


GREEN BANKING DEVELOPMENT: A CASE STUDY OF VIETNAM

Nguyen Ha Bang<sup>A</sup>, Nga Phan Thi Hang<sup>B</sup>, Le Trung Dao<sup>C</sup>



ARTICLE INFO	ABSTRACT
<p><b>Article history:</b></p> <p><b>Received</b> 10 March 2023</p> <p><b>Accepted</b> 08 June 2023</p>	<p><b>Purpose:</b> The objectives determine factors affecting green banking development in Vietnam. The authors proposed policy implications that contributed to the green banking development in Vietnam.</p>
<p><b>Keywords:</b></p> <p>Green; Banking; Technology; Legal Framework; Environmental; Policy; Risk Management.</p> <div data-bbox="172 1014 480 1256" data-label="Image">  </div>	<p><b>Theoretical framework:</b> For long-term sustainable economic development, many countries worldwide have chosen to develop a green economy, including the theory of green banking.</p> <p><b>Design/methodology/approach:</b> The research method of the paper is a combination of qualitative and quantitative research methods. Qualitative research was conducted with a group discussion technique, checked the scales used, and consulted with banking managers on the research issue, thereby building the scales included in the research model and setting up and completing the questionnaire. Quantitative research was carried out from January to February 2023. Processing data by statistical methods, analyzing EFA and CFA, using linear structural model analysis (SEM) to test the fit of models and hypotheses with SPSS 20.0 software and Amos.</p> <p><b>Findings:</b> The article showed that banking technology substantially impacts green banking development among eight factors.</p> <p><b>Research, Practical &amp; Social implications:</b> The study has inherited and supplemented the scale in the model and a new set of scales used to evaluate the development of green banks, systematized, increased, and developed more basic theoretical issues about banking green.</p> <p><b>Originality/value:</b> The paper's originality and value help researchers, managers, and policymakers for Vietnamese commercial banks, in particular, and the banking industry, in general, to apply to contribute to the development of green banking and the green economy in the future.</p> <p>Doi: <a href="https://doi.org/10.26668/businessreview/2023.v8i6.2037">https://doi.org/10.26668/businessreview/2023.v8i6.2037</a></p>

DESENVOLVIMENTO DE BANCOS VERDES: UM ESTUDO DE CASO DO VIETNÃ

RESUMO

**Objetivo:** Os objetivos determinam os fatores que afetam o desenvolvimento dos bancos verdes no Vietnã. Os autores propuseram implicações de políticas que contribuíram para o desenvolvimento de bancos verdes no Vietnã.

**Estrutura teórica:** Para o desenvolvimento econômico sustentável de longo prazo, muitos países em todo o mundo optaram por desenvolver uma economia verde, incluindo a teoria do banco verde.

**Projeto/metodologia/abordagem:** O método de pesquisa do artigo é uma combinação de métodos de pesquisa qualitativa e quantitativa. A pesquisa qualitativa foi conduzida com uma técnica de discussão em grupo, verificou as escalas usadas e consultou os gerentes de bancos sobre a questão da pesquisa, criando assim as escalas incluídas no modelo de pesquisa e montando e preenchendo o questionário. A pesquisa quantitativa foi realizada de janeiro

<sup>A</sup> PhD Student at University of Finance - Marketing (UFM). Vietnam. E-mail: [Bangtrainer@gmail.com](mailto:Bangtrainer@gmail.com)

Orcid: <https://orcid.org/0009-0007-6195-0674>

<sup>B</sup> Doctor. Associate Professor. Deputy Head of Science Management Department, University of Finance - Marketing (UFM). Vietnam. E-mail: [phannga@ufm.edu.vn](mailto:phannga@ufm.edu.vn) Orcid: <https://orcid.org/0000-0003-1143-2741>

<sup>C</sup> Doctor. Vice Rector of University of Finance - Marketing (UFM). Vietnam. E-mail: [ltdao@ufm.edu.vn](mailto:ltdao@ufm.edu.vn)

Orcid: <https://orcid.org/0000-0002-1095-5586>



a fevereiro de 2023. Processamento de dados por métodos estatísticos, analisando EFA e CFA, usando análise de modelo estrutural linear (SEM) para testar o ajuste de modelos e hipóteses com o software SPSS 20.0 e Amos.

**Conclusões:** O artigo mostrou que a tecnologia bancária impacta substancialmente o desenvolvimento do banco verde entre oito fatores.

**Implicações sociais, práticas e de pesquisa:** O estudo herdou e complementou a escala no modelo e um novo conjunto de escalas usadas para avaliar o desenvolvimento de bancos verdes, sistematizou, aumentou e desenvolveu questões teóricas mais básicas sobre bancos verdes.

**Originalidade/valor:** A originalidade e o valor do artigo ajudam os pesquisadores, gerentes e formuladores de políticas dos bancos comerciais vietnamitas, em particular, e do setor bancário, em geral, a contribuir para o desenvolvimento dos bancos verdes e da economia verde no futuro.

**Palavras-chave:** Banco Verde, Tecnologia, Estrutura Legal, Meio Ambiente, Política, Gestão de Riscos.

## DESARROLLO DE LA BANCA VERDE: ESTUDIO DE UN CASO EN VIETNAM

### RESUMEN

**Objetivo:** Los objetivos determinan los factores que afectan al desarrollo de los bancos verdes en Vietnam. Los autores proponen implicaciones políticas que contribuyen al desarrollo de los bancos verdes en Vietnam.

**Marco teórico:** Para lograr un desarrollo económico sostenible a largo plazo, muchos países de todo el mundo han optado por desarrollar una economía verde, incluida la teoría de los bancos verdes.

