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FACTORS AFFECTING THE USE OF E-BANKING SERVICES BY CUSTOMERS IN CAN THO CITY

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4. International Conference "Proceedings Economic and Business Development in the Digital Era" at Thanh Dong University in November 2025.

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INTRODUCTION TO THE RESEARCH TOPIC

1. Reason for choosing the topic

In the context of the 4.0 industrial revolution and the strong development of digital technology, online business activities are becoming an inevitable trend in Vietnam. In particular, the COVID-19 pandemic has acted as a catalyst, rapidly accelerating the digital transformation process in many fields, including e-commerce and financial and banking services. According to the 2022 E-commerce Index (EBI) report of the Vietnam E-commerce Association, the growth rate of e-commerce in Vietnam remained above 20% in 2021, with the expectation that by 2025, more than 50% of the population will participate in online shopping. Along with that, electronic banking services (E-banking) are also being promoted to meet the needs of fast, convenient, cashless payments of modern consumers.

However, in addition to the obvious benefits, e-banking services also face many challenges such as security risks, information security, and the fear of a segment of consumers when approaching new technologies. Previous empirical studies have shown that many factors affect the intention and behavior of using e-banking services, such as risk perception, cost, ease of use, and trust (Luarn & Lin, 2005; Amin et al., 2008; Yu, 2012). However, research results are not consistent, some works show that these factors do not have a significant impact in some contexts (Suoranta et al., 2004; Alam et al., 2014). On the other hand, research models on e-banking acceptance behavior are mainly built in international contexts or large cities in Vietnam. Meanwhile, the Southwest region – including Can Tho city – has its own distinct socio-economic and cultural characteristics, which affect the way people access and use modern banking services. Can Tho is the central urban area of the Mekong Delta, with a young population and a high rate of mobile device usage – these are favorable conditions for the development of e-banking. However, the level of acceptance and use of the service is still uneven, and there has not been much in-depth research examining consumer behavior in this region.

Many previous empirical studies by domestic and foreign authors show that there are many factors affecting the level of acceptance and use of e-banking services by customers. However, at different times and in different regions, previous studies have produced different research

results. Given this reality, it is necessary to study the factors affecting the acceptance and use of e-banking by customers in Can Tho city. The research results not only contribute to perfecting the theoretical model suitable for the regional context but also provide practical management implications for commercial banks in improving service quality and promoting the digital transformation process, towards sustainable digital banking development in the future.

Therefore, the topic "***Factors affecting the use of e-banking services by customers in Can Tho city***" was chosen to meet urgent requirements in both practice and theory in the current context.

2. Subject and scope of the thesis

- Research object: factors affecting the use of e-banking services by customers in Can Tho city.
- Survey object: consumers who are transacting at joint stock commercial banks in Can Tho city.
- Research scope:

Regarding the spatial scope, the researcher will limit the research to joint stock commercial banks in Can Tho city, and the data will be collected by a convenient method. Regarding the scope of content, the researcher will focus on the theoretical basis and analyze the level of influence of factors such as: perception of usefulness, perception of ease of use, perception of risk, social influence, bank brand... on consumers' acceptance of using e-banking services. The research is conducted during the period from September 2022 to August 2024.

3. Target thesis research

3.1 Target shared

The general objective of the thesis is to identify and measure factors affecting the use of e-banking services by customers in Can Tho city, based on the inheritance of previous studies and analysis of local practical context. Thereby, the thesis aims to discover new factors that are consistent with current trends, thereby proposing solutions to improve the efficiency of e-banking activities at joint stock commercial banks in the area.

3.2 Specific goals

The first objective of the thesis is to identify, test, and measure the impact of the factors influencing customers' e-banking service usage behavior in Can Tho city.

The second objective is to control for the influence of demographic characteristics (including age and gender) within the research model to further clarify the relationship between cognitive factors and e-banking service usage behavior.

The final objective is to propose managerial implications based on the research findings to support joint-stock commercial banks in Can Tho city in improving the efficiency and development of e-banking services.

4. Research methods and data collection

4.1 Research method

The author also combined both qualitative and quantitative methods to clarify the research problem. In the first stage, the qualitative research method was used to synthesize, analyze and compare secondary documents from previous studies to build a theoretical framework, research model and propose hypotheses. At the same time, the author consulted experts in the banking industry, including branch directors, department heads and managers at commercial banks in Can Tho city, to calibrate and perfect the theoretical model, measurement scale and preliminary survey. The discussions were conducted directly with about 10 selected experts.

In the next stage, the quantitative research method was conducted through a survey of e-banking service users using a structured questionnaire, based on the Likert scale. Preliminary quantitative research was conducted first with a small sample size to assess the reliability and appropriateness of the scales. On that basis, the questionnaire was adjusted and applied to the official research with a sample size of 500 people, selected by the convenience sampling method from individuals using e-banking services in Can Tho city.

Data were processed using Smart-PLS software. The reliability of the scale was assessed using Cronbach's Alpha analysis and exploratory factor analysis (EFA). Then, the author conducted confirmatory factor analysis (CFA) and structural equation modeling (SEM) to test the research model and the hypotheses.

4.2 Data collection method

For secondary data sources, the researcher will select data that are numerical information collected by the author from relevant sources such as statistics, reports of the State Bank, associations, magazines, seminars, relevant documents in articles, seminars as well as through

studies related to the thesis.

The researcher will use primary data sources through interviews and collecting discussion opinions from experts and leaders currently working at banks. For the survey, the author will send questionnaires to the transaction counters of some banks with a large number of customers in Can Tho city.

5. New contribution of the thesis

The thesis makes practical contributions to joint stock commercial banks operating in Can Tho city in the process of promoting the application and expansion of e-banking services. By clearly identifying the factors that positively and negatively affect customers' intention and behavior to use e-banking, the research results help bank managers better understand the psychology, expectations and barriers that local consumers are facing when accessing digital services. Thereby, banks can build marketing, communication and service development strategies that are more suitable to the needs and characteristics of each target customer group.

