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Factors affecting customers' intention to use chatbots at commercial banks in Vietnam

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Abstract

Chatbots have emerged as an effective interaction tool between commercial banks and their customers in banking operations in Vietnam. This study aims to explore the key factors influencing customers' intention to use chatbots at these banks. The authors systematically reviewed theoretical issues related to chatbots and customer behavior concerning product and service usage, employing the Technology Acceptance Model (TAM) as the foundation for the theoretical research framework. A survey targeting individuals intending to use banking chatbots yielded 192 valid responses. The collected data were coded, processed, and analyzed using the PLS-SEM method via SmartPLS 4.0 software. The results indicate that chatbot quality, perceived usefulness, perceived ease of use, privacy/security perception, and customer satisfaction impact the intention to use chatbots. Based on these findings, the study proposes solutions for the future development of bank chatbot systems, aiming to contribute to stable and sustainable business growth, and thereby enhance service quality and market position within the financial sector.

Keywords: *Influencing factors, Chatbot, Usage intention, Commercial bank*

1. Introduction

Amidst current economic trends, and with the advent of the Fourth Industrial Revolution, promoting the application and development of digital platforms has become an inevitable trend, offering numerous benefits and competitive advantages for businesses in general, and banks in particular. Throughout its formation and development, the Vietnamese commercial banking system has achieved significant accomplishments in both quality and quantity. The proliferation of banks and their products and services has intensified competition within the banking sector. Among these innovations is the adoption of chatbot applications, which can assist or augment human consulting experts, thereby significantly reducing labor costs and time (Kasilingam, 2020) while transforming customer interaction with financial institutions and banks. In the context of increasing competition and workload in the Vietnamese banking sector, improving employee performance and optimizing resources have become critical (Le Thu Hanh, Dao Thi Ha Anh, 2022). Thus, integrating AI-powered tools such as chatbots has emerged as a strategic solution to enhance service efficiency and reduce reliance on human consultation. According to Juniper research, AI chatbots save 862 million working hours for banks globally, equivalent to 7.3 billion USD in operating costs in 2023, approximately 35 times higher than in 2019. In Vietnam, some commercial banks, such as VPBank (2015) and TPBank (2017), adopted chatbots early on, achieving notable success. As of June 30, 2024, 16 out of 44 commercial banks in Vietnam have implemented chatbots for their business operations. However, chatbot usage is not yet widespread, characterized by low customer awareness and significant hesitation among potential users.

2. Objectives

This study aims to identify the factors influencing customers' intention to use Chatbots in Vietnamese commercial banks and analyze the current development of Chatbot applications in Vietnamese commercial banks from 2021 to the present, examine the effects of key factors - including Chatbot quality, perceived usefulness, perceived ease of use, privacy/security perception, and customer satisfaction - on customers' intention to use Chatbot, and provide recommendations for commercial banks to enhance customers' intention to use Chatbots effectively.

3. Materials and Methods

3.1. Literature Review

Over the past decade, the integration of artificial intelligence (AI) into financial services has driven a growing scholarly interest in understanding customers' behavioral intentions toward chatbot adoption in the banking sector. Research across various contexts consistently indicates that technological, psychological,

and contextual factors collectively shape user attitudes and behavioral intentions. However, the relative influence of these factors varies significantly depending on cultural, institutional, and technological environments. Early studies primarily explored customer satisfaction and trust as determinants of chatbot acceptance. For instance (Eren, 2021) investigated how perceived trust and corporate reputation affect customer satisfaction with banking chatbots in Turkey, revealing that perceived performance and organizational image significantly shape satisfaction levels. Similarly, (Abdul Karim Shaikh et al., 2023) examined determinants of chatbot service usage intention in Indian banks and confirmed that information security, design, and facilitation conditions strongly influence perceived usefulness, which in turn affects intention to use. These findings underscore that beyond functionality, trust and system assurance are critical for customers to perceive chatbots as reliable service tools. Building on these insights, subsequent research began to focus on service quality and customer experience as mediating mechanisms in the relationship between technological perceptions and loyalty outcomes. (El-Shihy et al., 2024) demonstrated that AI chatbot service quality—through dimensions such as personalization, cross-channel integration, and response accuracy—enhances customer satisfaction and loyalty. Similarly (Kanojiya et al., 2021) ound that perceived service and privacy risk indirectly influence usage intention via perceived usefulness, suggesting that system design quality and perceived security jointly determine customers' willingness to engage with chatbots. Together, these studies highlight that technical quality alone is insufficient; emotional and experiential elements are equally vital in fostering continued chatbot usage.