**Diseño/metodología/enfoque:** El método de investigación del documento es una combinación de métodos de investigación cualitativos y cuantitativos. La investigación cualitativa se llevó a cabo con una técnica de discusión en grupo, se comprobaron las escalas utilizadas y se consultó a los directores de los bancos sobre la pregunta de investigación, creando así las escalas incluidas en el modelo de investigación y montando y completando el cuestionario. La investigación cuantitativa se llevó a cabo de enero a febrero de 2023. Procesamiento de datos por métodos estadísticos, analizando EFA y CFA, utilizando análisis de modelos estructurales lineales (SEM) para probar el ajuste de los modelos y las hipótesis con el software SPSS 20.0 y Amos.

**Conclusiones:** El trabajo demostró que la tecnología bancaria influye sustancialmente en el desarrollo de la banca verde entre ocho factores.

**Implicaciones sociales, prácticas y de investigación:** El estudio heredó y complementó la escala del modelo y un nuevo conjunto de escalas utilizadas para evaluar el desarrollo de la banca verde, sistematizó, aumentó y desarrolló más cuestiones teóricas básicas sobre la banca verde.

**Originalidad/valor:** La originalidad y el valor del artículo ayudan a los investigadores, gestores y responsables políticos de los bancos comerciales vietnamitas en particular y del sector bancario en general a contribuir al desarrollo de los bancos verdes y de la economía verde en el futuro.

**Palabras clave:** Banca Verde, Tecnología, Marco Jurídico, Medio Ambiente, Política, Gestión de Riesgos.

### INTRODUCTION

An & Pivo (2020) showed that research on green banking can be understood in two aspects: (i) Banks carry out direct activities to minimize environmental impacts, such as saving energy, water, and waste treatment. (ii) The Bank indirectly impacts the environment by increasing support for environmentally friendly projects such as Waste gas plants, energy plants, renewable and solar energy, and bio-manufacturing plants.

The research on the strategic and policy framework for implementing green banking will be gradually upgraded in stages: (1) Commercial banks are expected to allocate budget sources annual allocation for the implementation of green banking and the establishment of a department dedicated to planning, assessing, and managing issues related to green banking. In

addition, banks must consider environmental risks in granting banks and conducting other activities.

The green banking: A strategic response to environmental uncertainty. Research results show that in developing green banking in Vietnam, the main goal is to increase awareness and social responsibility of the banking system for environmental protection, and combat climate change, step by step green streamlining banking operations. Besides, direct bank capital flows to finance environmentally friendly projects, promote green production, service and consumption industries, clean energy and renewable energy, and actively contribute to promoting green growth and sustainable development (Ikram et al., 2019; Owais & Arslan, 2020; Ren et al., 2020; Yadav & Pathak, 2013).

In short, a bank is called "Green" when it meets both conditions: (i) providing green products and services in the short term and (ii) having a long-term business strategy that meets environmental criteria and social responsibility. In other words, green banks all focus on the central issues, which are: (1) reducing carbon emissions in the bank's internal operations, (2) developing green products and services, and (3) promoting working for the environment through green banking policy.

The study on green banking - Environmental protection: Initiatives for sustainable development in Vietnam. The article has analyzed the current situation, problems, and causes of green banking implementation at commercial banks in Vietnam, such as carbon emissions in internal banking operations, green product development, service development, and green banking development. In addition, the authors also gave recommendations and solutions to build a "green bank" - protect the environment "green and clean" as an initiative for sustainable development at Vietnamese commercial banks (Masud et al., 2018; Chen, 2010; Antonio et al., 2017).

## **LITERATURE REVIEW**

### **Theories of the Green Banking Development (PTNHX)**

Many countries worldwide have chosen to develop a green economy for long-term sustainable economic development. The green bank development strategy plays a vital role in the green growth strategy. This article will study the experience of some countries in developing green banks and the current situation of green banking development in Vietnam, thereby giving some policy suggestions for Vietnam (Bhardwaj & Malhotra, 2013).

The concept of green banking can be understood in two aspects: (i) Banks carry out activities that minimize environmental impacts, such as saving energy, water, and treatment, and waste management. (ii) The Bank indirectly impacts the environment by increasing support for environmentally friendly projects such as Waste gas plants, renewable energy, and energy plants. the sun, a bio-fertilizer factory (Aleem & Bowra, 2020; Chen et al., 2013; Hernandez & Hugger, 2016). Thus, referring to relevant theories, green bank development must be ensured at level 3, such as (i) Internal operations of the bank; (ii) Activities related to the business process and transactions with customers; (iii) Governance activities and social orientation. The above activities must ensure economic, social, and environmental benefits.

### **Factors Affecting the Green Banking Development**

#### **Banking technology (CN)**

Investment in developing the bank's information technology system is also significant, especially when there is a sufficient basis for assessing and quantifying the risks of green banking in the future. Commercial banks build data banks on green banking risks using modern risk analysis and handling tools. This factor significantly affects the quality and effectiveness of bank governance, including risk management in general (Bailey, 2005; Aizawa & Yang, 2010; Bihari & Pradhan, 2011).

