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Digital Transformation in Vietnam's Banking Sector in the New Context

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Abstract

This study examines digital transformation in Vietnam's banking sector amid rapidly changing institutional, technological, and market conditions from the post-pandemic period to 2026. Drawing on digital transformation theory, the resource-based view, dynamic capabilities, and the technology-organization-environment framework, the paper proposes a six-pillar analytical model covering institutions and governance; technology infrastructure and architecture; data and artificial intelligence; products, processes, and business models; cybersecurity and operational resilience; and customers, human capital, and financial inclusion. The study employs document analysis, policy analysis, and the synthesis of secondary data from the State Bank of Vietnam, the Government, the National Assembly, the Bank for International Settlements, the World Bank, and relevant empirical studies. The findings indicate that the sector has moved beyond channel digitization toward data-driven operational restructuring and open digital ecosystems. More than 87% of Vietnamese adults

have a bank account; many core banking services have been fully digitized; numerous credit institutions conduct over 90% of customer transactions through digital channels; and non-cash payments, especially QR-based payments, continue to grow rapidly. Nevertheless, progress remains uneven and does not automatically generate sustainable competitive advantage because of legacy systems, fragmented data, weak technology governance, shortages of digital talent, compliance costs, online fraud, and persistent access gaps among vulnerable groups. The paper argues for a strategic shift from maximizing digital transaction volumes to creating responsible digital value. It proposes a 2026-2030 roadmap focusing on core modernization, data and AI governance, Open API and regulatory sandbox development, technology-enabled supervision, consumer protection, hybrid talent development, and outcome-based measurement of the economic and social value of banking digital transformation.

Keywords: Digital Transformation, Digital Banking, Non-cash Payments, Fintech, Artificial Intelligence, Data Governance, Financial Inclusion

1. Introduction

Digital transformation has become one of the most important forces reshaping the competitive structure of the financial services industry. Unlike the earlier computerization phase, when technology mainly supported the automation of selected operational tasks, digital transformation now simultaneously affects strategy, business models, operating architecture, risk management practices, and relationships between banks and their customers. Cloud computing, big data, artificial intelligence, electronic identification, open application programming interfaces, and real-time payment platforms are blurring the boundaries among traditional banks, Fintech firms, BigTech companies, e-commerce businesses, and digital infrastructure providers. Vives (2019) ^[23] argues that digitization reduces search and transaction costs while increasing the potential to unbundle components of the banking value chain. The Basel Committee on Banking Supervision (2024) ^[3] highlights three fundamental shifts: The expansion of products and distribution channels, the emergence of new service providers, and the growing use of technology in both risk management and supervision. These changes create opportunities for market expansion but also generate operational risk, technology concentration risk, data risk, and contagion risk through digital interconnections. In Vietnam, the banking sector has been identified as one of the pioneering fields under the National Digital Transformation Program. Decision No. 749/QĐ-TTg of 2020, Decision No. 810/QĐ-NHNN of 2021, and Project 06 on population data, electronic identification, and authentication established the policy foundation for the digitization of financial services. From 2024 to 2026, the institutional environment continued to change markedly with the 2024 Law on Credit Institutions, Decree

No. 52/2024/ND-CP on non-cash payments, Circular No. 50/2024/TT-NHNN on the safety and security of online banking services, Decree No. 94/2025/ND-CP on the regulatory sandbox in the banking sector, the 2024 Data Law, and the 2025 Law on Personal Data Protection. Resolution No. 57-NQ/TW dated December 22, 2024, further elevated digital transformation, science and technology, and innovation to the status of strategic breakthroughs. Accordingly, the 'new context' refers not only to the diffusion of new technologies but also to changes in legal requirements, customer expectations, competitive intensity, risk structures, and inclusive development objectives.

In practice, Vietnam's banking sector has achieved a rapid pace of digitization. According to the State Bank of Vietnam, more than 87% of adults have a bank account; many basic services, including the opening and use of payment accounts, money transfers, savings deposits, card issuance, and e-wallets, have been digitized end to end; and many credit institutions report that more than 90% of customer transactions are conducted through digital channels. In the first five months of 2025, the volume of non-cash payment transactions rose by 45.44% and their value by 25.21% year on year; QR-code transactions increased by 76.62% in volume and 179.14% in value. These figures reflect strong market acceptance and the effectiveness of the payment infrastructure. However, transaction growth does not fully capture the quality of transformation. A bank may achieve a high share of digital transactions while continuing to rely on legacy core systems, fragmented data, multilayered internal processes, or inflexible technology project governance. Digital transformation must therefore be assessed beyond user and transaction volumes to consider value creation, the depth of organizational restructuring, and operational resilience.

The current research gap has three dimensions. First, many Vietnamese studies focus on measuring the effects of digitization on ROA, ROE, NIM, operating costs, or credit risk, whereas few simultaneously connect institutional, technological, business-model, and financial-inclusion dimensions. Second, most empirical datasets end before 2023, although the 2024-2026 period has witnessed major changes in biometric authentication, data protection, Fintech sandboxes, Open APIs, and generative AI. Third, studies often assume that digital transformation produces a linear positive effect, even though its actual benefits depend on governance capability, data quality, architectural integration, and risk control. This study addresses these gaps by developing a multidimensional analytical framework and proposing a policy roadmap for 2026-2030.

