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Critical Factors Affecting Customer Loyalty at the Digital Banks in Vietnam: The Moderating Role of Digital Competence

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ABSTRACT

The rapid growth of digital banking has intensified competition in the financial sector, making customer loyalty a critical factor for sustainable development, particularly in emerging economies such as Vietnam. This study aims to identify the key determinants of customer loyalty at digital banks and to examine the moderating role of digital competence. Drawing on relationship marketing theory and information systems success theory, the proposed research model integrates five antecedents, including customer trust, service quality, multi-channel integration, web quality, and perceived security and privacy, along with digital competence as both a direct predictor and a moderating variable. A mixed-methods approach was employed. Qualitative discussions with 45 banking managers in Ho Chi Minh City were conducted to refine the measurement scales. Quantitative data were collected through an online survey of digital banking customers in Ho Chi Minh City and Dong Nai province, yielding 570 valid responses. The data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS 4.0. The results reveal that all proposed factors have significant positive effects on customer loyalty, with perceived security and privacy exerting the most decisive influence. Digital competence not only directly enhances customer loyalty but also positively moderates the relationship between customer trust and customer loyalty. These findings provide important theoretical contributions by extending digital banking loyalty research in an emerging market context and offer practical implications for digital banks seeking to strengthen customer retention through trust-building, enhanced security, and improved digital capabilities.

INTRODUCTION

The rapid advancement of digital technologies has fundamentally transformed the global banking industry, reshaping how financial services are designed, delivered, and consumed (Adam et al., 2021; Verhoef et al., 2015). Digital banking, characterized by the extensive use of mobile applications, internet platforms, and integrated digital channels, has become a strategic priority for banks seeking to enhance operational efficiency and customer reach (Soeharso, 2024; Raza et al., 2020). In emerging economies

such as Vietnam, the adoption of digital banking has accelerated significantly in recent years, driven by widespread smartphone usage, government initiatives promoting cashless payments, and the growing digital literacy of the population. In this context, understanding the determinants of customer loyalty in digital banking environments has become an increasingly important research agenda.

Customer loyalty is widely recognized as a critical driver of long-term profitability, sustainability, and competitive advantage in the banking sector (Paul et al., 2016). Loyal customers are more likely to continue using banking services, engage in cross-buying, and generate positive word of mouth, while exhibiting lower price sensitivity and reduced switching behavior (Ladhari, 2009; Kashyap et al., 2024). However, in digital banking, customer loyalty is more challenging to sustain due to the intangible nature of services, limited face-to-face interaction, and low switching costs between digital platforms. Consequently, digital banks must rely on a combination of relational and technological factors to foster enduring customer relationships (Hamouda, 2019).

Existing studies on digital banking loyalty have predominantly focused on isolated determinants such as service quality, perceived usefulness, or trust. While these studies provide valuable insights, they often overlook the complex and interactive effects of multiple factors that jointly influence customer loyalty in technology-driven financial services (Dhingra et al., 2020; Amin et al., 2013). Moreover, most prior research has been conducted in developed economies, limiting the generalizability of findings to emerging markets, where institutional conditions, technological readiness, and customer characteristics differ substantially. Vietnam, as a rapidly developing digital economy with a dynamic banking sector, offers a compelling context for extending digital banking loyalty research.
Trust remains a cornerstone of customer–bank relationships, particularly in digital environments where perceived risk and information asymmetry are high. Customers must trust that digital banks are reliable, competent, and capable of safeguarding their financial transactions and personal information (Alharthi et al., 2022; Fauzi & Suryani, 2019). Alongside trust, service quality continues to play a vital role in shaping customer perceptions and behavioral intentions. In digital banking, service quality encompasses not only traditional dimensions such as reliability and responsiveness but also system efficiency and personalization enabled by digital technologies.

In addition to relational factors, technology-related attributes are increasingly important in determining customer loyalty. Multi-channel integration allows customers to seamlessly interact with banks across mobile, online, and offline platforms, enhancing convenience and consistency in service delivery (Kumar & Mokha, 2022). Web quality, reflected in system usability, interface design, and information accuracy, directly affects customer experience and satisfaction during digital interactions. Furthermore, perceived security and privacy have emerged as critical concerns in digital banking, as cyber threats and data breaches continue to undermine customer confidence. Customers who perceive digital banking platforms as secure are more likely to develop trust and maintain long-term relationships with banks.
Another important yet underexplored factor in digital banking research is digital competence, the ability of customers to use digital technologies and online services effectively. In emerging markets such as Vietnam, digital competence varies considerably across demographic groups, influencing how customers perceive and interact with digital banking platforms (Gonu et al., 2023). Customers with higher digital competence are generally more confident in using digital services, better able to evaluate system reliability, and less susceptible to technology-related anxiety. As a result, digital competence may not only directly enhance customer loyalty but also strengthen the effects of other determinants, particularly customer trust (Kant & Jaiswal, 2017).

Against this background, the present study aims to investigate the key factors affecting customer loyalty in digital banks in Vietnam by developing and empirically testing an integrated research model. Specifically, this study examines the effects of customer trust, service quality, multi-channel integration, web quality, and perceived security and privacy on customer loyalty, while also exploring the direct and moderating role of digital competence. By employing a mixed-methods approach and Partial Least Squares Structural Equation Modeling (PLS-SEM), this research seeks to contribute to the literature on digital banking and customer loyalty and to provide practical insights for bank managers seeking to enhance customer retention in an increasingly digitalized financial landscape.

1. THEORETICAL FRAMEWORK AND HYPOTHESIS DEVELOPMENT

1.1. Theoretical Foundations

The present study is grounded in an integrated theoretical framework that combines insights from relationship marketing theory, the information systems (IS) success model, and technology acceptance theory to explain customer loyalty in digital banking contexts (Kumar & Lata, 2021). Relationship marketing theory emphasizes the importance of long-term relationships built on trust, commitment, and value creation between service providers and customers. In banking services, where offerings are largely intangible and high in credence attributes, strong relational bonds are essential for fostering customer loyalty (Yilmaz et al., 2018; Zhao et al., 2022; Oliver, 1999).

