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Fintech and Its Impact on the Operations of Vietnamese Commercial Banks: A SWOT-Based Analysis

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ABSTRACT: *This study employs the SWOT framework to examine the impact of financial technology (Fintech) on Vietnam's commercial banking system. Data are derived from a comprehensive review of existing literature and industry reports in the banking and Fintech sectors. The analysis focuses on key dimensions, including operational efficiency, customer experience, and market competition, highlighting the dynamic interaction between Fintech innovations and traditional banking practices. The findings suggest that Fintech offers significant opportunities for Vietnamese commercial banks to enhance service quality, reduce operational costs, and foster product innovation. However, it also poses notable challenges, including legacy infrastructure, regulatory constraints, and intensified competition from non-bank financial institutions. Key risks include cybersecurity threats and regulatory uncertainty. Moreover, Fintech expansion into traditionally bank-dominated areas, such as payments, fundraising, and asset management, reshapes the competitive landscape and creates both external opportunities and pressures. The study provides managerial insights into how Vietnamese banks can leverage their strengths while addressing structural weaknesses to sustain competitiveness in an evolving financial environment.*

KEY WORD*: Fintech, SWOT analysis, Vietnam, Commercial banking, Operational efficiency*

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I. INTRODUCTION

Today, the Fintech wave is booming and rapidly expanding in the Vietnamese financial market. The Fintech market in Vietnam has seen significant growth in the first nine months of the year, though it still faces several challenges. According to analysts at the financial holding Robocash Group, which expects the Fintech market to reach USD 18 billion by 2024, the Fintech market has grown fourfold since 2016, underscoring its tremendous growth potential. However, with approximately 200 Fintech companies operating by 2024, Vietnam must still catch up to regional counterparts such as Singapore (Robocash Group, 2022).

These technology-based financial services offer numerous benefits to consumers and open new avenues for improving financial accessibility. Fintech can be seen as a product of the 4.0 industrial revolution in finance and banking operations. It has become an indispensable part of banking, and commercial banks (CBs) today face immense competitive pressure in the financial services sector, particularly from non-bank financial institutions. Additionally, Fintech companies and financial service providers continue to expand and develop services targeting traditional banking areas, such as payments, alternative fundraising solutions, and asset management.

The rise of Fintech businesses presents opportunities and potential risks to the banking system's stability while helping CBs identify their strengths and weaknesses. From a macroeconomic perspective, an effective banking system demonstrates profitability and resilience in the face of adverse shocks, thereby contributing to system stability. For policymakers, the sustainability of the commercial banking system (CBS) remains a pressing issue, posing a non-traditional security threat that every nation must confront.

This study aims to assess the impact of Fintech on Vietnam's CBS operations using the SWOT model. The goal is to analyze and identify the internal strengths and weaknesses of the banking system, as well as the external opportunities and threats posed by Fintech's development. Based on this analysis, the study seeks to provide solutions and recommendations, offering information that can assist financial regulators in formulating appropriate policies to ensure the safe and effective development of Fintech in Vietnam, aligned with the growth of the commercial banking sector and the economy.

II. LITERATURE REVIEW

2.1 Definition of Fintech

Fintech (Financial Technology) is a term that emerged in the 1850s and has evolved significantly. With the advent and development of the Fourth Industrial Revolution (Industry 4.0), Fintech has become a topic of growing research interest. It is defined as "the application of advanced technologies to improve and enhance the quality of traditional financial service delivery methods," and its scope has gradually expanded.

According to Arner et al. (2016), "Fintech describes the provision of financial services through innovative technologies designed to disrupt traditional financial business models." Schueffel (2016) defines Fintech as "a new industry applying technology to financial activities to improve efficiency and offer innovative financial services." Gai et al. (2018) describe Fintech as "the application of innovative technologies in financial services to enhance user experience and improve financial operations." These definitions emphasize the role of technology in improving or innovating financial services, thereby distinguishing Fintech from traditional financial models.