Banking technology aims to increase the application of new and modern technologies to create a breakthrough in implementing green banking services. In addition, banking technology meets the diverse needs of customers for green consumption (Chin et al., 2003; Elena & Oriana, 2014). Applying artificial intelligence and big data science enhances customer experience and provides green banking products and services. Green banks must approach and invest in technology and people, followed by changing green business models and strategies, which is the direction banks are moving towards. Based on the above analysis, the authors propose hypothesis H1:

*H1: Banking technology has a positive impact on green banking development.*

#### **Financial capacity (TC)**

In the context of deep integration into the world economy, many difficulties and challenges are posed to the banking system, primarily commercial banks. Because according to international practices, the capital adequacy ratio of commercial banks must be 9% or more; if this ratio is not guaranteed, commercial banks will not be able to expand operations, even

standing still in danger of bankruptcy (Chua & Oh, 2011; Ghosh et al., 2018). Financial capacity represents the green financial ability so that the bank can carry out business activities effectively, and it is a measure of the bank's ability to mobilize and use financial resources, resources in society, including green credit development and green projects, green consumption (Goyal & Joshi, 2011; Borgers & Pownall, 2014). In addition, the financial capacity of green banks through economic indicators related to capital, income, profitability, asset quality, market share, and liquidity with projects, green credit. Based on the above analysis, the authors proposed the hypothesis H2:

*H2: Financial capacity has a positive impact on green banking development.*

#### Marketing strategy (MK)

A bank, like a business, must have capital, revenue, and sales. However, the bank's activities are mainly monetary and provide other services. In the era of technology 4.0, implementing marketing solutions for banks is even more focused. Banking marketing is a system and process of banks trying to implement solutions to satisfy customers' needs and proactively wants to meet the needs and desires of the bank (Hyoungkun & Jong, 2020; Jain & Kaur, 2004).

The marketing strategy promotes the strong development of green credit activities and projects. In addition, marketing is also a tool to promote and develop the relationship between banks and customers, especially potential customers for green credit and environmentally friendly projects. Green banks use green marketing to market products or services based on environmental protection factors (Julia et al., 2016). The bank applies environmentally friendly processes, uses recyclable paper packaging, reuses water, reduces CO<sub>2</sub> emissions, and prioritizes solar energy use. Based on the above analysis, the authors propose the hypothesis H3:

*H3: Marketing strategy has a positive impact on green banking development.*

#### Quality of human resources (NNL)

The quality of human resources to serve the development of green banking. In particular, improve the capacity of green credit assessment and appraisal and management and monitoring of green credit risks and projects related to the environment. In addition, the quality of human resources represents the capacity of the human resources to meet the strategic requirements for the development of the green banking system (Kianpour et al., 2014). People

are the central factor. For the bank's business activities to be more and more expanded, it is necessary to have a team of enthusiastic and highly responsible bank staff with professional knowledge. Therefore, human resource solutions are crucial in developing green banking, helping the bank limit environmental and social risks in its business operations (Lalon, 2015). Vietnam is also gradually following this trend but still faces many difficulties and needs solutions to promote this capital flow further. Therefore, the first hypothesis that the authors propose for this study is hypothesis H4 as follows:

*H4: Quality of human resources has a positive impact on green banking development.*

#### Risk management (RR)

Risk management at banks by 2025 will be very different from the present time. These differences may come from state management agencies changing regulations and policies in banking activities, from customers having higher expectations for product sales and interaction channels, or because risk types change in a more complex direction (Masukujjaman et al., 2016). Therefore, the bank must always be ready to change itself to promptly meet the requirements and expectations of customers, partners, state management agencies, and other stakeholders in the long term to contribute to improving the quality of green banking.

Risk management aims to identify, measure and identify the level of risks that may occur in green credit granting activities and environmental projects. In addition, risk management offers solutions to minimize the status of each type of risk in giving green credit. Identify factors arising from the bank itself and factors outside its ability to regulate (Miah et al., 2020). Green banks need to improve the quality of green financial analysis, develop an early warning system for potential problems in green credit, and develop a new risk management quality assessment approach. Internal risks and improve techniques in setting up provisions for risks of green credit and projects. Based on the above analysis, the authors propose hypothesis H5 as follows:

*H5: Risk management has a positive impact on green banking development.*

#### Supporting policies (HT)

Green banking is one of the green financial tools to finance green and environmentally friendly programs, projects, and initiatives to encourage consumers and businesses, optimize, regenerate energy sources, and care about environmental issues. In particular, green banks often finance initiatives and projects that are expected to have a clear and positive impact on the



environment, so they often have preferential interest rates and longer payment terms than other projects with regular loans. It can be said that green projects are considered priority areas for loans (Nath et al., 2014; Rahman et al., 2013). With the problems analyzed above, the authors propose the research hypotheses H6 as follows:

*H6: Supporting policies has a positive impact on green banking development.*

#### Legal framework (PL)

The legal framework relates to the conditions for developing green banks within the framework of the law on environmental protection when funding green projects and green consumption. In addition, the legal framework for the formation and development of green credit and green consumption in the coming time (Singh & Singh, 2012). Green Bank carries out direct activities to minimize the environmental impact, such as saving energy, water, and waste treatment. The bank indirectly impacts the environment by increasing support for environmentally friendly projects and green consumption (Wang & Zhia, 2016). From the theoretical bases of this factor, the authors proposed hypothesis H7 follows.

