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Policy Recommendations for Improving Credit Risk Management: A Case Study of Commercial Banks in Vietnam

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Abstract

Background: Credit risk management is essential in ensuring the safety of banks' credit activities and contributing to minimising risks in banking operations. It involves identifying and analysing risk factors, measuring risk levels, and choosing to deploy measures and manage credit activities to limit risk.

Objective: The study evaluates critical factors affecting credit risk management at commercial banks in Vietnam. On that basis, the author proposes policy implications that contribute to improving credit risk management.

Methodology: The researcher used a quantitative method and surveyed 700 credit officers in 20 commercial banks. The questionnaire served as the instrument for data collection. The data were processed by testing Cronbach's alpha, exploratory factor analysis, confirmatory factor analysis, and structure equation model with the support of SPSS 20.0 software.

Result: Research shows that five factors: (1) credit policy, (2) macro environment, (3) credit information, (4) credit process, and (5) digital technology are essential for effective credit risk management. Therefore, evaluating and measuring credit risk management is necessary for banks' survival and development.

Conclusion: Credit risk management is crucial to the bank's governance, operations, and development. Effective risk management minimises credit risk - an essential activity in Vietnamese commercial banks.

Unique Contribution: This study could benefit both theory and practice in credit risk management in commercial banks. This information could be useful for banks in their efforts to ensure profits and enhance their reputation and operational capacity.

Key Recommendation: From the above results, the researcher proposes five policy recommendations to improve the quality of credit risk management at commercial banks in the context of development and integration.

Keywords: Policy recommendation; credit risk; risk management; commercial banks.

Introduction

Since starting international economic integration and officially becoming a member of the World Trade Organization, Vietnam has opened up many new opportunities for businesses in all fields, including banks. Enterprises mainly operate in the field of currency trading. This is considered a compassionate field and the backbone for regulating the domestic economy, so it is regarded as a spearhead in economic integration. Vietnam has been implementing commitments to open international financial integration, making domestic businesses compete increasingly fiercely, opening up many opportunities but also many challenges; integration factors are considered a new factor and driving force that directly affects the production and business activities of enterprises, but at the same time comes with many potential risks, risks affecting the economy all affect operations of commercial banks in general and bank credit activities in particular (Abdulla & Elshandidy, 2023). Credit risk management is the best way

for credit institutions to implement so as not to affect investment capital. Credit risk management includes all actions to control risks arising during commercial banks' operation and scale development related to preventing and maintaining all types of risk.

Risk management is the systematic procedure of detecting and assessing potential risks, quantifying their levels, making decisions on implementing strategies, and overseeing credit operations in order to mitigate risk. Implement measures to control and mitigate risks in the process of giving credit (Ferreira, 2021; Giudici et al., 2020). Credit risk management is crucial for commercial banks due to the following factors:

Preventing and mitigating credit risk is a challenging challenge for commercial banks due to its inherent inevitability and its intricate and diversified nature, which is closely linked to credit activity. Managing credit risk may be challenging and can result in financial harm and the depletion of a bank's capital and income. If the measures to avoid and mitigate credit risks are effectively implemented (Hu & Zhang, 2021; Grassa et al., 2021). Under those circumstances, commercial banks stand to gain several advantages, including cost reduction, income growth, capital preservation, enhanced depositor and investor confidence, market expansion opportunities, and improved reputation, position, image, and market share.

The bank's equity, relative to its overall asset value, is modest. Even a tiny proportion of difficulties in the loan portfolio might significantly increase the risk of the bank going bankrupt. Business loans are very valuable assets for banks. Therefore, in the event of significant issues, if the loan cannot be successfully retrieved, it can result in substantial financial losses for the bank. Credit risk management at commercial banks typically follows a rigorous procedure encompassing risk identification, quantification, regulation, and mitigation. More precisely, the identification of credit risk is an ongoing and methodical procedure (Hussain & Al-Ajmi, 2012). Every loan is susceptible to encountering difficulties; promptly identifying the issues and implementing efficient, expert actions may effectively minimise problems and mitigate losses. Warning indicators are crucial in enabling banks to promptly identify and efficiently address issues at an early stage (Abdelaziz et al., 2022). Typically, identifying markers often emphasise both the financial and non-financial indicators of borrowers.

Credit risk measurement involves assessing the extent of hazards and determining the likelihood of risk events and the magnitude of losses associated with them, in order to assess the bank's capacity to tolerate such risks. This serves as the foundation for banks to make lending choices and formulate timely and suitable reaction strategies to mitigate credit risk in such circumstances and banks frequently construct suitable models to estimate credit risk.

Credit risk management and control: Credit risk management and control refers to a comprehensive set of instruments, rules, standards, and procedures implemented by a bank to avoid and address credit risk (Gaganis et al., 2021). This includes the establishment of a credit policy, the implementation of a credit process application, the use of credit risk management equipment, and the setting of credit limits. Managing credit risk: Managing credit risk is the last stage in credit risk management. During this phase, the bank will implement strategies and actions to secure funding and mitigate and reduce the financial expenses and damages incurred as a result of credit risk. Hence, the objective of this study was to find out the determinants impacting the management of credit risk at commercial banks in Vietnam. Ultimately, the author suggests policy recommendations to enhance credit risk management for commercial banks in Vietnam.

Literature Review

Credit Risk Management (CRM)

Credit risk management is a core issue in the existence of most large banks. Credit risk can be reduced by issuing credit limit policies for borrowers and reducing the risk of failure for related parties. Classifying credit portfolios and risk provisions for credits will prevent the possibility

of lowering the value of the loan portfolio (Bussmann et al., 2020; Ferreira, 2021; Koulafetis, 2017). In credit management, the bank must have transparent information about customers, the risks of the credit products that the bank provides, and whether the term of the credit products affects the bank's liquidity risk management. A bank's credit risk management capacity significantly impacts the quality of risk management principles. Credit risk management aims to maximise the bank's adjusted risk yield by maintaining the risk level at an acceptable rate. Banks need to manage credit risk for the entire portfolio and risk for each loan or other transaction. Banks also need to consider the relationship between credit risk and different types of risk (Giudici et al., 2020; Shafique et al., 2013). The effectiveness of credit risk management is an essential factor in risk management and is necessary for the long-term success of banks.

Credit Policy (CP)

Credit activities bring mainly profits to banks, so a credit policy suitable to the characteristics of capital resources, human resources, and risk management ability will help credit activities achieve success and higher efficiency. An effective credit policy must be updated per changes in the economic, social, and political environment (Hassan et al., 2019). Banks must forecast and orient their affiliated units in each stage of economic development. Credit policy is understood as a set of regulations on credit activities issued by the bank with the primary purpose of guiding credit activities and guiding bank officials to implement those regulations when providing credit to customers in need. A credit policy, from formation to completion, must go through quite a long period over many years (Hu & Zhang, 2021). Thanks to the introduction of credit policies, banks can target their loan portfolios more effectively; in addition, it is also easier to guide and train bank staff to firmly grasp important credit procedures, steps that need to be taken during the credit process so that lending activities always ensure the most accuracy and better credit risk management.

