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Article

Factors affecting the decision to use chatbots in e-banking services of GenZ customers in Vietnam

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Abstract: This article aims to measure and identify the factors influencing the decision to use Chatbot in e-banking services for GenZ customers in Vietnam through 292 customers. Testing methods: Cronbach's Alpha trust factor, EFA discovery factor analysis, and regression analysis have shown that 07 factors directly affect GenZ's decision to use Chatbot. Those factors include (1) Customer attitude; (2) Useful perception; (3) Perception of ease of use; (4) Behavioral control perception; (5) Risk perception; (6) Subjective norms and (7) Trust. On that basis, the article has set out management implications for Vietnamese commercial banks to approach and increase the decision of customers aged 18–24 years in Vietnam.

Keywords: impact factor; decision; chatbot; GenZ

1. Overview

Chatbots, powered by Artificial Intelligence (0AI), are emerging as a potential solution to enhance service and customer engagement throughout their service experience. The chatbot provides 24/7 customized support to customers while minimizing the work of customer support agents. Chatbots are integrated into various media such as websites, mobile applications, and social networks (Pillai and Sivathanu, 2020). Chatbots allow Vietnamese commercial banks to enhance communication with customers in real time. Chatbots offer many benefits such as convenience, flexibility, and accessibility (Cheng and Jiang, 2021). The popularity of chatbots is increasing, however, the adoption and use of chatbots is uneven across all customer segments. This study specifically focuses on Gen Z customers in Vietnam, a demographic group that represents the future of the market.

Born between 1997 and 2012, Gen Z was the first generation to grow up with the internet and digital technology as an integral part of their daily lives. Not only that, the Gen Z generation, which currently accounts for 47% of the country's population (45 million people) is increasingly becoming the main consumer force. Previous studies have shown that adopting new technology often depends on various factors, including usefulness, ease of use, trust, and social factors.

Although there are many studies conducted to evaluate the factors that impact the decision to use Chatbots such as (Nguyen and Dinh, 2023) that have studied the factors that impact customer adoption of AI Chatbots at some commercial banks, (Aashiek et al., 2022) studies user adoption of AI-powered Chatbots in the case of Tourism and the Tourism industries. However, very little research has focused on evaluating Gen Z's adoption of chatbots in the context of e-banking services in Vietnam. Therefore,

it is very necessary to conduct a study on the topic "Factors influencing the decision to use chatbots in e-banking services of GenZ customers in Vietnam".

2. Theoretical basis

2.1. Concepts

2.1.1. Concept of chatbot

Chatbots work by receiving input, specializing in programming languages, processing requests, and returning the output to the user. In some cases, humans can intervene in combination with working with chatbots. They can provide information, have conversations, perform required tasks, etc. based on pure text, image, or voice media or more than one of the above media (Følstad, 2022; Kucherbaev et al., 2018).

In the era of the Industrial Revolution 4.0, which is taking place strongly and has diverse applications in industries such as education, finance, healthcare, etc. (AbuShanab and Pearson, 2007; Shawar and Atwell, 2007) Chatbots have become a pioneering tool to help develop customer service thanks to their ability to provide a regular source of information and support some common tasks (Cecilie et al., 2019).

2.1.2. Concept of Gen Z

Gen Z (short for Generation Z) is a fairly new and popular term today. This phrase refers to the group of young adolescent people born between 1995 and 2012. However, the most common and widely accepted age range is 1997–2012. Gen Z is more connected and prefers to communicate through technology rather than face-to-face contact (Pol and Kl, 2019).

According to Education Corner: Gen Z is the generation that tends to prioritize learning and career development through online learning methods and digital learning platforms. They can adjust quickly and multitask in the modern work environment.

2.1.3. Concept of e-banking services

Theo (Sarma, 2017) said: "E-banking is the transformation of all traditional banking activities and services to a digital environment. E-banking is a banking service that allows customers to make transactions using internet and mobile technology to create value for customers and improve customer satisfaction." The growth in e-banking is supported by the application of potential digital technologies such as artificial intelligence, big data, blockchain, cloud, and the Internet of Things to automate the process and provide smarter banking services. It is also supported by open APIs that facilitate inter-institutional transactions in the digital ecosystem through integrated banking channels.