A parallel research stream, particularly in Southeast Asia, has applied and extended the Technology Acceptance Model (TAM) to chatbot contexts. Studies by (Humairoh et al., 2024) examined the impact of perceived usefulness and ease of use on continued banking chatbot usage intentions in Indonesia. The sample comprised Millennials enrolled in master's programs in Tangerang Raya, Banten Province. These individuals had used the MITA, VIRA, AISYAH, CINTA, and SABRINA banking chatbots. The sample consisted of 230 individuals, and simple random sampling was employed. Data were processed using path analysis techniques supported by SPSS software. The study found that both partial and simultaneous assessments of usefulness and ease of use favorably and significantly impacted customer satisfaction and continuance intention. The coefficient of determination for customer satisfaction was 74.4%, while that for continued chatbot usage intention was 83.2%.

A synthesis of the above studies provides insights into the role of factors influencing customer chatbot usage intentions in the banking sector. The research identified a range of influencing factors, including usefulness, safety, security, convenience, ease of use, psychological factors such as fear and trust, customer satisfaction, and system quality. These findings illuminate factors affecting customer chatbot usage intentions in commercial banks, thereby informing the development of effective chatbot systems by banks. In addition, domestic research exploring the factors influencing chatbot adoption has increased in recent years. These studies have identified numerous factors affecting customer chatbot usage intentions within Vietnamese commercial banks. In Vietnam, domestic research on chatbot adoption has expanded rapidly in recent years, though it remains fragmented and methodologically diverse. Nguyen et al. (2021) identified determinants of continuance intention toward banks' chatbot services, showing that satisfaction, trust, and perceived usefulness are key predictors, with trust exerting the strongest effect. Similarly, Tran Thi Kieu Chi (2024) explored customer attitudes in Ho Chi Minh City using a mixed-methods approach, revealing that customer attitude mediates the relationship between perceived ease of use, perceived usefulness, and behavioral intention. Meanwhile, Nguyen Quoc (2023) emphasized the growing relevance of chatbots for Generation Z, finding that attitude plays a dominant role in shaping intention, whereas quality, usefulness, and privacy primarily influence intention indirectly through attitude formation.

Further domestic studies have broadened the theoretical scope by integrating models beyond TAM. Nguyen Minh Tri (2023) applied the partial least squares (PLS) approach to assess AI chatbot acceptance and confirmed that perceived value fully mediates the effects of information and service quality on acceptance. Likewise, Cu (2023), adopting the Elaboration Likelihood Model (ELM), demonstrated that both central-route (accuracy, fit) and peripheral-route (trustworthiness) cues significantly influence perceived usefulness and trust, which ultimately drive usage intention. Collectively, these Vietnamese studies reinforce the importance of combining cognitive, affective, and contextual factors to explain users' chatbot adoption behaviors.

Although numerous studies have examined factors influencing the adoption of chatbots in the banking sector, several important gaps remain unresolved. First, most prior research has been conducted in developed economies, where digital literacy, technological infrastructure, and customer trust in AI-based systems are significantly higher (Eren, 2021; El-Shihy et al., 2024). Consequently, these findings may not fully capture the behavioral and cultural characteristics of customers in emerging markets such as Vietnam, where perceptions of technology usefulness and privacy differ considerably. Second, existing Vietnamese studies on chatbot adoption remain limited in scope and methodological rigor. Many of them (e.g., Nguyen Quoc, 2023; Cu, 2023; Tran Thi Kieu Chi, 2024) apply the traditional Technology Acceptance Model (TAM) or UTAUT framework without integrating contextual variables such as chatbot quality, privacy and security concerns, or customer satisfaction. This narrow focus constrains their ability to explain the complex interaction between technological and psychological determinants influencing users' behavioral intention. Third, prior studies often focus on single banks or regional samples, lacking generalizable evidence across the Vietnamese commercial banking system. Few studies have performed comprehensive quantitative analysis with representative customer data to validate structural relationships among key constructs (e.g., perceived usefulness, ease of use, privacy, satisfaction, and intention to use).

