THE IMPACT OF MOBILE BANKING APP SERVICE QUALITY ON CUSTOMER SATISFACTION: A SEM APPROACH IN VIETNAM

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Abstract: ***This study examines the impact of mobile banking app service quality on customer satisfaction in Vietnam. Data from 400 valid surveys were analyzed using SPSS 24 and AMOS 20 with EFA, CFA, and SEM. The findings show that five dimensions including mobile app integration and continuity (MIC), AI support quality (MAS), personalization (MAP), biometric login (BSL), and data privacy (DPC) all have positive effects on customer satisfaction. Among these factors, personalization, AI support, and data security have the strongest influence. The study contributes to the literature on digital banking service quality and provides practical implications for improving customer experience, trust, and satisfaction in the context of digital transformation.***

• Keywords: *mobile banking applications, customer satisfaction, structural equation modeling (SEM).*

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1. Introduction

Digital transformation has accelerated mobile banking, making apps a key service channel where users expect convenience, stability, and security. Prior studies confirm that service quality strongly affects user experience, trust, and satisfaction (Ho et al., 2025). Recent research also emphasizes the role of modern features such as AI support, biometric authentication, and data control, suggesting that traditional models like SERVQUAL may be insufficient (Lopes, 2025; Schrank, 2025). In Vietnam, empirical evidence shows that service quality significantly influences customer satisfaction, with factors such as responsiveness, reliability, transaction speed, security, system quality, and trust playing key roles (Nguyen, 2024; Nguyen, 2025). However, gaps remain as existing studies rarely incorporate emerging technologies like AI, personalization, and data privacy, and still rely on traditional SERVQUAL dimensions. This study addresses these gaps by proposing an SEM model with five constructs: MIC, MAS, MAP, BSL, and DPC, to better explain mobile banking service quality in Vietnam.

2. Literature review

2.1. Mobile banking service quality

Service quality is a cornerstone of marketing, with SERVQUAL and E-SERVQUAL serving as key foundations (Parasuraman et al., 1988; Zeithaml et al., 2002). In mobile banking, these traditional dimensions are often inadequate. Recent research suggests expanding frameworks to include technology related factors like AI, biometrics and data security. As mobile banking operates as a technology platform, users' technology readiness may also shape the links between quality, satisfaction and loyalty (Ho et al., 2025). Thus, service quality should be treated as a multidimensional construct covering functional and technological aspects to reflect current digital requirements.

2.2. Components of mobile banking service quality

1) Mobile app integration and continuity (MIC): Refers to seamless system synchronization and uninterrupted services. Integration of functions like payments and investments enhances convenience, perceived value, and customer loyalty (Nguyen, 2025).

2) Mobile app AI support quality (MAS): AI improves service through chatbots and behavioral analytics, enabling 24/7 support, higher efficiency, and early fraud detection, thereby enhancing trust (Lopes, 2025; Schrank, 2025).

3) Mobile app personalization (MAP): Tailored services and notifications enhance user experience and are key drivers of satisfaction and loyalty, especially when aligned with individual needs (Nguyen, 2024).

4) Biometric and seamless login (BSL): Biometric authentication increases security and convenience, reduces access barriers, and improves transaction efficiency, which is highly relevant in Vietnam (Ho et al., 2025; Nguyen, 2025).

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5) Data privacy and control (DPC): Ensuring user control over data and transparent privacy policies strengthens trust and long-term satisfaction, while weak protection can lead to loss of confidence and switching behavior.