The history of Fintech can be divided into several stages, beginning with the early adoption of technology in finance and culminating in the current explosion of Fintech companies. The stages of development are presented in Figure 1:

Figure 1: Key Development Milestones of Fintech

Phase 1:Early Period (1866 - 1967)	**Phase 2: The Rise of Banking Technology (1967 - 2008)**	**Phase 3: The Explosion of Modern Fintech (2008 to present)**	**Phase 4: The Future of Fintech**
Early Financial Technology The Birth of Credit Cards	ATMs and Electronic Banking The Emergence of Electronic Stock Markets The Introduction of Online Banking	Global Financial Crisis and the Growth of Fintech Mobile Payments and Digital Wallets Blockchain and Cryptocurrencies Peer-to-Peer Lending and Crowdfunding Artificial Intelligence (AI) and Big Data Analytics Digital Wallets and Digital Banking	Widespread Applications of Artificial Intelligence (AI)

Source: Compiled by the authors

2.2 The Role of Fintech

Fintech is a transformative force in the financial services industry, leveraging innovative technologies to improve efficiency, accessibility, and user experience. Its applications span diverse domains, including payment systems, lending, wealth management, and insurance. By integrating machine learning, blockchain, and artificial intelligence, fintech has revolutionized traditional financial operations, making them more agile and customer-centric. For instance, digital wallets and mobile payment platforms have democratized access to financial services, particularly in developing regions, thereby advancing financial inclusion (Bazarbash & Beaton, 2020). This capability has bridged the gap for underbanked populations, fostering economic participation and addressing longstanding inequities in the global financial system.

One defining feature of fintech is its ability to enhance financial inclusion, particularly in underserved regions. Digital platforms enable users to bypass traditional banking infrastructure, offering peer-to-peer lending and microfinance services. A study by Sahay et al. (2020) shows that mobile payment platforms, such as M-Pesa in Kenya and similar innovations, have successfully integrated unbanked populations into formal financial ecosystems. Moreover, fintech-driven financial inclusion is closely linked to poverty alleviation and sustainable development, enabling small businesses and individuals to access credit, insurance, and savings tools. These advancements contribute to a more inclusive global economy, underscoring fintech's pivotal role in bridging financial gaps.

The COVID-19 pandemic served as a litmus test for fintech's resilience and adaptability. Lockdown measures and the shift toward remote interactions accelerated the adoption of digital financial services, from contactless payments to remote wealth advisory. Research by Fu and Mishra (2022) indicates that the crisis accelerated the financial sector's digital transformation, with fintech firms outperforming traditional financial institutions in agility and user engagement. Additionally, fintech facilitated economic continuity by enabling businesses to adapt to the rapidly evolving landscape through digital lending platforms and virtual payment gateways. This demonstrated fintech’s critical role in safeguarding economic activity during disruption.

III. RESEARCH METHODOLOGY

The study employs the SWOT model and draws on secondary data from credible sources, including industry reports, academic publications, CBs, FinTech organizations, and specialized websites. The State Bank of Vietnam (SBV) and Statista are key data sources.

The research process consisted of the following steps:

Data Collection: The secondary data collection method included data aggregation, statistical analysis, and evaluation. This approach involved reviewing previously published research on FinTech and its impact on CBs. The collected data were then categorized into internal factors (strengths and weaknesses) and external factors (opportunities and threats) to align with the SWOT framework.

Qualitative Analysis: The research applies the SWOT analysis (Strengths, Weaknesses, Opportunities, Threats) to examine the interactions between FinTech innovations and traditional banking operations.

A SWOT analysis integrates insights from both internal and external environments to inform the strategic development of the entity under analysis (Karaki et al., 2023). As a qualitative analytical method, SWOT analysis examines market dynamics to identify the subject's internal strengths and weaknesses, as well as opportunities and threats in its external environment (Phadermrod, B. et al., 2019).

A SWOT analysis is used to assess the current and future outlook of the FinTech sector, thereby identifying its strengths and weaknesses (Karaki et al., 2023). SWOT analysis has significant potential to identify critical factors influencing FinTech adoption. Moreover, it facilitates the development of actionable strategies to leverage strengths and opportunities while effectively addressing weaknesses and mitigating risks (M. Nilashi et al., 2024).

Synthesis of Results: The findings underscore the interconnected relationship between FinTech and CBs, providing a foundation for developing recommendations and tailored solutions.

A notable limitation of this methodology is its reliance on the accuracy and timeliness of secondary data. Nonetheless, the use of diverse information sources and cross-analysis techniques enhances the reliability of the study's conclusions.

