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FACTORS AFFECTING THE ADOPTION OF BLOCKCHAIN TECHNOLOGY IN THE BANKING SECTOR IN VIETNAM

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ABSTRACT

This study aims to identify and measure the impact of factors influencing the adoption of Blockchain technology in Vietnamese commercial banks amidst the rapid digital transformation. The research model is developed based on an integration of the Technology Acceptance Model (TAM) and specific characteristics of the financial industry. A quantitative research method was employed, using data collected from a survey of 199 respondents, including officers, employees, and interns working in the banking sector. Regression analysis results indicate that four key factors significantly influence the intention to use Blockchain: (1) Legal Framework, (2) Application Risks, (3) Technical Proficiency, and (4) Technology. Among these, the Legal Framework is the most significant driver, while Application Risks (pertaining to security and costs) represent the primary barrier. Based on these findings, the study proposes managerial implications for banks and policy recommendations for establishing a regulatory sandbox to facilitate effective Blockchain implementation in Vietnam.

KEYWORDS: Blockchain, Banking, Digital transformation, Legal framework, Vietnam.

1.0 INTRODUCTION

In the midst of the ongoing Fourth Industrial Revolution (Industry 4.0), Blockchain technology has emerged as a disruptive solution with the potential to transform the operational dynamics of numerous sectors, particularly the banking industry. Characterized by its transparency, security, and the ability to automate complex processes, Blockchain promises significant advancements that contribute to enhancing management efficiency and financial services.

In Vietnam, the adoption of Blockchain within the banking sector has not yet been widespread, despite its immense potential and its recognition as a sophisticated upgrade across various fields.

Naturally, the implementation of a new technological frontier inevitably encounters specific hurdles and challenges, ranging from public perception and technical infrastructure to legal frameworks and implementation costs. Furthermore, existing research on Blockchain has predominantly focused on its technical aspects, while the factors influencing its practical deployment within the banking environment remain under-explored.

Therefore, the research topic "A Study on Factors Affecting the Adoption of Blockchain in the Banking Sector" was selected to clarify the influencing elements and propose solutions for the effective and sustainable application of Blockchain. The findings of this study aim to contribute not only to the theoretical expansion of Blockchain knowledge but also to provide practical significance. It serves as a strategic guide for banks in developing technological frameworks that align with contemporary developmental trends.

Moreover, this research may contribute to a reference database for regulatory bodies in establishing appropriate legal frameworks, thereby creating favorable conditions for Blockchain to flourish and contribute positively to socio-economic development, specifically within the Vietnamese banking landscape.

The general objective of this research is to provide remarks, assessments, and practical recommendations for banks when evaluating the impact of factors influencing the adoption of Blockchain (Fintech). To achieve this, the study focuses on identifying specific factors affecting the implementation of Blockchain within the Vietnamese banking sector while providing a detailed assessment of the magnitude and direction of each factor's impact. Based on the analytical results, the research proposes tailored solutions and observations to support Vietnamese banks in optimizing the application of Blockchain technology in their banking operations.

2.0 LITERATURE REVIEW AND HYPOTHESES

2.1 Theorical Framework

2.1.1 Theory of Financial Technology

Financial technology, or Fintech, is a combination of “finance” and “technology.” Thanks to the application of advanced technology, financial services have become more flexible, convenient, and suitable for companies and individuals in sectors such as banking, lending, payments, crowd funding, and investment. Fintech also encompasses aspects such as blockchain, big data, and the cryptocurrency Bitcoin. This is a new field that focuses on using technology to create new products or improve the efficiency of existing products and services in the financial sector. This helps to better serve market demands as well as contribute to economic development.

Financial technology activities are closely linked to the emergence and application of blockchain technology, artificial intelligence (AI), data visualization, big data analytics, and more. These tools play an important role in innovating the financial services industry. When studying Fintech, you will be trained in fundamental knowledge of economics, banking, and finance, along with natural and social science knowledge in the digital era. Additionally, you will learn about technology, data science, computer science, and applied statistics in the field of finance. Typical subjects in the Fintech major include: AI Applications in Fintech, Financial Big Data Applications, Financial

Software Applications, and Object-Oriented Programming in Python, Data Visualization, Digital Banking, Fintech Application Projects, and more.

2.1.2 Diffusion of Innovations Theory

Diffusion of Innovations theory, abbreviated as DOI, is a hypothesis that outlines how new technologies and other advancements spread throughout society and culture, from product introduction to adoption and use. The Diffusion of Innovations theory seeks to explain how and why new ideas and practices are adopted, with timelines capable of spreading over long periods. The manner in which innovations are communicated to different parts of society and the subjective opinions associated with the innovation are critical factors in how quickly diffusion (or spread) occurs. This is vital for understanding market share development.