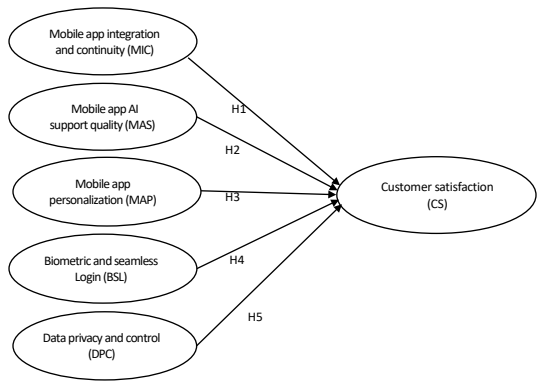
2.3. Customer satisfaction (CS) and its relationship with service quality

Customer satisfaction (CS) is the positive emotional state when service performance meets or exceeds expectations. In mobile banking, service quality factors such as reliability, speed and security directly drive CS (Ho et al., 2025; Nguyen, 2025). Vietnamese studies confirm these elements foster long term trust and positive word of mouth (Nguyen, 2024). Furthermore, CS acts as a vital mediator between service quality and outcomes like re-use intention (Lopes, 2025). Consequently, this study utilizes an SEM model to evaluate these relationships within the Vietnamese commercial banking sector.

3. Proposed research model and hypotheses

Based on service quality theory (Parasuraman et al., 1988; Zeithaml et al., 2002) and recent studies on digital banking services (Ho et al., 2025; Nguyen, 2025), this study proposes a conceptual framework to examine the relationship between service quality components of mobile banking applications and customer satisfaction.

Figure 1-Proposed research model



Specifically, five independent variables including: Mobile app integration and continuity (MIC), Mobile app AI support quality (MAS), Mobile app personalization (MAP), Biometric and seamless login (BSL), Data privacy and control (DPC) are assumed to have a direct and positive impacts on the dependent variable Customer satisfaction (CS). On that basis, five hypotheses are formed as follows:

H1: Mobile app integration and continuity (MIC) has a positive impact on customer satisfaction.

H2: Mobile app AI support quality (MAS) has a positive impact on customer satisfaction.

H3: Mobile app personalization (MAP) has a positive impact on customer satisfaction.

H4: Biometric and seamless login (BSL) has a positive impact on customer satisfaction.

H5: Data privacy and control (DPC) has a positive impact on customer satisfaction.

4. Research methodology

4.1. Research design

This quantitative study examines the impact of mobile banking service quality on customer satisfaction in Vietnam. The analysis follows three steps: reliability testing using Cronbach's alpha, validation through CFA, and hypothesis testing using SEM (Hair et al., 2022). Model fit is evaluated using indices such as CMIN/df, CFI, TLI, IFI, RMSEA, and PCLOSE. SEM is applied due to its ability to analyze multiple relationships simultaneously and its flexibility for future model extensions.

4.2. Sample and data collection

The study surveyed mobile banking users in Vietnam using convenience sampling across major banks (Nguyen, 2024). From June to August 2025, 450 questionnaires were distributed via online and direct methods, resulting in 400 valid responses, exceeding the minimum required sample size (Hair et al., 2019). A pilot test with 30 participants was conducted to refine the questionnaire. Ethical standards were ensured, including informed consent, confidentiality, and the right to withdraw.

4.3. Measurement instrument

The variables in the research model are measured using a 5-point Likert scale (1 = completely disagree, 5 = completely agree). The scale is inherited and adjusted from recent international studies, combined with researches in Vietnam to ensure the context suitability.

Table 1-Constructs, number of items and sources of measurement

Factor/Code	Number of items	Description	Sources of Measurement
Mobile app integration and continuity (MIC)	4	Inheriting the system quality scale in the ISS model, adding efficiency and system availability factors in e-banking services.	Malc (2023); Akin (2023)
Mobile app AI support quality (MAS)	4	Inheriting the AISQUAL scale, adding AI chatbot elements, artificial intelligence and the level of humanization in mobile banking.	Noor et al. (2022); Chen et al. (2022); Lee & Chen (2023)
Mobile app personalization (MAP)	4	Inheriting elements that create a personalized feel, design and customize mobile banking services.	De Keyzer et al. (2022); Malc (2023)