Therefore, there is a clear need for a comprehensive, empirically tested model that simultaneously examines the effects of both classical TAM constructs and additional contextual factors - namely, chatbot quality and privacy/security perception - on customers' intention to use chatbots in Vietnam's banking industry. Addressing this research gap will not only extend the theoretical foundation of technology acceptance in AI-driven banking but also provide evidence-based guidance for commercial banks to design and implement more user-centric chatbot systems.

3.2. Data collection

Primary data were collected through a questionnaire administered to users of commercial bank chatbots. For the online survey, participants simply clicked on the link provided in the survey invitation to respond. To measure attitudes and perceptions, observed variables were measured using a 5-point Likert scale: (1) Strongly Disagree, (2) Disagree, (3) Neutral, (4) Agree, (5) Strongly Agree. SmartPLS 4.0 was used to analyze the valid sample and test the measurement and structural models, including reliability, convergent validity, discriminant validity, and research hypotheses. Following a rule of thumb, the sample-to-observed variable ratio should be at least 5:1 (Bollen, 1989). Thus, with 35 parameters, the minimum sample size is 175. The survey was conducted from September 2024 to October 2024.

3.3. Research model and hypotheses

This research model is based on foundational theories and studies by Richard et al. (2019), Alnemer (2022), Muhamad Abduh & Jarita Duasa (2011), Cho et al. (2019), and has been adjusted to align with the research objectives and the Vietnamese context (Figure 1).

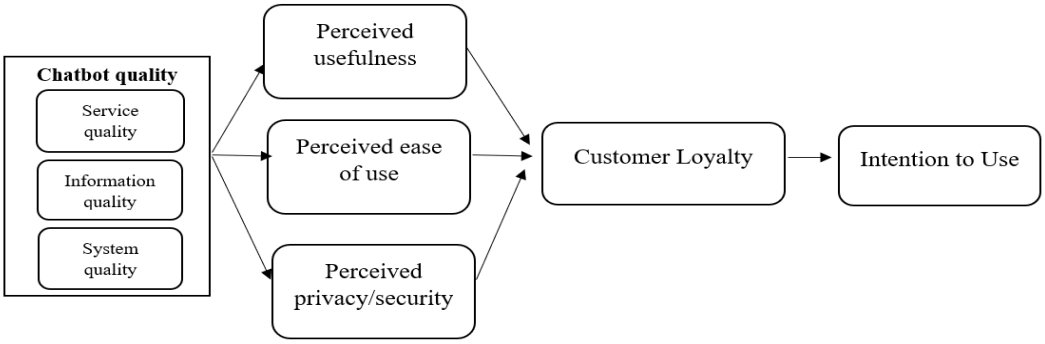

Figure 1 Proposed Research Model

The variables in the proposed research are presented in Table 1.

Table 1 Variables in the proposed research

Variable	Definition
Chatbot quality	Based on the Information Systems Success Model to evaluate chatbot quality, including system quality, information quality, and service quality (DeLone & McLean, 2016).
Perceived usefulness	Perceived usefulness is defined as "The degree to which a person believes that using a system will enhance his or her job performance" (Davis, 1989)
Perceived ease of use	Perceived ease of use refers to the extent to which a person believes that using a system will be easier than ever before.
Perceived privacy/security	Perceived privacy/security refers to users' understanding and concern about protecting their personal information on the Internet.
Customer Loyalty	Customer Loyalty is a customer's overall attitude toward a service provider or emotional response to the difference between what the customer anticipated and what they received regarding the fulfillment of some need, goal or desire (Hansemark and Albinsson, 2004)

This research proposes these following hypotheses:

Hypothesis H1: Chatbot quality influences customer intention to use chatbots through perceived usefulness and satisfaction.

Hypothesis H2: Chatbot quality influences customer intention to use chatbots through perceived ease of use and satisfaction.

Hypothesis H3: Chatbot quality influences customer intention to use chatbots through perceived privacy/security and satisfaction.

Hypothesis H4: Perceived usefulness influences customer intention to use chatbots through satisfaction.

Hypothesis H5: Perceived ease of use influences customer intention to use chatbots through satisfaction.

Hypothesis H6: Perceived privacy/security influences customer intention to use chatbots through satisfaction.

Hypothesis H7: Customer satisfaction influences customer intention to use chatbots.