Complementing this perspective, the IS success model highlights the role of system quality, information quality, and service quality in shaping users' satisfaction and behavioral intentions toward information systems (Supriyanto et al., 2021). In digital banking, websites and mobile applications function as primary service interfaces, making technological attributes such as web quality, system reliability, and security central to customer evaluations. Technology acceptance theory further suggests that users' perceptions of ease of use, usefulness, and technological competence influence their adoption and continued use of digital systems. Together, these theoretical perspectives provide a comprehensive lens for examining how relational and technological factors jointly determine customer loyalty in digital banking.

1.2. Customer Trust and Customer Loyalty

Customer trust refers to customers' belief that a bank is reliable, honest, and capable of delivering promised services while safeguarding customers' interests in a digital environment. In digital banking, trust plays a particularly critical role due to the absence of physical interactions and the heightened perceived risk associated with online financial transactions (Singh & Singh, 2024). Customers must trust not only the bank as an institution but also the digital platforms through which services are delivered. Prior research consistently demonstrates that trust reduces perceived uncertainty and risk, thereby increasing customers' willingness to engage in long-term relationships with service providers (Boonlertvanich, 2019; Wolfinbarger & Gilly, 2003). In the context of digital banking, trust has been found to influence continuance intention, satisfaction, and loyalty positively. When customers trust a digital bank, they are more likely to use its services repeatedly, resist switching to competitors, and recommend it to others. Accordingly, this study proposes the following hypothesis:

H1: Customer Trust positively influences Customer Loyalty.

1.3. Service Quality and Customer Loyalty

Service quality is defined as customers' overall evaluation of the excellence and performance of a bank's services. In digital banking, service quality extends beyond traditional dimensions such as reliability and responsiveness to include system efficiency, accuracy, and the ability to deliver timely, personalized services through digital channels (Boonlertvanich, 2019; Parasuraman et al., 1988). High service quality enhances customer satisfaction and strengthens the emotional bond between customers and banks. Numerous empirical studies have confirmed the positive relationship between service quality and customer loyalty in both traditional and digital banking contexts. Customers who perceive digital banking services as reliable, efficient, and responsive are more inclined to continue using them and develop long-term loyalty. Based on these arguments, the following hypothesis is formulated:

H2: Service Quality positively influences Customer Loyalty.

1.4. Multi-channel Integration and Customer Loyalty

Multi-channel integration refers to the degree to which different service channels, such as mobile banking, internet banking, call centers, and physical branches, are seamlessly coordinated to provide a consistent customer experience (Prentice et al., 2020; Saleem et al., 2016). In the digital era, customers increasingly interact with banks through multiple channels and expect smooth transitions between them. Effective multi-channel integration enhances customer convenience, reduces service disruptions, and improves overall service consistency (Yousafzai et al., 2003; Shaikh & Karjaluoto, 2015). Previous studies suggest that well-integrated channels increase customer satisfaction and engagement, which in turn foster customer loyalty. In digital banking, the ability to access services anytime, anywhere, across multiple channels, is a key competitive advantage. Therefore, this study proposes:

H3: Multi-channel Integration positively influences Customer Loyalty.

1.5. Web Quality and Customer Loyalty

Web quality refers to customers' perceptions of a digital bank's website or mobile application, including usability, visual design, information quality, and system reliability (Tabrani et al., 2018; Ladhari et al., 2011). As digital platforms serve as primary interfaces between banks and customers, web quality plays a crucial role in shaping customer experiences. High web quality reduces transaction errors, enhances ease of use, and increases customers' confidence in digital banking platforms (Gunasekar et al., 2021; Ariffin et al., 2018). Prior research in e-services and online banking has shown that web quality significantly influences customer satisfaction, trust, and loyalty. Customers who perceive digital banking platforms as user-friendly and reliable are more likely to maintain long-term relationships with banks. Accordingly, the following hypothesis is proposed:

H4: Web Quality positively influences Customer Loyalty.

1.6. Perceived Security and Privacy and Customer Loyalty

Perceived security and privacy refer to customers' beliefs regarding the protection of their personal and financial information when using digital banking services (Caruana, 2002). Security and privacy concerns remain among the most significant barriers to digital banking adoption, particularly in emerging markets where awareness of cyber risks is increasing (Dam & Dam, 2021; Kalia et al., 2021; Solimun & Fernandes, 2018). When customers perceive digital banking platforms as secure and trustworthy, they are more willing to engage in online transactions and maintain long-term relationships with banks. Empirical studies consistently demonstrate that perceived security and privacy positively influence trust, satisfaction, and loyalty in digital financial services. Therefore, this study posits:

H5: Perceived Security and Privacy positively influence Customer Loyalty.

1.7. Digital Competence and Customer Loyalty

Digital competence refers to customers' ability to effectively use digital technologies, including mobile applications, online platforms, and electronic payment systems (Shankar & Jebarajakirthy, 2019; Bolton et al., 2018). In emerging economies such as Vietnam, digital competence varies significantly across individuals due to differences in education, age, and exposure to technology. Customers with higher digital competence tend to experience lower technology-related anxiety, greater perceived ease of use, and stronger engagement with digital banking services (Endara et al., 2019). As a result, digital competence is expected to directly enhance customer loyalty by facilitating more positive user experiences. Based on this reasoning, the following hypothesis is proposed:

H6: Digital Competence positively influences Customer Loyalty.