So, e-banking is a model that operates through a technology platform, allowing transactions and information exchange between banks and customers through digital devices connected to the internet. This process is carried out through smart devices with an internet connection, interacting with the bank's software system. In addition, the outstanding feature of this model is that customers do not need to visit bank branches in Vietnam and banks do not need to meet customers directly to complete transactions. This creates convenience, saves time, and expands access to banking services anytime, anywhere.

2.2. Summary of relevant studies

The objective of the study "Research on factors affecting customer acceptance of AI Chatbots at some commercial banks" by Nguyen and Dinh (2023) is to examine the role of artificial intelligence (AI) Chatbot quality factors (Chatbot AI) and the perception of AI Chatbot users at four joint stock commercial banks (Joint Stock Commercial Banks) in Ho Chi Minh City Chi Minh. The research method used is the fractional least squared method (PLS) with an approach of 170 users who are customers at four commercial banks in Ho Chi Minh City. The results of data analysis show that the proposed hypotheses are supported, and at the same time, perceived value plays a full mediating role between information quality, service quality, perception of AI Chatbot users, and their acceptance of using AI Chatbot. However, a weakness of this study is that empirical studies on the factors that underlie users' behavioral intentions to interact with banking chatbots are limited.

Research: "Connecting with Generation Z: Customer Acceptance of the Use of Artificial Intelligence in Using Online Services" (Thamaiyanthi and Phoon, 2023) The goal of this study is to determine whether Generation Z will accept the use of artificial intelligence (AI) in the use of online services. The study used a quantitative online survey methodology that collected 135 responses from customers in Malaysia. The results showed that perceptions of usefulness and ease of use had a positive effect on the adoption of AI, while trust and technology proficiency had a negative effect. The R2 determination coefficient is 0.364, indicating that the model is suitable. However, this study has some limitations, such as the use of a purely quantitative survey method, limited sample size, and a focus only on Generation Z in Malaysia. The use of a mixed method, a larger sample, and the expansion of the study scope to other age groups and regions will help increase the generality and validity of the study results.

Study: "Artificial Intelligence in E-Banking Services: Investigating Customer Acceptance of Chatbots" (Shereen, 2023) The objective of this study is to survey the acceptance of chatbots in e-banking services in Egypt and identify influencing factors, positive and negative, to the user's behavioral intent. The study uses a quantitative survey method based on the theory of Use and Gratification with independent variables such as technology, aesthetics, and risk. The results showed that technological factors (authenticity of conversations) and aesthetics (enjoyment, entertainment) had a positive effect on behavioral intent, while risk factors (privacy, immature technology) had a negative effect. The limitation of the study is that it has not surveyed a group of subjects who have used chatbots before.

The article by Ma et al. (2024) explores the capability of ChatGPT to predict stock returns in the Chinese market. Using historical data and language models for analysis, the authors examine whether ChatGPT can provide accurate stock return predictions. The study focuses on testing the reliability and potential of artificial intelligence in analyzing and forecasting financial market behavior, a field often influenced by macroeconomic factors and market psychology. The research findings indicate that AI can offer certain support in forecasting, but they also highlight the limitations and potential risks of using ChatGPT in financial investment decisions.

Research on chatbots has been conducted in various cultural and market contexts, revealing the diversity in how consumers interact with this technology. For instance,

a study in the United States indicates that consumers generally have a more positive attitude towards using chatbots, thanks to their familiarity with technology and trust in information security (Huang and Benyoucef, 2017). In contrast, in other cultures, such as in some Asian countries, skepticism about sharing personal information and varying levels of familiarity with technology can influence the decision to use chatbots (Chung et al., 2020). The applicability of these studies to the Vietnamese market is quite feasible but requires adjustments to fit the cultural context and consumer behavior of the local population. Vietnam has a distinct communication culture and specific consumption habits; therefore, banks and businesses need to consider factors such as customer trust, awareness of information security, and readiness to adopt technology. By referencing models and research findings from other markets, along with conducting qualitative and quantitative research in Vietnam, businesses can develop chatbots that are more aligned with the needs and expectations of Vietnamese consumers, thereby enhancing usage effectiveness and customer satisfaction.