*H7: Legal framework has a positive impact on green banking development.*

#### Environmental policy (MT)

Environmental protection has been paid great attention to by our Party and State and is a cross-cutting point in leading the country. The system of policies and laws on the environment is still overlapping and inadequate; environmental management tools have not been effective and efficient (Wu & Li, 2020; Thombre, 2011). New management approaches and tools have not been institutionalized promptly and have not kept pace with the rapid development of environmental issues and the country's socio-economic development and international integration requirements. In the context of paying attention to green economic development, green banks need to reduce carbon emissions in internal banking operations, develop green products and services, and develop green credit. From the theoretical bases of this factor, the authors propose hypothesis H8 as follows:

*H8: Environmental policy has a positive impact on green banking development.*

## **METHODOLOGY**

The study uses a combination of qualitative and quantitative research methods through a research process that is carried out through the following main steps:

### **Qualitative Research Methods**

The authors identify the research problem, objectives, and conceptual contents based on the theory of green banking development and green economy. In step 1, the authors conducted research on 3 contents as follows: (1) theoretical overview to study related concepts such as green banking development and green economy. Factors affecting the development of green banking and green economy; (2) Determine the relationship between the concepts of the research model; (3) Building an initial scale for research concepts that already have a scale, precisely a scale with factors affecting the development of green banking and green economy. The authors continue to build variables to measure the concepts by studying the experience of developing green banking in some developed countries and discussing with a group of 15 managers related to the banking sector and 30 managers. Ministry, staff are working at 15 banks. In this step, there are two specific tasks as follows: (1) Adjusting and supplementing the scale of already-scaled concepts; (2) Building a set of variables of the scale of new concepts included in the model, namely the scale of banking technology, financial capacity, and environmental policy. The preliminary research intends to adjust and supplement the original scales through focus group discussions. Focus group interviews were carried out, some groups were established, and deputy heads of branches of the 15 banks listed above were interviewed. As a result of this step, the original scale is adjusted and is called the adjusted scale (Hair et al., 2021).

### **Quantitative Research Methods**

The authors collect data with preliminary quantitative research using the questionnaire built at the end of step 2, sent to each employee working at 15 banks. The sample size for collecting the primary stage is  $n = 900$  employees working in five provinces and cities, including Binh Duong Province, Ho Chi Minh City, Ba Ria - Vung Tau, Dong Nai, and Can Tho. Poetry to participate in the interview. The author preliminarily evaluates the scale by Cronbach's alpha reliability coefficient and EFA analysis on the data collected in step 3. The preliminary scale is adjusted from 15 managers and 30 staff comments. These scales are changed through the main techniques: (1) Cronbach's alpha reliability coefficient method, (2) exploratory factor analysis (EFA) method, and descriptive statistics. Analysis of the Cronbach Alpha coefficient is used to determine the scale's reliability. The scale is reliable when this coefficient is more significant than 0.6. The overall variable correlation coefficient is the correlation coefficient of one variable with the mean scores of other variables on the same scale.



The higher this coefficient, the better the correlation of the variables with other variables in the group increased. The variables with the correlation coefficient between the variable and the total (item-total correlation) must be greater than 0.3. Hair et al. (2021), variables with a total correlation coefficient less than 0.3 are considered garbage variables and removed from the scale.

Confirmatory factor analysis method. The authors evaluated the scale value using a combination of EFA and CFA analysis in the SEM model. EFA analysis was performed based on the scale assessed for reliability through Cronbach's alpha coefficient performed in step 6 and data collected in the formal study in step 5. The criterion (CFA) was used to test the validity of the scales. As presented, the authors combined EFA and CFA analysis in the SEM model used to replace step 7 in the procedure proposed by Hair et al. (2021).

The authors analyzed and discussed research results and proposed policy implications based on model testing results. Thus, to detail the research process combines two research methods. The qualitative and quantitative research used in the study is presented in the following section (Hair et al., 2021).

## **EMPIRICAL RESULT**

### **Overview of Green Banking Development in Vietnam**

Green credit activities have only been initially interested in deploying by some commercial banks because the benefits of becoming a green bank are unclear. Banks in Vietnam have begun to focus on developing their own strategies for effective green credit development, starting from using the set of principles that are being used by banks around the world, such as the equator principle serves as a basis for granting approval for projects or as a reference to develop a suitable set of standards.

According to the survey results of the State Bank (2022) on the application of green credit in the banking industry, many credit institutions have developed strategies to manage environmental and social risks, including recognition and integrating the content of environmental and social risk management into the green credit operation process. Besides, credit institutions have built bank credit products for green credit, and credit institutions have used Using the handbook of environmental and social risk assessment for 10 economic sectors. Preferential/supportive policies for banks that lend to environmentally and climate-sensitive areas, such as providing preferential loans, applying low-interest rates, or providing differential interest rates, were also made.

In addition, commercial banks with a high proportion of green credit loans are also given priority to access preferential loans from international organizations and development partners. However, the ratio of green credit is still modest in the total credit balance of the economy. Specifically, the proportion of green credit notable increases from 1.55% in 2015 to 3.69% in 2020. In 2021 and 2022, green credit will increase by 4.1% and 5.3%, respectively. In general, credit-granting activities gradually increase the proportion of green credit outstanding; at the same time. Issued many documents encourage credit institutions to focus their resources on granting credit to green fields, industries, and fields that are friendly to the environment, save fuel, and reduce greenhouse gas emissions.

Regarding the structure of outstanding loans by term, by the end of 2022, medium and long-term loans currently account for 76% of green credit balances, of which short-term green lending interest rates range from 5-8% /year; medium and long-term from 9-12%/year. Regarding structure by sectors, green credit loans mainly focus on green agriculture, accounting for 32% of total green credit outstanding; renewable and clean energy accounted for 47%; Sustainable water management in urban and rural areas accounts for 11% and sustainable forestry for 5%.

### Analysis of Regression Coefficients in the SEM model

The authors surveyed 900 officials and employees working at 15 banks in five provinces and cities in the research paper, including Binh Duong, Ho Chi Minh, Ba Ria - Vung Tau, Dong Nai. and Can Tho. Thus, the data put into processing was only 865 votes, respectively, 865 officials and employees. Due to missing information and 35 invalid votes, the percentage of votes passed was 96.11 percent. The following shows the results of some demographic information.