Macro Environment (ME)

One of the common factors leading to credit risk is that the borrower encounters unpredictable changes in the business environment and the impact of the economic cycle. During the high growth period, businesses do business well, so it is easy to recover loans, and credit risk is low (Khalid & Amjad, 2012). On the contrary, many companies encountered difficulties during the recession, so loans were susceptible to risks, mainly medium and macro environments, which include interest rates, inflation, and required reserve ratio. High base interest rates reflect the Central Bank's intervention policy when inflation exceeds the allowable level (Henseler et al., 2015). The operating mechanism of the compulsory reserve tool is to control the ability to create money, limit the credit multiple of commercial banks, and indirectly affect credit risk at commercial banks.

Credit Information (CI)

In a narrow sense, credit information is understood as information about an individual or company's ability to repay debt that banks consider before deciding to lend. In a broader sense, credit information is the relevant data, figures, facts, and news of borrowers at credit-granting institutions (Grassa et al., 2021). Credit information reduces information asymmetry between borrowers and lenders, allowing lenders to assess risks more accurately and improve the quality of credit operations. Indeed, commercial banks have difficulty capturing information about borrowers, such as legal status, credit level, financial capacity, efficiency of projects using loan money, and ability to repay debt (Facchinetti et al., 2020). This leads to risks in deciding to grant credit, which is the ability to grant credit to destructive projects and refuse to grant credit to good projects. On the contrary, customers may have difficulty understanding the products that banks provide to meet their loan purposes. In order to prevent risks, commercial banks often use screening mechanisms to select suitable projects and good customers for

lending (Hussain & Al-Ajmi, 2012). The screening mechanism includes customer information about legal status, creditworthiness, financial capacity, and ability to repay debt.

Credit Process (CPr)

The credit process is a series of steps and activities that banks, financial institutions, and financial service providers perform to evaluate customers' ability to borrow and manage finances. Compliance with credit processes at banks is critical to ensure transparency, fairness, and safety in financial activities (Abdelaziz et al., 2022). This process ensures that banks carry out financial activities properly and comply with relevant legal regulations, thereby protecting both banks and customers in the financial processes and contributing to the financial system's stability. In short, the credit process is a series of steps and activities performed to ensure customers' authenticity and repayment ability when they use credit products and services (Asllanaj, 2018; Rehman et al., 2019). This process ensures that both the applicant and the credit institution benefit and ensures transparency and safety in financial operations.

Digital Technology (DT)

Digital technology is considered advanced technology that is applied to the next stages of digital transformation after the digitalisation stage. Once the system has digitised data, AI, Big Data, and Cloud Computing technologies will analyse data, transform it, and create new value. At this level of digital technology, the application will open up forms of innovation and creativity in an entire industry or field instead of just upgrading or converting traditional processes and procedures (Colesnic et al., 2020). Thus, digital technology is a further development of information technology, allowing faster data processing and large capacity transmission at lower cost. This technological breakthrough has allowed for comprehensive digital transformation, something that was not possible before (Elamer et al., 2020). Digital technology can be considered from two aspects: building application software with multimedia, social networks, e-commerce platforms, shopping services, and online payments, and hardware development from mobile devices and automation systems to information data storage and processing, Big Data, and Cloud Computing.

Theoretical Framework

Credit policy (CP) and Credit Risk Management (CRM)

A bank's credit policy should pay attention to the size and allocation of its resources and how it manages its loan portfolio, such as appraisal, decision-making, monitoring, and recovery; what kind of loan? A good policy has regulations on loan limits and allows loan officers to present and convince the review board of good loans without violating lending principles (Gaganis et al., 2021; Koulafetis, 2017). Flexibility in adjusting credit policy is also essential when operating. Depending on each stage of the economy, banks change their credit policies towards expansion or tightening (Kozarevic et al., 2013). When the economy grows, the bank's credit policy will be built to reduce interest rates, the ratio of capital participating in bank financing to investment projects, customers' production and business plans will be increased, and loan approval procedures and time will be compact and quick. Therefore, H1 proposes the following hypothesis:

H1: Credit policy (CP) positively influencing Credit Risk Management (CRM).

Macro Environment (ME) and Credit Risk Management (CRM)

The macro environment is a set of factors, forces, and overall conditions outside the bank that indirectly or directly impact the bank's business activities, including the impact on credit risk management. Many studies have identified that competition between banks creates motivation to innovate and improve the way each bank operates better and better (Masood et al., 2012).

However, fierce competition between banks and other financial intermediaries creates substandard regulations in granting bank credit. To compensate for lost profits, managers must sacrifice the goal of standardizing credit appraisals. Uncontrolled credit management will damage future credit quality, and these credits will become bad debt. The interest rate race between banks leads to economic instability, causing business capital difficulties (Rwayitare et al., 2016). The problem of bad debt has become a complex problem for both banks and regulators. The legal system for management activities in general and for retail credit risk management activities, in particular, are the fundamental bases and instructions for banks to plan retail credit risk management activities, retail (Williams et al., 2006) Inadequacies in state mechanisms and policies also cause credit risks at banks. Therefore, H2 proposes the following:

H2: Macro Environment (ME) positively influencing Credit Risk Management (CRM).

Credit Information (CI) and Credit Risk Management (CRM)

Typically, banks can collect credit information from three primary sources: customers, internal bank details, and external information. However, information collection has many problems, including information asymmetry (Henseler et al., 2016). This problem arises when the bank has little information about the customer's reputation, financial capacity, willingness to repay debt, and project business performance. The bank will grant credit to unprofitable projects or customers who invest capital not for the purpose committed to the bank. Besides, investing in a credit information storage system for credit work costs banks a lot of money. Information from third parties such as customer partners, credit centres, credit rating agencies, and other banks may be inaccurate and detrimental to the bank's decision-making (Antunes et al., 2021). Credit information also plays a role in increasing credit efficiency and reducing bad debts in banks. Thus, H3 proposes the following hypothesis:

H3: Credit Information (CI) positively influencing Credit Risk Management (CRM).

