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International Practices in Developing Digital Services and Implications for Vietnam

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Abstract **Original Research Article**

Digital banking services are increasingly playing a crucial role in the development of the overall economy, and particularly in the financial and financial services markets. Especially in the post-COVID-19 context, public interest and consumer acceptance of digital products and services have grown significantly, contributing positively to the expansion of financial service coverage in digital finance markets. Against this backdrop, learning from international financial markets where digital banking services have been successfully developed offers significant implications for emerging markets like Vietnam to identify effective and appropriate strategies to accelerate digital banking development. This paper analyzes the development of digital banking services in four prominent Asian countries - South Korea, China, and India. The findings emphasize the importance of improving legal frameworks, promoting investment in digital payment infrastructure, and enhancing the technological capabilities of Vietnamese commercial banks (particularly in AI, big data, and service digitization) to improve efficiency and expand financial inclusion. The study also presents an up-to-date overview of the state of digital banking in Vietnam.

Keywords: Digital Banking, E-Banking Services, Cashless Payments, Financial Inclusion, Information Security, Data Protection.

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1. INTRODUCTION

The digitalization trend in the banking sector is rapidly accelerating worldwide, creating both new opportunities and challenges for financial systems (To, 2022). The development of digital banking services - those based on information technology platforms - helps reduce transaction costs, expand access to financial services, and improve efficiency and convenience for users (Crifdigital, 2023). The recent COVID-19 pandemic has significantly boosted the demand for contactless and online transactions, compelling commercial banks to advance their digital transformation strategies. In this context, comprehensive research and evaluation of international experiences in digital banking development become essential. South Korea, China, and India are selected as case studies due to their well-established digital banking models and cultural similarities in financial product usage with Vietnam. These international experiences are considered highly applicable and valuable for Vietnam's financial market.

Specifically, this study analyzes policy frameworks and successful digital banking models in each of these countries, updated to 2024, followed by an assessment of the current digital banking landscape in Vietnam and the proposal of recommendations to support the sector's development.

This research contributes to the existing literature on digital banking development in several ways: (i) It provides a theoretical foundation on digital banking services and their role in the economy, the banking sector, and customer engagement; (ii) It offers a detailed analysis of international experiences and the current state of digital banking development in Vietnam; (iii) The findings are not only significant for researchers and policymakers in developing solutions for digital banking advancement but also serve as valuable information for investors, businesses, and consumers in their use and

investment decisions regarding digital financial services.
The study employs qualitative research methods, including synthesis, statistical analysis, comparison, and qualitative evaluation, to examine the experiences and outcomes of digital banking development across selected countries and Vietnam.

2. THEORETICAL BACKGROUND

The concept of digital banking is diverse and varies across different studies, depending on the perspectives used to examine digital banking.
Sharma (2016) defines digital banking as the adoption of the latest technological platforms in all banking functions and services at every operational level.
IBM (2015) emphasizes that a 'true' digital bank must deliver the majority of its products and services through digital channels, backed by real-time transaction infrastructure and a culture that embraces rapid innovation.
CGAP (2021) defines a digital bank as a financial service institution with a banking license that applies new technologies across all operations, predominantly through digital channels.
Despite varying perspectives, the definitions of digital banking share common characteristics, including: (i) operating on digital platforms (such as online user interfaces, process automation, big data, and open APIs); (ii) reducing reliance on traditional channels (branches, ATMs, manual processes); and (iii) offering 24/7 services that are more convenient and secure.
The development of digital banking has multifaceted impacts. Economically, it promotes cashless payments, enhances transparency, and increases efficiency in the digital economy. More importantly, digital banking improves financial inclusion by enabling rural and remote populations to access banking services via smartphones. Digital transactions significantly reduce costs compared to traditional methods, making financial services more affordable for low-income groups (Crifdigital, 2023). For the banking industry, digital transformation enhances operational efficiency through process automation, cost reduction, and risk mitigation (Malyshev, 2025). At the commercial bank level, digital services help expand customer bases—especially among younger and tech-savvy segments - generate new revenue streams, and improve customer experience. For instance, India's UPI system has 'revolutionized retail payment experiences' by offering fast and convenient transactions (Panda, 2024), thereby contributing to the country's digital economy. Digital banking also enables the creation of digitized products (mobile banking, e-wallets, online lending) and cuts down processing costs (e.g., branches, paperwork). Reports suggest digital banks can reduce operational costs by up to 70% compared to traditional banks. With the advancement of AI and big data, digital banking is expected to remain a key driver in modernizing the banking sector.