Rogers categorizes adopters of innovation into five main groups. The Innovators, accounting for 2.5%, are the first to test an innovation, tending to be adventurous and risk-tolerant. Early Adopters, accounting for 13.5%, often lead trends and have a significant influence on community decisions. Next is the Early Majority at 34%, who are cautious but willing to adopt once an innovation has been proven. The Late Majority, also accounting for 34%, are typically skeptical and only join in when the majority of others have already accepted it. Finally, the Laggards, accounting for 16%, tend to cling to tradition and are less likely to accept change.

The speed at which an innovation is adopted depends on many factors. Rogers points out that innovations with substantial relative advantages, compatibility with social values, low complexity, ease of trial ability, and observability of results will likely be adopted faster. This theory has been widely applied in many fields such as marketing, education, healthcare, and technology. However, it also has limitations, such as the assumption that every innovation brings benefits and the failure to fully consider cultural or political factors. Nevertheless, it remains a useful tool for understanding and promoting the implementation of innovative initiatives.

2.1.3 Risk Management Theory

Risk management is the identification, analysis, and prevention of unwanted risks to minimize their negative impacts and increase the ability to seize opportunities. In other words, risk management is a system for handling risks before they become direct harms affecting the enterprise.

Risk management is a complex process that requires the cooperation of many stakeholders within the organization. Participation and commitment from all levels and departments in the enterprise are essential to achieve effectiveness in risk management.

2.1.4 Consumer Behavior Theory

Consumer Behavior is a collection of reactions, actions, and thoughts of customers throughout the process of purchasing and using a company's products/services. It includes stages from need recognition, information searching, evaluation, purchase decision, to post-purchase behavior.

When understanding customers, businesses can implement activities to improve product quality, optimize business strategies, or Marketing strategies to attract customers. At the same time, this effectively increases conversion rates and sales revenue.

Consumer behavior is always complex, flexible, and influenced by many internal and external factors such as psychology, culture, society, family, etc. Therefore, businesses need to research thoroughly to capture their preferences, needs, and habits to build appropriate strategies, stimulating the demand for purchasing and using products/services.

2.1.5 Technology Acceptance Model

The Technology Acceptance Model (TAM) is a theoretical model of technology usage behavior, introduced by Fred Davis in 1986. This model explains how users evaluate and use new technology. According to TAM, a user's technology usage behavior depends on two main factors:

- Perceived usefulness: This is the degree to which a person believes that using a particular technology would enhance his or her job performance or meet their needs.
- Perceived ease of use: This is the degree to which a person believes that using a particular technology would be free of effort and uncomplicated.

According to TAM, if users believe that technology will bring value to their work or needs and that using the technology is easy, they will tend to use that technology. TAM also shows that external factors such as prior knowledge, peer support, personal psychology, experience, and individual characteristics can influence the technology usage behavior of users. The TAM model has been widely applied in research on technology use and is considered one of the effective theoretical models to explain the technology usage behavior of users. Many studies have supplemented and expanded the TAM model to explain other factors and apply it to many different fields.

2.2 Research model and hypotheses

According to Gangwar et al. (2014) and Taherdoost (2018), TAM is one of the most widely accepted and utilized models for technology adoption. They explain that TAM attributes user adoption motivation to three factors: Perceived Usefulness (PU), Perceived Ease of Use (PEOU), and Attitude toward using (A), and sometimes includes a fourth factor: external variables.

Due to its core components, TAM has a strong ability to explain the differences in technology adoption, particularly based on the user's Behavioral Intention (BI), especially in the context of job-related technologies (Gangwar et al., 2014).However, Bagozzi (2007), one of the authors of the TAM model, points out that this model is not without its limitations. He argues that the simplicity of this model makes it unable to fit all different technologies, situations, and decision-making subjects. Additionally, TAM lacks a clear theoretical basis for determining the determinants of PU (Perceived Usefulness) and PEOU (Perceived Ease of Use). This model also primarily examines the decision-making process from an individual perspective, ignoring the influence of the group and the surrounding environment. Furthermore, TAM attributes decision-making to emotional factors without considering internal or external regulations.

Although these drawbacks may raise questions about the suitability of TAM, in this study, the TAM model is still considered more appropriate. This is because the research focuses on the banking industry, where banks act as work providers and are managed, rather than customers being the ones who decide to accept or reject technology. From there, combined with a review of relevant studies, the research team proposes a research model as shown in Figure 1, along with the following hypotheses:

- **Hypothesis H1:** Technology has a positive relationship with the application of blockchain in the banking sector.
- **Hypothesis H2:** Technical proficiency has a positive relationship with the application of blockchain in the banking sector in Vietnam.
- **Hypothesis H3:** The legal framework has a positive relationship with the application of blockchain in the banking sector in Vietnam.
- **Hypothesis H4:** Application risk has a negative relationship with the application of blockchain in the banking sector in Vietnam.