In addition, the thesis also plays a practical role in developing training programs, consulting and supporting customers to access e-banking, especially for older customers, those with low technology skills or living in rural areas. Implementing appropriate support strategies will contribute to increasing the coverage of digital banking services, thereby promoting the comprehensive digital transformation process in the local banking industry.

In terms of theory, the thesis has expanded and adjusted the UTAUT model to suit the context of e-banking services in Vietnam, specifically in Can Tho city. By integrating additional factors such as perceived risk, habits and demographic characteristics, the study has clarified the factors affecting customers' intention and behavior to use e-banking, thereby contributing to the completion of the theory of technology acceptance in the field of finance - banking.

In terms of science, the thesis has tested the research model through structural equation modeling (SEM), and at the same time conducted multi-group structural analysis to explore the moderating role of demographic characteristics. The research results provide reliable empirical evidence, contributing to supplementing the scientific basis for future studies on consumer behavior in the digital banking environment in developing markets.

6. New points of the thesis

In theory, the thesis has built an integrated research model between the Diffusion of Innovation (DOI) theory and the Expectation Confirmation theory (ECT) with UTAUT and TAM, in which DOI and ECT add important aspects in emphasizing the intrinsic nature of technological innovation, such as superiority, compatibility and complexity, thereby contributing to explaining the speed and extent of diffusion of innovation in the community, while UTAUT includes these factors in expected effectiveness and effort. The combination with DOI theory shows a clearer differentiation in the way users evaluate and accept a new technology compared to previous studies. In addition, the combination of DOI and ECT theories with UTAUT and TAM also allows for the expansion of the model's scope both horizontally (influencing factors) and vertically (spanning the user journey), that is, from the beginning of innovation awareness to the decision to continue using it.

In terms of methodology, a notable new point is the application of SEM (Structural Equation Modeling) analysis to evaluate multidimensional relationships between variables in the model. This technique allows simultaneous testing of both measurement models and structural models, thereby providing high reliability and accuracy for research results. The thesis also conducts multi-group analysis according to demographic characteristics to test the stability of the model in different segments, thereby deepening the understanding of behavioral differences in each customer group.

Overall, the thesis not only contributes to supplementing the theoretical foundation of consumer behavior in the field of digital banking, but also creates an analytical framework that can be applied in similar contexts in developing cities such as Can Tho city.

7. Structure of the thesis

In addition to references, appendices, tables and figures, the thesis includes the following chapters:

Chapter 1: Introduction to the research topic

Chapter 2: Theoretical basis and research model

Chapter 3: Research Methods

Chapter 4: Research results and discussion

Chapter 5: Managerial implications and conclusions.

CHAPTER 1. THEORETICAL BASIS AND RESEARCH MODEL

1.1 Theoretical basic

According to the definition of the International Accounting Standards Organization (IAS 30), a bank is understood as an organization that accepts deposits and provides credit and related financial services", while the Basel Committee on Banking Supervision (Basel Committee on Banking Supervision, 1997) emphasized that a bank is a financial entity that performs the function of intermediary between those who have capital and those who need capital, and at the same time provides payment, guarantee, and financial risk management services. In Vietnam, according to the Law on Credit Institutions (amended in 2010), a bank is defined as a type of credit institution that performs all banking activities and other business activities according to the provisions of law, in which the main and regular activities are receiving deposits and using those deposits to grant credit, providing payment services.

In the field of trade, services are understood as activities that are not of a nature but have a value similar to goods. Research by Kotler & Armstrong (2004) pointed out that services are activities or benefits that businesses and organizations provide to customers with the goal of building, maintaining and developing long-term relationships and sustainable benefits with them. Currently, there are many different approaches and definitions of services. However, within the framework of this research topic, the author uses the definition of services by Zeithaml & Bitner (2000) to clarify the research problem. Specifically, services are understood as activities, processes and methods of performing a certain job to provide value to consumers to satisfy their needs and desires. In addition, services can also be understood in another direction, which is an exchange process in which goods are intangible products transferred from the seller to the buyer at the same time to immediately meet the needs and desires of consumers.

Services are an important field in the modern economy, especially in the context of the knowledge and digital economy. increasingly developed. Unlike tangible goods, services are intangible, cannot be stored, and are often produced and consumed simultaneously. According to Kotler and Keller (2016), services are defined as any act or activity that one party can offer to another that is essentially

intangible and does not result in the ownership of anything. The provision of services may or may not be tied to a physical product. This definition emphasizes the intangible nature, non-ownership, and simultaneity of supply and demand – characteristics that distinguish services from traditional goods.

Service quality is a decisive factor in customer satisfaction and loyalty, especially in highly competitive environments such as e-banking. According to Parasuraman, Zeithaml & Berry (1988), service quality is defined as the gap between customer expectations and actual perceptions after using the service. In e-banking, the core elements of service quality The service can be mentioned as Reliability, which is the ability to perform the service as committed and without errors; Responsiveness, which is the willingness to support customers promptly; Security, which is the safety in transactions and protection of personal information; Usability, which is shown in the easy-to-use interface, quick access and Personalization, which is the ability to provide services suitable to the needs of each customer.

In the context of strong development of information and communication technology, electronic banking (e-banking) has become an inevitable trend in the operations of financial institutions. Electronic banking is understood as the provision of traditional banking services through modern electronic means such as the Internet, mobile devices, automatic teller machines (ATMs), terminals at the point of sale (POS), helping customers to perform financial transactions and non-financial anytime, anywhere without having to go directly to the bank.

Thus, it can be understood that electronic banking is a form of providing banking services through a digital technology platform, allowing customers to interact and transact with the bank conveniently, quickly, safely and cost-effectively. Popular services in electronic banking include: money transfer, bill payment, balance inquiry, savings, online account opening, and other digital financial services.

According to Dennis (2004), the form of electronic transaction is defined as a form of payment method agreement between the buyer and the seller by exchanging communication information on a digital platform. Another view is that electronic payment is considered a method of connecting businesses and individuals funded through banks to help electronic money be exchanged.