Credit Process (CPr) and Credit Risk Management (CRM)

Evaluating a credit granting process should focus on analysing the issued instructions and credit handbooks that have been applied and assessing the operational capacity of departments related to credit activities to further evaluate how to carry out the steps of credit document preparation, appraisal, decision-making, disbursement, supervision, and liquidation (Masood et al., 2012; Gaganis et al., 2021). Specifically, the factors that need to be evaluated are: Are the analysis, assessment, and loan decision-making processes detailed? Are there regulations and rules on lending decisions and credit limits at each management level and each branch of the banking system? Are there regulations on security for each type of credit, including methods, valuation methods, and storage of collateral for the loan? Are there regulations on the process of monitoring and administering granted loans? And procedures for handling exceptions or not. The credit process helps identify and establish a specific sequence of steps to manage and execute credit transactions (Colesnic et al., 2020). Thanks to this process, banks can easily manage, detect, and improve weaknesses in the credit process. This means increased transparency, clarity, and customer trust. Thus, H4 proposes the following:

H4: Credit Process (CPr) positively influencing Credit Risk Management (CRM).

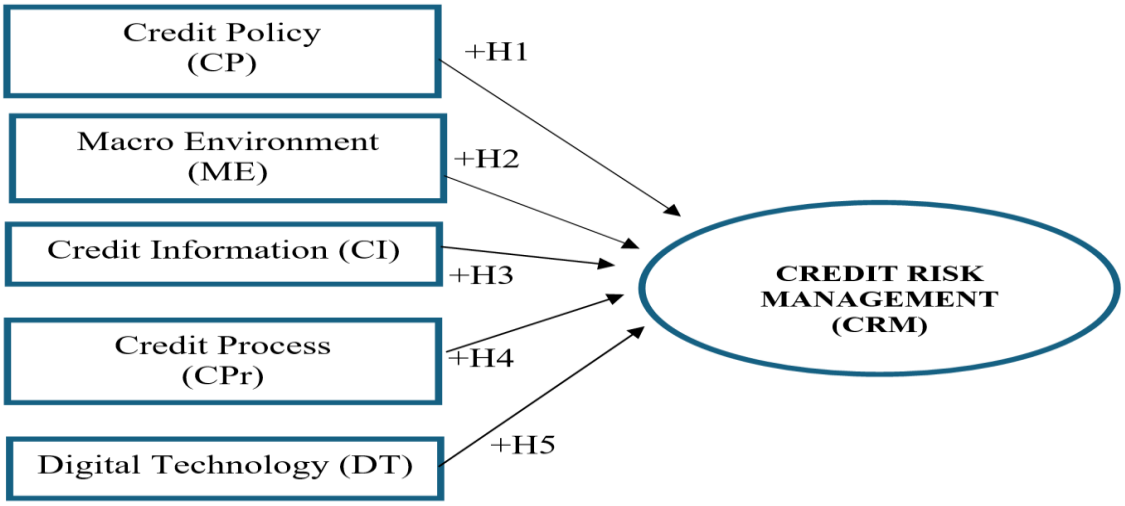
Digital Technology (DT) and Credit Risk Management (CRM)

Applying digital technology is an inevitable trend; every organisation takes advantage of the superiority of advanced technology to improve operational efficiency and compete with competitors. For the banking sector, applying digital technology brings essential benefits, such

as creating new products and services to have the opportunity to reach more customers and eliminate physical boundaries in operations (Colesnic et al., 2020). In business operations, it is crucial to eradicate intermediary steps, optimise processes and operations, save operating costs, and bring benefits and convenience to customers. In addition, management is better thanks to abundant sources of management information and a smooth, timely, and effective reporting system from which managers can make quick and accurate decisions (Elamer et al., 2020). An important issue in applying digital technology to banking activities is the threat of network security, security issues in the online environment, and user awareness of security issues. Therefore, hypothesis H5 proposes the following:

H5: Digital Technology (DT) positively influencing Credit Risk Management (CRM).

Based on the results of analysing the above-related studies, the author proposes a research model with five factors affecting credit risk management at commercial banks in Vietnam; the author suggested the form of a structural equation model below.



Source: The author proposed

Figure 1: ***The model for five factors influencing the credit risk management***

Figure 1 shows that five factors influence credit risk management at commercial banks, including (1) credit policy, (2) the macro environment, (3) credit information, (4) credit process, and (5) digital technology.

Research Methods

The article is conducted through two methods: (1) qualitative methods and (2) formal research using quantitative methods to evaluate the influence of factors on credit risk management. To achieve the proposed research objectives and content, the paper uses the following main research methods: Statistical and comparative methods. The topic uses data from reports and statistics of commercial banks in Vietnam and allows analysis and comparison to make comments and propose appropriate solutions. Method of analysis and synthesis: Based on collected documents and statistical data, described through absolute numbers, relative numbers, and development trends over time, tested with illustrations through data, the study will calculate based on those data for analysis. Survey method: Used to increase objectivity in detecting achievements and limitations in credit risk management activities for individual customers at commercial banks in Vietnam.

Moreover, the author surveyed the data, and a detailed description of the research questionnaire was provided to staff working on credit risk management for commercial banks. The author

explained the data type that will be collected and the methods used to anonymise and store it. Furthermore, all of the staff have granted the author permission to utilise this data for research purposes, and the survey results are also policy suggestions for commercial banks to implement credit risk management better. Therefore, the research process is carried out through the following steps:

First, qualitative methods are used to discover new factors, and there is no theoretical reference framework for factors affecting credit risk management; therefore, it is necessary to conduct qualitative research to confirm the factors influencing credit risk management. Qualitative is applied by collecting and consulting documents related to the research topic and consulting with 30 credit risk managers at 20 commercial banks. Theory and analysis of the current state of research and expert opinions were collected to check the appropriateness of the concepts and the relationships between them. In addition, the topic was expanded using open questions to gather additional information. Survey results of 30 managers working in the banking sector agree with the five factors affecting credit risk management at commercial banks. The qualitative result provided the clear questionnaire in Table A1 (Hair et al., 2018).

Secondly, quantitatively, by collecting survey data of 200 credit officers in 20 commercial banks concentrated in 5 major cities of Vietnam, a multiple linear regression model was built and analysed with many independent variables and one dependent variable. Based on the survey questionnaires obtained, the study synthesises and eliminates invalid questionnaires and uses valid questionnaires to conduct descriptive statistical analysis. In addition, the author analyses the reliability of the data through the Cronbach'Alpha coefficient, then explores the exploratory factors by the EFA method to refine the scale and determine the scale structure for official research (Hair et al., 2018).

The author conducts formal research to evaluate the scale, test the model, and research hypotheses. The official analysis was conducted through a survey with an expected sample size of n = 700 staff (respondents) at 20 commercial banks, collecting data by distributing questionnaires from Table A1 to the respondents using email and direct phone communication, and data were analysed to test the research hypotheses. Data collection subjects included unit heads, deputy heads, middle managers, and long-time employees working in credit lending, including green credit, with cost limitations. Time, non-probability, convenience sampling, and sample development are appropriate.