Table 1: Descriptive statistics on demographics

Gender	Employees	Percent	Valid percent	Cumulative percent
Male	361	41.7	41.7	41.7
Female	504	58.3	58.3	100.0
Total	865	100.0	100.0	
Marital status	Employees	Percent	Valid percent	Cumulative percent
Single	322	37.2	37.2	37.2
Married	543	62.8	62.8	100.0
Total	865	100.0	100.0	

Source: Prepared by the authors (2023)

Table 1 shows 361 male respondents, accounting for 41.7% and 58.3%, respectively, and the remaining female respondents out of 865 valid votes. Thus, the statistical results do not

have a gender difference between men and women when assessing green banking development. Table 1 shows that single respondents accounted for 37.2%, respectively, 322 people. Next, the respondents with family accounted for 62.8%, respectively 543 people. Thus, the statistical results have a disparity between single and married when assessing green banking development.

Table 2: Cronbach's Alpha of factors

Code	Factors	Cronbach's Alpha
CN	Banking technology	0.964
TC	Financial capacity	0.955
MK	Marketing strategy	0.949
NNL	Quality of human resources	0.918
RR	Risk management	0.958
HT	Supporting policies	0.964
PL	Legal framework	0.857
MT	Environmental policy	0.881
PTNHX	Green banking development	0.952

Source: Prepared by the authors (2023)

Table 2 shows that Cronbach's Alpha of 0.6 or more if the concept is measured, is new to the respondents in the research context and the minimum of the coefficients. Thus, after testing the scale's reliability for eight independent factors with 32 variables, the authors did not remove any variables used in the study. This result is consistent with the research data and valuable for the next steps.

Table 3: Sample descriptive statistics about dependent factors

Code	Customers	Minimum	Maximum	Mean	Std. Deviation
HT1	865	1.00	5.00	3.0867	0.98865
HT2	865	1.00	5.00	3.0821	1.00068
HT3	865	1.00	5.00	3.1121	0.96951
HT4	865	1.00	5.00	3.0832	1.00577
PL1	865	1.00	5.00	3.3861	0.87733
PL2	865	1.00	5.00	3.5156	0.96707
PL3	865	1.00	5.00	3.3329	0.98137
PL4	865	1.00	5.00	3.3884	0.91381
TC1	865	1.00	5.00	3.0462	0.97429
TC2	865	1.00	5.00	3.0636	0.98455
TC3	865	1.00	5.00	3.0960	0.94467
TC4	865	1.00	5.00	3.0775	0.97883
CN1	865	1.00	5.00	3.0763	0.97951
CN2	865	1.00	5.00	3.0613	1.00448
CN3	865	1.00	5.00	3.1052	0.96311
CN4	865	1.00	5.00	3.1029	0.97767
RR1	865	1.00	5.00	3.0590	0.98952
RR2	865	1.00	5.00	3.0636	0.99971
RR3	865	1.00	5.00	3.0960	0.96407
RR4	865	1.00	5.00	3.0728	1.00370
MT1	865	1.00	5.00	2.3526	0.65392
MT2	865	1.00	5.00	2.4428	0.66963
MT3	865	1.00	5.00	2.3954	0.64977
MT4	865	1.00	5.00	2.4590	0.70776

NNL1	865	1.00	5.00	2.3538	0.65595
NNL2	865	1.00	5.00	2.4266	0.67665
NNL3	865	1.00	4.00	2.3884	0.64683
NNL4	865	1.00	5.00	2.4382	0.69965
NNL5	865	1.00	5.00	2.4486	0.71034
MK1	865	1.00	5.00	3.4000	0.94624
MK2	865	1.00	5.00	3.3341	0.95770
MK3	865	1.00	5.00	3.2751	0.99566

Source: Prepared by the authors (2023)

Table 3 shows that the number of respondents with the lowest answer is 1.0, and the highest is 5.0. There is not much difference between the variables. The mean between the variables is around 3.0 and is less than 1.0 apart. The standard deviation of the data is approximately 1.0. Thus, the data is relatively good to perform further tests.

Table 4: CFA test results for all scales

Indicators	Value	Standard	Result
CMIN/DF	4.426	< 5.0	Good
GFI	0.860	> 0.8	Good
TLI	0.928	> 0.9	Good
CFI	0.937	> 0.9	Good
RMSEA	0.063	< 0.08	Good
Sig value	0.000	< 0.05	Good

Source: Prepared by the authors (2023)

RMSEA is satisfactory. Table 4 shows the model goodness of fit indicators such as chi-square adjusted for degrees of freedom (CMIN/df), CFI comparability index, TLI index, and the index. A model is considered appropriate when the chi-squared test has a p-value less than < 0.05. Thus, the above results are consistent with the research data set.

Table 5: Results for testing the structural equation model

The relationship between the factors	Unstandardized Coefficients	Standardized Coefficients	Std. Error	C.R	P-value
PTNHX <--- CN	0.497	0.533	0.028	17.848	***
PTNHX <--- MK	0.087	0.072	0.030	2.917	0.004
PTNHX <--- PL	0.143	0.148	0.029	4.896	***
PTNHX <--- TC	0.073	0.081	0.026	2.847	0.004
PTNHX <--- MT	0.175	0.095	0.052	3.369	***
PTNHX <--- RR	0.085	0.092	0.028	3.068	0.002
PTNHX <--- HT	0.078	0.092	0.023	3.337	***
PTNHX <--- NNL	0.139	0.090	0.045	3.110	0.002

Source: Prepared by the authors (2023)

Table 5 shows that the SEM model test results are satisfactory, the values of the regression coefficients are positive, and the statistical significance is less than 0.05. The column P value is the significance level of the relationship between the impact of the factors. If this

value is less than 5%, the hypothesis is accepted. In the case of \*\*\*, as shown in Table 5, it is because this value is less than 0.001, the better because it is < 5%, and all hypotheses are accepted. After running the SEM model, the authors used multivariable linear regression statistics like SPSS for analysis. That is also based on the p-value coefficients to evaluate whether the hypothesis is successful or not. Thus, the purpose of analyzing the SEM results is mainly to assess the hypothesis, whether it is successful or not, and at the same time to evaluate the strong/weak impact of that relationship. Here are some observations of the model results.