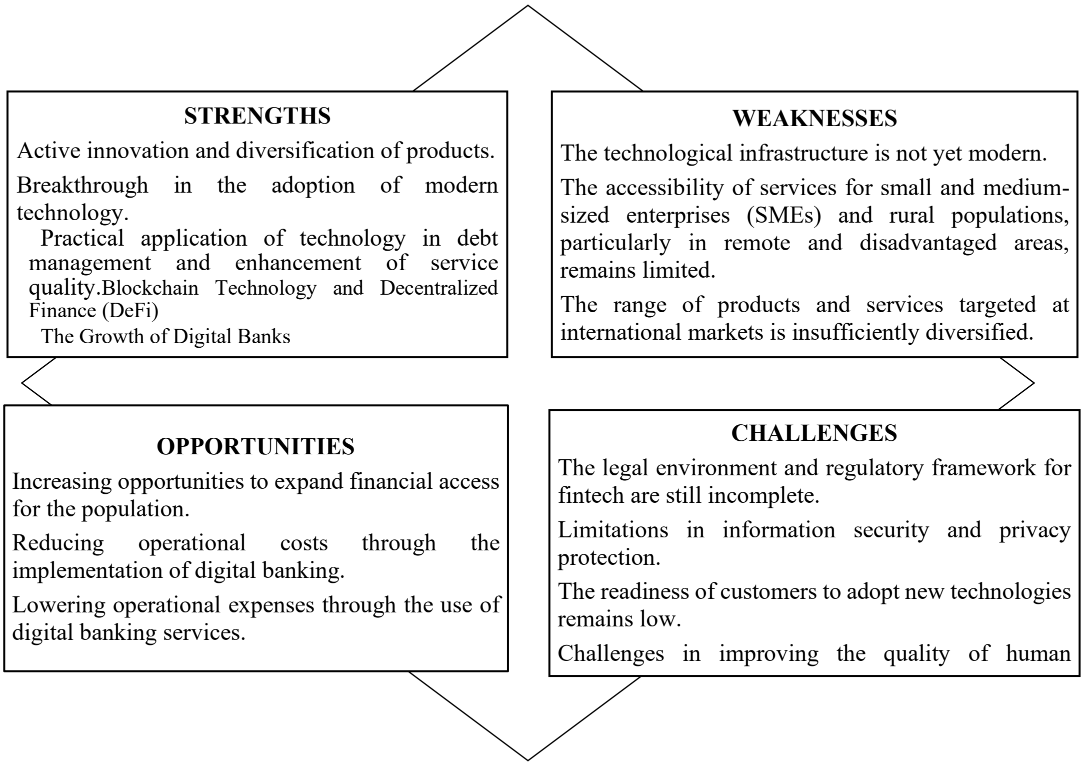
IV. RESULTS AND DISCUSSIONS

The rise of Fintech has profoundly transformed the global financial landscape, presenting both opportunities and challenges for CBs. Fintech enables the creation of innovative financial products and services powered by cutting-edge technologies such as artificial intelligence, blockchain, and big data analytics. These advancements improve operational efficiency, reduce costs, and enhance customer experiences, particularly in digital payments and peer-to-peer lending. However, Fintech growth also disrupts traditional banking models, introducing competitive pressures from agile Fintech startups and non-bank financial institutions. These entities often leverage technological flexibility and regulatory leniency to deliver cost-effective, user-centric solutions, challenging the conventional dominance of banks in financial intermediation (Quỳnh, N. T., & Dung, H. T. K., 2020; Murinde, V. et al., 2022).

The Fintech market in Vietnam is growing rapidly, encompassing mobile payments, peer-to-peer lending, personal financial management, and insurance technology. It is considered one of the most promising markets in the Asia-Pacific region. According to the SBV, the number of Fintech companies in the country has risen from 10 at the end of 2010 to nearly 200 by 2024, with ample room for further growth in the coming years, including the next decade (Statista Market Insights, 2024). This evolution creates significant opportunities by increasing financial inclusion, especially in rural areas and among unbanked populations. Fintech applications such as mobile payment platforms and alternative lending solutions bridge the accessibility gap, fostering economic participation. Nonetheless, this growth brings inherent risks and challenges. Data security and customer privacy are increasingly critical as Fintech platforms accumulate vast amounts of sensitive information. Furthermore, regulatory gaps and the influx of global Fintech players intensify the competitive environment, compelling Vietnamese banks to innovate or collaborate to maintain relevance. The absence of a comprehensive legal framework further exacerbates vulnerabilities, posing systemic risks to the financial sector (Quỳnh, N. T., & Dung, H. T. K., 2020; Hanh Dao et al., 2022).