The electronic payment system is considered an Internet-based payment method for online payment for products or services provided instead of the third party. Purchase must use the form of forgiveness

Electronic payment system is considered as an Internet-based payment method for online payment for products or services provided instead of the buyer having to use other forms of payment such as cheque, master card etc. (Peter & Babatunde, 2012). The main types of electronic payment systems include cheque, master card, e-money and micropayment (Maiyo, 2013).

Adeoti & Osotimehin (2012) study, the term electronic payment is used to describe an electronic means to pay for products and services purchased online in stores and shopping malls. A study also found that electronic payment is a form of payment through an online platform with money transfer by electronic means (Kaur & Pathak. 2015).

1.2 Theories of service acceptance and usage

1.2.1 Theory of Reasined Action – TRA

The Theory of Reasoned Action (TRA) was developed to show the unity of theories surrounding the correlation of human behavior and attitudes towards decision making (Fishbein and Ajzen, 1975). It is considered one of the most influential theories in explaining human behavior (Venkatesh and Ctg, 2003). According to Fishbein and Ajzen (1975), the factor that governs human behavior is not attitude but behavioral intention. However, TRA cannot be used to explain human adoption behavior based on habit or unconsciousness with the assumption that consciousness controls human behavior. In computer science, it also has the potential to explain human attitudes and behavior towards computers (Saudi by Abdulrahman and Abbas, 2008).

1.2.2 Theory of Planned Behavior – TPB

The Theory of Planned Behavior (TPB) was first formed to overcome the limitations of the Theory of Rational Behavior (TRA), that is, TRA assumes that all behaviors are completely controllable, but this does not reflect reality because there will be behaviors influenced by factors beyond the individual's control such as circumstances, resources, time, skills, etc. In addition, Ajzen also added the element of Perceived Behavioral Control to reflect the extent to which an individual believes they can perform that behavior, which better predicts actual behavior, especially when the behavior is influenced by objective

factors or limitations such as no internet connection, lack of technological skills, etc. TPB was born to increase the ability to explain and predict an individual's behavior. Adding the factor of Perceived Behavioral Control will help TPB to be applied more widely in many fields such as consumption, health, environment, education, technology, banking..., thereby helping TPB to have a higher ability to predict behavior than TRA in empirical studies.

1.2.3 Technology Acceptance Model

The Technology Acceptance Model (TAM) includes core components such as: Perceived Usefulness - reflecting the extent to which an individual believes that using a technology system will improve work performance; Perceived Ease of Use - reflecting the belief that using the technology does not require much effort; Attitude toward Use; Behavioral Intention to Use - representing the level of willingness to adopt the technology; and finally Actual System Use, which is considered the final result of the process of accepting and using technology.

The TAM theory was developed based on the Theory of Reasoned Behavior (TRA) of Fishbein & Ajzen (1975) but was adjusted to fit the context of using information systems and technology.

1.2.4 Unified Theory of Acceptance and Use of Technology

The Unified Theory of Acceptance and Use of Technology (UTAUT) developed by Venkatesh et al. (2003) is a comprehensive model, built to explain users' acceptance and use of technology in the context of organizations and technological environments. The goal of UTAUT is to combine and unify previous theories and models such as TRA (Theory of Reasoned Action), TPB (Theory of Planned Behavior), TAM (Technology Asseptance Model) and IDT (Innovation Diffusion Theory). The UTAUT model was created to increase the ability to predict technology use behavior, which according to old models is only at an average level.

According to Venkatesh et al. (2003), within the framework of the Unified Theory of Acceptance and Use of Technology (UTAUT), an individual's behavioral intention to use technology is directly influenced by three main factors: Performance Expectancy, Effort Expectancy, and Social Influence. Performance Expectancy refers to the extent to which an individual believes that using technology will enhance their job

performance. Effort Expectancy reflects the ease that an individual perceives when using a technology system. Meanwhile, Social Influence represents the extent to which an individual feels pressure or influence from others to use technology.

1.2.5 Diffusion of Innovation – DOI

The Diffusion of Innovation (DOI) theory, developed by Rogers (1962, 2003), is one of the fundamental theoretical frameworks to explain how, how fast, and why an innovation, including a technology, idea, or product, is adopted and spreads within a community or social organization. According to Rogers (2003), "innovation" is understood as an idea, practice, or object that is perceived as new to the individual or unit that adopts it, while "diffusion" refers to the communication process through which the innovation is transmitted from source to recipient in a social system over time.

DOI emphasizes five key characteristics of an innovation that influence the extent and speed of adoption, including Relative advantage, which is the extent to which the innovation is perceived as better than what already exists. Compatibility, which is the extent to which the innovation fits the values, needs, and experiences of users; Complexity, which is the extent to which the innovation is difficult to understand and use; Trialability, which is the extent to which the innovation can be tested before committing to use; and Observability, which is the extent to which the results of the innovation can be seen and evaluated by others.

1.2.6 Expectation Confirmation Theory – ECT

In the fields of services and information systems, the Expectation Confirmation Theory (ECT), originally developed by Oliver (1980), is a prominent model in the study of satisfaction and consumer behavior. ECT suggests that the behavior of continuing to use a product or service is the result of a comparison between initial expectations and actual perceptions after use, thereby forming confirmation (or disconfirmation), leading to satisfaction and influencing future behavioral intentions.

The core content of ECT includes four main components: Initial expectations, which are beliefs or predictions about the effectiveness or quality of a product/service before use; Perceived performance, which is the user's actual assessment after use; Confirmation, which is the extent

to which actual perceptions meet (or do not meet) initial expectations; and Satisfaction, which is the positive or negative emotional response to the usage experience, is formed from the confirmation process.

ECT has been extended and applied in many models of information system user behavior research, especially studies related to the intention to continue using technology platforms (Bhattacherjee, 2001). In the context of digital technology, this theory helps explain why users continue or abandon applications, platforms or services based on the usage experience and the level of personal expectations. Integrating ECT into digital consumer behavior research models contributes to clarifying the role of emotional factors (satisfaction) and cognitive factors (confirmation) in forming decisions to use again or maintain long-term consumer behavior.