The analysis results show that there are 8 factors affecting the development of green banking, including (1) Quality of human resources (NNL), (2) Banking Technology (CN), (3) Supporting Policy (HT), (4) Risk Management (RR), (5) Financial Capacity (TC), (6) Environmental Policy (MT), (7) Legal Framework (PL), (8) Marketing Strategy (MK) with 1.0% significance level. Among the influencing factors, banking technology affecting green banking development was identified as the most substantial influencing factor ( $\beta = 0.533$ ), and the lowest influencing factor on green banking development was strategic Marketing ( $\beta = 0.072$ ).

Table 6: Testing the research model by Bootstrap method

The relationship between the factors			SE	SE-SE	Mean	Bias	SE-Bias
PTNHX	<---	CN	0.039	0.001	0.497	0.000	0.001
PTNHX	<---	MK	0.034	0.001	0.083	-0.004	0.003
PTNHX	<---	PL	0.036	0.001	0.142	0.000	0.001
PTNHX	<---	TC	0.026	0.001	0.068	-0.005	0.004
PTNHX	<---	MT	0.084	0.002	0.146	-0.009	0.005
PTNHX	<---	RR	0.032	0.001	0.085	0.000	0.001
PTNHX	<---	HT	0.022	0.000	0.076	-0.002	0.001
PTNHX	<---	NNL	0.044	0.001	0.140	0.000	0.001

Source: Prepared by the authors (2023)

Table 6 shows that the results of testing the SEM model through estimation by the Bootstrap method with N = 50,000 are satisfactory. The values of the regression coefficients are positive and statistically significant because the column deviation is very high. In addition, the indicator CR = Bias/SE-Bias is less than 1.96 at the 5% significance level. CR < 1.96, infer p-value > 5%, conclude that non-zero deviation is not statistically significant at 95% confidence level, and thus we conclude that the model is reliable and this is Expected results when analyzing SEM.

Estimates from N samples are averaged, and this value tends to be close to the population estimate. Thus, the Bootstrap method performed with the number of repeated

instances N is 50,000 times. The smaller the difference between the mean estimated by Bootstrap and the model estimate with the original sample, allowing the conclusion that the model estimates can be trusted.

Based on the above analysis, the authors accepted hypothesis H1: Banking technology positively impacts green banking development at a 1% significance level. Banking technology has the most substantial impact of the eight factors, with a standardized estimate of 0.533. Modern technology helps banks promote business activities, reduce transaction costs, and increase security, transparent and safer transactions with new technologies such as images and the use of stamps, fingerprints, and replacement for the payment card. The demand for online payment has increased as e-commerce activities develop, and the technology of things connected to the internet is more common. This is also an excellent opportunity for banks to expand their business in the digital economy. This study's results are consistent with those (Masukujjaman et al., 2015).

Based on the above analysis, the authors accepted hypothesis H2: Financial capacity positively impacts green banking development with a significance level of 1%. Next, financial capacity is essential in developing green banks, ensuring financial resources for operations to achieve the set goals. However, when considered from different angles or scopes, the specific content of financial capacity has other points. Usually, financial capacity is assessed and contributed to the development, as also the financial capacity for green growth. This research result is consistent with the results (Jha & Bhome, 2013).

Based on the above analysis, the authors accepted hypothesis H3 as follows: Marketing strategy positively impacts green banking development at the significance level of 1%. The results of this study are consistent with the research results (Janakiraman & Karthikeyan, 2016). With the current context, polluted environments, and epidemics occurring every day around the world, building a green marketing strategy is considered urgent and very important for developing green banking. Being well aware of the importance of green marketing, commercial banks need to have action strategies suitable to the characteristics of each bank instead of providing free plastic bags as before, which will encourage customers to buy bio-hazardous bags and reusability. Implementing various plastic waste recycling strategies through recycled products displayed in supermarkets; or deploying environmental education content on social networks through the bank's fan page. This can be seen as a strategy to exploit potential customers for green needs and, at the same time, improve the bank's image with society.



Based on the above analysis, the authors accepted for this study the hypothesis H4 follows: The quality of human resources has a positive impact on the development of green banks with a significance level of 1%. In fact, the commercial banking system has gone through many stages of development. The development stages all pose requirements for the respective quality requirements of human resources. Over the past and now, the system of commercial banks needs to have developed strategies towards high technology content. This study's results are consistent with those (Aboelmaged & Gebba, 2013).

Based on the above analysis, the authors accept hypothesis H5 as follows: Risk management positively impacts green banking development with a significance level of 1%. Risk management plays an essential role in ensuring the safety of credit activities of banks and contributes to minimizing risks in banking activities, especially green banks. Preventing and limiting credit risks are well implemented and will benefit commercial banks, such as: Reducing costs, improving income, and preserving capital for commercial banks. This study's results are consistent with those (Aleem & Bowra, 2020; Hernandez & Hugger, 2016; Areej & kadhim, 2022).