Furthermore, non-probability sampling is often used to evaluate factors in preliminary exploratory studies. The survey period is from June 2023 to December 2023, and the data are processed. After verifying the scale's reliability and analysing the factors, the author used a structural equation model (SEM) to test the model and research hypothesis.

Thirdly, research sample size: To ensure representativeness and reliability for the sample and EFA analysis, at least five samples are required for each observed variable. Therefore, with 23 observed variables, the sample size should be at least 23 x 5 = 115 samples. The survey results were analysed using the techniques of SPSS and AMOS software. The author conducts Cronbach's alpha reliability analysis, exploratory factor analysis (EFA), confirmatory factor analysis (CFA), and structural equation model (SEM) to see the influence of the variables.

Finally, the author formulated all questions in a section of the questionnaire using a 5-point Likert scale, which indicates the ascending degree of agreement from respondents on the author's credit risk management interview. The precise definitions are as follows: The options for agreement levels in the study conducted by Hair et al. (2018) are as follows: (1) Strongly disagree, (2) Disagree, (3) Neutral, (4) Agree, (5) Strongly agree. The sampling procedure employed was convenient and distributed to each participant. However, out of the 670 samples analysed, 30 votes were found to be lacking information. As a result, only the remaining 670 votes were officially included in the computation and utilised in the study model. Finally, the author discusses the results and policy recommendations for credit risk management at commercial banks in Vietnam.

Study Results

Analysis of descriptive statistics, Cronbach's alpha, and confirmatory factor analysis for factors affecting the credit risk management at commercial banks in Vietnam

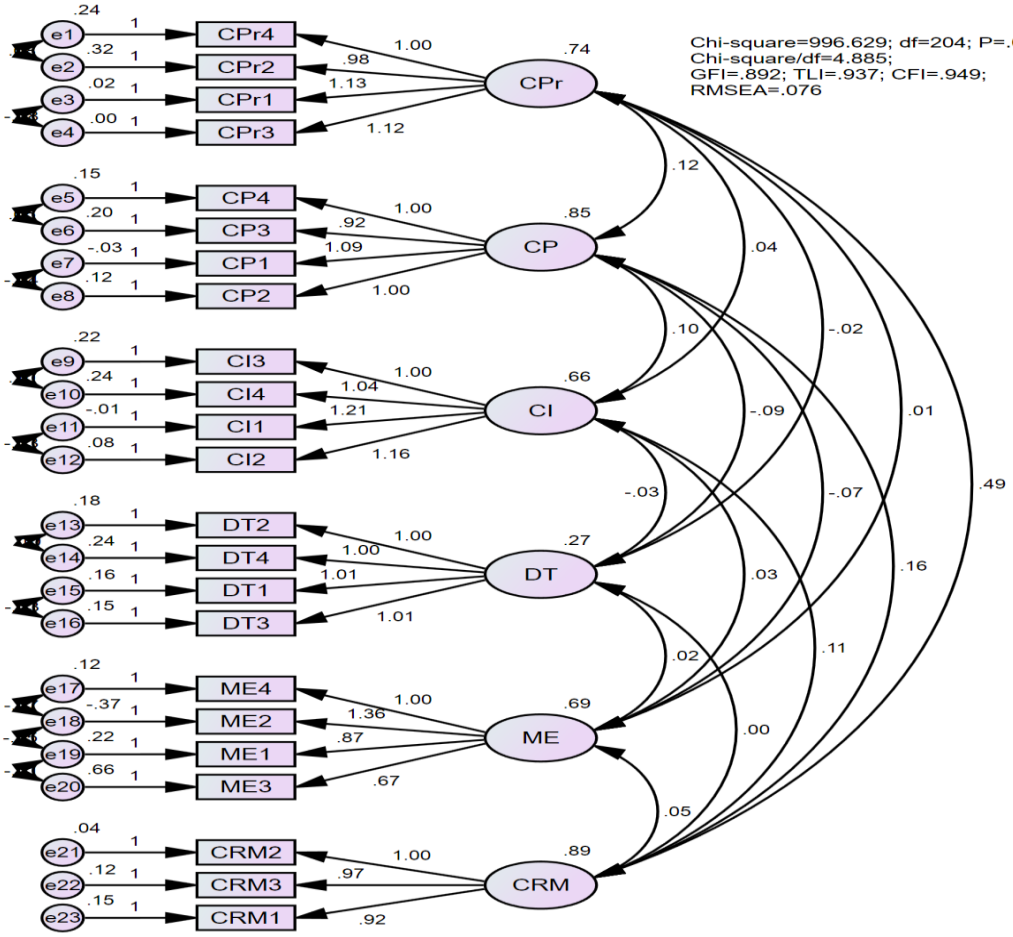
Table 1: ***Testing descriptive statistics and Cronbach's alpha for critical factors affecting the credit risk management at commercial banks in Vietnam***

Code	Items	Cronbach's alpha	Mean	Std. Deviation
Credit Policy (CP)		**0.964**	**3.088**	-
CP1	Credit policies have specific orientations and strategies for each customer	0.951	3.066	0.996
CP2	Credit policies are diverse in terms of credit granting forms, industries, and lending fields	0.963	3.091	0.985
CP3	Credit policies are reviewed and adjusted to suit the economic situation	0.950	3.124	0.959
CP4	Credit policies are disseminated to each branch, relevant department, and credit officer	0.947	3.070	1.002
Macro Environment (ME)		**0.850**	**3.423**	-
ME1	Stable economic environment, including economic growth, inflation, politics	0.805	3.409	0.863
ME2	State legal systems on credit, such as interest rates and exchange rates	0.802	3.533	0.960
ME3	Information on monetary policy is complete and accurate	0.833	3.343	0.983
ME4	The Government operates the economy flexibly and according to market trends	0.798	3.408	0.902
Credit Information (CI)		**0.957**	**3.074**	-
CI1	Credit information is complete, objective, accurate, and reliable	0.940	3.039	0.973
CI2	Quality Good credit information affects credit quality	0.951	3.066	0.977
CI3	The bank has built a credit information system	0.939	3.115	0.936
CI4	Credit assessment criteria are reasonable and complete	0.942	3.075	0.977
Credit Process (CPr)		**0.957**	**3.096**	-
CPr1	The bank's credit granting process is clear and specific to each customer	0.938	3.082	0.985
CPr2	The credit granting process complies with legal regulations	0.956	3.049	1.020
CPr3	The credit granting process is consistent with personnel qualifications	0.935	3.127	0.963
CPr4	The credit granting process is separate between relevant departments	0.944	3.127	0.992
Digital Technology (DT)		**0.871**	**2.418**	-
DT1	Modern digital technology investment bank	0.850	2.345	0.660
DT2	Digital technology meets risk management	0.808	2.464	0.677
DT3	Digital technology secures customer information	0.855	2.397	0.652
DT4	Customers are satisfied when using digital banking	0.823	2.467	0.720
Credit Risk Management (CRM)		**0.958**	**3.395**	-
CRM1	Banks have measures to identify, measure, and warn of risks remotely	0.957	3.442	0.950
CRM2	Banks comply with minimum capital adequacy ratio regulations	0.916	3.382	0.966
CRM3	Banks have measures to handle and control bad debts	0.942	3.360	0.977