1.3 Some literature reviews of relevant studies

In recent years, the rapid development of digital technology has promoted the transformation of banking service delivery models from traditional to electronic forms. In response to this change, many studies have focused on exploring factors affecting customers' acceptance and use of e-banking services. Scholars have approached this topic from many theoretical perspectives, from individual behavior to system factors and social environment.

In the Vietnamese market, the strong development of the digital economy has promoted many studies focusing on exploring factors affecting usage behavior and satisfaction with e-banking services. From the perspective of theoretical model approach, the study by Le Van Huy et al. (2020) applied the UTAUT model to analyze the behavior of accepting e-banking in the Central region, thereby confirming the important role of factors such as efficiency expectation, social influence and technical support conditions, in which the factor "efficiency expectation" has the strongest influence on the intention to use the service. Expanding the scope to the Mobile Banking platform, the study by Pham Thi Thanh Huyen and Nguyen Duc Loc (2021) showed that convenience, safety and user experience are three core factors that shape the level of satisfaction, especially among young customers in big cities - a group that is considered to have a higher level of technology acceptance.

Domestic studies on the behavior of using e-banking services in

Vietnam have approached the problem from many different theoretical perspectives and application contexts, reflecting the diversity in the choice of analytical models and influencing factors. A popular trend is to apply technology acceptance models such as UTAUT and TAM to explore consumers' intention to use services in the context of strong digitalization.

Specifically, the study by Nguyen Thi Ngoc Phuong et al. (2023) in Ho Chi Minh City used the UTAUT model to assess the impact of seven factors on the intention to use e-banking services. The results showed that all factors had a positive influence, in which effort expectancy, social influence and performance expectancy were the factors with outstanding impact. This reflects the central role of cognitive factors in forming the intention to use, and also shows that users care about ease of use and influence from the community when making decisions.

The study by Ha Nam Khanh Giao et al. (2020) adjusted the TAM model to suit the specific context of Smart Banking services at a commercial bank branch. By adding factors related to trust, convenience and perceived risk, the study provided a more comprehensive view of usage behavior, in which convenience and usefulness are positive motivators, while risk and cost are barriers. However, the limitation of the convenience sampling method means that the generalizability of the results is still limited.

Another approach focuses on service quality instead of behavioral intention. The study by Bui Nhat Quang and Nguyen Huu Thai Thinh (2020) established the relationship between five service quality factors and customer satisfaction. In which, security, reliability and interface design are considered key factors affecting user experience. This shows that, in addition to technology awareness, the quality of actual interaction also plays an essential role in retaining customers in the digital environment.

For foreign studies, typically in a study in the Middle East, Al-Somali, Gholami, and Clegg (2009) showed that trust, perceived security, and technological environment have a strong influence on the decision to use online banking services. This group of authors emphasized the role of technological infrastructure and accessibility in the context of customers being unfamiliar with the non-physical

transaction model.

In Southeast Asia, Lai (2017) conducted a study of users in Malaysia and found that expectations of transaction efficiency, perceived ease of use, as well as the influence of friends and relatives played an important role in shaping the intention to use e-banking. This result suggests that social factors still have a significant weight, even in individual behaviors such as financial transactions.

Meanwhile, Pikkarainen et al. (2004) with a study in Finland made an interesting finding: customers' understanding of the service (financial literacy) and the ability to search for information related to e-banking directly affect the level of willingness to use the service. This indicates that not only the characteristics of the technology, but also personal knowledge is a prerequisite factor. Zhou, Lu and Wang (2010) argue that to successfully implement e-banking, financial institutions need to invest not only in technological infrastructure, but also in risk management and personnel training. This study highlights that internal organizational readiness and security policies play a fundamental role in effective service delivery.

According to Mbama's (2018) study on customer experience of digital banking services in the UK, it reflects their impact on the performance of banks. According to the study, there is a positive association between perceived value, convenience, functional quality, service quality, brand trust and employee interaction with customers. The study also found that customer experience, satisfaction and delight are positively related to each other. This has transformed the way businesses in this service sector operate and manage. Studies by Irfanand Chendragiri (2015) and Mehmet (2016) concluded that factors including perceived usefulness, ease of use, adaptability, flexibility, trust, safety and security are all crucial to the effectiveness of Smart Banking. According to Irfanand Chendragiri (2015), perceptions of usefulness, ease of use, trust and experience are the decisive factors for customers to choose to use Smart Banking. Attitude, risk perception, pleasure and trust also contribute to determining consumer behavior when using Smart Banking. For the use of banking services, awareness of security issues is considered a key factor for customers' choice. Mehmet's (2016) study also found that risk factors and social effects do not have a significant impact on customers' use of mobile banking.

In general, the interest of domestic and foreign researchers in e-banking services as well as factors affecting the acceptance and use of this service is relatively large. In the research process, the exploratory factor analysis (EFA) method is often used to reduce a large number of observed variables into a set of representative factors. In addition, confirmatory factor analysis (CFA) is applied to test, validate and adjust measurement models independently. The purpose of using EFA and CFA is to build appropriate measurement models, which are the basis for testing structural equation modeling (SEM). These are two popular methods chosen by authors in research on the field of electronic banking.

1.4 Select research components

Based on the synthesis of results from previous studies related to the level of acceptance and use of e-banking, combined with the results of qualitative research through expert interviews, the author has proposed factors affecting the level of acceptance and use of e-banking services. Specifically, the factors include: Perceived ease of use; Perceived usefulness; Perceived risk; Social influence; Bank brand; Intention to use.

Hypothesis H1: Perceived ease of use has a positive impact on the level of acceptance of using e-banking by customers in Can Tho City.

Hypothesis H22: Perceived usefulness has a positive impact on the level of acceptance of using e-banking by customers in Can Tho City.

Hypothesis H3: Perceived risk has a negative impact on the level of acceptance of using e-banking by customers in Can Tho City.