3. INTERNATIONAL CASE STUDIES

3.1. South Korea

South Korea is among the most advanced countries in developing digital banking services. With strong technological foundations and supportive government policies, South Korea has become a model for integrating digital banking into people's daily lives. Several key lessons from South Korea's experience in digital banking development include:
First, the government plays a leading and supportive role.
South Korea has actively promoted cashless payments to enhance transaction transparency and reduce the risks associated with physical cash. Programs such as Cashback incentives have facilitated the public's transition to electronic payments.
Alongside consistent digital economy objectives, the Korean government has implemented policies to foster the development of digital technology and banking. Initiatives like K-ICT have created a favorable environment for the rapid growth of digital banking services. Startups in the fintech sector receive substantial support through investment funds and innovation promotion programs. This support has enabled fintech firms to develop new and flexible financial services.
In terms of legal reform and regulation, Korea has adopted flexible policies to manage digital banking activities, protect consumers, and provide transparent legal frameworks for online financial services. For instance, the Electronic Financial Transactions Act governs e-payment operations and protects users. The Financial Services Commission (FSC) launched a regulatory sandbox in 2019 to support financial innovation, along with an Open Banking system implemented in December 2019. As of April 2021, Open Banking had attracted around 76.6 million users and 138.5 million accounts, expanding to include credit card companies and consumer finance firms. The government also promotes MyData and financial data-sharing platforms to enhance AI and Big Data development in finance.
FSC introduced licenses for internet-only banks in 2016 - 2017. K Bank was the first to receive approval (December 2016), followed by Kakao Bank (April 2017) and Toss Bank (June 2021). A fourth digital bank is under consideration (Kapronasia, 2024). These policies aim to increase competition, expand consumer options, and foster industry innovation.
Second, South Korea focuses on technological infrastructure investments to support digital banking services. With the world's fastest internet speeds and high smartphone penetration, the country provides ideal conditions for digital financial access anytime, anywhere.
Third, a consumer protection and monitoring framework for digital banking services has been established. Regulatory agencies ensure consumer rights and information security, helping build public trust in digital banking services.
Fourth, South Korea has prioritized improving public financial literacy to enhance understanding and use of digital financial services. Education programs target all age groups, from students to the elderly, empowering them to use digital banking effectively.
Fifth, South Korean banks offer user-friendly and secure digital banking services, including:
(i) Mobile apps enabling nearly all financial transactions—money transfers, bill payments, investments—via a few taps;
(ii) Smart financial services, such as chatbots, automated financial advice, and user financial data analysis for saving/investment suggestions.
Sixth, strong partnerships between banks and tech firms drive innovation. Banks collaborate with major technology companies like Samsung, Kakao, and Naver to deliver digital

banking solutions. Kakao Bank, operated by Kakao Corp, is a widely used digital bank model. Partnerships with Samsung Pay and Naver Pay allow seamless online payments.

Seventh, heavy investment in blockchain and data protection ensures digital transaction security. Banks employ encryption and two-factor authentication (2FA) to guard against digital risks, enhancing consumer confidence.

With these policies and initiatives, South Korea's digital banking sector has seen rapid and positive development. Internet-only banks like Kakao Bank attracted one million users within five days of its 2017 launch. By 2025, it had over 13 million customers (Kim, 2025). Kakao Bank emphasizes customer needs with user-friendly money transfers, shared accounts, and open technology. Both K Bank and Kakao Bank have achieved profitability and rapid growth at low costs; Toss Bank targets underserved groups such as the elderly, migrant workers, and SMEs.