The Covid-19 pandemic has seriously affected all aspects of socio-economic life, putting significant pressure on health, economy, and social order, making the demand for state budget expenditure in general, state budget State policies for health, social security, and business support to develop production and business increased. From the theoretical bases of this factor, the authors accept hypothesis 6 as follows: Supportive policy positively impacts green banking development with a significance level of 1%. The results of this study are consistent with those (Chen et al., 2013; Hernandez & Hugger, 2016). Although the size of green credit outstanding loans has gradually improved significantly in recent years, the proportion of outstanding loans in total bank credit exceptional loans is still relatively low, only at less than 1 digit level. This reality requires policies to open up green credit capital to more actively support green projects, and sustainable economic development projects, towards the goal of sustainable economic growth and increased growth, the ability of the economy to withstand the risks of climate change like Vietnam.

Among the factors affecting the development of green banking and the green economy in Vietnam, the legal framework and promotion policies are essential and influential factors. From the theoretical bases of this factor, the authors accept hypothesis H7: The legal framework positively impacts green banking development with a significance level of 1.0 %. The results

of this study are consistent with those of the results (Aleem & Bowra, 2020; Insawan et al., 2022).

From the theoretical bases of this factor, the authors accept hypothesis H8: Environmental policy positively impacts green banking development with a significance level of first%. Environmental policy is a matter of concern worldwide, including in Vietnam. Environmental protection is a vital issue in the country, a profoundly social task associated with socio-economic development, peace, and social progress is both a goal and an essential content of Vietnamese law in sustainable development. This study's results are consistent (Ren et al., 2020; Yadav & Pathak, 2013).

## CONCLUSION

The Covid-19 pandemic has strongly impacted all sectors, including the banking industry. Developing a green bank will be an essential resource for implementing the green economic strategy. The banking system can contribute to limiting environmental and social risks by not lending capital to customers with projects that pollute or adversely impact the environment and people's lives. Besides, the development of green banking is a relatively new issue in Vietnam, and banks do not have much experience in implementation. On the other hand, environmental protection and a green economy are common problems in society, not only in the financial and banking sectors. Therefore, if each bank's own efforts in promoting green banking development are not enough, it is necessary to have the cooperation of the whole community. With the results presented above, the linear structural model shows that all eight factors mentioned above positively influence the development of green banks at the significance level of 5%. The eight weak effects include. In addition, to help Vietnamese commercial banks realize the importance of green banking development in terms of impact factors and their benefits to the environment and economy as well as green banking activities. The study also shows international experiences in green banking from developed countries. Then, the article summarizes the current status of green banking activities in Vietnam and has appropriate and effective policies for customers using banking services.

Limitations of the research and suggestions for further study: Although the authors have made great efforts, the research paper still has some limitations: sampling method and sample size. The authors have only sampled by convenience method and randomization, and the sample size is also limited due to the difficulty of accessing the research object. The study was only tested with 900 officers and bankers representing 15 commercial banks in five provinces and

cities of Vietnam. This data is still tiny compared to all commercial banks' total number of officers and employees nationwide. Therefore, future studies should overcome the disadvantages mentioned above.

## ACKNOWLEDGMENTS

The University of Finance - Marketing (UFM), Vietnam, supported the study.

## REFERENCES

Aboelmaged, M., & Gebba, T. (2013). Mobile banking adoption: an examination of technology acceptance model and theory of planned behavior. *International Journal of Business Research and Development*, 2(1), 35-50.

Aizawa, M., & Yang, C. (2010). Green credit, green stimulus, green revolution? China's mobilization of banks for environmental cleanup. *Journal of Environment & Development*, 19(2), 119-144.

Aleem, M., & Bowra, Z. A. (2020). Role of training & development on employee retention and organizational commitment in the banking sector of Pakistan. *Review of Economics and Development Studies*, 6(3), 639-650.

An, X., & Pivo, G. (2020). Green buildings in commercial mortgage-backed securities: The effects of leed and energy star certification on default risk and loan terms. *Real Estate Economics*, 48(1), 7-42.

Antonio, A., Romano, G. S., Alfonso, C., & Mate. F. (2017). Renewable investments: The impact of green policies in developing and developed countries. *Science Direction*, 68(1), 738-747.

Areej, S. H. A., & kadhim, S. M. (2022). Improve the competitive advantage through human resources management practices in the Iraqi banking sector. *International Journal of Professional Business Review*, 7(6), 1-20.

Bailey, A. A. (2005). Consumer Awareness and use of product review websites. *Journal of Interactive Advertising*, 7(1), 78-81.

Bhardwaj, B. R., & Malhotra, A. (2013). Green banking strategies: sustainability through corporate entrepreneurship. *Journal of Business and Management Studies*, 3(4), 180-193.

Bihari, S. C., & Pradhan, S. J. J. (2011). CSR and performance: The story of banks in India. *Journal of Transnational Management*, 16(1), 20-35.

Borgers, A. C., & Pownall, R. A. (2014). Attitudes towards socially and environmentally responsible investment. *Journal of Behavioral Experimental Finance*, 1(2), 27-44.