Hypothesis H4: Social influence has a positive impact on the level of acceptance of using e-banking by customers in Can Tho City.

Hypothesis H5: Bank brand has a positive impact on the level of acceptance of using e-banking by customers in Can Tho City.

Hypothesis H6: Intention to use has a positive impact on the level of acceptance of using e-banking by customers.

CHAPTER 2. RESEARCH METHOD OF FACTORS AFFECTING CUSTOMERS' USE OF ELECTRONIC BANKING SERVICES IN CAN THO CITY

The research process in the thesis is carried out through two main stages, such as preliminary research stage and official research stage.

2.1 Preliminary qualitative research

Before conducting formal quantitative research, a preliminary qualitative study was conducted through expert interview techniques to correct, supplement or confirm the suitability of the theoretical model, measurement variables and scales in the specific research context. This method helps ensure the content validity of the measurement tool, while better reflecting the specific characteristics of the market and consumers in Vietnam.

Experts were selected using a purposive sampling method, ensuring that they have in-depth professional knowledge and practical experience related to the research field. The criteria for selecting experts for interviews are very clear, they must be lecturers, in-depth researchers in marketing, e-commerce, consumer behavior or financial technology (fintech) or managers or senior experts working at commercial banks in Can Tho city, have experience in implementing e-banking services or digital transformation in the banking industry, must have at least 5 years of practical or academic experience related to the research field or have participated in scientific research topics, strategic consulting or building consumer behavior assessment models, with a number of about 10 experts.

The purpose of the expert interviews is to collect independent opinions from experts on factors affecting the level of acceptance and use of e-banking services by customers in Can Tho city. Based on the collected information, the author compares and contrasts with the factors in the original research model. This allows re-examination of the suitability of the variables, thereby adjusting and perfecting the research model to more accurately and appropriately reflect the factors affecting the behavior of accepting and using e-banking.

2.2 Official quantitative research

After building the proposed research model, the author proceeds to identify related concepts and research variables, and selects appropriate scales for each variable. The scales used in the study are

mainly inherited and adjusted from the original scales that have been tested and applied in previous studies, to ensure the reliability and validity of the measurement tool.

To measure which factors affect the use of e-banking services by customers in Can Tho city, the author uses the confirmatory factor analysis method CFA and the linear structural model SEM to assess the factors affecting the level of acceptance and use of e-banking by customers in Can Tho city.

To assess whether or not there is a negative impact of these factors and how to limit their negative impact on the use of e-banking services by customers in Can Tho city. The researcher will analyze both the positive and negative impacts of these factors on the business operations of banks, thereby proposing specific solutions to promote positive factors as well as improve somewhat negative factors to enhance customer experience.

The survey questionnaire was sent to the sample subjects in a direct form (interview or sending the survey at the transaction counter with a printed questionnaire) and collected after the respondents completed it. At the same time, through personal relationships, subjects who completed the survey were encouraged to introduce and share the questionnaire to other potential participants in the same unit.

2.3 Sample size

According to Tabachnick and Fidell (2006, cited in Ha Ngoc Thang, 2015), the minimum sample size required to perform meaningful regression analysis is 8*n + 50, where n is the number of independent variables in the model. Hair et al. (2010) suggested that the sample size should be at least 5 times the total number of observed variables in the research model. Similarly, Hoang Trong and Chu Nguyen Mong Ngoc (2008) suggested that the sample size should be at least 4 to 5 times the number of observed variables to ensure reliability in the analysis.

In this study, with a total of 25 observed variables and in order to increase the reliability of the model, the author collected 500 valid survey forms. This number meets the minimum sample size requirement as proposed by Hair et al. (2020), which is 125 observations, and is equivalent to the sample size in many previous studies in the same field.

The survey subjects are individuals who are using or not using e-banking services, using mobile phones and conducting transactions at

commercial banks in Vietnam. The survey forms were sent directly to respondents through relatives and friends and placed at bank transaction counters. A total of 500 valid forms were collected.

2.4 Data collection method

After the qualitative research phase to adjust the model and scale, the study conducted official quantitative data collection to test the research model, assess the relationship between variables and test the suitability of the proposed hypotheses. The method of collecting quantitative data was carried out through a structured questionnaire survey, issued in the form of direct distribution of questionnaires at a number of joint stock commercial banks in Can Tho city. This approach aims to increase the response rate and ensure the representativeness of the survey sample.

The survey subjects are customers who are transacting at commercial banks in Can Tho city with the criteria of being 18 years old or older, having a bank account and having used e-banking at least once in the last 6 months and being able to read, understand and answer the questionnaire independently. At the same time, the author also used the sampling method of non-probability sampling combined with the convenience sampling method (purposive and convenience sampling), in order to approach the right target audience, while ensuring feasibility in practical implementation.

2.5 Data analysis method

After designing the survey questionnaire, the first step in the data quality assessment process is to test the reliability of the scale. The popular and widely used method is to calculate the Cronbach's Alpha coefficient to assess the level of internal consistency between observed variables in the same concept such as Testing the reliability of the scale using Cronbach's Alpha, exploratory factor analysis (EFA), and structural equation modeling (SEM).

CHAPTER 3. RESEARCH RESULTS AND DISCUSSION

The analysis results show that, in addition to core factors such as perceived ease of use, usefulness and social influence, the decision to use e-banking services is also significantly influenced by perceived risk and bank brand image in the minds of consumers. These findings not only contribute to strengthening the hypotheses in the C-TAM-TPB model but also show similarities and differences compared to previous studies on factors affecting the behavior of accepting e-payment methods.

3.1 Discussion on the Perceived Ease of Use Factor

The results of the study show that perceived ease of use positively affects the decision to use e-payment (ETP), with an impact coefficient of β of 0.343. This shows that consumers tend to accept the service when they feel that the operation is easy and convenient, especially when gender plays a mediating role.