Factor/Code	Number of items	Description	Sources of Measurement
Biometric and seamless login (BSL)	4	Inheriting research on biometric mobile payment systems, adding convenience and usability when logging in.	Cabanillas et al. (2024); Amirkhalili & Wong (2025)
Data privacy and control (DPC)	4	Inheriting the security and privacy scale in e-banking, adding the element of transparency in data sharing policy.	Nguyen (2025); Akin (2023); Xu et al. (2012)
Customer satisfaction (CS)	3	Inheriting the basic satisfaction scale and adjusting it for the mobile banking context in Vietnam.	Nguyen (2024)

Source: Compiled by the authors based on prior studies

4.4. Data analysis methods

Data were analyzed using SPSS 24 and AMOS 20. Descriptive statistics were first applied, followed by reliability testing using Cronbach's Alpha (≥ 0.7) and item-total correlation (> 0.3) (Nunnally and Bernstein, 1994). EFA was used to refine constructs, and CFA validated the measurement model with factor loadings > 0.5, AVE > 0.5, and CR > 0.7. Discriminant validity was confirmed using Fornell-Larcker (1981) and HTMT < 0.85 (Henseler et al., 2015). SEM was then employed to test hypotheses, with model fit assessed by $\chi 2/df < 3$, CFI and TLI > 0.9, and RMSEA and SRMR < 0.08 (Hu & Bentler, 1999). Hypotheses were accepted at $p < 0.05$.

5. Results

5.1. Descriptive statistics of respondents

Table 2- Respondents' demographic profile (n = 400)

Variable	Frequency	Percent (%)
Gender		
Male	212	53
Female	188	47
Age		
Under 30 years old	181	45.3
From 30 TO 40	128	32
Over 40	91	22,8
Region		
In the North	150	37.5
In the Middle	100	25
In the South	150	37.5
Job		
State servant	66	16.5
Company employee	145	36.3
Student	95	23.8
Other	94	23.5
Education Attainment		
Below university level	218	54.5
Bachelor degree	158	39.5
Master's degree and above	24	6
Length of Service Use		
Less than 2 year	62	15.5
From 2 to 5 years	156	39
More than 5 years	182	45.5

Source: Compiled by the authors

The study analyzed 400 valid responses with a balanced gender distribution (53% male, 47% female). Most participants were under 30 (45.3%), followed by those aged 30 to 40 (32%). The North and South each accounted for 37.5% of the sample, while the Central region made up 25%. Company employees (36.3%) and students (23.8%) were the main occupational groups.

In terms of education, 54.5% had below university level and 39.5% held bachelor's degrees. Most respondents were experienced users, with 45.5% using services for over five years and 39% for two to five years. This diversity and experience provide a reliable basis for analysis.

5.2. Descriptive analysis of factors

Table 3- Descriptive statistics for mobile banking app factors and customer satisfaction

Construct	Mean (M)	Std. Deviation (SD)
Mobile app AI support quality (MAS)	3.46	0.69
Data privacy and control (DPC)	3.48	0.80
Mobile app personalization (MAP)	3.34	0.77
Mobile app integration and continuity (MIC)	3.52	0.72
Biometric and seamless login (BSL)	3.51	0.76
Customer satisfaction (CS)	3.54	0.60

Source: Compiled by the authors

Factor means range from 3.34 to 3.54 on a 5-point Likert scale. Customer satisfaction (CS) achieved the highest score (M = 3.54, SD = 0.60), reflecting generally positive perceptions of mobile banking services. High ratings were also observed for integration and continuity (MIC) (M = 3.52) and biometric login (BSL) (M = 3.51), indicating that users value convenience and secure access.

In contrast, personalization (MAP) recorded the lowest mean (M = 3.34), while AI support (MAS) and data privacy (DPC) remained at moderate levels. These results suggest that while core functions are well received, improvements in personalization and AI quality are necessary to further enhance the user experience.