The aforementioned studies have highlighted that while adapting to technological innovations introduced by traditional CBs, Fintech presents numerous opportunities but also entails significant risks. These risks can undermine the stable development of CBs and erode customer trust in these institutions. In this paper, the SWOT analysis model clearly identifies the strengths, weaknesses, challenges, and opportunities that Fintech enterprises and CBs can leverage or address to improve.

Figure 2: SWOT Model



Source: Compiled by the authors

4.1. Internal Analysis

The strengths and weaknesses of Fintech in shaping the operational dynamics of Vietnamese CBs are primarily contingent on the banks' institutional capacities. These aspects are derived from an internal evaluation of CBs' operational performance in the context of Fintech's impact.

4.1.1. Strengths

Commercial Banks Actively Innovate and Diversify Products: Fintech companies can assist CBs in various ways to improve the delivery of traditional services. For instance, in commercial and consumer lending, new technologies help CBs develop new products and enhance existing ones to meet diverse customer needs. Several CBs in Vietnam have launched credit products to meet diverse customer needs: (i) “A” Bank has introduced flexible consumer loan packages with competitive interest rates and flexible repayment terms, making it easier for customers to access capital for personal and business purposes. (ii) “B” Bank has implemented the “B” Mobile digital banking application, which offers features such as QR payments, instant money transfers, and personal account management, providing greater convenience for customers using banking services. (iii) “C” Bank has partnered with insurance companies to offer life and asset insurance products directly through the bank’s system, while also developing investment products such as open funds and fund certificates, creating additional options for customers in managing personal finances.

C*ommercial Banks Breakthrough in Adopting Modern Technology*: Fintech companies entering the market with technological advantages have forced CBs to actively transform digitally to improve operational efficiency, enhance the customer experience, and compete with Fintech companies. As a result, Vietnamese CBs have made breakthroughs in adopting modern technology through (i) Attracting Tech Talent: “D” Bank has collaborated with top universities and technology firms, such as FPT Software, to recruit and train talent in information technology and data analytics. This collaboration helps the bank develop advanced financial solutions and improve the customer experience. (ii) Innovating Financial Products Through Technology: “E” Bank has developed the "iMSB" (Interactive Mobile Smart Banking) platform, integrating artificial intelligence (AI) to offer automated financial advisory services, helping customers receive investment recommendations and manage personal finances more effectively. (iii) Establishing Research and Development Centers: Some banks, such as “F” Bank, have set up R&D centers specializing in Fintech to research and develop new financial products, such as e-wallets and mobile payment services, to meet growing customer demand. “B” Bank has established innovation centers to research and develop digital banking solutions and personal financial management (PFM) applications.

Commercial Banks Effectively Apply Technology in Debt Management and Service Quality Improvement: (i) According to the 2023 financial report of the SBV, the non-performing loan (NPL) ratio in the commercial banking system has decreased to about 1.5%, down from 2.3% in 2021 (Linh, 2024). This improvement was achieved through stricter risk management and more efficient debt recovery. For example, "D" Bank has maintained an NPL ratio below 1% for several years by adopting modern risk management practices and data analytics. "G" Bank has implemented a big data and AI system to assess customer repayment capacity, thereby reducing risks and improving NPL management efficiency. (ii) Many banks have actively collaborated with Fintech companies to enhance service quality. For instance, "G" Bank has implemented biometric recognition technology in LiveBank transactions, allowing customers to complete transactions without staff assistance. "E" Bank and "H" Bank have partnered with MoMo and MoCa to integrate financial services into the e-wallet platform, expanding cashless payment capabilities. The digital bank Cake by "E" Bank has applied AI and big data analytics to offer unsecured personal loans within minutes.