This finding is consistent with previous studies on the C-TAM-TPB model (Ming-Chi Lee, 2009; Rahmath Safeena, 2013; Putra et al., 2019; Talat Islam et al., 2020; Haitham Joudaa et al., 2020; Ghana Shyam Kafley et al., 2021) and studies in Vietnam (Phan Tan Tai & Liu Gia-Shie, 2015). The results also support the hypothesis in Davis's TAM model (1989) on the relationship between perceived ease of use and consumer attitudes toward technology.

3.2 Discussion on the factor Perceived usefulness

The research results show that perceived usefulness has a positive impact on the decision to use electronic payment methods (ETP), with an impact coefficient of β of 0.232. Consumers appreciate the benefits of e-banking (ETB) such as saving time, costs, increasing convenience, safety and supporting online transactions, thereby forming a positive attitude and promoting usage behavior.

In addition to the direct impact, perceived usefulness also indirectly affects the decision to use through attitudes and the mediating variable gender. Raising awareness of the benefits of e-banking is expected to improve consumer attitudes, thereby creating a spillover effect in the acceptance and use of e-banking services.

3.3 Discussion on the factor Social influence

The research results show that social influence has a positive impact on consumers' decision to use electronic payment methods

(ETP), reflecting the behavioral tendency to affirm that they want to keep up with the times. Data analysis shows that the influence coefficient is β equal to 0.265, showing the significant role of social influence, and this factor also has an indirect impact through the mediating variable of gender.

3.4 Discussion on the factor Bank brand

Bank brand is identified as a factor that positively affects the decision to use E-payment. Banks with strong brands and long-standing reputation often create trust and encourage consumers to use the service. The impact coefficient is recorded as β equal to 0.269, showing that trust in the brand plays an important role in the behavior of accepting E-banking services.

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3.6 Discussion on the factor Risk perception

Risk perception has a negative impact on the decision to use e-banking services, consistent with previous studies such as Ming-Chi Lee (2009), Hossein et al. (2012), and Haitham Jouda et al. (2020). This factor not only directly affects the usage behavior but also indirectly through consumers' attitudes towards e-banking. When consumers perceive a high level of risk, negative attitudes toward the service increase, reducing the likelihood of adoption. This finding is supported by studies in Vietnam such as Phan Tan Tai and Liu Gia-Shie (2015), Nguyen Thi Phuong Linh and Nguyen Van Hau (2020). However, other studies such as Roy (2014), Dalia et al. (2009), and Mariel Katrina et al. (2022) did not find a significant relationship between perceived risk and e-commerce adoption behavior.

3.7 Discussion by Demographic Group – Gender

In the framework of the thesis, multi-group structure analysis (MGA) was used to test the differences between demographic groups in the research model. The results show that, in addition to traditional factors affecting the decision to use electronic payment, the differences

between qualitative groups such as gender, age, education level, occupation and income also play an important role. The analysis according to these variables contributes to providing a more comprehensive view of consumer behavior in the field of electronic banking.

3.8 Discussion by Demographic Group – Age

The analysis results (Table 3.10) show that there is no statistically significant difference between age groups in terms of intention and decision to use electronic banking services, with the Sig values of Levene's test and ANOVA both greater than 0.05. However, further analysis revealed differences in how factors affected each age group.

3.9 Demographic Group Discussion – Education Level

The analysis results show significant differences in the relationship between the research factors and the behavior of using e-banking by education level. Specifically, perceived ease of use has a positive impact on intention to use and decision to use in the group with university and postgraduate degrees, but no similar impact was recorded in the group with high school, vocational high school and college degrees. This shows that people with higher education levels often have better access to and use of technology, thereby appreciating the convenience of e-banking. On the contrary, the group with lower education levels may encounter many barriers in operation, leading to use not significantly affecting the behavior of use.

3.10 Discussion by demographic group – Occupation

The analysis results show that the relationships between influencing factors and the behavior of using e-banking differ by occupation. Specifically, perceived ease of use positively affects the intention to use in the groups of office workers, managers and marketing sales, but has no significant impact on the groups of technical workers, housewives and other groups. This shows that people working in administrative and business environments often appreciate the convenience and ease of use of e-banking, while the remaining groups may face technical barriers or pay little attention to this factor.

3.11 Discussion by demographic group – Income

The analysis results show that the relationships between perceived ease of use, social influence and perceived risk on the intention to use are only statistically significant in the group of income

from 5 to 10 million VND. This shows that consumers in the low-middle income group tend to be more sensitive to psycho-social factors in forming the intention to use electronic payments (ETP). With this income level, they have enough access to technology but still need support from factors such as ease of use, impact from the social environment and trust in the level of security.

In addition to discussing the moderating variables as mentioned above, in this study, the author combined with the Diffusion of Innovations theory to be able to divide the user groups in the area into 05 groups. The Diffusion of Innovations (DOI) theory proposed by Rogers (2003) suggests that the acceptance of a new technology or product in society does not occur simultaneously but according to each consumer group, classified into five main groups: pioneers, early adopters, early majority, late majority, and laggards. Each group has different demographic, psychological, and behavioral characteristics, affecting the level and timing of innovation adoption. Based on the analysis results from the extended C-TAM-TPB model and multi-group structure analysis (MGA), this study shows a clear correspondence between the characteristics of consumer groups in the DOI theory and the behavior of using e-banking services in Can Tho city.

The discussion by consumer groups within the framework of the Diffusion of Innovation theory not only helps identify the level of readiness to accept technology but also is an important basis for financial institutions to build effective market segmentation and approach strategies. Each group needs to be positioned and communicated appropriately, from the pioneering group that loves innovation to the laggard group that needs to be supported and clearly oriented. This contributes to promoting the acceptance and diffusion of electronic payment methods in the consumer community in Can Tho city.

CHAPTER 4. CONCLUSION AND MANAGEMENT IMPLICATIONS

4.1 Conclusion

The thesis has completed the realization of three research objectives set out in Chapter 1. First, the thesis has identified factors affecting customers' use of e-banking services, including perceived ease of use, perceived usefulness, perceived risk, social influence and bank brand, and tested and measured the level of impact of those factors on the use of e-banking services by consumers in Can Tho city. In addition, the thesis tested the moderating role of demographic variables, specifically age, gender, income, education level and occupation in the relationship between factors such as: perceived ease of use, usefulness, social influence, perceived risk and bank brand. At the same time, based on the results of empirical analysis, the thesis also clarified the third objective in proposing some managerial implications to support local banks in developing solutions and service provision methods suitable for customers' decision-making behavior in using e-banking.