Source: Data processed from SPSS 20.0

Table 1 shows that Cronbach's alpha for various factors affecting credit risk management at commercial banks in Vietnam is higher than 0.7. Five factors include (1) credit policy, (2) macro environment, (3) credit information, (4) credit process, and (5) digital technology. Besides, one dependent variable shows the credit risk management at commercial banks. The adequacy of the research model was evaluated by looking at the discriminant value,

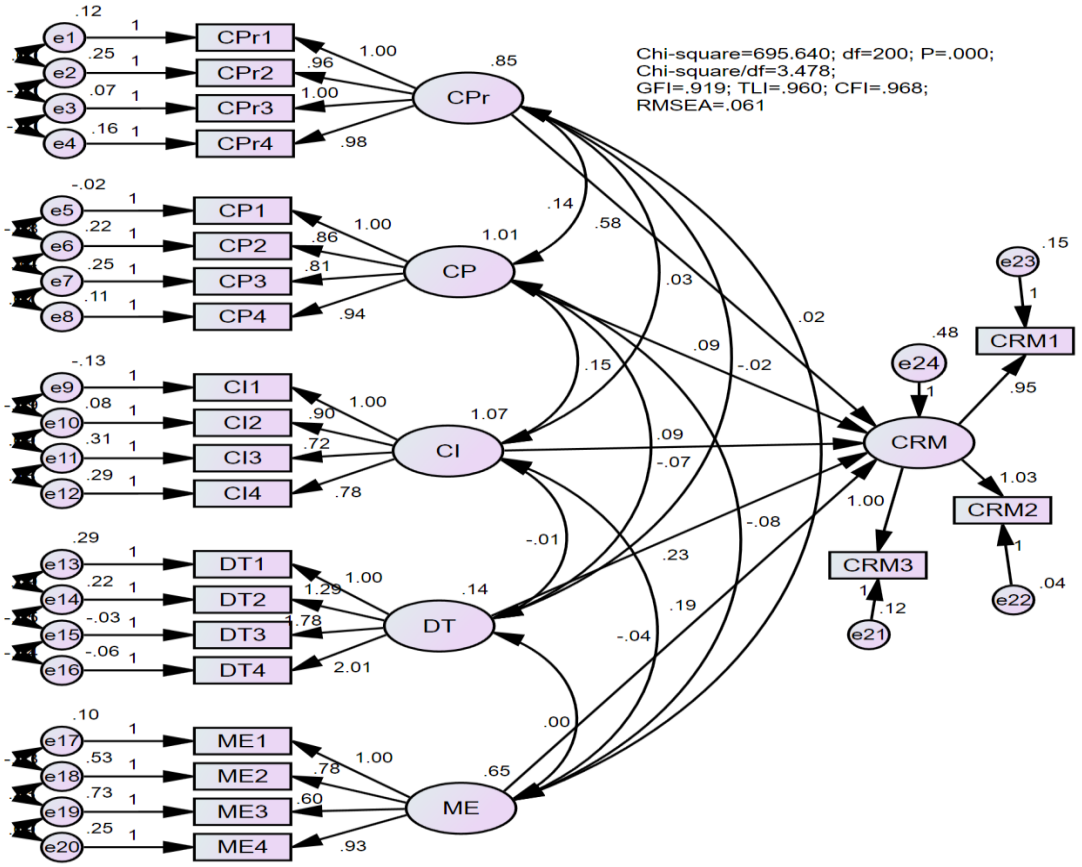
convergence value index, and reliability of the scale system used in this study. The study model agrees with the survey data, as shown by the results. At the same time, the following analysis may make good use of the concepts.



Source: The data processed by SPSS 20.0 and Amos

Figure 2: ***The confirmatory factor analysis for five factors influencing credit risk management***

Figure 2 showed that the confirmatory factor analysis (CFA) is a test used to perform the following purposes: the author had evaluated the overall fit of the data based on model fit indices such as Chi-square/df = 4.885 (< 5.0), CFI = 0.949 (> 0.9), TLI = 0.937 (> 0.9), GFI = 0.892 (> 0.85), RMSEA = 0.076 (< 0.08). Figure 2 also evaluated the observed variables' quality, confirming factor structures. If EFA is responsible for discovering the factor structure from a set of observed variables and assuming it is unknown which variables are in the same scale (a common factor), then CFA is quite different. The observed variables included in the CFA analysis are assumed to have been determined which observed variables belong to which scale, and the function of CFA at this time is to evaluate whether the observed variables within that scale are appropriate; CFA can perform the quantitative part according to Cronbach's Alpha, SEM procedures as applicable.



Source: The data processed by SPSS 20.0 and Amos

Figure 3: ***Testing critical factors influencing credit risk management at commercial banks***

Figure 3 showed that testing critical factors affecting the credit risk management at commercial banks with the following results: (1) Evaluate the overall fit of the data based on model fit indices such as Chi-square/df = 3.478 (< 5.0), CFI = 0.968 (> 0.9), TLI = 0.960 (> 0.9), GFI = 0.919 (> 0.85), RMSEA = 0.061 (< 0.08). (2) figure 3 tested five factors affecting credit risk management at commercial banks in Vietnam, with a significance level of 0.01.

Table 2: ***Testing five factors influencing credit risk management***

Relationships			Standardized estimate	S.E	C.R	P	Result
CRM	<---	CPr	0.589	0.033	17.634	***	Accepted H4
CRM	<---	CP	0.102	0.028	3.267	0.001	Accepted H1
CRM	<---	CI	0.106	0.028	3.393	***	Accepted H3
CRM	<---	DT	0.096	0.062	3.754	***	Accepted H5
CRM	<---	ME	0.165	0.040	4.666	***	Accepted H2

*Note: *** is significance 0.01; Source: Data processed from SPSS 20.0, Amos*

Table 2 displays the five characteristics that have an impact on credit risk management of commercial banks in Vietnam. These factors have been shown to be statistically significant at a level of 0.01. The article's main contribution is in identifying the credit process (CPr) that has the greatest influence on credit risk management of commercial banks in Vietnam. This influence is quantified by a standardized estimate of 0.589. This is the most influential factor and also the priority for policy implementation. With such important implications, the bank credit process contributes significantly to the sustainable development of the financial industry. It enables customers to better understand the loan process and monitor their financial situation

conveniently. At the same time, this process also ensures that financial activities are carried out in the correct order, helping to limit unnecessary risks and protect the interests of both banks and customers.