4.1.2. Weaknesses

The Vietnamese CBS still faces several weaknesses that must be addressed to enhance competitiveness and operational efficiency:

Outdated Technological Infrastructure: Some CBs still rely on outdated core banking systems, resulting in low operational efficiency and difficulty in integrating with modern Fintech platforms. According to a 2022 report by the Vietnam Banking Association, only about 40% of domestic CBs had upgraded to modern core banking systems such as Temenos or Oracle Flexcube, while the majority still relied on legacy systems. Major banks in Vietnam, such as "B" Bank and "H" Bank, have invested heavily in technological infrastructure and deployed advanced solutions, including Artificial Intelligence (AI), Machine Learning (ML), and Big Data analytics, to improve the customer experience. However, smaller banks or regional branches lack the resources to implement these technologies, creating a clear disparity in operational capacity and digital service provision. Many banks have not yet fully deployed digital banking services in rural and remote areas. The lack of stable internet connectivity and outdated technological infrastructure are significant barriers, making it difficult for individuals and businesses in these areas to access services such as mobile payments or online loans.

Limited Access to Services for Small and Medium-sized Enterprises (SMEs) and Rural Populations: (i) Limited Access to Credit for SMEs: SMEs account for over 97% of all businesses in Vietnam, yet most struggle to access credit. A 2021 World Bank study found that only about 30% of SMEs in Vietnam can obtain bank loans, primarily due to a lack of collateral or a transparent credit history. This issue is even more pronounced in rural and remote areas, where economic conditions are challenging and financial resources are limited. (ii) Limited Bank Branch Networks: The number of bank branches and transaction points in rural and remote areas remains limited. According to the SBV, the number of bank branches per 100,000 people in rural areas is significantly lower than in urban areas. This makes it difficult for individuals and businesses in these regions to access financial services, from opening accounts and securing loans to more complex services such as electronic payments or credit guarantees. (iii) Lack of Suitable Financial Products: Current financial products offered by CBs are not well suited to the needs of individuals and businesses in rural areas. For example, loans often require high-value collateral or do not align with agricultural production cycles, making it difficult for people to access capital.

Limited International Service Offerings: (i) Underdeveloped International Financial Derivatives: Derivatives such as swaps, forwards, and options offered by Vietnamese CBs remain simple and fail to meet the complex needs of import-export businesses in managing exchange rate risks. According to SBV statistics, only about 5% of businesses in Vietnam use these financial products, compared with 20-30% in countries with more open economies, such as Singapore or Hong Kong. (ii) Limited Competitive International Payment Services: While some Vietnamese banks have launched cross-border payment services, the range of connectivity remains limited. For example, the payment networks of Vietnamese banks primarily serve traditional markets such as China, South Korea, and Japan, while emerging markets in Africa or South America have not been fully explored.

4.2. External Analysis

External factors include opportunities and threats outside Vietnamese CBs. These factors may be influenced—or at least anticipated—but not fully controlled—by the CBs.

4.2.1. Opportunities

The entry of Fintech companies into the financial and banking markets has brought fresh opportunities for the financial system and the banking sector.

Increased Opportunities to Expand Financial Access for the Public: The explosion of Fintech solutions has significantly impacted the financial and banking sectors, particularly by promoting financial inclusion. Built on information and telecommunications technology and without requiring branch networks or transaction offices, Fintech has attracted a large number of customers, including those in rural, remote, and island areas who lack bank accounts—segments that traditional banks and financial institutions have not targeted. According to the General Statistics Office, about 65% of Vietnam's population, or approximately 65 million people, live in rural, remote, and disadvantaged areas, where access to financial and banking services is limited. CBs' banking branch systems, transaction offices, and ATM networks have very low coverage in these regions. Due to the difficulty of accessing CB services, people in these areas often resort to unregulated, risky alternative payment and remittance channels. Many studies have shown that Fintech is a breakthrough in providing rapid, affordable, and secure access to financial and banking services. For many people living in rural or remote areas, the internet or mobile technology has become the primary communication channel, serving as the simplest way to access financial and banking services. Quality payment and remittance services, with reasonable pricing, developed through new financial technologies, will help those without bank accounts in rural areas gain easier access to financial services, thus contributing to broader financial inclusion and achieving the goal of financial coverage—a key objective for many countries, including Vietnam, to reduce the wealth gap, address social and environmental issues, and promote sustainable economic growth.