Top commercial banks have heavily invested in mobile platforms: Shinhan Bank launched the 'Super SOL' super app, with 25 million active users. Woori Financial Group recorded 20.7 million registered users on its Woori WON app in 2023, with 79.5% of unsecured loans and 84.4% of savings accounts opened online. KB Kookmin Bank has over 11 million mobile app users. Most major banks offer online KYC and AI-enabled remote account opening. These efforts allow traditional banks to maintain competitive advantages, with DBS reporting 97% user growth in digital channels in recent years.

South Korea has established an ideal environment for digital banking through government support, advanced infrastructure, fintech participation, and tech-bank collaborations. These lessons can inform other countries -especially in areas such as e-payment systems, cybersecurity, and financial education.

3.2. China

China is one of the leading nations in the development of digital banking and electronic payments. Large technology companies have played a pivotal role in transforming how Chinese consumers access and utilize financial services.

China has emerged as a global model in digital banking development through a synergy of government support, technological innovation, and the application of emerging technologies such as AI and blockchain. Key lessons from China's experience include:

First, like South Korea, China's digital financial services sector - including digital banking - has received strong support from the government.

Supportive Fintech Policies: The Chinese government has fostered a favorable regulatory and policy environment for digital banking and fintech. Initiatives such as the Five-Year Digital Economy Plan and the Smart Finance Program have provided a strategic foundation for development.

While encouraging the growth of 'Internet Banks' and fintech, China has also enhanced risk supervision, favoring cooperation between traditional banks and digital-only banks (e.g., WeBank and MyBank).

Infrastructure Development: Massive investments have been made in high-speed internet, 4G/5G networks, and digital platforms, enabling the rapid spread of digital banking services.

Cashless Society: China has aggressively promoted non-cash transactions, reducing the risks and costs of cash usage. Platforms like Alipay and WeChat Pay have become ubiquitous. QR code payments revolutionized point-of-sale transactions, enabling even small vendors to accept payments digitally.

Digital Currency Policy: Since 2014, the People's Bank of China (PBoC) has piloted the digital yuan (e-CNY). By 2024, e-CNY was trialed in 17 provinces and 26 cities, integrated into platforms like Alipay, WeChat Pay, and DiDi. As of July 2024, e-CNY had reached 180 million personal wallets with cumulative transactions of 7.3 trillion yuan (~USD 1.02 trillion) (Omelchenko, 2024) - the largest retail CBDC initiative globally.

Second, expanding financial inclusion has created the groundwork for the extended reach of digital banking services.

Rural Financial Access: China has focused on extending digital banking and e-payments to rural areas, leveraging smartphones and QR payments to connect underserved populations with formal financial services.

Inclusive Finance Programs: Government and fintech collaborations have supported savings, investment, and other financial behaviors among rural residents, improving quality of life and economic empowerment.

Third, public awareness and financial literacy campaigns have helped promote safe and informed use of digital banking services. These efforts have mitigated risks and empowered consumers.

Fourth, China has integrated digital banking into all aspects of daily life.

Extensive Payment Ecosystems: Tech giants like Alibaba and Tencent have built ecosystems where digital banking services are deeply embedded into shopping, entertainment, transportation, dining, and more. Users can complete financial transactions within multifunctional super apps.

Beyond Traditional Banks: Digital platforms offer not only payment tools but also lending, insurance, and investment products, making them essential to consumers' financial lives.

Fifth, financial product innovation has been rapid and far-reaching.

Flexible Products: Platforms like Alipay and WeChat Pay offer investment funds, peer-to-peer lending, and online insurance. Alipay provides user-friendly savings tools with returns higher than traditional bank deposits, attracting millions of new users.

Sixth, advanced technologies have been widely adopted.

(i) AI and Big Data: Fintech giants such as Ant Group leverage AI and Big Data to analyze user behavior and preferences, personalizing services and improving operational efficiency.