2.3. Background theory

2.3.1. Unified theory of acceptance and use of technology (UTAUT)

According to Venkatesh et al. (2003), the UTAUT model is an important theory in the study of technology adoption and use. The UTAUT model integrates many previous theories and models of technology adoption, to provide a comprehensive theoretical framework to explain the factors influencing technology adoption and use.

The UTAUT model has been widely applied in many fields of research, including information technology, health services, education, and many others. Researchers use this model to understand and predict how users will adopt and use new technologies, thereby helping to design and implement technology more effectively.

2.3.2. Theory of reasoned action (TRA)

According to Fishbein and Ajzen (1975), the theory of rational action (TRA) is applied to clarify the correlation between attitudes and behaviors in human action. Theory helps to predict how a person acts depends on their intentions, behavior, and attitudes. Specifically, the person will perform the behavior depending on the results they expect to receive.

2.3.3. Theory of planned behavior

Planned behavior theory (TPB) was inherited and developed from rational action theory (Fishbein and Ajzen, 1975) when researchers applied TRA and discovered many limitations. According to Ajzen (1991), the control of perceived behavior is the same as the human perceptual capacity to perform that behavior. The degree of control over the perceived behavior of each individual depends on the control of their trust, which is the difficulty in performing a specific behavior in a certain situation.

2.4. Hypotheses

2.4.1. Effects of attitude

Attitude is defined as an individual's positive or negative emotions about the performance of targeted behaviors (Davis et al., 1989). According to the TPB and TAM models, customer decisions and attitudes are predictable. It has been suggested

that attitude is a multi-structure that includes the main structures of useful cognition and easy-to-use cognition (Taylor and Todd, 1995). When customers have positive reviews about that technology, they tend to accept it.

H1: Attitude has the same (+) impact on GenZ customers' decision to use chatbots.

2.4.2. Effects of the perception of usefulness

Useful perception is defined as "The degree to which a person believes that the use of a system will enhance his or her work performance" (Davis, 1989). This factor determines the user's subjective probability of trying to improve their performance by using technology. In this article, the perception of the usefulness of chatbots refers to providing customers with product information, solving problems and bases for using the service, so it will affect the acceptance of using chatbots.

H2: Perception of Usefulness has the same (+) impact on GenZ customers' decision to use chatbots.

2.4.3. Effects of ease of using perception

According to Davis (1989), the definition of "ease of use perception" is the degree to which users feel that using a system does not require much effort. This is one of the two main elements of the Technology Adoption and Use Model (UTAUT), along with the "perception of usefulness".

H3: Ease of use perception has the same (+) impact on GenZ customers' decision to use chatbots.

2.4.4. Effects of risk perception

Bauer (1960) argues that risk perception is related to uncertainty and consequences related to customer actions. According to the theory of planned behavior (TPB), risk perception can reduce the control of uncertain customer behavior and will have a negative impact on their behavioral decisions. Risk perception has a certain impact on customer decision-making.

H4: Risk perception has the opposite impact (-) on GenZ customers' decision to use chatbots.

2.4.5. Effects of trust

According to Liao et al. (2022), this study proposes a model of user trust in AI chatbots and the effect of trust on predictive quality and user experience. Trust in the chatbot's ability to understand and interact is a key factor in driving user acceptance and satisfaction.

H5: Trust has the same (+) impact on GenZ customers' decision to use chatbots.

2.4.6. Effects of subjective norm

The subjective norm is "the individual's perception of social pressures to perform or not to perform an act" (Ajzen, 1991). Subjective standards and behavioral decisions have a positive impact. When individuals perceive a higher social expectation for a given behavior, the client is willing to receive advice from reference sources and tends to follow a stronger subjective standard of behavior, thus deciding to perform that behavior (Ajzen, 1985, 1991).