1.8. Moderating Role of Digital Competence

Beyond its direct effect, digital competence may also moderate the relationship between customer trust and customer loyalty (Arli et al., 2024; Mugova et al., 2025). Customers with higher digital competence are better able to evaluate digital banking systems, understand security mechanisms, and interpret online information, thereby strengthening the effect of trust on loyalty (Omoregie et al., 2019). In contrast, customers with lower digital competence may rely more on traditional banking interactions and be less influenced by trust in digital platforms. This moderating perspective is supported by technology acceptance theory, which emphasizes the role of individual capabilities in shaping technology-related behaviors. Accordingly, this study proposes:

H7: Digital Competence positively moderates the relationship between Customer Trust and Customer Loyalty.

1.9. Proposed Research Framework

Based on the above theoretical arguments, this study proposes an integrated research framework in which Customer Trust, Service Quality, Multi-channel Integration, Web Quality, and Perceived Security and Privacy directly influence Customer Loyalty. At the same time, Digital Competence exerts both a direct effect on Customer Loyalty and a moderating effect on the relationship between Customer Trust and Customer Loyalty. This framework provides a comprehensive basis for empirically examining customer loyalty in digital banking within the Vietnamese context.

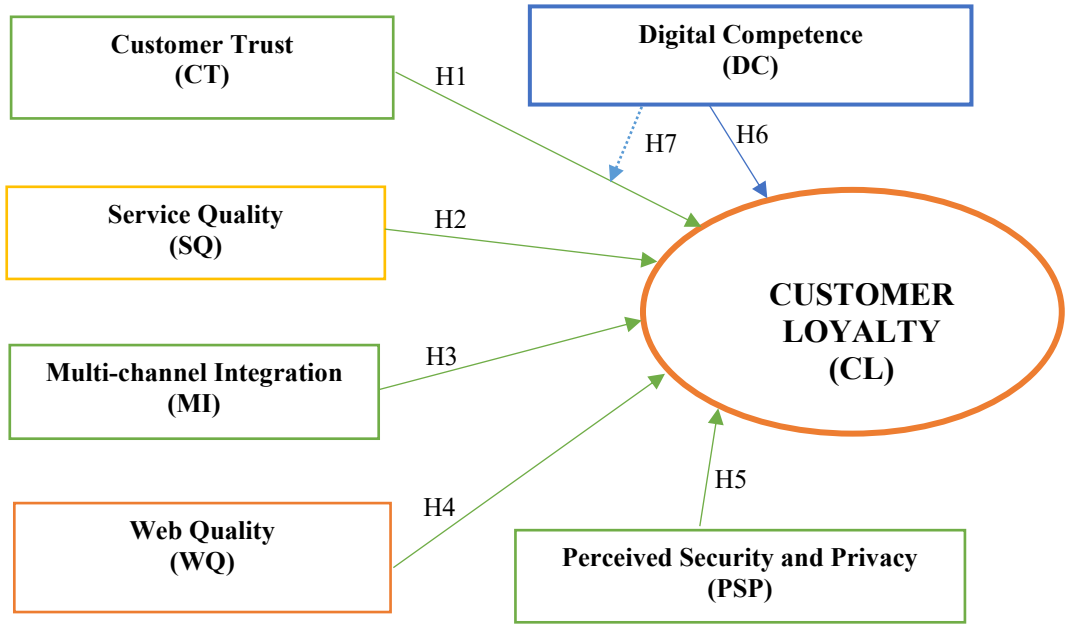

Figure 1. A research model for critical factors influencing customer loyalty

Figure 1 presents the proposed research model examining the key factors influencing customer loyalty in the context of digital banking. Customer Loyalty (CL) is positioned as the central dependent variable. It is directly affected by five antecedents: Customer Trust, Service Quality, Multi-channel Integration, Web Quality, and Perceived Security and Privacy. In addition, Digital Competence plays a dual role in the model by exerting a direct effect on Customer Loyalty and moderating the relationship between Customer Trust and Customer Loyalty. Overall, the model highlights the combined influence of relational and technological factors in shaping customer loyalty in digital banking services in Vietnam.

2. RESEARCH METHODOLOGY

2.1 Qualitative Research Method

This study employed a qualitative research approach as an initial step to develop a robust conceptual framework and refine the measurement scales used in the subsequent quantitative analysis. The qualitative phase aimed to ensure content validity and contextual relevance of the research constructs within the digital banking environment in Vietnam.

Data were collected through in-depth group discussions with 45 banking managers directly involved in digital banking operations, strategy, and customer service management in Ho Chi Minh City, Vietnam's most significant financial and commercial hub. The participants were selected through purposive sampling to ensure they had substantial professional experience and practical insights into digital banking services and customer behavior. Their average managerial experience exceeded 5 years, particularly in digital transformation, service quality management, and customer relationship management (Hair et al., 2019).

The discussion sessions focused on identifying key factors influencing customer loyalty in digital banking, evaluating the relevance and clarity of measurement items adapted from prior studies, and exploring emerging issues specific to the Vietnamese context, such as digital literacy gaps and security concerns. Open-ended questions were used to encourage participants to share their perspectives freely, enabling a comprehensive understanding of both the relational and technological dimensions of digital banking.

The qualitative data were analyzed using thematic analysis. Key themes and recurring patterns were identified and compared with existing theoretical frameworks and empirical findings from the literature. Based on the insights obtained, several measurement items were refined, reworded, or eliminated to enhance clarity and suitability for Vietnamese digital banking customers. The results of this qualitative phase played a crucial role in shaping the final research model and questionnaire design, thereby providing a solid foundation for the subsequent quantitative study.

2.2 Quantitative Research Method

Following the qualitative phase, a quantitative research approach was employed to test the proposed research model and hypotheses empirically. The quantitative stage aimed to examine the relationships among customer trust, service quality, multi-channel integration, web quality, perceived security and privacy, digital competence, and customer loyalty in the context of digital banking in Vietnam.

Data Collection and Sample: Data were collected through an online survey administered to customers who actively use digital banking services. The survey was conducted in Ho Chi Minh City and Dong Nai province, two economically dynamic regions with high levels of digital banking adoption. A non-probability convenience sampling method was applied due to the accessibility of respondents and the exploratory nature of the study within an emerging market context (Hair et al., 2019).