(ii) Blockchain: Pilot programs in blockchain are enhancing transparency and security in digital banking transactions.

Seventh, China has prioritized security and fraud prevention in digital banking.

Advanced Security Measures: Biometric authentication (fingerprint, facial recognition), encryption, and multi-factor authentication are standard.

Fraud Monitoring Systems: AI-powered real-time monitoring helps detect and prevent fraud.

Eighth, collaboration between traditional banks and fintech is strongly encouraged.

Bank–Fintech Integration: Rather than fostering competition, the Chinese government promotes collaboration. Traditional banks improve service quality through partnerships, and fintech firms expand their reach.

Partnerships with Tech Giants: Banks and fintech companies collaborate with platforms like Alibaba and Tencent to deliver broad-reaching financial services. As a result of these policies, China's digital banking sector has experienced remarkable growth:

According to LedgerInsights (2021), WeBank and MyBank—China's first digital-only banks—were licensed in 2014–2015. Backed by Tencent and Ant Group respectively, these banks became major private institutions by asset and profit size, participating in e-CNY pilots. Hundreds of medium-sized and small banks are also connected to the digital yuan system via intermediaries like City Bank Clearing.

Traditional banks such as ICBC and China Merchants Bank have invested heavily in mobile banking and e-wallets. WeBank enables fully online consumer credit approval, while Ant Group offers real-time credit card issuance and wealth management services. Tao et al. (2021) note that digital banks effectively assessed and lent to SMEs during COVID-19, supporting business continuity and growth.

Major Chinese banks now offer diverse digital services—from online account opening to AI-based financial management. Still, many affluent customers prefer a hybrid model combining digital services with access to human advisors (Leung, 2023).

3.3. India

India has achieved significant success in digital banking development through coordinated efforts by the government, banks, and fintech companies. India's experience offers valuable lessons for other countries, particularly in digital infrastructure building, consumer protection, and financial inclusion promotion.

First, strong government leadership has been crucial in driving digital banking through policy initiatives and support programs.

Private Sector and Fintech Engagement: The Indian government has encouraged private banks and fintech participation in digital banking development. Banks such as HDFC and ICICI have made substantial investments in technology and online banking services, while fintech firms like Paytm, PhonePe, and Razorpay have launched user-friendly digital payment solutions.

Modernization of Payment Infrastructure: The Reserve Bank of India (RBI) introduced the Unified Payments Interface (UPI) in 2016, operated by the National Payments Corporation of India (NPCI). UPI allows instant money transfers between banks via mobile. According to BIS, India's digital payments tripled in volume since June 2021, primarily due to UPI, which accounted for 81.8% of total retail payment transactions as of March 2024.

Other government initiatives include Aadhaar (a national biometric ID system) that supports electronic Know Your Customer (e-KYC) processes, the Account Aggregator framework, and broader payment service provider regulations. The Digital India and Make in India schemes have improved infrastructure and created an enabling environment for digital banking.

By mid-2024, UPI processed around 14 billion monthly transactions with approximately 424 million unique users (Panda, 2024).

Second, similar to China, India has emphasized financial inclusion to broaden the base for digital banking.

Jan Dhan Yojana (PMJDY): This national initiative enabled over 400 million Indians to open their first bank account, particularly in rural areas. Financial education programs have raised awareness and encouraged digital banking adoption.

Third, India has built a robust regulatory and security framework. RBI regulations ensure secure digital transactions, addressing fraud and data misuse concerns. Consumer protection is prioritized, with strict guidelines on data privacy and service transparency.

Fourth, India's digital banking model emphasizes scalability and flexibility.

Scalability: UPI is capable of handling billions of transactions daily, reflecting the system's ability to serve massive populations.

Service Flexibility: Digital banking services are designed to be intuitive and accessible for users with varying levels of digital literacy.

Fifth, India's banks have made major strides in adopting and expanding digital services.