H6: Subjective norm has the same (+) impact on GenZ customers' decision to use chatbots.

2.4.7. Effects of behavioral control perception

Behavioral control perception is defined as an individual's perception of how easy or difficult it is to perform a behavior (Ajzen, 1991). Behavioral control perception indicates the degree of control over the performance of the behavior rather than the result of the behavior (Ajzen, 2002). Previous studies have shown that behavioral control cognition directly impacts usage decisions.

H7: Behavioral control perception has the same (+) impact on GenZ customers' decision to use chatbots.

2.5. Proposed research model

Figure 1 illustrates the model proposed in this study:

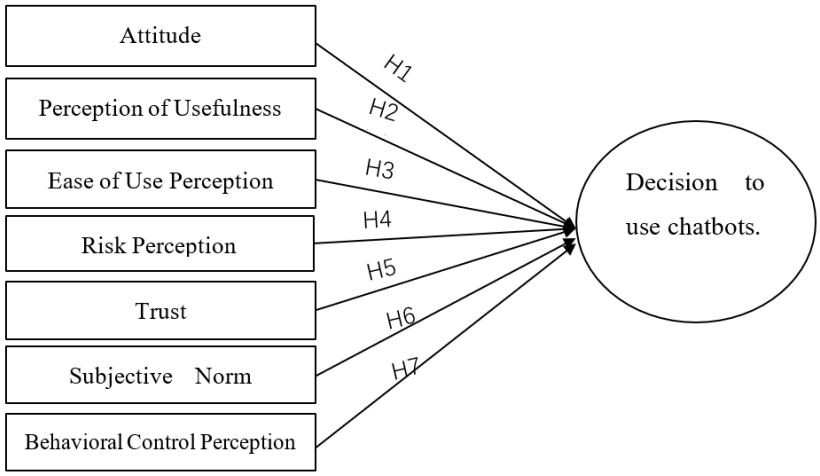

Figure 1. Proposed research model of the decision to use chatbots.

3. Data collection methods

3.1. Research process

The study employed qualitative research methods through in-depth interviews to enhance the depth and reliability of the results. By conducting interviews with relevant participants, the research gathered detailed and rich information about their perspectives and experiences related to the research topic. The in-depth interview method not only clarifies complex aspects but also allows participants to express their opinions in a natural and comfortable manner. This helps to improve the reliability of the research, thus providing a more comprehensive and insightful view of the issue being studied. After that, quantitative research is conducted to test research hypotheses and models. The data obtained from the survey is entered and processed using SPSS 20.0 software. Data analysis techniques include factor analysis, reliability analysis, and linear regression analysis. The results of the data analysis are used to evaluate the research model and draw conclusions.

3.2. Pattern design and scale

The primary data source will be used to run the model collected by distributing survey forms. Lesson using the 5-level Likert scale:

(1) Completely disagree
(2) Disagree
(3) Normal
(4) Agree
(5) Completely agree

All data was collected through a survey question list method designed on the online form generator Google Forms and sent to Gen Z. The survey was conducted at university groups in Vietnam. In the survey, participants were asked to rate their satisfaction and identify the factors that impacted their decision to use the Chatbot.

4. Research results

4.1. Overview of the research sample

After removing the invalid responses, the authors collected 292 votes (reaching a rate of 100%). Thus, with a sample size of 292, it is satisfactory to analyze the discovery factor and multivariate regression. Characteristics of the study sample are presented in **Table 1**.

Table 1. Summary of the study sample.

			Weight
Gender	Male	157	53.8%
	Female	135	46.2%
Total		292	100%

Source: Results of a study of 292 GenZ customers, 2024.

4.2. Scale reliability analysis using Cronbach's alpha

The results of the study in **Table 2** show that the Cronbach's Alpha coefficient is greater than 0.6, which is standard and ranges from 0.734 to 0.843. In addition, the total correlation coefficient of the observed variables was greater than 0.3. It is inferred that all variables are consistent and used for exploratory factor analysis.