Table 3: ***Testing average variance extracted for factors affecting the credit risk management at commercial banks***

Indicators	CR	AVE	MSV	Results
CPr	0.937	0.665	0.071	Good
CP	0.942	0.876	0.363	Good
CI	0.938	0.889	0.042	Good
DT	0.929	0.865	0.075	Good
ME	0.939	0.824	0.024	Good
CRM	0.895	0.661	0.303	Good

Source: Data processed from SPSS 20.0, Amos

Table 3 demonstrates that all CR results are above the threshold of 0.8, indicating that the overall dependability of this scale is satisfactory and acceptable. All AVE values are more than 0.5. In order to guarantee the convergence of the scales, the Average Variance Extracted (AVE) must be equal to or greater than 0.5. The results of the CFA analysis indicate that the AVE values for the factors fall within the range of 0.661 to 0.889, so meeting the convergence condition. Additionally, the maximum shared variance (MSV) is lower than the EVA, ensuring discriminant validity.

Table 4: ***Testing Bootstrap 50.000 samples for factors affecting the credit risk management***

Parameter			SE	SE-SE	Mean	Bias	SE-Bias	CR	Results
CRM	<---	CPr	0.041	0.001	0.580	0.002	0.003	0.667	Good
CRM	<---	CP	0.030	0.001	0.049	0.001	0.001	1.000	Good
CRM	<---	CI	0.029	0.001	0.090	0.004	0.003	1.333	Good
CRM	<---	DT	0.057	0.001	0.021	0.005	0.004	1.250	Good
CRM	<---	ME	0.054	0.001	0.076	0.002	0.003	0.667	Good

Source: Author collected and processed from SPSS 20.0, Amos

Table 4 displays the results of conducting a Bootstrap test with a sample size of 50,000 to analyse the factors that influence credit risk management of commercial banks in Vietnam. The test was conducted at a significance level of 0.01. The Bootstrap approach was performed using 50,000 repeated instances, denoted as population (N). The mean of estimates from N samples tends to roughly resemble the population estimate. The greater the proximity between the mean derived using Bootstrap and the model estimate obtained from the original sample, the higher our confidence in the reliability of the model estimations.

Discussion of Findings

Credit risk management is an administrator's process that includes identifying and assessing the level of potential risks that the bank faces. At the same time, appropriate measures and tools must be selected and implemented to deal with risks in the credit activities of commercial banks. In addition, the credit risk management process includes tasks that any bank must perform in business management activities and needs to identify factors affecting credit risk management as follows: Based on SEM testing, five key factors affected credit risk

management at commercial banks, with sig. 0.01. Five components need to be considered: (1) credit policy, (2) macro environment, (3) credit information, (4) credit process, and (5) digital technology, which includes the following discussions synchronously implemented:

Firstly, credit policy: This factor affects the credit risk management at commercial banks at a significance level of 0.01 in Table 2; there are the same results of studies (Gaganis et al., 2021; Kozarevic et al., 2013). Therefore, The banking industry needs to improve mechanisms and policies, especially credit policies, to encourage private economic development. Bank credit capital promotes the development of production and business and service activities of private enterprises, including enterprises with foreign direct investment, joint venture enterprises, and joint stock companies. Sections, households, individuals, and cooperative groups in all fields and professions. Credit institutions need to shift credit capital to safe and practical areas for the economy, directing loan capital to priority areas according to the State Bank's operating orientation and the Government's policy, increasing the proportion of private economic loans. Credit institutions still need to continue to focus capital on production and priority areas, efficient projects, in-depth investment projects, and application of science and technology to produce Vietnamese brand products that are competitive in regional and world markets; enterprises producing along the value chain, applying high technology in agricultural production, clean agricultural production, startups, small and medium enterprises.

Secondly, macro environment: This factor affects the credit risk management at commercial banks at a significance level of 0.01 in Table 2, the same as the results of previous studies (Masood et al., 2012; Rwayitare et al., 2016). Therefore, the Government needs to be ready with plans to effectively respond to fluctuations, helping the country's economy to firmly overcome solid waves and winds. The Government continues to build an independent, self-reliant economy, promoting the spirit of self-reliance, self-reliance, and self-development from the hands of the mind, the sky, and the sea, without passively relying on others to strive to best complete the set goals and tasks. The Government needs to continue to restructure debt repayment terms, waive and reduce loan interest rates, and maintain the same debt group for customers affected by the COVID-19 pandemic, closely monitoring economic developments and the money market. Currency needs to have appropriate solutions to support businesses and people while ensuring the safe operation of the credit institutions system. Continue to research and consider reducing electricity and water bills for businesses and people. Continue to implement preferential credit policies to support disadvantaged groups. In addition, the Government needs to operate monetary policy tools synchronously and flexibly and closely coordinate with fiscal policy and other macroeconomic policies to support the recovery and development process actively. Socio-economic development should not be subjective with inflation risks, maintain macroeconomic stability, and ensure the safety of the credit institution system. Closely monitor macro indicators to have timely solutions to ensure macroeconomic stability and significant balances, with particular attention to indicators on inflation and bad debt; strive to increase revenue, save expenses, and reduce overspending to achieve targets in the National Financial Plan.

Thirdly, credit information: This factor affects the credit risk management at commercial banks with a significance level of 0.01 in Table 2, and the same results as previous studies (Henseler et al., 2016; Antunes et al., 2021). Therefore, banks need to establish an internal credit information processing department that is responsible for synthesizing and storing information from all customers' branches to help departments have timely and straightforward information. The credit information synthesis department is built and arranged at the Head Office and in each operating area throughout the country. Needs to be provided from many reliable sources and continuously updated periodically, promptly responding to the review of the performance of the loan portfolio, especially information about the customer's financial situation, to avoid outdated information. Banks need to pay more attention to credit

information. This is an essential factor that directly affects the credit appraisal, thereby making the decision to lend to the right target and the loan value following the customer's financial and business capacity. Timely, accurate, and complete credit information contributes to minimizing credit risks for banks. The need to improve the professional qualifications and capacity of credit appraisal staff is one of the critical factors that directly affect the quality of appraisal and credit analysis of the bank that owns the employees. In addition, mechanisms, policies, and regulations of the State change frequently, so banks must increase training and dissemination of new rules, improve professional qualifications, and keep up and update development trends in the banking sector in particular and the economy, in general, is an urgent and severe requirement.