5.3. Reliability analysis

Table 4 -Cronbach's Alpha for factors

Factors	No. of Items	Cronbach's Alpha (α)
Mobile app AI support quality (MAS)	4	0.840
Data privacy and control (DPC)	4	0.862
Mobile app personalization (MAP)	4	0.894
Mobile app integration and continuity (MIC)	4	0.868
Biometric and seamless login (BSL)	4	0.882
Customer satisfaction (CS)	3	0.959

Source: Compiled by the authors

Table 4 shows that all scales have Cronbach's Alpha values above 0.8, exceeding the 0.7 threshold (Nunnally & Bernstein, 1994), indicating high reliability. MAP (0.894), BSL (0.882), and MIC (0.868) demonstrate very strong consistency, while DPC (0.862) and MAS (0.840) are also reliable. The CS scale achieves an excellent value of 0.959. Overall, all scales are reliable and suitable for further CFA to assess validity.

5.4. Exploratory factor analysis (EFA)

Table 5-Results of exploratory factor analysis (EFA)

Indicator	Value
Kaiser-Meyer-Olkin - KMO	.879
Measure of Sampling	6147.467 (df = 253, p < 0.001
Number of Components (Eigenvalue > 1)	6
Cumulative Variance Explained	73.435

Source: Compiled by the authors

Table 5 confirms the suitability of the data for factor analysis, with KMO = 0.879 (> 0.7) and Bartlett's Test significant (p < 0.001). Six factors with Eigenvalues > 1 were extracted, consistent with the proposed model. The total variance explained is 73.435%, exceeding the 50% threshold. Overall, the EFA results support the scale structure and provide a basis for CFA to test validity.

5.5. Confirmatory factor analysis (CFA)

CFA results for the mobile banking service quality and customer satisfaction model indicate an excellent fit. Model fit indices meet all recommended thresholds: chi-square/df = 1.706 (< 3), CFI = 0.975, TLI = 0.970, NFI = 0.942, RMSEA = 0.042 (< 0.08) and PCLOSE = 0.964 (> 0.05). These values confirm the measurement model's high explanatory power and lack of fit violations, providing a reliable basis for subsequent SEM.

Table 6- Summary of CFA results

Construct	Cronbach's α	CR	AVE	Conclusion
MAP1234	0.894	.895	.682	Reliable, valid
BSL1234	0.882	.884	.656	Reliable, valid
DCP1234	0.862	.865	.618	Reliable, valid
MIC1234	0.868	.871	.629	Reliable, valid
MAS1234	0.840	.842	.570	Reliable, valid
CS123	0.959	.961	.892	Reliable, valid

Source: Compiled by the authors

Table 6 confirms the scales' reliability and convergent validity. Cronbach's Alpha (0.840–0.959) and Composite Reliability (0.842–0.961) both exceed the 0.7 threshold. Furthermore, all AVE values range from 0.570 to 0.892, surpassing the required 0.5 and demonstrating that the latent factors explain most of the observed variance. Notably, the CS123 scale shows exceptional reliability (CR = 0.961, AVE = 0.892). Overall, these CFA results establish a statistically sound foundation for the following SEM analysis.

Table 7-HTMT Ratios among Constructs

Construct	HTMT					
	MAP1234	BSL1234	DCP1234	MIC1234	MAS1234	CS123
MAP1234	–	.266	.590	.453	.126	.603
BSL1234		–	.263	.426	.126	.387
DCP1234			–	.371	.239	.599
MIC1234				–	.134	.538
MAS1234					–	.436
CS123						–

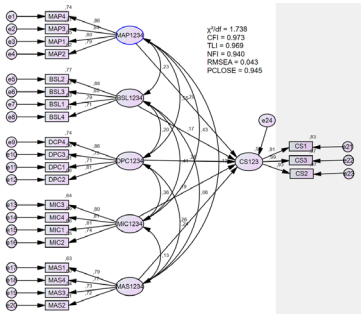
Source: Compiled by the authors
Note: All HTMT values < 0.85 (Henseler et al., 2015), confirming discriminant validity.

Discriminant validity was assessed using the Heterotrait-Monotrait Ratio (HTMT). According to Henseler et al. (2015), values must be below 0.85 to confirm distinct conceptual structures. As shown in Table 7, all HTMT values range from 0.126 to 0.603, well below the threshold. This confirms that the scales do not overlap and each represents a separate concept, strengthening the evidence for a solid measurement model before conducting SEM.