Table 2. Cronbach's alpha of the scales.

Factor	Total variable correlation coefficient	Cronbach's Alpha if the variable is eliminated	MEAN
Attitude (ATT)		Cronbach's Alpha = 0.763	
ATT1	0.585	0.693	3.61
ATT2	0.602	0.674	3.50
ATT3	0.597	0.679	3.57
Perception of Usefulness (PU)		Cronbach's Alpha = 0.830	
PU1	0.599	0.804	3.56
PU2	0.629	0.796	3.40
PU3	0.618	0.799	3.48
PU4	0.715	0.771	3.53
PU5	0.582	0.810	3.36

Table 2. (*Continued*).

Factor	Total variable correlation coefficient	Cronbach's Alpha if the variable is eliminated	MEAN
Ease of Use Perception (EUP)		Cronbach's Alpha = 0.843	
EUP1	0.589	0.828	3.45
EUP2	0.611	0.822	3.54
EUP3	0.652	0.811	3.33
EUP4	0.659	0.809	3.27
EUP5	0.739	0.787	3.38
Subjective Norm (SN)		Cronbach's Alpha = 0.774	
SN1	0.640	0.660	3.47
SN2	0.600	0.706	3.20
SN3	0.589	0.717	3.53
Behavioral Control Perception (BCP)		Cronbach's Alpha = 0.734	
BCP1	0.563	0.640	3.66
BCP2	0.561	0.646	3.17
BCP3	0.551	0.656	3.61
Risk Perception (RR)		Cronbach's Alpha = 0.756	
RR1	0.579	0.681	3.13
RR2	0.601	0.655	3.25
RR3	0.576	0.685	3.30
Trust (NT)		Cronbach's Alpha = 0.805	
NT1	0.632	0.750	3.39
NT2	0.623	0.754	3.59
NT3	0.601	0.765	3.64
NT4	0.622	0.754	3.49
Decision (DC)		Cronbach's Alpha = 0.815	
DC1	0.613	0.778	3.76
DC2	0.670	0.751	3.68
DC3	0.643	0.764	3.71
DC4	0.614	0.778	3.57

Source: Results of a study of 292 GenZ customers, 2024.

4.3. Exploratory factor analysis (EFA)

The observed variables all showed KMO = 0.829 ($0.5 \leq KMO \leq 1$), so the results were consistent based on the results of the EFA analysis in **Table 3**. Bartlett's calculation with Sig = 0.00 identified the variables that are compatible with each other and the total variance given = 59.590 thereby explaining 59.590% of the variability of the observed variables. The seven sets of factors are extracted at Eigenvalue = 1.418 (≥ 1).

Table 3. Results of eigenvalue, KMO and bartlett's test.

Analysis for independent variables **KMO and Bartlett's Test** **KMO and Bartlett's Test**									
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.							0.829		
		Approx. Chi-Square					2218.845		
Bartlett's Test of Sphericity		df					276		
		Sig.					0.000		
	Total Variance Explained								
	Initial Eigenvalues			Sum Squared Load Factor			Sum Squared Rotational Load Factor		
Factor	Sum	% Variance	Acc %	Sum	% Variance	Acc %	Sum	% Variance	Acc %
1	5.655	23.561	23.561	5.655	23.561	23.561	2.570	10.707	10.707
2	2.081	8.671	32.232	2.081	8.671	32.232	2.467	10.277	20.985
3	1.851	7.712	39.944	1.851	7.712	39.944	2.413	10,054	31.039
4	1.683	7.011	46.955	1.683	7.011	46.955	2.111	8.796	39.835
5	1.615	6.727	53.682	1.615	6.727	53.682	2.048	8.534	48.369
6	1.418	5.908	59.590	1.418	5.908	59.590	2.043	8.512	56.881
7	1.351	5.630	65.220	1.351	5.630	65.220	2.001	8.339	65.220

The Factor Rotation Matrix (**Table 4**) shows that there are 24 observed variables combined into 7 factors, all of which have a Factor Loading factor > 0.45.