3.0 RESEARCH METHODOLOGY

3.1 Data Collection

Primary Data

This refers to raw, unprocessed data collected for the first time directly from the units within the research population through surveys. To evaluate the factors influencing the decision to apply Blockchain in the Vietnamese banking sector, the primary data to be collected consists of the evaluations and perceptions of the survey respondents regarding the research content. Primary data is gathered through a survey questionnaire administered to the survey subjects. The questionnaires are sent to the respondents through indirect methods

Secondary Data

- Data from domestic and foreign theses and research projects: Since the topic investigates the application of the Blockchain model in the Vietnamese banking sector regarding behavioral theories and innovation diffusion theories, the team collected research papers related to these specific issues.
- Data from digital technology journals: To obtain content regarding the factors influencing the application of the Blockchain model in the banking sector in Vietnam.
- Data from survey units: The survey subjects are officers, employees, and interns working at banks; therefore, the collected information sources are directly relevant to the field under study.

3.2 Data Analysis Methods

The research employed a qualitative research method based on literature review: examining previously published articles and research papers. Based on these materials, the team developed a theoretical framework, research model, and observational variables to create the questionnaire.

The research author conducted a survey of bank employees, staff, and interns by sending out questionnaires via an online link. A total of 203 questionnaires were sent out, of which 199 were

accepted and 4 were rejected. The data was then analyzed using SPSS software to assess the impact of various factors on the application of Blockchain models in the banking sector in Vietnam.

Here is the translation into English, maintaining the original structure:
To ensure the reliability and accuracy of research results, the data processing stage plays an extremely important role. Collected survey questionnaires will undergo coding, classification, and appropriate evaluation. It is essential to assess the validity of the data by verifying it based on the representativeness of the sample and the logic of the designed questionnaire; any responses that do not meet the requirements must be excluded from the collected data. This involves checking the completion level of the surveys and ensuring consistency in the answers to guarantee the logic of the responses. Questions in the survey are coded with numbers during the questionnaire development process and are displayed directly on the form. The authors utilize SPSS 20.0 software to analyze the results from the returned survey questionnaires.

Descriptive Statistics of the Sample: Describes the characteristics of the research sample according to predefined identifying criteria such as gender, department/faculty, and year of study.

Frequency Tables: Frequency tables are a simple tool for organizing data and analyzing results based on respondent information. They help arrange data by numerical value, with columns representing indicators presented as percentages.

Research Hypothesis Testing: The study tests the reliability of the scale using the Cronbach's Alpha coefficient, Exploratory Factor Analysis (EFA), and linear regression analysis.

4.0 RESULTS AND DISCUSSION

4.1 Descriptive result

The study was conducted with a survey population consisting of interns, officers, and employees at commercial banks. A total of 203 questionnaires were distributed, of which 199 were valid, representing a response rate of 98.03%. The invalid questionnaires were primarily those with incomplete responses or those where all parameters were answered identically (straight-lining). All such invalid samples were excluded prior to data entry into SPSS. Consequently, the 199 valid questionnaires constituted the final sample for this formal study.

Table 1: Summarize of survey results

Criteria	Frequency	Fraction (%)
Gender		
Male	96	48.2
Female	103	51,8
Working place		
Joint Stock Commercial Bank for Investment and Development of Vietnam	51	25.6
Vietnam Joint Stock Commercial Bank for Industry and Trade	40	20.1
Vietnam Technological and Commercial Joint Stock	25	12.5

Bank		
Joint Stock Commercial Bank for Foreign Trade of Vietnam	33	16.6
Military Commercial Joint Stock Bank	37	18.6
Tien Phong Commercial Joint Stock Bank	13	6.6
Job		
Bank employees	130	65,3
Intern	69	34,7

Source: Author's survey analysis

The research results show that the number of female interns, officers, and employees participating in the survey is higher than that of male interns, officers, and employees, specifically 51.8% female interns, officers, and employees compared to 48.2% male interns, officers, and employees. This is not surprising, given that according to a recent study by IFC in collaboration with the State Bank of Vietnam, women account for 68% of the total workforce at the banks surveyed. Interns, officers, and employees at BIDV and Vietin Bank account for 25.6% and 20.1% respectively, ranking first and second in the survey. Interns, officers, and employees at MBBANK accounted for 18.6%, at Vietcom bank 16.6%, Techcom bank 12.5%, and TP Bank the smallest at 6.6%. The survey included participants from 7 out of 30 domestic commercial banks. These are the large banks with the largest number of officers, employees, and interns in Vietnam. The research results show that the majority of survey participants were bank employees (71.9%) and bank intern (34.7%).