Fourthly, credit process: This factor affects credit risk management at commercial banks with a significance level of 0.01 in Table 2, and the same results have been reported (Masood et al., 2012; Gaganis et al., 2021). Therefore, Financial institutions must establish a rigorous credit approval procedure, using measures to effectively manage credit risk as soon as it arises. While there may be variations across banks, the credit process is fundamentally uniform and has been meticulously developed by banks. It encompasses several distinct procedures that are interconnected, interdependent, and subject to mutual oversight. During the credit appraisal/analysis stage, banks primarily concentrate on evaluating the borrower's operational condition, enhancing the quality of loan and project investment appraisal, and carefully analyzing project efficiency and factors that may impact it in order to assess loan risks. Conduct credit assessments effectively and collaborate seamlessly with internal control to verify information. Developing and implementing an internal credit rating system to assess the risks associated with credit transactions: Banks often organize their internal credit rating systems into distinct categories for three main client groups: Corporate customers (comprising established businesses, newly formed organizations, and future enterprises), individual/business customers, and financial institution customers.

Finally, digital technology: This factor affects the credit risk management at commercial banks at a significance level of 0.01 in Table 2, and the same results have been reported (Colesnic et al., 2020; Elamer et al., 2020). Therefore, applying information technology to support risk management in the process of deploying credit and other services of commercial banks, such as upgrading, developing, and perfecting the credit information system, creating easy access and use for all subjects, through this system and some other related information systems, housing management agencies countries can forecast potential risks for the supply and demand sides when participating in providing and using financial services, and promptly promulgate legal regulations to limit possible risks happens to participants in financial services. Develop and deliver information systems for monitoring, analysis, and risk assessment for people, businesses, and state management agencies to serve the purposes of management, supervision, and evaluation of risks from which people, businesses, and service providers can make reasonable decisions when choosing to provide and use services, and through that, state agencies can issue have appropriate policies for the market.

Conclusion and Recommendations

In the current economic situation and increasingly entering a more profound and comprehensive integration stage, the banking business is always an area containing many risks, especially credit risks. The problem is how to limit risks to an acceptable level. This reality requires commercial banks to improve their credit risk management capacity. The study results clearly indicated five factors that affect credit risk management at commercial banks with sig. 0.01. Descriptive statistical tools were used to measure the mean value, standard deviation, and structural equation modeling. Moreover, five factors: (1) credit policy, (2) macro environment, (3) credit information, (4) credit process and (5) digital technology. Therefore, evaluating and measuring credit risk management is necessary for banks' survival and development. Credit

risk management is crucial to the bank's governance, operations, and development. Effective risk management minimises credit risk - an essential activity in Vietnamese commercial banks. This study is beneficial in both theory and practice in credit risk management at commercial banks and today, ensuring profits and enhancing banks' reputation and operational capacity. The article's novelty is finding out the credit process (CPr) that has the most substantial impact on credit risk management at commercial banks in Vietnam, with a standardized estimate of 0.589. This is the most influential factor and also the priority for policy implementation. Based on the research results, to cope with the above-standardized estimate, it is necessary to implement five recommendations synchronously:

First, improve the credit process: The bank credit process is fundamental in ensuring financial activity transparency, safety, and efficiency. Below are significant meanings of the banking credit process: (i) Building and perfecting the process: The credit process helps identify and establish specific steps to manage and carry out credit transactions. Thanks to this process, banks can easily manage, detect, and improve weaknesses in the credit process. This means increased transparency, clarity, and customer trust. (ii) Improve efficiency and reduce risks: Implementing credit processes helps banks improve service quality and, at the same time, minimize credit risks. When loan operations are performed according to predetermined steps, employees and management can follow the process and limit the occurrence of unwanted problems. (iii) Delineate and manage responsibilities: The bank credit process helps clearly define and manage the responsibilities and tasks of each employee in the organization. This helps build a basis for establishing loan documents and procedures suitable for each individual. These procedures need to provide all necessary information and not waste customers' time. (iv) Linkage and relationship management: The credit process determines the relationship between related departments in financial activities. When a risk or error occurs, this procedure provides guidance on how to proceed based on operational procedures. This ensures transparency and accountability in the incident resolution process.

Secondly, the macro environment can be improved: The Government continues to accompany market actors, people, and businesses. The Government needs to continue stabilizing the macro economy, creating a favorable environment for the recovery and development of Vietnam's economy and the banking industry. The government determines that the difficulties and problems of people and businesses are also difficulties and problems of the Government and are tasks that the government, ministries, and branches must focus on solving. The government considers the success of people and businesses to be the success of the Government. Every penny of the people's tax money must be brought to the correct address at the right time and used effectively so that every person and every business can enjoy the results they create. The government, at all levels, sectors, and localities, will regularly contact and grasp the thoughts and aspirations of companies and people. Continue to focus on removing difficulties, reforming administrative procedures, improving the investment and business environment, and creating the most favorable conditions for domestic businesses to develop and attract foreign investment capital.

Thirdly, improve credit information: Continue building and developing a modern credit information system, an essential pillar of the national financial infrastructure. Besides, commercial banks need to continue to increase the implementation of solutions to improve system performance, enhance security and safety measures, protect data, and ensure the operation of the credit information system smoothly, meeting the requirements of regular and continuous exploitation and use of credit information of the State Bank, credit institutions and customers. Continue to innovate and improve information supply channels, and continue to review and improve the quality of products and services to meet the needs of credit institutions in exploiting and using credit information.

Fourthly, improve credit policy: Promote measures to enhance the quality of credit and limit newly arising bad debts of commercial banks. Besides, strengthen inspection and control

of credit granting activities and credit quality for potentially high-risk fields with attention paid to consumer lending activities, credit given to the real estate sector, especially granting credit for real estate investment and business, investing in unlisted corporate bonds. Note the level of credit concentration on large customers/customers and related persons, related customer groups, shareholders, and related persons. Continue to improve the quality of credit appraisal, valuation of collateral assets, and inspection of loan use, especially credit granting to potentially risky areas for early detection and timely handling of risk problems and violations, contributing to ensuring the safety of banking operations.

Finally, improve digital technology: Commercial banks continue applying data mining technology to enhance the quality of reporting to serve the Board of Directors and SBV units in provincial and city branches' management, administration, and payment. Bank investigation and supervision. Implement information technology projects, with the focus being on investment projects to build core business application systems. Besides, commercial banks need to develop innovative thinking and make risk management the default, and throughout, digitizing risk management must be identified as a strategic goal; banks need to boldly move from experimental groups on cloud platforms, analytics, automation, and artificial intelligence (AI) to a core, proactive strategy that serves the overall development of risk management.