5.6. Structural model and hypotheses testing

After testing the measurement model using CFA, the study continued to conduct structural equation modeling (SEM) analysis to test the hypothesized relationships between independent factors and customer satisfaction. Figure 3 illustrates the SEM model with standardized estimated coefficients. Model fit indices are also reported to assess the compatibility between the theoretical model and the empirical data.

Figure 2- SEM for Mobile banking app service quality and Customer satisfaction



Source: Compiled by the authors

The SEM results show a good model fit, with all indices meeting required thresholds (χ^2/df = 1.738, CFI = 0.973, TLI = 0.969, NFI = 0.940, RMSEA = 0.043, PCLOSE = 0.945), confirming model reliability. All five factors positively affect customer satisfaction. MIC and BSL have the strongest impact, followed by DPC and MAP, while MAS has the weakest effect. Overall, the findings confirm that mobile banking service quality significantly enhances customer satisfaction, supporting the research model.

Table 8- Standardized regression Weights, Standard errors, Critical ratios and hypothesis testing

Hypo-thesis	Path	Estimate (β)	S.E.	C.R.	p-value	Result
H1	MIC → CS	0.187	0.042	4.006	***	Supported
H2	MAS → CS	0.264	0.035	6.490	***	Supported
H3	MAP → CS	0.286	0.037	5.855	***	Supported
H4	BSL → CS	0.174	0.032	4.188	***	Supported
H5	DPC → CS	0.257	0.034	5.266	***	Supported

Source: Compiled by the authors

*Note: *** p < 0.001; ** p < 0.01; * p < 0.05. The model explains 58.2% of the variance in Customer Satisfaction (R^2 = 0.582).*

Table 8 shows that all hypotheses (H1–H5) are supported with positive and significant effects ($p < 0.001$), confirming that all service quality factors enhance customer satisfaction. MAP has the strongest impact ($\beta = 0.286$), followed by MAS ($\beta = 0.264$) and DPC ($\beta = 0.257$), highlighting the importance of personalization, AI support, and data security. MIC ($\beta = 0.187$) and BSL ($\beta = 0.174$) also have significant but smaller effects. The model explains 58.2% of the variance in customer satisfaction ($R^2 = 0.582$), indicating strong explanatory power.

6. Discussion

The results show that all five factors MAP, MAS, DPC, MIC, and BSL have positive and significant effects on customer satisfaction, aligning with prior studies that emphasize the growing importance of personalization and AI in digital banking (Ali et al., 2023). In particular, AI-driven features enhance both engagement and trust (Ahmed et al., 2024), while biometric authentication improves perceptions of security and convenience (Kumari & Gupta, 2023; Hussain et al., 2024).

A key contribution of this study is the integration of these five dimensions into a unified model, extending traditional frameworks that mainly focused on reliability and convenience (Parasuraman et al., 1988; Zhou, 2013). The findings highlight that MAP and MAS are the most influential factors, underscoring the critical role of intelligent and personalized services in modern banking. At the same time, the significant effects of DPC and MIC reflect increasing customer expectations for data security and seamless system performance. Although BSL has the smallest coefficient, it remains an essential feature in enhancing user experience.

Overall, the model explains 58.2% of the variance in customer satisfaction, indicating strong explanatory power. This confirms the importance of integrating both traditional service quality elements and advanced technological factors, providing robust empirical support for contemporary digital banking models.

7. Conclusion and implications

7.1. Conclusion

This study has built and tested a model to measure the quality of mobile banking application services with five independent factors (Mobile app integration and continuity, Mobile app AI support quality, Mobile app personalization, Biometric and seamless login, Data privacy and control) and one dependent factor which is Customer satisfaction. Through EFA, CFA and SEM analysis, the results show that all scales have achieved reliability and validity, the structural model fits the data well and all five hypotheses are accepted. In which, personalization (MAP), AI support quality (MAS) and data security (DPC) are the three factors that have the strongest impacts on customer satisfaction, followed by integration - continuity (MIC) and biometric login (BSL).