Reducing Operational Costs Through Digital Banking: Investments in developing technological solutions to compete with Fintech companies and the shift in how customers access basic financial services from in-person to online channels are transforming the distribution of traditional banking products and services. The growth of online transactions through Internet Banking, Mobile Banking, and social media platforms presents an opportunity for financial institutions to seize by making substantial investments in IT infrastructure and replacing outdated banking systems to attract more customers, especially those living in rural, remote, or underserved areas who face challenges accessing traditional banking services. In the future, the trend is for banks to transition to digital banking, fundamentally changing how they deliver products and services, reducing the number of branches, and gradually shifting their role from transactional services to customer advisory and support, aiming for a "paperless" banking model. This presents an opportunity for banks to restructure their networks of transaction points, thereby reducing physical space, equipment, and personnel costs and increasing the overall competitiveness of the banking system.

Enhancing the Competitiveness of Traditional Financial Institutions: Through innovative technological solutions, Fintech has diversified the financial and banking services available to customers, offering new services that have the potential to replace traditional financial and banking products, with a focus on key areas such as lending, payments, and insurance. Fintech also enhances efficiency across financial services, including advisory, small loans, customer identification, and security. Financial information is also becoming more transparent and detailed through Fintech solutions, driven by the development of Big Data technology and Open API interfaces, which reduce information asymmetry in the financial sector and enable financial institutions to assess and quantify risks more accurately. As a result, traditional financial institutions and banks must evolve, increase investment, innovate in technology, and enhance customer product experiences. They must also adapt their business models and management strategies, which may no longer be suited to the increasingly competitive landscape.

4.2.2. Threats

Incomplete Legal and Regulatory Framework for Fintech: Vietnam lacks a comprehensive, dedicated legal framework for Fintech activities, leading to regulatory confusion. According to a 2023 report by the SBV, Fintech activities in Vietnam are governed solely by general regulations, such as the Banking Law, the Enterprise Law, and State Bank circulars, rather than by dedicated Fintech laws. The Vietnamese government introduced the sandbox mechanism (an experimental environment for Fintech companies) in 2020, but only a few companies have participated, making it challenging to develop and expand new services. For instance, companies offering peer-to-peer (P2P) lending services still lack clear regulations, creating fraud risks and regulatory challenges. Cryptocurrencies and digital assets have not been recognized or regulated in Vietnam, despite being an important area of focus for Fintech companies. This limits Fintech development in this area and creates legal risks for businesses and consumers. Many Fintech companies process large volumes of personal data, but Vietnam still lacks a comprehensive law on personal data protection and privacy management in Fintech operations. This increases the risk of data leaks and erodes customer trust.

Security and Data Privacy Challenges: Fintech, with its rapid technological advancements, has transformed how financial services are delivered, making them faster, more convenient, and often more competitive than those of traditional banks. Banks typically require extensive documentation and time to process loans, while Fintech companies offer simpler, quicker loan approval processes, with some loans approved within hours. This shift compels banks to change their operational procedures to become more efficient and competitive with Fintech companies. However, even when banks collaborate with Fintech firms and modify their processes, sharing databases can pose significant risks, including cybersecurity threats such as fraud, customer scams, cyberattacks on banking infrastructure, and data breaches. Such data, including customer information, passwords, banking leadership details, financial data, strategies, mergers, R&D data, intellectual property, and third-party vendor information, is highly valuable to cybercriminals. Data leaks have become a significant concern for cybersecurity, especially as digitization continues to grow. Therefore, both Fintech companies and banks must invest adequately in cybersecurity, which places significant pressure on the financial system to balance funds for IT infrastructure development.

Low Customer Readiness: Although Fintech services are rapidly expanding, many customers, especially in rural areas, still do not fully understand or know how to use them. According to a 2023 Visa survey, only 45% of Vietnamese citizens are aware of online financial services such as e-wallets, compared with 85% in Singapore and 70% in Malaysia (Visa, 2024). Many Vietnamese customers remain hesitant to use Fintech services because of concerns about transaction security and the risk of personal data breaches. A 2023 PwC survey found that 60% of Vietnamese consumers worry about security risks when using e-wallets or mobile payment applications. Cash usage remains prevalent in Vietnam, with 75% of domestic transactions still conducted in cash, especially in rural and remote areas where Fintech services are harder to access. Many customers, especially older individuals and households in rural areas, do not have smartphones or are unfamiliar with Fintech applications. A 2023 World Bank report indicated that only 50% of Vietnam's population owns a smartphone and is proficient in using financial apps.