4. Results and Discussion

When validating the measurement model using SmartPLS, five key indicators were considered: Outer Loading, Cronbach's Alpha, Composite Reliability, Convergent Validity, and Discriminant Validity. After data filtering and processing, the PLS Algorithm was applied. In SmartPLS, the standard acceptance criterion for observed variables is an outer loading ≥ 0.708 (Hair et al., 2019). Results showed that the outer loadings of 12 observed variables (SYQ3, SYQ4, SYQ5, IQ1, IQ2, IQ3, IQ4, SEQ1, PU1, PU3, PEU2, SP2) were < 0.708. These 12 variables were deemed inadequate and removed. The results after removal are presented in Table 2.

Table 2 Results of factor analysis after removing inappropriate observed variables

Scale	Observed	Outer	Cronbach's	Composite	Average Variance
Chatbot Quality (CQ)	SYQ1	0,770	0,859	0,859	0,587
	SYQ2	0,752			
	IQ5	0,801			
	SEQ2	0,767			
	SEQ3	0,745			
	SEQ4	0,761			
Perceived Usefulness (PU)	PU2	0,853	0,719	0,875	0,778
	PU4	0,911			
Perceived Ease of Use (PEU)	PEU1	0,821	0,739	0,852	0,657
	PEU3	0,838			
	PEU4	0,772			
Security/Privacy Perception (SP)	SP1	0,810	0,735	0,849	0,652
	SP3	0,821			
	SP4	0,792			
Customer Loyalty (HL)	HL1	0,771	0,797	0,868	0,622
	HL2	0,757			
	HL3	0,768			
	HL4	0,854			
Intention to Use Chatbot (IU)	IU1	0,772	0,852	0,894	0,628
	IU2	0,769			
	IU3	0,808			
	IU4	0,773			
	IU5	0,838			

The results from Table 2 show that the Cronbach's Alpha values and composite reliability values are all greater than 0.708. Therefore, this study concludes that the measurement scales achieve reliability. In addition, the factor loading coefficients are all greater than 0.7, and the Average Variance Extracted (AVE) of the constructs is greater than 0.5. Therefore, the scales achieve convergent validity.

The study examines the discriminant validity between the conceptual structures based on the values of the HTMT matrix, the results are shown in Table 3.

Table 3 Results of discriminant validity test of the scale

	CQ	HL	IU	PEU	PU	SP
CQ						
HL	0,778					
IU	0,791	0,905				
PEU	0,665	0,686	0,707			
PU	0,630	0,721	0,685	0,576		
SP	0,685	0,722	0,724	0,637	0,467	

This study examines the discriminant validity between the constructs based on the values of the HTMT matrix. Accordingly, since the correlation values in the HTMT matrix are all less than 0.85, this study concludes that the constructs achieve discriminant validity. The discriminant validity of customer

satisfaction with usage intention is 0.905. However, when evaluating discriminant validity, it is necessary to note the role of independent and dependent variables, especially when a very strong impact is hypothesized between them. Therefore, in this case, HTMT values exceeding 0.85 are acceptable.

Evaluating the PLS-SEM structural model

For testing the PLS-SEM structural model, the study considered the VIF coefficient to assess multicollinearity, the impact relationship through the standardized path coefficient (Original Sample) and p-values, as well as R-squared and f-squared values. Therefore, in addition to running the PLS Algorithm, the authors also ran the bootstrapping test. Multicollinearity was assessed by examining the inner VIF values. With the condition that VIF ≤ 3, all factors in the study do not exhibit multicollinearity (Table 4).

Table 4 Inner VIF Values Results

	CQ	HL	IU	PEU	PU	SP
CQ				1,000	1,000	1,000
HL			1,000			
IU						
PEU		1,435				
PU		1,272				
SP		1,337				

Regarding the adjusted R-squared, the values for Perceived Usefulness, Perceived Ease of Use, and Perceived Privacy/Security are 0.252, 0.278, and 0.298, respectively, indicating a low level of variance explained by the independent variables for these constructs. Specifically, the independent variables explained 25.2%, 27.8%, and 29.8% of the variance in Perceived Usefulness, Perceived Ease of Use, and Perceived Privacy/Security, respectively; the remaining variance is attributable to unobserved factors or measurement error. The value of customer satisfaction is 0.486, indicating a low level of explanation of the independent variables for customer satisfaction. Specifically, the independent variables explained 48.6% of the variance in customer satisfaction; the remaining 51.4% is error from the system or factors outside the model. The value of usage intention is 0.562, indicating a moderate level of explanation of the independent variables for usage intention. Specifically, the independent variables explained 56.2% of the variance in usage intention; the remaining 43.8% is error from the system or other factors outside the model. However, the results are still acceptable.