A total of 600 questionnaires were distributed via email and social media platforms. After screening for completeness and consistency, 570 valid responses were retained for analysis, yielding a high response rate and exceeding the minimum sample size recommended for Partial Least Squares Structural Equation Modeling (PLS-SEM). This sample size is considered adequate to ensure statistical power and reliability of the results.

Measurement Instrument: The questionnaire was developed based on validated measurement scales adapted from prior studies in digital banking, electronic services, and information systems literature. All constructs were measured using multiple items on a five-point Likert scale, ranging from 1 (“strongly disagree”) to 5 (“strongly agree”). The measurement items were refined based on insights from the qualitative

research phase to ensure clarity, relevance, and contextual appropriateness for Vietnamese digital banking users.

Data Analysis Technique: The collected data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS 4.0. PLS-SEM was selected due to its suitability for complex research models involving multiple constructs and moderating effects, as well as its robustness in handling non-normal data distributions. The analysis followed a two-step approach: first, the measurement model was assessed to evaluate reliability and validity; second, the structural model was assessed to test the hypothesized relationships. To guarantee convergent validity, the measurement model was evaluated using Cronbach's alpha and composite reliability (both above 0.70), as well as an average variance extracted (AVE) exceeding 0.50. The Fornell-Larcker criterion and the HTMT ratio (HTMT < 0.85) were used to assess discriminant validity. The factors used to assess the structural model were path coefficients (β), t-statistics (≥ 1.96, $p < 0.05$), R^2 values, and the moderating effect's significance as measured by the interaction term (Hair et al., 2019).

Bootstrapping with 5.000 resamples was employed to assess the significance of path coefficients, t-values, and p-values. This approach allowed for rigorous testing of both direct and moderating effects. Overall, the quantitative research method provided strong empirical evidence to validate the proposed model and offered meaningful insights into the determinants of customer loyalty in digital banking in Vietnam.

3. RESEARCH RESULTS

3.1 Descriptive statistics

This section presents descriptive statistics for survey respondents, providing an overview of their demographic characteristics. A total of 570 valid questionnaires were used for the analysis, offering a comprehensive representation of digital banking customers in Ho Chi Minh City and Dong Nai province, Vietnam. The demographic profile includes gender, marital status, age, average monthly income, and duration of digital banking usage.

Regarding gender distribution, the sample consists of 234 male respondents (41.1%) and 336 female respondents (58.9%). The relatively higher proportion of female participants indicates that women are actively engaged in using digital banking services in Vietnam. This distribution suggests that digital banking adoption is not limited to a specific gender group but reflects a broad, inclusive user base, consistent with recent trends in digital financial services.

In terms of marital status, 61.6% of respondents (351 individuals) reported being married, while 38.4% (219 individuals) were single. The dominance of married respondents suggests that digital banking services are widely used by individuals with family responsibilities, who may value convenience, time efficiency, and secure financial management solutions offered by digital banking platforms.

The age distribution shows that the majority of respondents fall within the 35-45 age group, accounting for 53.2% (303 respondents) of the sample. This is followed by the 25-35 age group, with 23.2% (132 respondents). Younger users aged 18 to under 25 represent 8.1%, while respondents aged 45 and above account for 15.6%. These findings indicate that middle-aged customers form the core user segment of digital banking services in Vietnam. This group is likely to have stable income, higher financial needs, and sufficient digital competence to adopt and use digital banking applications continuously.

Regarding average monthly income, the sample reflects a relatively strong earning capacity. Respondents earning above 15 million VND per month account for 37.2%, while those earning between 10 and 15 million VND represent 36.0%. Together, these two groups comprise more than 70% of the sample. Meanwhile, 21.6% of respondents earn between 5 and 10 million VND, and only 5.3% earn below 5 million VND. This income distribution suggests that digital banking users are predominantly middle- to high-income

individuals, who may have greater access to digital devices and a stronger demand for advanced banking services.

Finally, regarding the duration of digital banking usage, a significant proportion of respondents reported long-term usage. Specifically, 37.2% have used digital banking services for 10 to under 15 years, and 35.3% have more than 15 years of experience. In contrast, 21.2% have used digital banking for 5 to under 10 years, and only 6.3% reported using it for 1 to under 5 years. This indicates that most respondents are experienced users, which enhances the reliability of their evaluations of service quality, trust, security, and loyalty. Overall, the descriptive statistics demonstrate that the sample is well-suited for examining customer loyalty in digital banking, as it consists mainly of experienced, economically active, and digitally engaged users.

3.2 Testing for factors affecting customer loyalty

Table 1. Cronbach's Alpha and composite reliability testing for factors affecting customer loyalty

Factors	Code	Items	Mean	Std. Deviation	Cronbach's alpha	Composite reliability	Average variance extracted
1. Customer Trust	CT	4	3.226	0.931	0.892	0.925	0.756
2. Service Quality	SQ	4	3.451	0.927	0.928	0.949	0.822
3. Multi-channel Integration	MI	4	3.350	0.936	0.856	0.879	0.655
4. Web Quality	WQ	4	3.117	0.919	0.919	0.938	0.791
5. Perceived Security and Privacy	PSP	3	3.213	0.928	0.875	0.923	0.800
6. Digital Competence	DC	4	3.189	0.945	0.849	0.893	0.678
7. Customer Loyalty	CL	3	3.385	0.938	0.812	0.887	0.725

Source: The authors' process

Table 1 presents the results of the reliability and convergent validity assessment for the constructs used in the study examining factors affecting customer loyalty in digital banking. The analysis includes descriptive statistics (mean and standard deviation), Cronbach's alpha, Composite Reliability (CR), and Average Variance Extracted (AVE), which are commonly employed criteria in PLS-SEM to evaluate the quality of the measurement model.