Table 4. Factor rotation matrix results.

Rotated Component Matrix							
	Component						
	1	**2**	**3**	**4**	**5**	**6**	**7**
NT1	0.784						
NT2	0.774						
NT3	0.740						
NT4	0.737						
EUP4		0.782					
EUP3		0.767					
EUP1		0.727					
EUP2		0.699					
PU2			0.764				
PU5			0.756				
PU1			0.740				
PU3			0.696				
SN1				0.840			
SN2				0.818			
SN3				0.804			
RR2					0.786		
RR3					0.783		
RR1					0.783		

Table 4. (*Continued*).

Rotated Component Matrix							
	Component						
	1	**2**	**3**	**4**	**5**	**6**	**7**
ATT2						0.805	
ATT3						0.792	
ATT1						0.770	
BCP3							0.778
BCP1							0.777
BCP2							0.767

Source: Results of a study of 292 GenZ customers, 2024.

4.4. Multivariate regression analysis

To identify the factors influencing the decision to use, the team proceeded to multivariate regression analysis by the "Enter" method, in which the independent variable (Constant), ATT, PU, EUP, SN, BCP, RR, NT, and dependent variable (DC) were analyzed. The results of the regression analysis are presented in **Tables 5–7**.

Table 5. Summary of the model.

Model	***R***	***R* Square**	**Adjusted R Square**	**Std. Error of the Estimate**	**Durbin-Watson**
1	0.791[a]	0.626	0.616	0.44972	2.102

Source: Results of processing survey data.

Table 6. ANOVA analysis results.

Model	**Sum of Squares**	**df**	**Mean Square**	***F***	**Sig.**
Regression	95.979	7	13.711	67.794	0.000[b]
Residual	57.438	284	0.202		
Total	153.417	291			
a. Dependent Variable: DC					
b. Predictors: (Constant), NT, SN, ATT, RR, PU, BCP, EUP					

Source: Results of processing survey data.

Table 7. Results of regression analysis.

Model	**Unstandardized Coefficients**		**Standardized Coefficients**	***t***	**Sig.**	**Collinearity Statistics**	
	B	Std. Error	Beta			Tolerance	VIF
(Constant)	0.372	0.302		1.232	0.219		
ATT	0.266	0.039	0.273	6.785	0.000	0.815	1.227
PU	0.214	0.041	0.213	5.201	0.000	0.787	1.271
EUP	0.157	0.041	0.159	3.845	0.000	0.768	1.302
SN	0.045	0.035	0.048	1.287	0.199	0.953	1.049
BCP	0.180	0.038	0.189	4.692	0.000	0.811	1.233
RR	−0.145	0.040	−0.148	−3.664	0.000	0.807	1.239
NT	0.220	0.039	0.233	5.623	0.000	0.765	1.308

Source: Results of processing survey data.

From the analysis results in **Tables 5–7**, the R^2 value of the model is 0.626 and the adjusted R^2 coefficient is 0.616. That is, it explains 61.6% of the variability of the dependent variable. The decision is explained by 7 independent variables. The Durbin-Watson coefficient = 2.102, which ranges from 1.5 to 2.5, so there is no correlation. The model does not have a multi-collinear phenomenon because the VIF coefficients of the variables are all less than 2.

From the results in **Table 7**, six of the seven independent factors are positively correlated with the dependent variable (DC), those independent factors are ATT, PU, EUP, SN, BCP, and NT. On the contrary, the RR factor is inversely correlated with the customer's decision to use the Chatbot. In particular, the NT factor has the greatest impact on the decision to use Chatbot, followed by ATT, PU, EUP, SN, BCP, and RR.

After the regression analysis, we get the following equation:

$$DC = 0.273ATT + 0.213PU + 0.159EUP + 0.189BCP – 0.148RR + 0.233NT + e$$

The normalized regression coefficients of Constant and SN have a *p*-value greater than 0.05 while the normalized regression coefficients of ATT, PU, EUP, BCP, RR, and NT have a *p*-value of less than 0.05. We can conclude that: The variables ATT, PU, EUP, BCP, RR, and NT all have a direct impact on the decision to use, the variable SN does not directly affect the decision to use. Thereby, accepting the hypotheses from H1 to H7, except the H4 hypothesis.

