pilot survey, with all observed variables measured using a 1-5 Likert scale, where 1 means "strongly disagree" and 5 means "strongly agree." We conducted in-depth interviews with 2 experts and 8 National Economics University students to ensure the questions were clearly articulated. Based on the results of these in-depth interviews, we adjusted the content of the questions to ensure clarity and ease of understanding. Subsequently, we carried out a pilot survey, resulting in 50 completed surveys collected through an online survey. We checked the quality of the observed variables using the outer loading indicators in Smart

PLS4 software. The results showed that all indicators were >0.7 (Hair et al., 2019). The observed variables in the research model are suitable for the main study.

4.3. Official survey

4.3.1. Sample size

To ensure representativeness across the entire population of Vietnam, we determined the sample size using the formula of Cochran (1963), as follows:

$$N=\frac{Z^2pq}{e^2}$$

In this case, e is the standard error at a 95% confidence interval level, e=0.05; Z is the value calculated based on the confidence interval when e=0.05, *Z*=1.96 (Beyer, 2019); p is the proportion (estimated) of the Vietnamese population meeting the study's criteria for gender (male/female), age group (18 - over 55), and education level (High School/ Undergraduate degree/Postgraduate degree), thus p=50% (0.5); q=1−p. Therefore, the minimum sample size is:

$$N=\frac{1.96^2*0.5*0.5}{0.5^2}=385$$

To ensure that the collected survey responses reach the minimum sample size, we chose a study size of **500** observations.

4.3.2. Data collecting

Secondary data consists of research works, academic books, scientific articles, and journals related to the field of digital banking and customer experience. Primary data was collected by conducting a wide-ranging sociological survey. The survey subjects were Vietnamese people in Hanoi and Ho Chi Minh City, with the survey period from January 2024 to June 2024. The questionnaire was designed on the Google Form platform, and the survey was conducted online. The sample size was 500 observations, and the number of usable responses collected was **392**.

5. Results and discussion

The results of estimating the parameters of the research model were performed using SmartPLS4 software in two steps. The first step involved assessing reliability and overall measurement validity, and the second step involved evaluating the structural model and hypotheses. Regarding the characteristics of the respondents, 47.193% were male, and 52.806% were female. Most respondents were aged between 25 - 34 (40.561%). See Table 1.

Table 1 Demographic characteristics of the study sample

Demographic variables	Categories	Frequency	Percent (%)
Gender	Male	185	47.193
	Female	207	52.806
Age group	18-24	99	25.255
	25-34	159	40.561
	35-44	63	68,478
	45-55	55	14.030
	Over 55	16	4,081

5.1. Measurement model

The evaluation of the measurement model is based on the following aspects: outer loading indicator quality of the observed variables, composite reliability (CR (rho_c)), convergent validity, and discriminant validity (Hair et al., 2019). Accordingly, the indicator of the variable DBI4 (outer loading = 0.682) was less than 0.7, not meeting the quality standard (Bagozzi & Yi, 1988; Hair et al., 2019). We removed DBI4 from the model and retesting. The results showed

that all indicators of the observed variables met the condition of >0.7 (see Table 2). Composite reliability (CR (rho_c)) >0.7 is the appropriate threshold (Henseler & Sarstedt, 2013). Cronbach's alpha >0.7 is a suitable level (DeVellis & Thorpe, 2021). The average variance extracted (AVE) >0.5, indicating that the scale achieves convergent validity (Fornell & Larcker, 1981). Discriminant validity was assessed using two indicators: the Fornell-Larcker criterion (Fornell & Bookstein, 1982) and the Heterotrait-Monotrait Ratio (HTMT), which should be < 0.85 (Henseler & Sarstedt, 2013). All test results satisfied the conditions, indicating the scale has discriminant validity. Details are presented in Table 2 and Table 3.

Table 2 Measurement model evaluation results

Factors	**Code**	**Outer loading**	**VIF**	**Alpha**	**CR(rho_c)**	**AVE**
Digital Banking Innovation (DBI)	DBI1	0.799	1.714	0.776	0.856	0.599
	DBI2	0.831	1.700			
	DBI3	0.775	1.490			
	DBI4*	0.682	1.324			
Employee Customer Interaction (ECI)	ECI1	0.855	2.122	0.805	0.872	0.631
	ECI2	0.793	1.775			
	ECI3	0.768	1.646			
	ECI4	0.759	1.398			
Functional Quality (FQ)	FQ1	0.860	2.101	0.796	0.867	0.621
	FQ2	0.807	1.758			
	FQ3	0.752	1.409			
	FQ4	0.725	1.534			
Digital Banking Service Quality (DBSQ)	DBSQ1	0.894	2.328	0.855	0.896	0.775
	DBSQ2	0.887	2.116			
	DBSQ3	0.859	1.995			
Customer Experience (CE)	CE1	0.900	2.343	0.825	0.896	0.742
	CE2	0.899	2.501			
	CE3	0.779	1.515			
χ^2 = 506.601, SRMR=0.059, NFI=0.817, d_ULS=0.533, d_G=0.211						
*: Variables are excluded due to outer loading < 0,7						