Most large banks have integrated UPI into their mobile platforms - e.g., SBI YONO, HDFC PayZapp, ICICI iMobile. Mobile-first payment banks such as Paytm Payments Bank and Airtel Payments Bank serve hundreds of millions of users despite not being full-service banks.

Initiatives like DigiPay and widespread digital service points have brought banking to remote and underserved areas.

In FY2023–2024, UPI processed 131 billion transactions, up from 84 billion the previous year, representing 80% of national retail payments. Over 80 UPI apps and 641 connected banks were operating as of January 2025. AI and machine learning are being deployed for automated financial advice and credit scoring.

Traditional banks are also innovating. For example, the State Bank of India (SBI) offers the YONO app, which had over 80 million downloads and 37 million registered users by 2021 (Worldfinanceinforms, 2021). SBI also introduced video KYC for remote account opening. ICICI and HDFC banks have mobile apps with millions of users and fast-growing digital lending portfolios.

4. CURRENT STATUS AND POLICY RECOMMENDATIONS FOR VIETNAM

4.1. Current Status of Digital Banking Development in Vietnam

Government and Central Bank Policy:

Vietnam is strongly promoting a comprehensive digital transformation strategy, with digital banking and financial services as key priorities. According to the 2024 report by the State Bank of Vietnam (SBV), the digital transformation of the banking sector has achieved progress across several pillars: mindset transformation, institutional framework enhancement,

infrastructure development, data application, digital bank model implementation, and cybersecurity. These align with the goal of making innovation and digitalization a primary driver of rapid, sustainable, and safe banking sector development.

Table 1: Digital transformation goals of the Vietnamese banking sector for the period 2025 - 2030

Goals for 2025	Goals for 2030
a) At least 50% of banking operations enable customers to perform transactions entirely in digital environments; b) At least 50% of the adult population use electronic payment services; c) At least 70% of customer transactions are conducted via digital channels (i.e., interfaces connecting customers and banks via the internet); d) At least 60% of credit institutions have more than 30% of their revenue derived from digital channels; e) At least 50% of loan disbursement and lending decisions by commercial banks and finance companies for small-scale and consumer loans are made through digital and automated processes; f) At least 70% of internal documents and workflows at credit institutions are processed and archived in digital formats (excluding documents classified as state secrets).	a) At least 70% of banking operations will enable customers to perform transactions entirely in digital environments; b) At least 80% of the adult population will use electronic payment services; c) At least 80% of customer transactions will be conducted via digital channels; d) At least 80% of credit institutions will have more than 30% of their revenue derived from digital channels; e) At least 70% of loan disbursement and lending decisions by commercial banks and finance companies for small-scale and consumer loans are made through digital and automated processes; f) At least 90% of internal documents and workflows at credit institutions are processed and archived in digital formats (excluding national confidential documents)

Source: Decision No. 810/QD-SBV

Legal Framework: The National Assembly passed the Law on Credit Institutions 2024. The Government issued Decree No. 52/2024/ND-CP on non-cash payments and Decree No. 94/2025/ND-CP on regulatory sandbox mechanisms for banking. The SBV released Decision No. 810/QD-SBV on May 11, 2021, outlining the Banking Sector Digital Transformation Plan to 2025 with a 2030 vision. Other key frameworks include the National Strategy for Payment System Development to 2030 and Decision No. 1887/QD-SBV, implementing the National Strategy on Digital Economy and Digital Society in banking to 2025. Annual events such as Digital Banking Day (since 2022) facilitate knowledge sharing. In early 2025, the SBV Governor reaffirmed strong commitment to improving the regulatory framework to support tech-driven banking transformation (Nguyen, 2025). Vietnam's legal framework for digital transformation in the banking sector is gradually taking shape and being updated. However, it still requires further refinement to keep pace with global trends.

On the Development of Modern Digital Infrastructure: Vietnam's Interbank Electronic Payment System (IEPS) has operated with stability and security, processing approximately 125 million VND-denominated transactions in 2024—an increase of 7.43% in volume compared to 2023. The Financial Switching and Electronic Clearing System has provided real-time payment capabilities and continuous 24/7 operations, supporting multi-channel and multi-platform transactions. In 2024, the system recorded a year-over-year increase of 29.69% in transaction volume and 15.12% in transaction value.