- Chatzitheodorou, K., Skouloudis, A., Evangelinos, K., & Nikolaou, I. (2019). Exploring socially responsible investment perspectives: A literature mapping and an investor classification. *Sustainable Production Consumption*, 19(3), 117-129.
- Chen, H., Chen, Q., & Gerlach, S. (2013). The implementation of monetary policy in China: The interbank market and bank lending. *International Finance Review*, 14(3), 31-69.
- Chen, Y. S. (2010). The drivers of green brand equity: green brand image, green satisfaction, and green trust. *Journal of Business Ethics*, 93(2), 307-319.
- Chin, W. W., Marcellin, B. L., & Newsted, P. R. (2003). A partial least squares latent variable modeling approach for measuring interaction effects: Results from a Monte Carlo simulation and an electronic-mail emotion/adoption study. *Information Systems Research*, 14(2), 127-219.
- Chua, S. C., & Oh, T. H. (2011). Green progress and prospect in Malaysia. *Renewable and Sustainable Energy Reviews*, 15(6), 2850-2861.
- Elena, D., & Oriana, N. (2014). A model of green investments approach. *Science Direct*, 15(14), 847-852.
- Ghosh, S. K., Ghosh, P. K., & Chowdhury, S. (2018). Essential of central bank's regulatory policy to strengthen green banking practices and reporting in a country. *Asian Journal of Finance & Accounting*, 10(2), 12-24.
- Goyal, K., & Joshi, V. (2011). A study of social and ethical issues in the banking industry. *International Journal of Economics and Research*, 2(5), 49-57.
- Hair, J., Anderson, R., Tatham, R., & Black, W. (2021). *Multivariate data analysis*. US: Prentice-Hall: Upper Saddle River, NJ, USA.
- Hernandez, D., & Hugger, C. (2016). Creating social impact through responsible investing. *Benefits Magazine*, 53(2), 14-22.
- Hyoungkun, P., & Jong, D. K. (2020). The transition towards green banking: role of financial regulators and financial institutions. *Asian Journal of Sustainability and Social Responsibility*, 5(1), 1-25.
- Ikram, M., Zhou, P., Shah, S., & Liu, G. (2019). Do environmental management systems help improve corporate sustainable development? Evidence from manufacturing companies in Pakistan. *Journal of Cleaner Production*, 22(6), 628-641.
- Insawan, H., Abdulahanaa, Karyono, O., & Farida, I. (2022). The Covid-19 Pandemic and its impact on the yields of Sharia Stock Business Portfolio in Indonesia. *International Journal of Professional Business Review*, 7(6), 1-19.
- Jain, S. K., & Kaur, G. (2004). Green marketing: An attitudinal and behavioural analysis of Indian consumers. *Global Business Review*, 5(2), 187-205.
- Janakiraman, R., & Karthikeyan, S. (2016). A study on green banking in India-An overview. *Indian Journal of Research*, 5(10), 346-348.

- Jha, N., & Bhome, S. (2013). A study of green banking trends in India. *Journal of Research in Management Technology*, 2(3), 127-132.
- Julia, T., Rahman, M. P., & Kassim, S. (2016). Shariah compliance of green banking policy in Bangladesh. *Humanomics*, 32(3), 390-404.
- Kianpour, K., Jusoh, A., & Asghari, M. (2014). Environmentally friendly as a new dimension of product quality. *International Journal of Quality & Reliability Management*, 31(5), 547-565.
- Lalon, R. M. (2015). Green banking: Going green. *Finance and Management Sciences*, 3(1), 34-42.
- Masud, M., Kaium, A., Hossain, M. S., & Kim, J. D. (2018). Is green regulation effective or a failure: Comparative analysis between Bangladesh Bank (BB) green guidelines and global reporting initiative guidelines. *Sustainability*, 10(4), 1267-1279.
- Masukujjaman, M., Siwar, C., Alam, A., Bashawir, A., & Er, A. (2016). Economy-environment nexus for development: Is Bangladesh on the right track? *International Journal of Advanced Applied Sciences*, 3(2), 25-29.
- Masukujjaman, M., Siwar, C., Mahmud, M., & Alam, S. S. (2015). Banker's perception on green banking an empirical study on Islamic banks in Bangladesh. *Management & Marketing Journal*, 13(2), 296-310.
- Miah, M. D., Rahman, S. M., & Mamoon, M. (2020). Green banking: The case of commercial banking sector in Oman. *Environment Development and Sustainability*, 5(3), 1-17.
- Nath, V., Nayak, N., & Goel, A. (2014). Green banking practices – A review. *International Journal of Research in Business Management*, 2(4), 45-62.
- Owais, S., & Arslan, M. (2020). Factors influencing bankers' intention to adopt green finance in Pakistan. *Review of Economics and Development Studies*, 6(4), 773-785.
- Prakash, A., Kumar, K., & Srivastava, A. (2018). Consolidation in the Indian banking sector: Evaluation of sustainable development readiness of the public sector banks in India. *International Journal of Sustainable Strategic Management*, 6(1), 3-16.
- Rahman, M. M., Ahsan, M. A., Hossain, M. M., & Hoq, M. R. (2013). Green banking prospects in Bangladesh. *Asian Business Review*, 2(2), 1-10.
- Ren, X., Shao, Q., & Zhong, R. (2020). Nexus between green finance, non-fossil energy use, and carbon intensity: Empirical evidence from China based on a vector error correction model. *Journal of Cleaner Production*, 277, 122844–122811.
- Saurabh, G., & Hardeep, K. (2019). Green banking: A strategic response to environmental turbulence. *Journal of Management Research and Analysis*, 6(2), 120-123.
- Singh, H., & Singh, B. P. (2012). A practical and resourceful contribution of green banking towards sustainability. *International Journal of Advances in Engineering Science and Technology*, 1(2), 41-45.

Thombre, K. (2011). The new face of banking: Green banking. *Research Paper-Commerce*, 1(2), 1-14.

Wang, Y., & Zhia, Q. (2016). The role of green finance in environmental protection: Two aspects of market mechanism and policies. *Energy Procedia*, 104(2), 311-316.

Wu, A., & Li, T. (2020). Gaining sustainable development by green supply chain innovation: Perspectives of specific investments and stakeholder engagement. *Business Strategy and the Environment*, 29(3), 962-975.

Yadav, R., & Pathak, G. (2013). Environmental sustainability through green banking: A study on private and public sector banks in India. *OIDA International Journal of Sustainable Development*, 6(8), 37-48.