Limitations and future research: Credit risk management is influenced by many factors, but the author only focused on 5 factors in this study. In the following research, it is necessary to explore many other factors to see a general picture of factors affecting credit risk management for commercial banks in Vietnam. In addition, the research sample was also selected using the convenience sampling method, combining surveys of customers and many other subjects, such as bank managers and employees.

References

Abdelaziz, H., Rim, B., & Helmi, H. (2022). The interactional relationships between credit risk, liquidity risk, and bank profitability in MENA region. *Global Business Review*, *23*(3), 561-583. https://doi.org/10.1177/0972150919879304.

Abdulla, H., & Elshandidy, T. (2023). Do governance factors affect the effectiveness of risk management disclosure in UAE banks?. *Cogent Business & Management*, *10*(2), 1-28. https://doi.org/10.1080/23311975.2023.2238394.

Antunes, J., Hadi-Vencheh, A., Jamshidi, A., Tan, Y., & Wanke, P. (2021). Bank efficiency estimation in China: DEA-RENNA approach. *Annals of Operations Research*, *5*(1), 1-19. https://doi.org/10.1007/s10479-021-04111-2.

Asllanaj, R. (2018). Does credit risk management affect the financial performance of commercial banks in Kosovo?. *International Journal of Finance & Banking Studies*, *7*(2), 49-57. https://doi.org/10.20525/ijfbs.v7i2.902.

Bussmann, N., Giudici, P., Marinelli, D., & Papenbrock, J. (2020). Explainable AI in Fintech risk management. *Frontiers in Artificial Intelligence*, *3*(26), 1-5. https://doi.org/10.3389/frai.2020.00026.

Colesnic, O., Kounetas, K., & Michael, P. (2020). Estimating risk efficiency in Middle East banks before and after the crisis: A met frontier framework. *Global Finance Journal*, 46, 100484. https://doi.org/10.1016/j.gfj.2019.100484.

Elamer, A. A., Ntim, C. G., & Abdou, H. A. (2020). Islamic governance, national governance, and bank risk management and disclosure in MENA countries. *Business & Society*, *59*(5), 914-955. https://doi.org/10.1177/0007650317746108.

Facchinetti, S., Giudici, P., & Osmetti, S. (2020). Cyber risk measurement with ordinal data. *Statistical methods and applications*, *29*(1), 173-185. https://doi.org/10.1007/s10260-019-00470-0.

Ferreira, C. (2021). The efficiency of european banks in the aftermath of the financial crisis: a

panel stochastic frontier approach. *Journal of Economic Integration*, *36*(1), 103-124. https://doi.org/10.11130/jei.2021.36.1.103.

Gaganis, C., Galariotis, E., Pasiouras, F., & Staikouras, C. (2021). Macroprudential regulations and bank profit efficiency: International evidence. *Journal of Regulatory Economics*, *59*(2), 136-160. https://doi.org/10.1007/s11149-021-09424-5.

Giudici, P., Hadji-Misheva, B., & Spelta, A. (2020). Network based credit risk models. *Quality Engineering*, *32*(2), 199-211. https://doi.org/10.1080/08982112.2019.1655159.

Grassa, R., Moumen, N., & Hussainey, K. (2021). What drives risk disclosure in Islamic and conventional banks? An international comparison. *International Journal of Finance & Economics*, *26*(4), 6338-6361. https://doi.org/10.1002/ijfe.2122.

Hair, J., Anderson, R., Tatham, R., & Black, W. (2018). *Multivariate data analysis*. US: Prentice-Hall: Upper Saddle River, NJ, USA.

Hassan, M. K., Khan, A., & Paltrinieri, A. (2019). Liquidity risk, credit risk and stability in Islamic and conventional banks. *Research in International Business and Finance*, 48, 17-31. https://doi.org/10.1016/j.ribaf.2018.10.006.

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, *43*(1), 115-135. https://doi.org/10.1007/s11747-014-0403-8.

Henseler, J., Ringle, C. M., & Sarstedt, M. (2016). Testing measurement invariance of composites using partial least squares. *International Marketing Review*, *4*(1), 23-34. https://doi.org/10.1108/IMR-09-2014-0304.

Hu, S., & Zhang, Y. (2021). Covid-19 pandemic and firm performance: Cross-country evidence. *International Review of Economics & Finance*, 74, 365-372. https://doi.org/10.1016/j.iref.2021.03.016.

Hussain, H. A., & Al-Ajmi, J. (2012). Risk management practices of conventional and Islamic banks in Bahrain. *Journal of Risk Finance*, *13*(3), 215-239. https://doi.org/10.1108/15265941211229244.

Khalid, S., & Amjad, S. (2012). Risk management practices in Islamic banks of Pakistan. *Journal of Risk Finance*, *13*(2), 148-159. https://doi.org/10.1108/15265941211203198.

Koulafetis, P. (2017). *Modern credit risk management: Theory and practice*. Springer,

Kozarevic, E., Nuhanovic, S., & Nurikic, M. B. (2013). Comparative analysis of risk management in Conventional and Islamic Banks: the case of Bosnia and Herzegovina. *International Business Research*, *6*(5), 180-193. https://doi.org/10.5539/ibr.v6n5p180.

Masood, O., Al Suwaidi, H., & Darshini Pun Thapa, P. (2012). Credit risk management: A case differentiated Islamic and non-Islamic banks in UAE. *Qualitative Research in Financial Markets*, *4*(2/3), 197-205. https://doi.org/10.1108/17554171211252529.

Rehman, Z. U., Muhammad, N., Sarwar, B., & Raz, M. A. (2019). Impact of risk management strategies on the credit risk faced by commercial banks of Balochistan. *Financial Innovation*, *5*(1), 44-54. https://doi.org/10.1186/s40854-019-0159-8.

Rwayitare, J. B., Shukla, J., & Ruhara, C. (2016). Credit risk and commercial bank profitability in Rwanda. *International Journal of Advanced Research*, *4*(9), 294-325. https://doi.org/10.21474/IJAR01/1482.

Shafique, O., Hussain, N., & Hassan, M. T. (2013). Differences in the risk management practices of Islamic versus conventional financial institutions in Pakistan: An empirical study. *The Journal of Risk Finance*, *14*(2), 179-196. https://doi.org/10.1108/15265941311301206.

Williams, R., Bertsch, B., Dale, B., Van Der Wiele, T., Van Iwaarden, J., Smith, M., & Visser, R. (2006). Quality and risk management: what are the key issues? *The TQM Magazine*, *18*(1), 67-86. https://doi.org/10.1108/09544780610637703.