4.2 Contributions of the thesis

In terms of theory, the thesis has enriched the understanding of e-banking services as well as the overall picture of the current use of e-banking services in the locality, thereby providing a more objective view of the general development of the local economy compared to other localities. In addition, the thesis has also selected a suitable theory for the research and development of e-banking services in Vietnam in general and Can Tho city in particular, specifically the UTAUT theory, and at the same time developed the original UTAUT theory through expanding the factors of Perceived Usefulness and Perceived Risk. In addition, the author has also built a scale suitable for the actual situation in the locality, thereby making the actual consumer survey data authentic and highly reliable. In practice, based on the results drawn from the study, the author has proposed a number of solutions for commercial banks in expanding and developing e-banking services further in the future, in accordance with the actual context of the locality, bringing about business efficiency for banks in particular and for Can Tho city in general.

4.3 Solutions for developing e-banking services in Can Tho city

The development of e-banking services may vary among banks,

depending on factors such as financial resources, management capacity, level of technology application and strategic orientation of each organization. Therefore, the solutions proposed in the study are general orientations, aiming to optimize benefits and limit risks in the process of implementing e-banking services at commercial banks. The development and application of a specific roadmap for each solution needs to be adjusted to suit the practical conditions and long-term development strategy of each bank.

In Can Tho city, commercial banks also need to proactively approach, research and select successful practical experiences from international credit institutions to build appropriate solutions, contributing to promoting positive effects and overcoming the limitations of e-banking services. At the same time, it is necessary to focus on increasing customer convenience through diversifying product offerings, improving service quality and optimizing user experience. In addition, banks also need to overcome current shortcomings such as complicated registration processes, issues related to security, privacy and technical problems in network infrastructure systems.

In addition, e-banking services need to ensure criteria of accuracy, convenience, ability to perform transactions quickly and reasonable costs. To expand the reach of e-banking services to more people, especially in rural areas, banks need to promote operational innovation, promote process automation and transition to a branchless digital banking model. Proactively adjusting the scale of operations, reducing the number of branches in urban areas and expanding the network of small-scale branches in rural areas will help e-banking services reach more customers, contributing to reducing operating costs and improving the competitiveness of banks.

In addition to the requirement for financial resources, the issue of developing high-quality human resources is also posing a great challenge for the bank's leadership and management team. The fourth industrial revolution has been and is profoundly changing the way of recruiting, using and rewarding human resources in the banking sector, aiming to attract and retain highly qualified personnel, meeting the requirements of sustainable development not only of the finance and banking sector but also of the entire economy. The quality of human resources today is not only limited to professional knowledge, but also

requires the ability to use digital technology, quickly adapt to change and comply with operating procedures in providing new products and services. At the same time, the management thinking of the leadership team also needs to be strongly innovated, in order to adapt to the continuous development trend of the digital economy.

Building an effective recruitment policy and applying appropriate remuneration to attract and retain highly qualified human resources with good knowledge of banking technology. To make the most of this resource, banks need to promote internal training activities as well as strengthen cooperation with prestigious educational institutions to improve the quality of human resources. In addition to regularly organizing programs to update knowledge on modern banking operations, special attention should be paid to training in information technology applications. The goal is to ensure that the staff is proficient in operating electronic payment systems and is able to effectively handle arising situations, thereby contributing to minimizing risks in the process of providing electronic banking services.

In addition, banks need to focus on developing management skills and soft skills for managers at all levels, thereby creating positive changes in thinking and leadership capacity in the digital era. Changing leadership thinking is considered a key factor, playing a guiding role in the process of implementing innovation strategies and comprehensive reforms, including adjusting or restructuring personnel at the implementation and operation levels. The quality of human resources, especially communication skills and service attitudes of bank employees, also play an important role in building trust and customer satisfaction. In reality, the situation of a number of bank employees lacking professionalism and being unfriendly in communication still exists, especially at some state-owned banks. This reflects a slow innovation in organizational culture, which is not really suitable for the specific requirements of the modern financial services industry, and can undermine brand image as well as customer engagement with the bank.

Commercial banks need to step up marketing activities to promote new e-banking products, especially innovating online marketing methods, increasing customer interaction through social networking platforms such as Facebook, LinkedIn, Instagram, and investing in upgrading the website interface to make it friendly, easy to

access and attractive. Currently, marketing activities related to e-banking are still limited in scope, while frontline staff have limited knowledge of e-banking products and services. Therefore, staff not only face difficulties in fully introducing product features to customers but also face pressure on service introduction targets. This leads to an increase in the number of customers registering to use e-banking services but not actually making transactions, affecting service quality.

In addition to developing products and technology infrastructure, banks need to focus on simplifying the registration procedures for e-banking services, while expanding customer consultation and support channels to improve the quality of service experience. Currently, the authentication and registration process for e-banking services still requires direct implementation at the transaction counter, causing many inconveniences and becoming a barrier to access to banking services for a large number of people, especially in rural areas or those with limited access to the traditional banking system.

Information security and safety are always key factors in the banking sector, especially in the context of digital technology and the strong development of data digitization. With the continuous change of modern technology and the popularity of cloud computing, security vulnerabilities are becoming increasingly complex, creating conditions for cyber attacks to occur more frequently. Risks caused by hackers can lead to serious property damage, threaten financial security and negatively affect the reputation of the entire banking system. Therefore, strengthening security measures, updating risk prevention technology and raising information security awareness are necessary solutions to minimize limitations in e-banking services.