Challenges in Enhancing Human Resource Quality: The commercial banking system in Vietnam faces substantial challenges in improving the quality of its human resources amid the transformative pressure of Fintech and the demands of the digital economy. As Hinh, L.V., & Lanh, N. V. (2019) note, the current workforce is largely unprepared to meet the advanced technical and digital skills required by Fintech innovations. This gap stems from limited access to targeted training programs and insufficient alignment between academic curricula and industry demands. Similarly, Tam, H.T.D. (2023) highlights the growing competition between banks and Fintech firms for top-tier talent, exacerbating the talent acquisition dilemma for traditional banks. Additionally, Nhan, L.T.K., & Son, N.H. (2022) underscore the imperative of developing a digitally skilled workforce to integrate effectively into a rapidly evolving economic landscape, emphasizing the urgency of fostering partnerships among banks, educational institutions, and policymakers. The development of digital banking is no longer optional but a necessity when competing with Fintech. The demand for skilled professionals to implement this transition is significant, particularly for roles such as software developers, IT engineers, and technology project managers, which Vietnamese banks are increasingly recruiting for to support their digital transformation. However, building a team to take on these responsibilities is challenging because the industry requires specialized knowledge of banking operations, procedures, regulations, risk management, and more. Moreover, training and real-world experience cannot keep pace with technological development, resulting in a shortage of skilled talent in the market. Furthermore, these specialized technical roles require candidates with expertise in emerging technologies such as machine learning, artificial intelligence (AI), and blockchain, which are not yet widely taught in Vietnam. As a result, recruiters often have limited options and are forced to search for either foreign talent or local candidates who have studied and worked abroad for key technical positions. Additionally, banks compete not only with each other for top talent but also with Fintech companies, which often offer more dynamic work environments and competitive salaries, making them attractive to young technology professionals. This puts significant pressure on banks to improve their recruitment and training policies.

4.3. Discussions

Integrating Fintech into Vietnam's CBS has introduced transformative dynamics, encompassing strengths, weaknesses, opportunities, and threats that fundamentally shape operational frameworks.

Strengths lie in CBs' ability to innovate and diversify their product offerings through partnerships with Fintech firms. For instance, partnerships have enabled the introduction of digital financial solutions such as QR payments, e-wallets, and P2P lending, significantly enhancing customer convenience and operational efficiency. These innovations represent a breakthrough in technology adoption, enabling banks to better address customer needs while reducing transaction costs. Additionally, Fintech solutions, powered by AI and Big Data analytics, enhance risk management and service quality, thereby improving debt recovery processes and reducing the NPL ratio.

However, notable *weaknesses* in the system undermine these strengths. Many Vietnamese banks still rely on outdated technology, limiting their ability to compete effectively with agile Fintech firms. This technological gap is compounded by disparities in access to digital services, particularly in rural and underserved areas, where economic challenges and inadequate infrastructure persist. The shortage of skilled professionals in emerging technologies such as blockchain, AI, and Big Data presents another significant challenge. Banks struggle to recruit and retain talent capable of driving digital transformation, especially in a competitive labour market where Fintech companies offer more attractive compensation and dynamic work environments.

Fintech's growth also presents substantial *opportunities* for Vietnam's banking sector. Digital banking solutions powered by Fintech enable banks to expand their reach into previously inaccessible rural areas, promoting financial inclusion. Technologies such as Open APIs and Big Data improve service delivery by increasing transparency and reducing information asymmetry, benefiting customers and institutions. Furthermore, Fintech allows banks to reduce operational costs by transitioning from physical branches to digital platforms, aligning with global trends toward paperless banking and customer-centric advisory services. These developments not only enhance the efficiency of traditional banking but also open avenues for engaging new customer segments.

Nevertheless, the sector faces significant *threats*, particularly in cybersecurity and regulatory ambiguity. As banks and Fintech firms increasingly share sensitive data, risks such as fraud, cyberattacks, and data breaches intensify. The absence of a comprehensive legal framework for Fintech operations exacerbates these challenges, leaving critical areas such as P2P lending and cryptocurrency under-regulated. This regulatory void not only stifles innovation but also heightens systemic vulnerabilities. To address these challenges, banks must collaborate with regulators to establish a robust legal framework and invest in cybersecurity measures to safeguard customer data and maintain trust. Balancing these factors is essential to ensure that Vietnam’s commercial banking sector can fully leverage Fintech’s transformative potential while mitigating associated risks.