5. Management implications

5.1. For the attitude factor

The results of the study show that attitude has a positive and strong impact on the decision to use Chatbot of GenZ customers in e-banking services in Vietnam, with a β coefficient of 0.273 the highest among the surveyed factors and with an average value of 3.50 to 3.61. This suggests that Vietnamese commercial banks need to focus on forming and improving customers' positive attitudes towards Chatbots. To do this, Vietnamese commercial banks should strengthen communication about the benefits and utilities of Chatbots, and design friendly and easy-to-use Chatbot interfaces and interactions. Providing a positive Chatbot experience, and meeting the needs and expectations of GenZ customers will contribute to forming a favorable attitude, thereby promoting the decision to use Chatbot in the future. Integrating these chatbots with existing banking products and services can enhance their effectiveness. For instance, banks can ensure that chatbots are seamlessly connected to online banking platforms, allowing users to access account information, make transactions, or inquire about products directly through the chatbot interface. Additionally, incorporating chatbots into mobile banking apps can provide users with immediate support and guidance while navigating their banking needs. Providing a positive chatbot experience that meets the needs and expectations of Gen Z customers will contribute to forming a favorable attitude towards this technology. Furthermore, the integration of promotional offers or personalized recommendations via chatbots can encourage customers to engage more frequently. By enhancing the user experience through thoughtful integration with existing services, banks can not only improve customer satisfaction but also promote the decision to use chatbots in the future.

5.2. For the trust factor

The trust factor, which has an impact on the decision to use chatbots of Gen Z customers in Vietnam, has a coefficient of β ranked 2nd in the model factors given by the authors of 0.233. The results obtained from the survey with an average value of 3.39 to 3.64 show that the number of people who agree with this factor is quite high. That proves that customer trust in the decision to use chatbots is extremely important. To strengthen customer confidence in the decision to use chatbots, Vietnamese commercial banks can apply enhanced personalization, Gen Z attaches great importance to personal experience. Chatbots need to be designed to communicate in a natural, friendly way and understand each customer. Using names, storing interaction history, and making relevant product suggestions will help strengthen connections. At the same time, Gen Z is very concerned about the security of personal information. Vietnamese commercial banks need to be transparent about how they collect and use data, and at the same time commit to protecting customer information.

5.3. For the useful perception factor

Useful perception is one of the important factors that positively impact the decision to use chatbots in e-banking services of GenZ customers in Vietnam. With a normalized regression coefficient of $\beta = 0.213$ ranking third in the factors and having an average value of 3.36 to 3.56, it shows that useful cognition has a significant impact, second only to attitudes and trusts. This suggests that Vietnamese commercial banks providing e-banking services should focus on raising customer perception of the usefulness of chatbots. Specifically, they need to design and develop chatbots that can respond quickly and accurately to customer requests, provide detailed product information, support price comparisons, and make relevant recommendations. At the same time, Vietnamese commercial banks should actively communicate about the benefits of using chatbots, such as saving time, convenience in searching for information, and 24/7 support. By increasing perception of the usefulness of chatbots, Vietnamese commercial banks can promote the adoption and use of this technology among GenZ customers, thereby improving the experience of using online services and enhancing business efficiency.

5.4. For the perception factor that controls behavior

The results of behavioral control perception affecting the decision to use chatbots in e-banking services of GenZ customers in Vietnam have a coefficient of β ranking fourth in the model factors given by the author is 0.189. The results obtained from the survey with an average value of 3.17 to 3.66 show that the number of people who agree with this factor is quite high. Thereby, it is found that the perception factor of controlling behavior plays an important role in influencing the decision to use Chatbot in the service use of GenZ customers in Vietnam. To raise the perception of behavior control, Vietnamese commercial banks need to create a user-friendly, intuitive, and easy-to-use chatbot interface. Allowing customers to customize the experience, easily navigate, and end conversations will help them feel in control and proactive during the interaction.