Table 3 Results of testing the reliability and convergence of the scale

Fornell-Larcker Criterion	**CE**	**DBSQ**	**DBI**	**ECI**	**FQ**
Customer Experience (CE)	0.861				
Digital Banking Service Quality (DBSQ)	0.404	0.880			
Digital Banking Innovation (DBI)	0.270	0.209	0.774		
Employee Customer Interaction (ECI)	0.391	0.385	0.231	0.794	
Functional Quality (FQ)	0.357	0.454	0.262	0.375	0.788
Heterotrait-Monotrait Ration (HTMT)	**CE**	**DBSQ**	**DBI**	**ECI**	**FQ**
Customer Experience (CE)					

Digital Banking Service Quality (DBSQ)	0.476				
Digital Banking Innovation (DBI)	0.340	0.254			
Employee Customer Interaction (ECI)	0.477	0.459	0.286		
Functional Quality (FQ)	0.447	0.542	0.337	0.470	

5.2. Structural model

We employed the bootstrapping resampling approach with 5000 repeated samples to draw statistical inferences about the significance of the model coefficients. The evaluation of the structural model is based on the coefficient of determination (R^2), path coefficients (O), t-values, p-values, and the goodness-of-fit (GoF) index. The results from Table 4 and Figure 2 show that the R^2 of digital banking service quality (DBSQ) is 0.263, and that of customer experience (CE) is 0.163, indicating that the model explains the dependent variables well (Chin, 1998). The path coefficient from DBSQ to CE is 0.404 (t = 8.943, p < 0.001), from ECI to DBSQ is 0.24 (t = 5.410, p < 0.001), and from FQ to DBSQ is 0.348 (t = 8.004, p < 0.001), showing that these relationships are statistically significant. Hypotheses ***H2***, ***H3***, and ***H4*** are supported. Hypothesis ***H1*** is rejected (p = 0.156 > 0.05), as it does not reach statistical significance at the 95% confidence level (Hair et al., 2019). The SRMR (Standardized Root Mean Square Residual) index in Table 2 is 0.059 < 0.08, indicating that the model fits well (Henseler & Sarstedt, 2013). These results are illustrated in **Figure 2** and confirm the reliability of the relationships in the research model regarding service quality and customer experience in digital banking in Vietnam.

Table 4 Research hypothesis results

Hypothesis	Path Coefficients (O)	Sample mean (M)	Standard deviation (STDEV)	t	f^2	p	Result
H1: DBI →DBSQ	0,065	0,068	0,045	1,420	0,005	0,156	Rejected
H2: ECI → DBSQ	0,24	0,242	0,044	5,410	0,065	***	Supported
H3: FQ → DBSQ	0,348	0,349	0,043	8,004	0,136	***	Supported
H4: DBSQ → CE	0,404	0,406	0,045	8,943	0,195	***	Supported