On Ensuring Cybersecurity and Information Safety: The State Bank of Vietnam issued Directive No. 02/CT-SBV dated January 20, 2025, to promote digital transformation and enhance cybersecurity and information safety in the banking sector. SBV regularly disseminates security advisories via official dispatches and email alerts. It has established connections for real-time monitoring and information sharing with the National Cybersecurity Monitoring Center and the National Cybersecurity Supervision Center (Ministry of Public Security). Furthermore, SBV actively participates in the National Cyber Incident Response Network and has established the Banking Sector Information Security Incident Response Network, encompassing credit institutions and financial intermediaries.

On Awareness Raising, Communication Efforts, and Digital Literacy Enhancement in the Banking Sector: Since 2022, SBV has designated May 11 as the annual "Digital Transformation Day of the Banking Sector." This initiative aims to highlight the sector's achievements in digital transformation, thereby contributing to the advancement of the national digital transformation agenda and supporting the broader socio-economic development of the country.

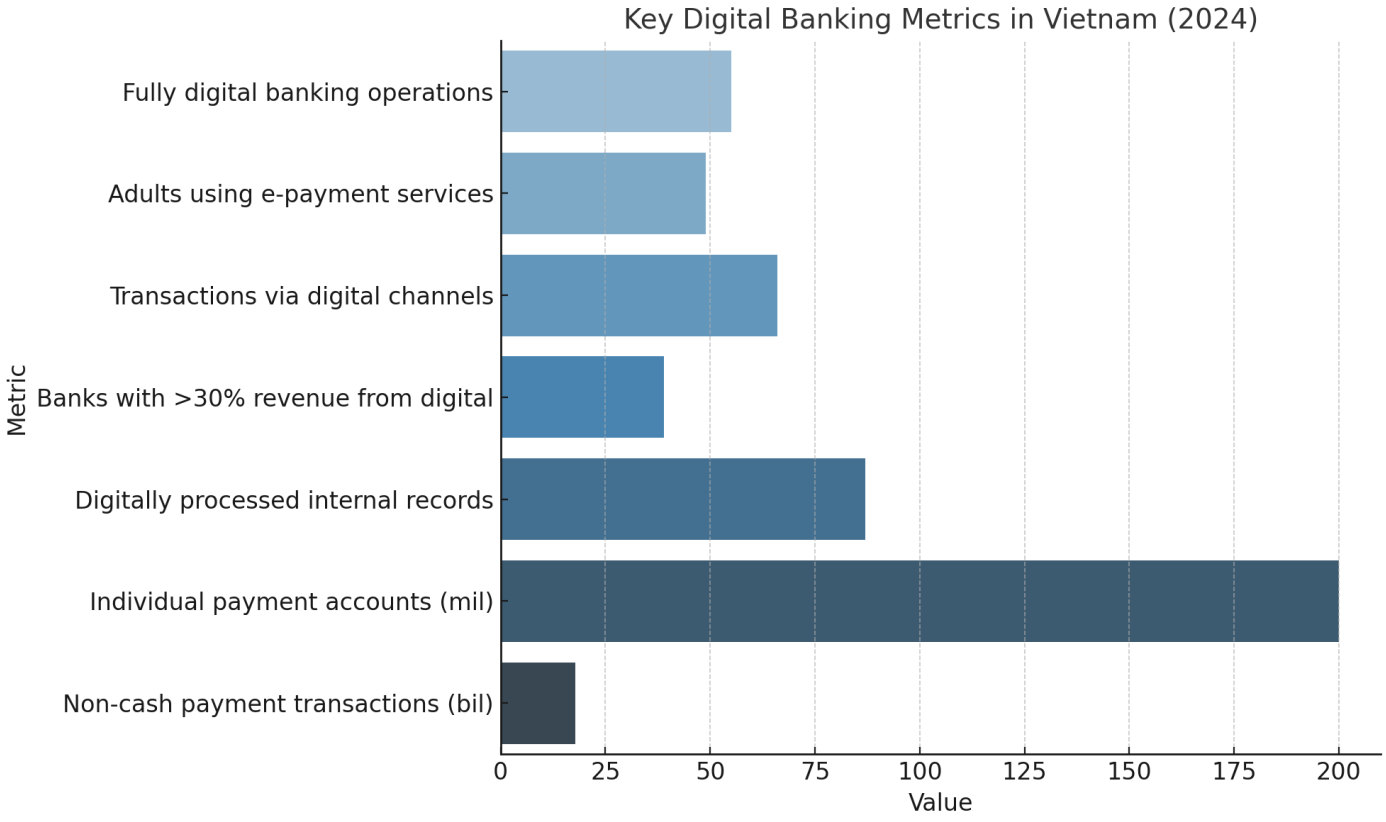
Hundreds of news articles, features, and multimedia reports have been published. SBV's official portal has created dedicated sections on payments and banking technology, such as "Payments & Treasury" and "Fintech," and has launched a specialized digital transformation page. In addition, SBV has actively implemented financial education campaigns such as "The Household Treasurer", "The Smart Money", and "Mr. Money". These initiatives include student competitions and educational events that promote awareness of digital payment security and support the implementation of national digital