5.5. For the easy-to-use perception factor

The factor of ease of using perception that affects the decision to use chatbots in e-banking services of GenZ customers in Vietnam has a β coefficient of ranking fifth in the model factors given by the author of 0.159. The results obtained from the survey have an average value of 3.27 to 3.54, showing that the number of people who agree with this factor is quite high. From there, it shows that the ease of use of Chatbot plays an important role in influencing the decision to use the services of GenZ customers in Vietnam. The interface design is friendly, easy to understand, and accessible, helping users feel comfortable and confident when using it. Therefore, administrators need to work closely with the development team to ensure the product or tool is suitable for the needs and habits of users.

5.6. For the risk perception factor

The Risk Perception factor has a final impact on the dependent variable in the model, but the effect is not small ($\beta = -0.148$). The results obtained from the survey with an average value of 3.13 to 3.30 show that the number of people who agree with this factor is quite high. That proves that customer risk perception of Chatbots in e-banking services plays an important role. The safety and security of personal information are the core factors that build customer trust in a brand. A reliable chatbot is a measure of how committed Vietnamese commercial banks are to protecting customer data. To strengthen this trust, Vietnamese commercial banks need to:

Strong investment in security system: Strictly protect all customers' personal information, especially payment information. Additionally, banks can apply several other methods, such as:

1) Two-Factor Authentication (2FA): Using two-factor authentication for online transactions increases safety, helping customers feel secure when conducting transactions on digital banking platforms.
2) Automated Fraud Monitoring and Detection: Deploy AI and machine learning technologies to monitor abnormal activities and automatically detect fraud, preventing suspicious actions that could impact customer accounts.
3) Raising Customer Awareness: Regularly provide information, organize training sessions, or send guidelines to enhance customer awareness of security measures and ways to protect their personal information.
4) Commitment to Privacy: Clearly state in service terms that the bank is committed to complying with data protection regulations and will not share customers' personal information with third parties without consent.
5) Risk Insurance Policies: Provide risk insurance policies for financial transactions to ensure that customers are compensated for losses caused by security issues.
6) Transparent Communication: Communicate transparently and promptly with customers about security policies, updates on information safety, and data protection methods to help customers understand their rights and responsibilities.
7) International Security Certifications: Achieve international security certifications like ISO/IEC 27001, PCI-DSS to demonstrate that the bank's system meets high standards of security and safety.

By implementing these measures, banks can not only strengthen customer trust but also reduce perceived risks associated with the use of electronic banking services and new technologies.

5.7. Research limitations

First, conceptualizing variables: Defining and measuring concepts such as "subjective cognition," "subjective norms," and "behavioral control cognition" can be difficult due to their abstraction and multidimensionality. Differences in how these variables are understood and measured between studies can affect results and comparability.

Second, the generality of the results: The results of this study are primarily applicable to a specific audience (Gen Z in Vietnam) and may not fully apply to other demographic groups or different contexts. A limitation of this study is the relatively homogeneous sample, which may reduce the generalizability of the findings. To enhance representativeness, future research could consider diversifying the sample population to include different age groups, cultural backgrounds, and geographic regions, allowing for a better understanding of factors influencing chatbot adoption across various user groups and contexts.

Third, the effect of external factors: In addition to the variables studied, there are many other factors that may influence the decision to use chatbots, such as culture, socio-economic conditions, and technology. Cultural differences can lead to varied attitudes and behaviors toward technology adoption, as different cultural norms may affect the level of trust and openness of users toward chatbots. Socio-economic factors, including income levels and educational background, can also influence different customer groups' access to and use of technology. Furthermore, the technological infrastructure in each region or country will determine the prevalence and effectiveness of chatbots, due to factors such as internet speed, coverage, and the availability of digital devices. Failure to control for these factors can reduce the accuracy of the study results; therefore, it is essential to consider these factors to gain a more comprehensive understanding of chatbot adoption across different contexts.

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