(1) The mean values of the constructs range from 3.117 to 3.451, indicating that respondents generally exhibit moderately positive perceptions toward all constructs. Service Quality (Mean = 3.451) and Customer Loyalty (Mean = 3.385) show the highest mean scores, suggesting that respondents have relatively favorable evaluations of digital banking services and a moderate level of loyalty. The standard deviation values, which range from 0.919 to 0.945, indicate an acceptable level of variability in responses, reflecting diverse customer perceptions without extreme dispersion.

(2) Regarding internal consistency reliability, Cronbach's alpha values for all constructs exceed the recommended threshold of 0.70, ranging from 0.812 (Customer Loyalty) to 0.928 (Service Quality). These results confirm that the measurement items for each construct are internally consistent and reliably capture the underlying latent variables. In addition, the Composite Reliability (CR) values range from 0.879 to 0.949, further reinforcing the reliability of the constructs. Higher CR values than Cronbach's alpha in most cases indicate that the constructs are well-specified and suitable for PLS-SEM analysis.

(3) Convergent validity is assessed using the Average Variance Extracted (AVE). All AVE values exceed the minimum recommended level of 0.50, ranging from 0.655 (Multi-channel Integration) to 0.822 (Service Quality). This demonstrates that each construct explains more than half of the variance of its associated measurement items, confirming satisfactory convergent validity. Notably, Service Quality and Perceived Security and Privacy exhibit particularly high AVE values (0.822 and 0.800, respectively), suggesting strong explanatory power of their measurement items.

Conclusion: The results presented in Table 1 indicate that the measurement model meets the required standards of reliability and convergent validity. All constructs are measured accurately and consistently, providing a solid foundation for subsequent structural model analysis. These findings confirm the appropriateness of the measurement scales for examining customer loyalty in the Vietnamese digital banking context.

Table 2. SEM testing for factors affecting customer loyalty

Factors	Original sample	Sample mean	Standard deviation	T statistics	P values
CT → CL	0.232	0.233	0.039	5.949	0.000
DC → CL	0.135	0.142	0.032	4.232	0.000
DC x CT → CL	0.106	0.103	0.035	2.999	0.003
MI → CL	0.089	0.095	0.040	2.261	0.024
PSP → CL	0.304	0.303	0.040	7.600	0.000
SQ → CL	0.160	0.159	0.035	4.509	0.000
WQ → CL	0.079	0.084	0.038	2.063	0.039

Source: The authors' process

Table 2 presents the results of the Structural Equation Modeling (SEM) analysis conducted using PLS-SEM to examine the factors affecting customer loyalty in digital banking. The table reports the standardized path coefficients (β), sample means, standard deviations, t-statistics, and p-values, which together indicate the strength and significance of the hypothesized relationships. The results demonstrate that all proposed paths are statistically significant, confirming the robustness of the research model. The t-statistics for all relationships exceed the critical value of 1.96, and all p-values are below 0.05, indicating strong empirical support for the hypothesized effects.

(1) Among the direct effects, Perceived Security and Privacy (PSP → CL) exhibits the most decisive influence on Customer Loyalty, with a path coefficient of $\beta = 0.304$ ($t = 7.600$, $p < 0.001$). This finding highlights the paramount importance of security and privacy concerns in shaping customer loyalty in digital banking. Customers who perceive digital banking platforms as secure and capable of protecting their personal and financial information are significantly more likely to remain loyal.

(2) Customer Trust (CT → CL) is the second most influential factor ($\beta = 0.232$, $t = 5.949$, $p < 0.001$). This result underscores the critical role of trust in digital financial services, where customers rely heavily on intangible systems and technologies. Trust reduces perceived risk and uncertainty, thereby strengthening customers' commitment to digital banks.

(3) Service Quality (SQ → CL) also demonstrates a strong positive effect on customer loyalty ($\beta = 0.160$, $t = 4.509$, $p < 0.001$). This indicates that reliable, responsive, and efficient digital banking services remain essential drivers of loyalty, even in highly technology-driven environments.

(4) Regarding individual customer capabilities, Digital Competence (DC → CL) has a significant positive impact on customer loyalty ($\beta = 0.135$, $t = 4.232$, $p < 0.001$). This suggests that customers with higher digital skills and confidence are more likely to engage with digital banking services and maintain long-term relationships with their banks.

(5) The interaction effect between Digital Competence and Customer Trust (DC × CT → CL) is statistically significant ($\beta = 0.106$, $t = 2.999$, $p = 0.003$). This finding confirms the moderating role of digital competence, indicating that the positive effect of trust on customer loyalty is more substantial for customers with higher levels of digital competence.

(6) Multi-channel Integration (MI → CL) and Web Quality (WQ → CL), although exhibiting relatively smaller effect sizes, both have significant positive influences on customer loyalty ($\beta = 0.089$ and $\beta = 0.079$, respectively). These results emphasize that seamless channel integration and high-quality digital interfaces contribute meaningfully to enhancing customer loyalty.

Table 2 provides strong empirical evidence supporting the proposed structural relationships and highlights the combined importance of security, trust, service quality, technological factors, and digital competence in fostering customer loyalty in digital banking.