transformation goals and the National Financial Inclusion Strategy.

SBV has also developed and maintained a dedicated Facebook fanpage on financial education (https://www.facebook.com/giaoductaichinh.official) to disseminate financial and banking knowledge in an accessible, easy-to-understand, and memorable format.

Results of Digital Transformation and Development of Digital Banking Services in Vietnamese Commercial Banks

According to reports from Vietnamese commercial banks and SBV, significant progress in digital transformation was achieved in 2024. Key outcomes include:
(i) 55% of banking operations could be conducted entirely in digital environments;
(ii) 49% of the adult population used electronic payment services;
(iii) 66% of customer transactions were carried out through digital channels (interfaces connecting customers to banks via the internet);
(iv) 39% of commercial banks had more than 30% of their total revenue generated through digital channels;
(v) 87% of internal documents and workflows in commercial banks were processed and stored digitally (excluding documents classified as state secrets);
(vi) The number of individual payment accounts exceeded 200 million, representing a 12% increase compared to 2023. The volume of non-cash payment transactions reached 17.77 billion VND, a growth of 56.68% year-over-year.
Vietnamese commercial banks have concretized and implemented their digital transformation through annual strategies and plans. Specifically: (i) Over 80% of commercial banks have developed and are executing digital transformation strategies/plans; (ii) 57% of banks have piloted and scaled up self-service branch models enabling customer identification and biometric registration; (iii) Most banks have adopted big data, artificial intelligence (AI), and machine learning technologies to provide automated 24/7 advisory services via mobile apps and websites; (iv) More than 70% of commercial banks have deployed or are in the process of deploying Data Warehouse systems to support automated credit scoring, optimize internal processes, and enhance customer experience. For instance, Vietcombank has adopted a detailed digital transformation resolution and action plan with seven strategic groups and 304 specific actions. Techcombank has committed to investing an additional 500 million USD in IT infrastructure during 2021–2025 to advance its "Digital–Data–Talent" transformation agenda.



Source: SBV (2024)

Human resources for information technology (IT) and digital transformation (DX) are receiving increasing attention in both quantity and quality. Leading banks in digital transformation report that IT and DX staff account for 8–10% of their total workforce.