4.2 Empirical result

4.2.1 Exploratory Factor Analysis (EFA) Results

With the KMO and Bartlett's test result reaching 0.821 (> 0.5) and a significance level of over 99% (Sig. = .000 < 0.01), it can be concluded that this research dataset is entirely appropriate. Thus, in conjunction with the sample size, the Exploratory Factor Analysis technique is fully applicable to this dataset.

The EFA results reveal that there are four factors with Eigen values (the amount of variance explained by the factor) greater than 1 included in the model. The Cumulative Variance Explained by these four factors reaches 69.226%, satisfying the requirement of being greater than 50%.

The analysis further shows that no variables have a factor loading of less than 0.5; therefore, all 18 observed variables included in the analysis are retained as scales and demonstrate an influence on the decision to apply the Blockchain model among banks in Vietnam.

4.2.2 Linear Regression Analysis Results

The linear regression testing results (Model Summary table) show that the R^2(R Square) value is 0.429, indicating that the research model with four independent variables explains 42.9% of the variance in the dependent variable.

The ANOVA table results show that the F-statistic, calculated from the R Square value of the full model, has a Sig. value (0.000) less than 0.05. This leads to the rejection of the null hypothesis

(H_0)—which assumes that all regression coefficients are equal to zero (except for the constant). This means that at least one independent variable has an influence on the dependent variable. Consequently, the regression model is a good fit for the dataset and is suitable for use.

Table 2: Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	B			Tolerance	VIF
1	(Constant)	.880	.302		3.776	.014		
	CN	.273	.055	.134	1.587	.031	.835	1,885
	TD	.155	.058	.190	4.819	.012	.694	1.183
	RR	.220	.052	-.298	2.231	.000	.701	1.450
	KPL	.289	.054	.284	4.934	.000	.860	1.225

In addition, in the Coefficients table, the VIF (Variance Inflation Factor) values for the independent factors in the model are all low and less than 2 (ranging from 1.225 to 1.885); accordingly, there is no phenomenon of multicollinearity among the independent variables in the model (Nguyễn Đình Thọ, 2011). Consequently, it can be concluded that the four factors exert an influence on the dependent variable.

According to Norusis (1993), the B coefficient indicates the magnitude of the impact of an independent variable on the dependent variable. In other words, it determines the relative importance of the independent variables in percentage terms. Based on the results of the Standardized B coefficients, the level of impact of the factors on the decision to apply the Blockchain model by banks in Vietnam can be determined as shown in the following table:

Table 3: Linear regression results demonstrating the influence of factors on bank' intention to adopt Blockchain Technology

No.	Code	Variable Name	Standardized B	Impact Ranking	Sig.
1	UD	Decision to apply Blockchain model	-	-	-
2	CN	Technology	0.134	4	0.031
3	TD	Technical Proficiency	0.19	3	0.012
4	RR	Application Risk	-0.298	2	.000
5	KPL	Legal Framework	0.284	1	.000

Based on the Standardized β coefficients, there are three factors with a positive impact and one factor with a negative impact on the decision to apply the Blockchain model among banks in Vietnam, including:

- Technology (Positive)
- Technical Proficiency (Positive)
- Application Risk (Negative impact)
- Legal Framework (Positive)

Therefore, the hypotheses H1, H2, H3, and H4 proposed in the theoretical model are all accepted. The regression model regarding the factors influencing the decision to apply the Blockchain model in Vietnamese banks, based on the Standardized β coefficients, is defined as follows:

$$UD = -0.298 \times RR + 0.284 \times KPL + 0.190 \times TD + 0.134 \times CN$$

4.2.3 Hypothesis Testing

Table 4: Summarize of hypothesis testing

Hypothesis	Relationship	Standardized Coefficient (β)	Significance (Sig.)	Testing Result
H1	CN => UD	0.134	0.031	Accepted
H2	TD => UD	0.19	0.012	Accepted
H3	KPL => UD	0.284	0	Accepted
H4	RR => UD	-0.298	0	Accepted

The regression model representing the factors influencing the decision to apply the Blockchain model among banks in Vietnam is formulated as follows:

$$UD = -0.298 \times RR + 0.284 \times KPL + 0.190 \times TD + 0.134 \times CN$$

4.2.4 Comments on the Regression Model

- Hypothesis H1: Technology influences the decision to apply the Blockchain model in Vietnamese banks.