Bootstrapping subsample = 5000, significant level = 0,05, *** p < 0,001

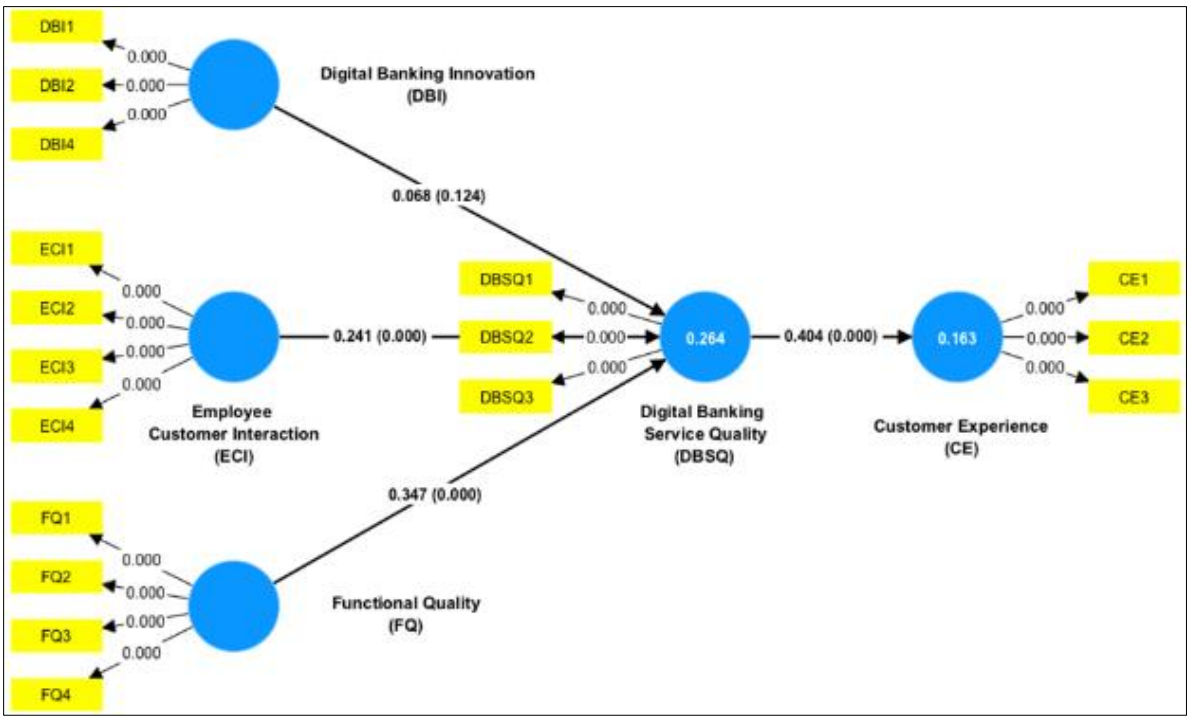

Figure 2 PLS-SEM structural equation modeling results

6. Conclusion

- ***Hypothesis H1***: The research results show that digital banking innovation does not significantly impact digital banking service quality (p=0.156 > 0.05). This differs from previous studies such as Dootson et al. (2016) and Fairooz & Wickramasinghe (2019), which indicated that innovation in technology and services positively affects the quality of digital banking services. This difference may be due to the following factors: (1) The level of technology acceptance among Vietnamese customers may not be as high as in more developed markets. Customers may be unfamiliar with new technologies or find them difficult to use, leading to innovation not being highly valued. (2) Vietnam's technological infrastructure and technical support may not be strong enough to support technological innovations effectively. This could reduce service quality despite the presence of innovation. (3) Customers may need to perceive the value brought by innovation clearly. Customers may only appreciate the innovation if new features meet specific needs or improve the user experience.
- ***Hypothesis H2***: The interaction between employees and customers is confirmed to positively impact the quality of digital banking services ($p < 0.05$, O=0.24). This result is consistent with the study by Mbama et al. (2018), which emphasizes the crucial role of human factors in enhancing the quality of digital banking services.
- ***Hypothesis H3***: Functional quality positively impacts the quality of digital banking services ($p < 0.05$, O=0.348). This aligns with the studies by Jun & Palacios (2016) and Sayed & Sayed (2020), which show that the ease of use, reliability, and security of digital banking features are important factors in evaluating service quality.
- ***Hypothesis H4***: The quality of digital banking services positively affects customer experience ($p < 0.05$, O=0.404). This result is consistent with previous studies by Chahal & Dutta (2015) and Amin (2016), emphasizing that factors such as reliability, responsiveness, and ease of use of digital banking services contribute to enhancing the overall customer experience.

Recommendation

Based on the research results, the author proposes the following important recommendations to improve the quality of digital banking services and customer experience in Vietnam:

- Banks should invest in training employees on new technologies and the use of digital banking services. Additionally, they should organize training programs and educate customers on using the services safely and effectively, providing easy-to-understand instructional materials and online support channels.
- Invest heavily in technological infrastructure to ensure the stability, security, and high performance of digital banking services. This includes upgrading server systems, networks, and security measures, as well as optimizing the processes for deploying and maintaining new technologies.
- Conduct regular research to better understand customer needs and use these findings to develop and adjust new features and services. Apply big data analytics and artificial intelligence technologies to personalize customer experiences, providing suitable services and financial advice.

These recommendations will help Vietnam's banks enhance service quality, improve customer experience, and succeed in the digital transformation process.

Limitation

The study is limited to the digital banking industry in Vietnam and may not provide a complete picture of the situation in other nations. Furthermore, the survey sample is small and does not accurately reflect the total client base. Customers who do not regularly use the internet are not included in the statistics because it is mostly sourced online. In addition, the study did not fully account for variables, including new technological trends, competition from non-traditional financial institutions, and government legislation.

Future research

In order to compare and contrast the findings, future research could broaden its scope to include several nations and areas. It is also advised to increase the sample size and variety while ensuring comprehensiveness by combining various data collection techniques. In-depth examinations of the effects of new technical developments, FinTech competition, and governmental regulations should also be done. To create tactics that increase customer pleasure and loyalty, further research into the psychology and behavior of customers is necessary. By understanding how technical advancement affects the caliber of digital financial services, these study avenues will provide future service development with a solid scientific foundation.

Compliance with ethical standards

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Disclosure of conflict of interest

The authors declare no conflicts of interest.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

Data Availability Statement

The corresponding authors will make the raw data supporting this article's conclusions available upon reasonable request. Informed consent was obtained from all subjects involved in the study.

Author Contributions

- Vannam LE: Conceptualization, Methodology, Software
- Thi Kim Lien HOANG: Investigation, Resources, Data Curation
- Vannam LE and Thi Kim Lien HOANG: Writing original draft, Writing review & editing
- All authors have read and agreed to the published version of the manuscript.

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