Vietnam's major banks have made substantial investments in digital channels and recorded remarkable results in customer acquisition and service adoption. By the end of 2024, VPBank reported over 10 million users of digital banking services. In 2023 alone, Techcombank acquired 2.6 million new customers - 2.3 times higher than in 2022. Notably, 94% of Techcombank's retail transactions were conducted via digital channels, reflecting widespread customer adoption of the MBBank application. Military Bank (MB) reported that it served 30 million customers by early 2025 (equivalent to nearly 30% of Vietnam's population), with 6.5 billion digital transactions conducted in 2024. The MBBank app registered a peak of 20 million transactions per day, and approximately 96.7% of MB's transactions were conducted digitally. Other banks such as BIDV and VietinBank have also expanded their digital and mobile banking services. Overall, digital channels are increasingly dominating daily transaction volumes across the sector.

In general, Vietnam's financial system has rapidly embraced digitalization. National payment infrastructure -including NAPAS, QR-Code systems, and VNPAY-QR—has expanded, and users have shown growing adaptability to eKYC and mobile banking. However, Vietnam's digital banking development remains anchored in traditional bank-led models; independent digital-only banking models have yet to emerge. Most digital transactions are still managed by commercial banks, relying heavily on their in-house technological capacities. Compared to Asia's leading digital banking nations, Vietnam still needs to enhance its regulatory framework and explore new business models tailored to both domestic conditions and global digital banking trends.

4.2. Policy Recommendations for Vietnam

Based on the analysis of international experiences from South Korea, China, and India, as well as Vietnam's current digital banking development strategy, this study proposes several key recommendations for Vietnam's next phase of digital banking advancement:

First, strengthening government policy and infrastructure: Establishing a supportive legal and regulatory framework is critical. Open banking frameworks (as in South Korea) and public digital infrastructure (such as India's UPI) can stimulate competition and improve customer utility.

Government strategies should combine top-down (licenses, legal standards) and bottom-up (regulatory sandboxes, innovation hubs) support, as seen in Korea.

China's approach demonstrates the importance of widespread payment infrastructure (QR codes, e-wallets) and the use of AI-driven credit models to serve SMEs, even during crises (Tao et al., 2017).

Second, strategic role of commercial banks: *(i)* Banks must consider digital transformation as a strategic imperative. Rising competition from fintechs demands continuous innovation (Frankie et al., 2023); (ii) Investments in technology and product innovation should be accelerated—focusing on accounts, credit, payments, and bancassurance; (iii) Apply AI and Big Data to personalize services, enhance credit assessments, and improve customer care. Blockchain may improve security and transaction transparency; (iv) Expand cooperation with fintech through API platforms and sandbox-friendly policies; (v) Enhance customer experience by streamlining digital channels (apps, web, ATMs), improving usability, speed, and security; (vi) Adopt customer-centric design models (e.g., Kakao Bank), tailoring services to user behavior and preferences; (v) Strengthen authentication and data security: implement eKYC, biometric unlocking, encryption, and multi-factor authentication; (vi) Promote communication and awareness campaigns to educate users on fraud prevention and digital hygiene.

Third, Fintech development and financial inclusion:

Encourage fintech startups to co-create digital financial products with banks.

Embrace partnerships that support broad access to digital financial services across demographic and geographic segments.

Implement nationwide financial literacy programs, particularly in rural areas, to increase acceptance and usage of digital banking.

Fourth, capacity building and human resource development:

Develop IT and digital finance human resources within both government and banking institutions.

Follow South Korea's model in enhancing workforce capabilities in AI, data science, and cybersecurity.

Fifth, the role of the State Bank of Vietnam (SBV):

Promote integration across commercial banks for seamless transaction ecosystems.

Develop a digital banking performance evaluation framework, similar to World Bank's digital readiness index.

Coordinate with the Ministry of Public Security and Ministry of Information and Communications to ensure systemic cybersecurity.

Leverage international cooperation to attract capital, transfer technology, and strengthen institutional capacity in banking digitalization.

Overall, following the recommendations by Tao et al. (2017), Vietnam should adopt a holistic strategy that "leverages the strengths of digital banking, empowers innovation, and manages risk" to support post-pandemic recovery and long-term growth. Adaptive policymaking and targeted investments can enable Vietnamese banks to harness global digital economic opportunities.

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