7.2. Managerial implications

The findings suggest several key implications for banks and digital service providers. First, personalization should be prioritized by tailoring interfaces, recommendations, and services based on customer behavior to enhance satisfaction and loyalty. Second, banks should strengthen AI-based support systems such as chatbots and real-time analytics to improve service efficiency, responsiveness, and customer trust. Third, ensuring data security and transparency is essential. Investing in encryption, privacy controls, and clear communication helps build long-term trust in digital services. Fourth, optimizing login processes through biometric authentication and seamless system performance can significantly improve user experience and perceived service quality. Overall, these strategies help enhance customer satisfaction, loyalty, and competitive advantage in the digital banking environment.

References:

Akin, O. (2023). Evaluation of e-service quality of mobile banking services with E-S-QUAL model. Eurasian Journal of Social Sciences, 46(5), 61–74.

Chen, Q., Gong, Y., Lu, Y., & Tang, J. (2022). Classifying and measuring the service quality of AI chatbot in frontline service. Journal of Business Research, 145.

De Keyzer, F., Vanderborght, O., Bailly, N., & Swinnen, A. (2022). Let's get personal: Which elements elicit perceived personalization? Telematics and Informatics, 71, 101778.

Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2022). A primer on partial least squares structural equation modeling (PLS-SEM) (3rd ed.). Sage.

Ho, H., Han, S.-M., Cha, J., & Pham, L. (2025). Mobile banking customer satisfaction and loyalty: The roles of technology readiness. Journal of Risk and Financial Management, 18(7), 403.

Hussain, M., Rahman, M., & Khan, A. (2024). Customer authentication in mobile banking: MLOps practices and AI-driven biometric authentication systems. ResearchGate.

Kumari, S., & Gupta, N. (2023). AI and machine learning in mobile banking security: Enhancing biometric authentication. ThinSlices Insights.

Lee, C. H., & Chen, H. (2023). Artificial intelligence in mobile banking: The role of perceived intelligence and anthropomorphism. Humanities and Social Sciences Communications, 10, 223.

Liébana-Cabanillas, F., Ramos-de-Luna, I., & Molinillo, S. (2024). Biometric m-payment systems: A multi-analytical approach to determining use intention. Journal of Business Research. Advance online publication.

Lopes, J. M. (2025). The role of artificial intelligence in mobile banking. Future Business Journal, 11(1), 125.

Malc, D. (2023). Developing and validating a measurement scale for electronic service quality in mobile banking. Sustainability, 15(16), 12659.

Noor, N., Hill, S. R., & Troshani, I. (2022). Developing a service quality scale for artificial intelligence service agents (AISAQUAL). European Journal of Marketing, 56(5), 1301–1336.

Nguyen, N. H. T. (2024). Factors influencing customer satisfaction towards internet banking service: Case study of Vietnam. Journal of Economics, Finance and Management Studies, 7(5), 2325–2336. https://doi.org/10.47191/jefms/v7-i5-06

Nguyen, T. K. Q. (2025). E-banking service quality and customer satisfaction with moderator factor. Emerging Science Journal, 9(2), 725–740.

O., & Bogoevska-Gavrilova, I. (2025). Service quality in mobile banking: Theories, constructs, contexts and methods – A systematic review. International Journal of Bank Marketing, 43(6), 1195–1230.

Parasuraman, A.; Zeithaml, V.A.; Berry, L.L. (1988). SERVQUAL: A Multiple-Item Scale for Measuring Consumer Perceptions of Service Quality. Journal of Retailing.

Schrank, J. (2025). The impact of artificial intelligence on behavioral intentions in financial services. Frontiers in Artificial Intelligence, 8, 1649392. https://doi.org/10.3389/frai.2025.1649392

Zeithaml, V.A., Parasuraman, A., & Malhotra, A. (2002). Service quality delivery through web sites: A critical review of extant knowledge. Journal of the Academy of Marketing Science, 30(4), 362–375.