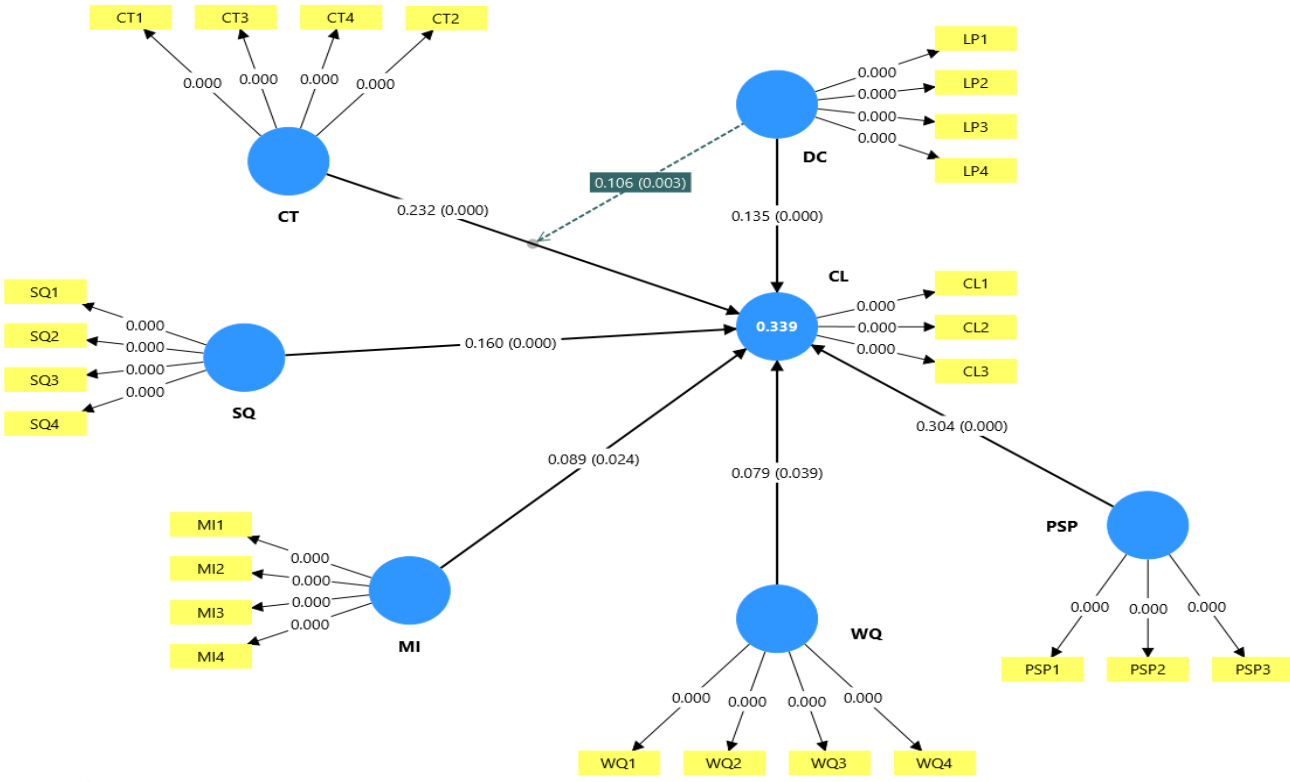

Figure 2. Testing factors influencing customer loyalty

Figure 2 presents the results of the structural model analysis examining the factors influencing customer loyalty in digital banking, estimated using PLS-SEM with SmartPLS 4.0. The model shows that Customer Loyalty (CL) is explained by multiple relational and technological factors, with an R^2 value of 0.339, indicating that the proposed antecedents account for 33.9% of the variance in customer loyalty. This level of explanatory power is considered moderate and acceptable in behavioral and service-related research. All hypothesized direct relationships are statistically significant. Perceived Security and Privacy (PSP) exert the most potent positive effect on customer loyalty ($\beta = 0.304$, $p < 0.001$), highlighting the critical role of data protection and transaction security in digital banking. Customer Trust (CT) also demonstrates a strong influence ($\beta = 0.232$, $p < 0.001$), followed by Service Quality (SQ) ($\beta = 0.160$, $p < 0.001$) and Digital Competence (DC) ($\beta = 0.135$, $p < 0.001$). Additionally, Multi-channel Integration (MI) ($\beta = 0.089$, $p < 0.05$) and Web Quality (WQ) ($\beta = 0.079$, $p < 0.05$) contribute positively, although with smaller effect sizes.
Importantly, the interaction effect between Digital Competence and Customer Trust (DC × CT) is significant ($\beta = 0.106$, $p = 0.003$), confirming the moderating role of digital competence. This finding suggests that customers with higher digital competence are better able to translate trust in digital banks into loyal behavior. Overall, Figure 2 provides strong empirical support for the proposed research model and hypotheses.

Table 3. Hypotheses testing summary for factors affecting customer loyalty

Hypothesis	Path	β	t-value	p-value	Result
H1	CT → CL	0.232	5.949	0.000	Supported
H2	SQ → CL	0.160	4.509	0.000	Supported
H3	MI → CL	0.089	2.261	0.024	Supported
H4	WQ → CL	0.079	2.063	0.039	Supported
H5	PSP → CL	0.304	7.600	0.000	Supported

H6	DC → CL	0.135	4.232	0.000	Supported
H7	DC x CT → CL	0.106	2.999	0.003	Supported

Source: The authors' process

Table 3 summarizes the results of hypothesis testing for the factors affecting customer loyalty in digital banking. The findings indicate that all seven proposed hypotheses (H1–H7) are supported, demonstrating strong empirical validation of the research model.

Specifically, H1 confirms that Customer Trust positively influences Customer Loyalty ($\beta = 0.232$, $t = 5.949$, $p < 0.001$), highlighting trust as a fundamental determinant of long-term customer relationships in digital banking. H2 is also supported, showing that Service Quality has a significant positive effect on Customer Loyalty ($\beta = 0.160$, $t = 4.509$, $p < 0.001$). This result underscores the importance of reliable, responsive digital services. H3 and H4 examine technology-related service attributes. The results indicate that Multi-channel Integration ($\beta = 0.089$, $p = 0.024$) and Web Quality ($\beta = 0.079$, $p = 0.039$) both exert significant positive influences on customer loyalty, supporting H3 and H4. Although their effect sizes are relatively smaller, these factors contribute meaningfully to enhancing customer experience and engagement.