To further explain the strength of the influence of the independent variable on the dependent variable, the authors used the f-squared coefficient. The results showed that the impact of Perceived Ease of Use on Customer Loyalty (referred to as customer satisfaction in the discussion) was small when f-squared reached 0.073. The impact of Perceived Usefulness and Perceived Privacy/Security on customer satisfaction and Chatbot Quality on Perceived Ease of Use is medium when 0.15 ≤ f-squared < 0.35. However, the impact of customer satisfaction on usage intention and chatbot quality on Perceived Usefulness and Perceived Privacy/Security is very large because f-squared ≥ 0.35. (Table 5).

Table 5 Results of f-squared coefficient

	CQ	HL	IU	PEU	PU	SP
CQ				0,392	0,344	0,432
HL			1,297			
IU						
PEU		0,073				
PU		0,179				
SP		0,159				

Next, the author assesses the impact coefficient and significance of the path relationship. Bootstrapping test was run with 1000 subsamples at a 5% significance level. With 192 observations (original sample), SmartPLS 4.0 software was used to generate 1000 subsamples through an iterative resampling with replacement method. From these 1000 samples, the average of the estimates can be calculated. The model testing results are shown in Table 6, Figure 2, and Table 7.

Table 6 Results of the research model test on direct impact

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T-statistic (|O/STDEV|)	P-values	Conclusion
CQ -> PEU	0,531	0,531	0,073	7,293	0,000	Accepted
CQ -> PU	0,506	0,506	0,056	8,991	0,000	Accepted
CQ -> SP	0,549	0,550	0,059	9,332	0,000	Accepted
HL -> IU	0,751	0,752	0,038	19,858	0,000	Accepted
PEU -> HL	0,230	0,236	0,074	3,118	0,002	Accepted
PU -> HL	0,340	0,339	0,076	4,489	0,000	Accepted
SP -> HL	0,329	0,326	0,068	4,825	0,000	Accepted