One of the important solutions to improve authentication efficiency and prevent fraudulent behavior in transactions is to deploy electronic identification (eKYC). eKYC technology has been widely applied in many banks, financial and insurance companies around the world to support customer identification, identity document authentication and payment information. This method uses a camera to record the user's face and compare it with the image information on the personal documents registered with the bank. When making transactions using eKYC technology, the system requires facial recognition of the owner, thereby significantly reducing the possibility of committing

fraud because bad actors will be afraid of revealing their identity or being detected when using fake documents.

In addition, the issue of customer personal information security needs to be given top priority by commercial banks in the process of developing e-banking products and services. To ensure absolute security for customer data, banks need to implement many synchronous solutions, including: developing policies and standards for information security in accordance with current legal regulations; implementing communication activities, disseminating knowledge to raise customer awareness of information security when using e-banking services; and strengthening internal control, strictly managing data information, ensuring that customer data is not used or provided outside the permitted scope.

Regarding risk management, in the context of strong development of e-banking services, banks need to establish comprehensive risk management principles and develop situation handling plans to prevent and minimize risks arising in the process of providing services. Risk prevention activities need to be enhanced for both internal system threats and external factors. To improve the effectiveness of risk management in e-banking services, banks can implement some specific solutions as follows:

First, effectively monitor and manage the operation of e-banking services. Banks need to establish a comprehensive security control process, and build a system to fully monitor, evaluate and assess outsourcing activities, relationships and dependencies with third parties. This is to ensure transparency, control and maintain quality in the service supply chain.

Second, security control requires strict implementation of customer authentication measures; clearly defining the responsibilities of parties involved in electronic transactions; controlling access rights and authorizations in the e-banking system, databases and applications; ensuring the integrity of data, records and information related to electronic transactions; establishing a clear and transparent auditing system for all transactions; and at the same time, ensuring absolute confidentiality of the bank's important information.

Third is managing legal and reputational risks. Banks need to ensure that the disclosure of e-banking service information is complete

and in accordance with legal regulations; secure customer information; improve operational capacity, develop a business continuity plan, as well as a contingency plan to maintain the availability of e-banking systems and services in all situations; and establish a timely and effective incident response mechanism.

In addition to the above solutions, for each customer group, there will be strategic solutions specifically for each consumer group to promote the acceptance and use of e-banking services in the future. First of all, the Pioneer Group (Innovators), this is a group of young people, highly educated and often working in technical or business fields, like to explore new technologies, and are less afraid of risks. Therefore, to have an effective solution for this group of people, banks must have electronic products and services with new features, let this group experience first (such as opening an account with only facial recognition, biometric authentication), organize free technology experience programs or special incentives to encourage testing and spreading through personal channels or social networks, create technology innovation playgrounds (innovation labs) to attract this group to participate in feedback, contribute to improving e-banking products and build digital community relationships where they can discuss and share experiences.

For the Early Adopters group, this is usually a group of middle-aged people, with social status, often working in management-related jobs, office workers, having great influence in social networks, needing to be persuaded by brand reputation. Therefore, to effectively use e-banking services for this group of people, banks need to strengthen brand communication and bank reputation, emphasize security certifications, domestic and international awards, or have cooperation strategies with large partners. It is necessary to build controlled word-of-mouth campaigns, take advantage of KOLs in the fields of finance, management or small and medium enterprises (SMEs), personalize service experiences, provide outstanding features such as online personal financial consulting, service packages based on usage behavior and provide transparent documents, short instructional videos, helping them feel confident when using the product.

Banks also need to have effective solutions for low-income customers because they belong to the Early Majority group. This group

tends to wait for confirmation from the community, they are often interested in convenience, safety and suitability for habits, so banks need to pay attention to providing clear social proof such as the number of users, user reviews, and testimonials from real customers to create trust in them. In addition, designing a simple, easy-to-understand interface, accompanied by a chatbot or virtual assistant to support operations, having a policy of rewarding friends, refunding, accumulating points, creating behavioral motivation through direct benefits and providing flexible service packages, multiple levels... will thereby create suitability for the financial capacity and different needs of this group.

In addition to the solutions for the above customer groups, there are also customers who are older, less educated, less tech-savvy, risk-averse, only use when there is a high safety commitment... and they belong to the Late Majority group. To attract the use of e-banking services, banks should regularly organize user training sessions at the counter or in the community (offline), combined with local support staff. Communication work must be in simple, easy-to-understand language, with specific illustrations, avoiding too many technical terms, having clear security policies, transparently announcing the commitment to safe transactions, and combining programs to accompany the elderly, such as "Smart Banking for the Elderly"...

In addition, banks also need to have solutions for the Laggards group because this is a group of people with low incomes, informal and unstable jobs, little access to modern technology and often have a mentality of being afraid of changing habits. Therefore, there should be solutions to integrate electronic payments into familiar basic services such as paying electricity/water bills, withdrawing money at points of sale, and encouraging through practical financial benefits such as free transactions, reduced account maintenance fees, and points for gifts. Cooperating with local authorities as well as associations to increase access, and at the same time deploying simple e-banking services that do not require app installation such as transactions via text messages, pre-printed QR codes, etc. to increase attraction for this group of customers.

In general, designing policies and solutions according to the characteristics of each consumer group in the DOI model not only helps

increase the adoption rate, but also contributes to optimizing communication resources, product development and customer care. An effective diffusion strategy needs to start with the pioneer and early adopter groups, then expand to more conservative groups through the social resonance effect.

4.4 Limitations and future research directions

The limitation of the thesis is that the author's research focuses mainly on the basic factors that affect the use of electronic banking by individual customers. In addition to inheriting the UTAUT model, the research has expanded the model with two factors: Perceived Usefulness and Perceived Risk. In reality, in the context of increasingly developing Internet Banking services, customers' usage behavior can be influenced by many other factors, especially demographic characteristics. However, the sample size in the study is still limited, not large enough to comprehensively reflect the entire region.

Therefore, in subsequent studies, the author will continue to develop the research model with more suitable extended variables, expanding the scope of the survey across the Southwest region with a larger sample size. At the same time, the author will also focus on studying organizational and corporate customers - a group of subjects that has not yet been mentioned in this study.