Among all direct effects, Perceived Security and Privacy (H5) has the most decisive influence on Customer Loyalty ($\beta = 0.304$, $t = 7.600$, $p < 0.001$), underscoring the critical role of security and data protection in digital banking environments. H6 confirms that Digital Competence positively affects Customer Loyalty ($\beta = 0.135$, $t = 4.232$, $p < 0.001$), suggesting that digitally skilled customers are more likely to remain loyal. Finally, H7 validates the moderating role of Digital Competence in the relationship between Customer Trust and Customer Loyalty ($\beta = 0.106$, $t = 2.999$, $p = 0.003$). This indicates that higher digital competence strengthens the trust–loyalty relationship. Overall, the results provide comprehensive support for the proposed hypotheses and reinforce the robustness of the research framework.

3.3 Discussion of Findings

The findings of this study provide comprehensive insights into the key determinants of customer loyalty in the context of digital banking in Vietnam. Overall, the results confirm that customer loyalty is shaped by a combination of relational, service-related, and technological factors, as well as individual customer capabilities, thereby supporting the integrated theoretical framework proposed in this research.

(1) Among all examined factors, Perceived Security and Privacy emerge as the most influential determinant of customer loyalty. This finding reflects the heightened sensitivity of digital banking customers to data protection, transaction security, and privacy (Tegambwage & Kasoga, 2022; Gonu et al., 2023). In an environment characterized by increasing cyber threats and financial fraud, customers are more likely to remain loyal to digital banks that they perceive as secure and capable of safeguarding their personal and financial information. This result is consistent with prior studies that emphasize security and privacy as critical drivers of trust and continued use in digital financial services, particularly in emerging markets.

(2) Customer Trust is identified as the second most important factor influencing customer loyalty. The significant positive relationship between trust and loyalty underscores the central role of trust in reducing perceived risk and uncertainty in digital banking transactions (Yilmaz et al., 2018; Zhao et al., 2022). Even though digital platforms rely heavily on technology, trust in the bank's integrity and competence remains fundamental for fostering long-term customer relationships. This finding aligns with relationship marketing theory, which highlights trust as a core antecedent of loyalty.

(3) Service Quality also demonstrates a strong positive effect on customer loyalty, indicating that efficient, reliable, and responsive digital services continue to be essential in retaining customers (Boonlertvanich, 2019; Parasuraman et al., 1988). Despite advancements in automation and self-service technologies, customers still evaluate digital banks based on service performance, accuracy, and problem

resolution. This suggests that technology alone is insufficient to secure customer loyalty without high-quality service delivery.

(4) The results further show that Multi-channel Integration and Web Quality, although exhibiting smaller effect sizes, significantly contribute to customer loyalty (Prentice et al., 2020). Seamless integration across digital and physical channels enhances convenience and consistency, while high-quality web and mobile interfaces improve usability and overall customer experience. These findings highlight the importance of delivering a coherent and user-friendly digital ecosystem.

(5) Importantly, Digital Competence plays a dual role in the model. Its direct effect on customer loyalty indicates that digitally skilled customers are more comfortable with digital banking services and are more likely to establish long-term relationships with banks (Arli et al., 2024; Mugova et al., 2025). Moreover, the significant moderating effect of digital competence strengthens the relationship between customer trust and loyalty. This suggests that customers with higher digital competence are better able to assess digital systems and security features, thereby translating trust into more loyal behavior.

Conclusion: these findings contribute to the literature by emphasizing the intertwined roles of security, trust, service quality, and digital capabilities in shaping customer loyalty in digital banking. They also offer valuable insights for bank managers seeking to enhance customer retention in an increasingly competitive digital environment.

4. MANAGERIAL RECOMMENDATIONS

Based on the empirical results of the structural model, this section provides managerial recommendations prioritized according to the magnitude of standardized path coefficients (β values). This prioritization allows digital bank managers to allocate resources more effectively by focusing on the most influential drivers of customer loyalty in the Vietnamese digital banking context.

(1) Strengthening Perceived Security and Privacy (β = 0.304): Perceived Security and Privacy have the most substantial impact on customer loyalty, indicating that security-related concerns are paramount for digital banking customers. Therefore, digital banks should prioritize investments in advanced cybersecurity infrastructure, including multi-factor authentication, biometric verification, end-to-end encryption, and real-time fraud detection systems. Beyond technical solutions, banks should actively communicate security measures to customers. Transparent communication about data protection policies, privacy practices, and incident response mechanisms can significantly enhance customers' confidence. Regular security notifications, educational campaigns on safe digital banking practices, and visible security certifications can further strengthen perceived security and privacy. From a strategic perspective, positioning security as a core brand value can serve as a strong differentiator in an increasingly competitive digital banking market. Finally, digital banks must implement strict security and data privacy policies, including advanced authentication mechanisms and robust data protection protocols. Transparent communication of privacy practices is equally important. At the macro level, strengthening legal frameworks on cybersecurity and personal data protection is crucial for reinforcing customer confidence in digital banking services.

(2) Enhancing Customer Trust (β = 0.232): Customer Trust is the second most influential determinant of customer loyalty. To build and sustain trust, digital banks should focus on consistency, transparency, and reliability across all customer interactions. This includes ensuring system stability, minimizing service downtime, and delivering on promised service standards. Trust can also be reinforced through transparent fee structures, clear terms and conditions, and prompt resolution of customer complaints. Personalized communication, ethical data use, and proactive customer support further build trust. Given the strong interaction effect between trust and digital competence, banks should tailor trust-building strategies to different customer segments, ensuring that less digitally competent customers receive additional guidance and reassurance. Finally, digital banks should implement policies that emphasize transparency, reliability, and ethical practices in digital service delivery. Clear communication regarding terms, fees, and transaction processes is essential. At the regulatory level, authorities should strengthen consumer protection

frameworks and disclosure requirements to enhance trust in digital banking systems and promote confidence across the financial sector.