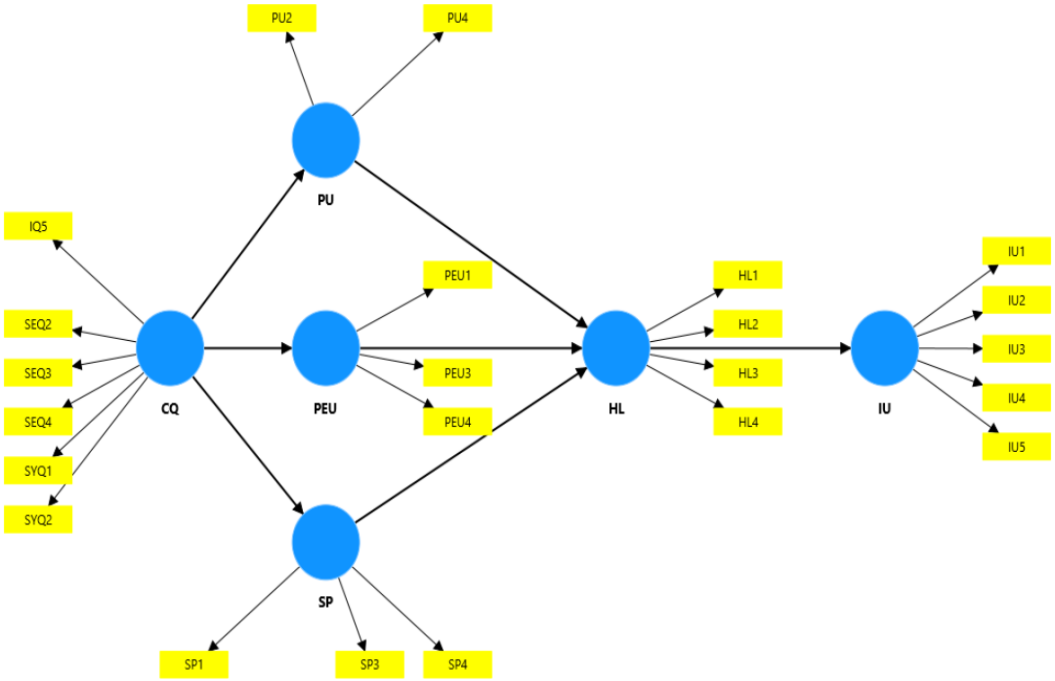

Figure 2 SEM linear structural model

Table 7 Results of the research model test on direct impact

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T-statistic (|O/STDEV|)	P-values	Conclusion
PEU -> HL -> IU	0,173	0,177	0,055	3,124	0,002	Accepted
PU -> HL -> IU	0,255	0,255	0,060	4,232	0,000	Accepted
SP -> HL -> IU	0,247	0,246	0,055	4,489	0,000	Accepted
CQ -> PU -> HL -> IU	0,129	0,130	0,038	3,357	0,001	Accepted
CQ -> SP -> HL -> IU	0,136	0,136	0,035	3,859	0,000	Accepted
CQ -> PEU -> HL -> IU	0,092	0,095	0,035	2,617	0,009	Accepted
CQ -> SP -> HL	0,180	0,180	0,043	4,163	0,000	Accepted
CQ -> PU -> HL	0,172	0,173	0,048	3,585	0,000	Accepted
CQ -> PEU -> HL	0,122	0,126	0,046	2,664	0,008	Accepted

Based on the result tables, all seven hypotheses were accepted, demonstrating both direct and indirect effects of factors influencing customers' intention to use chatbots at Vietnamese commercial banks, including Chatbot Quality, Perceived Usefulness, Perceived Ease of Use, Privacy/Security Perception, and Customer Satisfaction. Although the results show that the variables in the model all have an impact on customers' intention to use Chatbots at commercial banks, the level of impact is different, largely due to different research spaces.

Furthermore, according to the research results, the "Perceived Usefulness" factor had the strongest and most positive impact on customers' intention to use chatbots through satisfaction (HL), with an impact coefficient $\beta = 0.255$. Consistent with previous studies (Li et al., 2021); the perceived usefulness of information played an important role in the intention to use chatbots. When customers perceive the benefits of chatbots, such as timeliness, quick response, useful information, and 24/7 operation, they are more likely to accept and use them. This is entirely reasonable, as in reality, current chatbots in banks increase convenience and flexibility for customers in managing personal and business finances. With diverse features and services such as bill payment lookup and account management via mobile applications, chatbots support customers in synthesizing financial information, facilitate the introduction of new services, and aid in handling suspicious activities. Consequently, customers feel that they can easily look up information quickly and conveniently. Applying Chatbots in banking truly enhances the customer experience. Customers can check account balances or request transaction receipts using a simple interface with the help of Chatbots. To perform account-related activities, a unique identification code is provided to customers, allowing them to access account data. With these simple authentication methods, transferring money to the bank or interbank or to a third party also saves time, while reducing the workload for bank staff. When customers perceive that using bank chatbots helps them save time, reduce risks and costs, and brings specific benefits to daily life, they feel satisfied and are more inclined to use bank chatbot services.

Following the "Perceived Usefulness" factor, the "Privacy/Security Perception" factor was the second strongest factor positively impacting the intention to use bank chatbots through satisfaction (HL), with $\beta=0.247$. This result is similar to previous studies such as (Ananda et al., 2020); (Kizgin et al., 2018). This shows that the hypothesis was entirely consistent with reality, as customers' concern for information security and privacy when using bank chatbot services was a decisive factor, influencing not only their satisfaction but also their intention to use the service. When customers feel that their personal information is securely protected when using bank Chatbots, they will feel more secure and confident in this service. Applying security measures such as data encryption, two-factor authentication, and protection against cyber threats can create a safe environment for customers to conduct online financial transactions. When customers feel that their personal information is securely protected when using bank chatbots, they feel more secure and confident in this service.

Besides "Perceived Usefulness" and "Privacy/Security Awareness", "Perceived Ease of Use" also significantly influenced the intention to use bank chatbots through satisfaction (HL), with an impact

coefficient of β=0.173. This result aligns with previous studies such as (Ahmad et al., 2020); (Anouze & Alamro, 2019); (Baabdullah et al., 2019). When a product or service is easy to use, customers can utilize it more efficiently. Regarding bank chatbots, if customers understand how to use them and their response process, they prefer using them for transactions, loan procedures, and savings inquiries rather than visiting bank counters. Customers need a clear understanding of the benefits to be motivated to use the service. They will use a product or service if it meets their needs. When customers know how to use bank chatbots to address their inquiries, update information, and access information about new programs and services 24/7, they will choose to use them.