V. CONCLUSION AND RESEARCH IMPLICATIONS

Given the strengths, weaknesses, opportunities, and challenges arising from the explosion of Fintech activities in the era of Industry 4.0, banks have various options regarding their relationship with Fintech. Many retail-oriented banks, recognizing the challenges posed by Fintech, have leveraged the early stages of Fintech development to accelerate technology investments and deliver the best banking experiences for customers. However, many banks have opted to partner with Fintech companies, a strategy that has proven more suitable. In practice, banks in Vietnam tend to collaborate rather than compete with Fintech companies. Although most Fintech companies in Vietnam primarily operate in the payments sector, Vietnamese banks are still forming partnerships with Fintech firms to deliver better services, enhance customer convenience, and reduce user costs, for example, through QR code payments, e-wallet transactions, and P2P lending partnerships.

Collaboration between banks and Fintech companies is inevitable, intended to compensate for each other's shortcomings. Banks are currently facing numerous challenges brought by Fintech companies in almost all of their traditional business operations, such as lending, payments, money transfers, personal finance, and insurance. Therefore, the operations of Vietnamese CBs in the context of Fintech development need to be enhanced with the following solutions to improve their efficiency:

Complete and Develop a Legal Framework in Line with International Standards: Review and adjust the legal framework to build a regulatory environment aligned with new technological developments and international standards. Establish mechanisms and policies to support research and the application of technology in the financial and banking sectors. Expedite the issuance of a Fintech sandbox. Align Fintech development policies with monetary and economic policies to attract international investors to the digital finance and digital banking sectors.

Enhance Information Security and Data Protection: Fintech companies must adopt high-security authentication tools, including digital certificates, mobile device certificates, and biometric identification. Data encryption should be used to protect data, and payment gateways should implement enhanced, standardized chip technology.

Train and Attract Tech Talent and Digital Workforce: The development of Fintech requires a skilled workforce with expertise in technologies such as artificial intelligence (AI) and big data. Therefore, CBs should collaborate with universities and Fintech companies to establish Fintech training programs and centers that organize courses and workshops for staff development. This will enable employees to apply new knowledge to their daily work and develop innovative solutions. Additionally, banks must offer competitive compensation, incentives, and career opportunities to attract and retain skilled professionals who will commit to the organization long term.

Modernize Technological Infrastructure: Fintech companies and CBs must upgrade their technological infrastructure to support Fintech development, including big data, P2P lending, digital identification, and blockchain technology. Sharing infrastructure resources can also help reduce information technology costs. Enhancing information sharing and further promoting a cashless payment economy will be crucial, as will diversifying electronic payment methods.

Support Customers in Adopting Fintech Services: Fintech companies need to develop creative mechanisms to obtain consumer consent for data sharing and use. Effective data management is crucial for building trust and increasing customer satisfaction with Fintech services. Furthermore, raising awareness of digital finance, educating consumers about data security, and promoting the safe use of Fintech products and services are essential for organizations and the public.

The research on the impact of Fintech on the operations of Vietnam's commercial banks, employing a SWOT analysis framework, has several notable limitations. First, the study relies heavily on secondary data from the existing literature, industry reports, and regulatory documents. This reliance raises concerns about the timeliness and accuracy of the data, as the rapidly evolving Fintech landscape may render some findings outdated or less reflective of current trends. Additionally, the absence of primary data collection, such as surveys or interviews with industry stakeholders, limits the depth of insights and fails to capture nuanced perspectives from practitioners in the field.

Another limitation concerns the generalization of findings within the Vietnamese context. While the SWOT analysis effectively highlights strengths, weaknesses, opportunities, and threats, it may oversimplify the complex interactions between Fintech and traditional banking operations. For example, variations in technological readiness and financial inclusion across urban and rural areas are not fully addressed, potentially leading to incomplete assessments of systemic challenges. Furthermore, the study's focus on the Vietnamese market, without a broader comparative analysis, may limit the generalizability of its recommendations to other emerging economies facing similar Fintech disruptions. These limitations underscore the need for future research that incorporates mixed methods and comparative frameworks to provide a more comprehensive understanding of Fintech's impact.

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