(3) Improving Service Quality (β = 0.160): Service Quality remains a critical driver of customer loyalty, even in highly digitalized banking environments. Digital banks should continuously enhance service reliability, responsiveness, and efficiency. This can be achieved by optimizing system performance, reducing transaction processing times, and ensuring accuracy in digital services. The integration of artificial intelligence (AI) and chatbots for customer support can improve responsiveness, but human support should remain available for complex issues. Service personalization, such as customized financial recommendations and tailored user interfaces, can further enhance perceived service quality. Managers should also regularly monitor service quality metrics and customer feedback to promptly identify and address service gaps. Finally, digital banks need to establish continuous service quality improvement policies focusing on reliability, responsiveness, and personalization. Regular monitoring of service performance and customer feedback should be institutionalized. Policymakers may consider setting minimum digital service quality standards to ensure consistent customer experiences and encourage fair competition among digital banking providers.

(4) Developing Customers' Digital Competence (β = 0.135; Moderating Effect β = 0.106): Digital Competence plays a dual role by directly influencing customer loyalty and moderating the trust–loyalty relationship. This highlights the importance of empowering customers with digital skills and confidence. Digital banks should invest in customer education programs, such as tutorials, instructional videos, in-app guidance, and online workshops, to help users navigate digital platforms effectively. Simplifying application design and providing intuitive user interfaces can reduce technology-related anxiety, particularly for older or less digitally experienced customers. By enhancing digital competence, banks not only improve direct customer engagement but also amplify the positive effects of trust on loyalty, creating a reinforcing cycle of digital adoption and retention. Finally, banks should develop policies to improve customers' digital competence through educational programs, in-app guidance, and user-friendly system design. Enhancing digital skills reduces technology-related anxiety and increases engagement. Policymakers should support national digital literacy initiatives to narrow the digital divide and facilitate inclusive adoption of digital banking.

(5) Enhancing Multi-channel Integration (β = 0.089): Although the effect size of Multi-channel Integration is relatively smaller, it remains a significant contributor to customer loyalty. Digital banks should ensure seamless integration across mobile applications, websites, call centers, and physical branches. Customers should be able to switch between channels without losing transaction continuity or service consistency. Unified customer data systems, synchronized service processes, and consistent branding across channels can significantly enhance the overall customer experience. Managers should view multi-channel integration as a strategic enabler of convenience and reliability, particularly for customers who prefer combining digital and traditional banking interactions. Finally, banks should adopt policies that promote seamless integration across digital and traditional service channels, enabling customers to move effortlessly between platforms. Unified data management and synchronized processes are essential. From a policy perspective, investment in digital infrastructure and interoperability standards can support effective multi-channel strategies within the digital banking ecosystem.

(6) Improving Web and Application Quality (β = 0.079): Web Quality, while having the smallest effect size, still plays a meaningful role in shaping customer loyalty. Banks should focus on improving the usability, interface design, navigation, and system reliability of their digital platforms. Regular usability testing, performance optimization, and updates based on customer feedback are essential. Ensuring fast loading times, minimal errors, and clear information presentation can significantly enhance user experience. Although web quality alone may not strongly drive loyalty, it supports other key factors such as trust, service quality, and digital competence. Finally, digital banks should prioritize policies that enhance the usability, stability, and accessibility of websites and mobile applications. Regular system upgrades and usability testing are critical. Regulators may provide technical guidelines for digital banking platforms to ensure minimum standards of functionality, accessibility, and service continuity for diverse customer groups.

Digital banks of strategic implication: Digital banks in Vietnam should adopt a hierarchical strategy to enhance customer loyalty. Security and privacy should be treated as foundational priorities, followed by trust and service quality. Simultaneously, investments in digital competence development and multi-channel integration can amplify loyalty outcomes. By aligning managerial actions with the relative importance of each factor, banks can achieve more effective customer retention and sustainable competitive advantage in the digital banking era.

4.1 Limitations and future research

Despite its theoretical and practical contributions, this study has several limitations that should be acknowledged and addressed in future research. First, the data were collected from digital banking customers in Ho Chi Minh City and Dong Nai province, which may limit the generalizability of the findings to other regions of Vietnam or to different national contexts. Future studies could expand the sample to include customers from rural areas or other emerging and developed economies to enhance external validity. Second, this study employed a cross-sectional research design, which captures customer perceptions at a single point in time. As customer loyalty and digital banking experiences may evolve, longitudinal studies are recommended to examine changes in customer behavior and to establish stronger causal inferences. Third, the research model focused on selected relational and technological factors. Future research could incorporate additional variables, such as customer satisfaction, perceived value, brand image, and switching costs, to provide a more comprehensive understanding of customer loyalty in digital banking. Future studies may explore alternative moderating or mediating mechanisms, such as customer involvement or technology readiness. Finally, while PLS-SEM is suitable for exploratory and predictive research, future studies may employ alternative analytical techniques or mixed-methods approaches to validate further and extend the findings of this study.

CONCLUSION

This study investigates the key factors influencing customer loyalty in digital banking in Vietnam by integrating relational, service-related, and technological perspectives into a comprehensive research framework. Using a mixed-methods approach and applying Partial Least Squares Structural Equation Modeling (PLS-SEM) to data collected from 570 digital banking customers, the study provides robust empirical evidence on the determinants of customer loyalty in an emerging market context. The findings reveal that perceived security and privacy are the most influential factors affecting customer loyalty, underscoring the critical importance of safeguarding customer information and ensuring secure digital transactions. Customer trust and service quality also play significant roles, highlighting that strong relational foundations and reliable service delivery remain essential even in technology-driven banking environments. In addition, multi-channel integration and web quality both positively contribute to customer loyalty, underscoring the importance of seamless, user-friendly digital experiences. Notably, the study identifies digital competence as both a direct predictor of customer loyalty and a moderating variable that strengthens the relationship between customer trust and loyalty. This dual role emphasizes that customers' digital skills and confidence significantly influence how they perceive and engage with digital banking services. Finally, this research extends the existing literature by providing empirical insights into digital banking loyalty in Vietnam and highlighting the critical interplay among trust, security, service quality, and digital competence. The findings offer a solid foundation for future research and practical strategies to enhance customer loyalty in the rapidly evolving digital banking landscape.

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