"Chatbot Quality," encompassing service quality, system quality, and information quality, influenced customer intention to use chatbots through perceived usefulness, perceived ease of use, privacy/security awareness, and satisfaction (HL). This aligned with previous research by (Nguyen et al., 2021), (Nguyễn Quốc, 2023) and international studies such as (Abdul Karim Shaikh et al., 2023) though the degree of influence varied due to different subjects, sample sizes, or survey scopes. As consumers became more tech-savvy, they expected immediate and accurate support. A well-functioning, responsive chatbot providing helpful information retained customers, while an unreliable one could cause them to switch to competitors. Furthermore, with increasing data breaches, customers prioritized security. A secure bank chatbot fostered trust and encouraged usage.

Finally, "Customer Satisfaction" (HL) directly influenced the intention to use bank chatbots. This aligned with previous research (Ashfaq et al., 2020) and (Nguyen et al., 2021). Customer satisfaction resulted from the overall experience using the bank chatbot service and reflected various factors such as usefulness, ease of use, security, and chatbot quality. Positive experiences, such as quick responses, accurate information, and easy interaction, increased satisfaction and the likelihood of returning. For example, a customer with a positive experience using a chatbot for quick problem resolution was likely to continue using it. Conversely, slow responses or inaccurate information could lead to dissatisfaction and discouraged future use or recommendations.

5. Conclusion

The findings of this study confirm that chatbots play an increasingly important role in the digital transformation of Vietnam's banking industry. By extending the Technology Acceptance Model (TAM) with contextual variables - namely chatbot quality, privacy and security perception, and customer satisfaction - the study provides a comprehensive understanding of the factors influencing customers' intention to use chatbots at commercial banks. Empirical analysis reveals that perceived usefulness and chatbot quality are the most influential determinants of customers' behavioral intention, while perceived ease of use exerts an indirect effect through satisfaction and usefulness. Moreover, privacy and security perception significantly enhance customers' trust and confidence, confirming that data protection remains a decisive condition for adoption. These findings demonstrate that customers are more willing to engage with banking chatbots when they perceive tangible benefits, reliable performance, and secure interactions. In summary, the study provides evidence that technological convenience alone is insufficient to drive chatbot adoption. Instead, customer satisfaction and trust - shaped by perceived quality and security - are essential mediating factors. The model proposed and validated in this research therefore contributes both to theoretical understanding and practical guidance for improving chatbot implementation in Vietnam's commercial banking system.

From a theoretical perspective, this study enriches the Technology Acceptance Model by integrating variables that capture the unique characteristics of AI-based financial services. It demonstrates that chatbot quality and privacy/security perception are critical extensions that enhance the model's explanatory power in emerging markets such as Vietnam. The empirical validation of this extended framework strengthens the cross-cultural applicability of TAM and expands the literature on technology adoption in digital banking contexts. From a managerial perspective, the research offers valuable insights for commercial banks aiming to accelerate chatbot adoption. Banks should prioritize improving system reliability, interface usability, and response accuracy to reinforce customers' perceived usefulness. In parallel, developing robust privacy and security policies and clearly communicating them to users will help build trust. Additionally, user education programs that demonstrate chatbot capabilities and benefits can foster satisfaction and sustained engagement. These managerial strategies will support banks in creating secure, efficient, and customer-centered chatbot services.

Despite its meaningful findings, this study has several limitations that offer potential directions for future research. The data were collected from a limited number of respondents from selected banks, which may constrain generalizability. Future studies should employ larger and more diverse samples across regions and customer segments. Moreover, the cross-sectional design captures user perceptions at one point in time; thus, future research could adopt longitudinal approaches to examine changes in attitudes as chatbot technology evolves. Additionally, subsequent studies could incorporate other theoretical perspectives such as trust theory, expectation–confirmation theory (ECT), or UTAUT, to better explain post-adoption behavior. Comparative analyses across different service industries or countries would also enrich the understanding of contextual influences. Finally, adopting advanced analytical methods - such as multi-group structural equation modeling or machine learning-based sentiment analysis - could provide more robust insights into the complexity of customer decision-making in AI-based financial interactions. In conclusion, this research contributes to both academic theory and industry practice by clarifying how perceived usefulness, quality, and security jointly shape customers' intention to use chatbots. Its findings offer a foundation for future work on digital service adoption and for the continued development of intelligent, human-centered financial technologies.

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