Technology has a significant impact on the decision to apply the Blockchain model in Vietnamese banks. The positive sign of the B coefficient indicates a direct (positive) relationship between these two factors. The regression results show that the Technology (CN) factor has \β = 0.134 and Sig. = 0.031 (< 0.05). This means that, holding other factors constant, a 1-unit increase in CN leads to a 0.134-unit increase in the decision to apply the Blockchain model. The research findings indicate that banks' perception of technology is directly linked to their decision-making regarding Blockchain adoption. Thus, Hypothesis H1 is accepted.

- Hypothesis H2: Technical Proficiency influences the decision to apply the Blockchain model in Vietnamese banks.

Technical Proficiency significantly influences the decision to apply the Blockchain model. The positive B coefficient signifies a direct relationship between Technical Proficiency and the adoption decision. The regression results yield β = 0.190 and Sig. = 0.012 (< 0.05), implying that with other factors remaining unchanged, a 1-unit increase in Technical Proficiency (TD) results in a 0.190-unit increase in the decision to apply the Blockchain model. This suggests that banks' awareness of their technical capabilities is a key factor in their decision to adopt Blockchain. Thus, Hypothesis H2 is accepted.

- Hypothesis H3: Legal Framework impacts the decision to apply the Blockchain model in Vietnamese banks.

The third factor, Legal Framework, impacts the decision to apply the Blockchain model. The positive B coefficient indicates a direct relationship between these two variables. Results show that the Legal Framework (KPL) factor has β = 0.284 and Sig. = 0.000, which is statistically significant at a confidence level of over 90% for the sample. This demonstrates that, ceteris paribus, a 1-unit increase in KPL results in a 0.284-unit increase in the decision to apply the Blockchain model. Thus, Hypothesis H3 is accepted.

- Hypothesis H4: Application Risk influences the decision to apply the Blockchain model in Vietnamese banks.

The Application Risk factor influences the decision to apply the Blockchain model. The negative sign of the B coefficient indicates an inverse (negative) relationship between these two factors. Regression results show that Application Risk (RR) has β = -0.298 and Sig. = 0.000, which is statistically significant at a confidence level of over 90% for the observed sample. This signifies that, with other factors held constant, a 1-unit increase in RR leads to a 0.298-unit decrease in the decision to apply the Blockchain model. Thus, Hypothesis H4 is accepted.

5.0 CONCLUSION AND RECOMMENDATIONS

In this study, several factors contribute significantly to the decision to adopt Blockchain technology in Vietnamese banks, utilizing the Technology Acceptance Model (TAM).

Technology (B = 0.134) and Technical Proficiency (B = 0.190): Inheriting from studies by Phan et al. (2022), Tran Viet Dung et al. (2022), Davis et al. (1989), and others, our findings align with previous works showing a positive correlation between these factors and Blockchain adoption. Individuals evaluate technology based on its ability to support goal achievement and optimize benefits. High performance-enhancing activities are highly valued, while perceived ease of use reduces entry barriers. Conversely, inadequate technical proficiency and infrastructure decrease adoption feasibility. Facilitating conditions, such as IT support and staff training, significantly boost the intention to use Blockchain.

Legal Framework (B = 0.284): Drawing from Wong et al. (2020), Das and Teng (1998), and JPMorgan (2024), this study highlights that a "Legal Framework" positively influences the facilitating conditions and performance expectancy. In Vietnam's developing legal environment, the absence of clear regulatory support diminishes the positive impact of existing facilitating conditions. Without legislative backing, Blockchain remains a lower priority for the government. Furthermore, legal support acts as a positive moderator between Technology/Technical Proficiency and the adoption capacity of banks.

Application Risks (B = -0.298): This factor, inherited from Nguyen Thuy Anh et al. (2024) and Yi-Hsiang Lu et al. (2024), exerts a strong negative influence on adoption decisions. To foster acceptance, banks must clearly identify risks during the experimental phase. Regulatory bodies should collaborate with banks to apply international standards, such as ISO 27001 for information security. Implementing advanced security measures—like data encryption, Multi-Factor Authentication (MFA), and modern information systems—is crucial to enhancing workflow

efficiency, building customer trust, and maximizing Blockchain's benefits. Banks require synchronized and optimized technological infrastructure. It is essential to test various blockchain platforms to select the most suitable model while enhancing scalability to handle large transaction volumes. Technical proficiency is vital. Banks should collaborate with research institutes and universities to provide specialized training. Workshops and advanced courses are necessary to raise awareness of both the potential and challenges of Blockchain.

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