The paper addresses four questions: (1) What stage has digital transformation in Vietnam's banking sector reached, and what are its salient characteristics? (2) Which institutional, technological, and market forces are shaping the new phase of transformation? (3) How are the economic, governance, and social effects of digital transformation manifested, and which risks require priority control? (4) What groups of measures should the State Bank of Vietnam and credit institutions implement to move from extensive digitization toward sustainable digital value creation? The analysis focuses primarily on commercial banking and payment infrastructure in Vietnam; securities, insurance, and crypto-assets are discussed only where they are directly connected to the banking ecosystem.

2. Theoretical Foundations and Literature Review

Digital transformation has been conceptualized through several approaches. Vial (2019)^[22] defines it as a process in which digital technologies create disruptions that prompt organizations to respond strategically by changing their paths of value creation while managing structural and organizational barriers. Verhoef *et al.* (2021)^[21] distinguish three levels: Digitization, which converts information from physical form into digital data; digitalization, which uses technology to improve processes; and digital transformation, which comprehensively changes business models and the logic of value creation. This distinction is particularly important in banking. Replacing paper documents with electronic records is digitization; deploying eKYC to shorten the account-opening process is digitalization; and building a platform bank, embedding financial services in commercial ecosystems, and adopting data-driven governance constitute digital transformation.

From a strategic perspective, the resource-based view holds that sustainable competitive advantage arises when an organization possesses and coordinates resources that are valuable, rare, difficult to imitate, and non-substitutable (Barney, 1991)^[1]. In banking digital transformation, individual technologies rarely create lasting advantage because competitors can purchase the same platform or engage the same vendor. Advantage lies in complementary assets: High-quality historical data, customer insight, analytical talent, model-governance capability, decision-making processes, and a culture of experimentation. These resources must be integrated into organizational capabilities rather than treated merely as a portfolio of technology projects. Studies by Do *et al.* (2022)^[6], Phan *et al.* (2024), and Linh *et al.* (2025) suggest that digital investment and innovation can improve financial performance, but the effect depends on how banks convert investment into product innovation, cost reduction, and better decision quality.

Dynamic capabilities theory complements the resource-based view by explaining adaptability in volatile environments. According to Teece, Pisano, and Shuen (1997)^[18], firms require the capabilities to sense opportunities, seize them, and reconfigure resources. Warner and Wäger (2019)^[24] apply this perspective to describe digital transformation as a continuous process of sensing digital trends, designing business models, and transforming the organization. For banks, sensing capability is reflected in detecting changes in customer behavior and technology risk; seizing capability is reflected in investment decisions concerning platforms, partners, and products; and reconfiguration capability is reflected in changes to core architecture, product-based team structures, control mechanisms, and workforce reskilling. If any of these three capabilities is missing, transformation may become trapped in the pilot stage, producing numerous disconnected applications without changing system-wide performance.

The Technology-Organization-Environment (TOE) framework developed by Tornatzky and Fleischer (1990)^[20] provides an appropriate approach for analyzing innovation adoption at the organizational level. The technological context includes infrastructure readiness, compatibility, complexity, security, and scalability. The organizational context includes size, financial resources, leadership capability, structure, skills, and culture. The environmental context includes competition, regulation, partners, customers, and national infrastructure. In Vietnam,

institutions play a particularly important role because banking is highly regulated. Changes such as the authorization of eKYC, biometric authentication requirements, the regulatory sandbox, and the data-protection framework can rapidly alter costs, risks, and implementation speed. Digital transformation is therefore not merely an internal decision of each bank; it is also the outcome of interaction between organizational capability and the quality of the institutional ecosystem.

At the customer level, Davis's (1989) ^[5] Technology Acceptance Model and subsequent extensions emphasize perceived usefulness, perceived ease of use, trust, perceived risk, and digital capability. Research in Vietnam shows that the intention to use digital banking is significantly influenced by benefits, convenience, trust, and perceived security (Nguyen, 2020) ^[13]. However, high usage does not necessarily imply strong financial literacy. Customers may be proficient in transfers and QR scanning yet lack the ability to recognize scams, assess the cost of credit, or manage data-access permissions. Customer experience in digital transformation must therefore encompass accessibility, understanding, control, and complaint mechanisms rather than focusing solely on transaction speed.

International research identifies both positive and negative effects of banking digitization. On the positive side, digital banking reduces transaction costs, expands service scale, improves information collection, and enables personalized products (Gomber, Koch, & Siering, 2017; Ozili, 2018) ^[9, 15]. Fintech and alternative data can reduce information asymmetry in lending, particularly for small firms and individuals without conventional credit histories. On the negative side, digitization increases dependence on technology vendors, cloud concentration risk, cyberattacks, algorithmic bias, digital exclusion, and the speed at which incidents can spread. Thakor (2020) ^[19] argues that the relationship between Fintech and banking involves not only substitution but also complementarity and functional reallocation. The Basel Committee on Banking Supervision (2024) ^[3] therefore emphasizes activity- and risk-based supervision and a consistent competitive playing field for banks and technology-based providers.

Empirical evidence from Vietnam is becoming increasingly extensive. Do *et al.* (2022) ^[6], using data from commercial banks, identify a positive association between digital transformation and operating performance. Phan, Pham, and Duong (2024) ^[16] analyze 35 banks over 2009-2020 and find that mobile-banking application innovation and research-and-development expenditure have positive effects on net interest margins. Doan *et al.* (2024) ^[7] examine 29 banks over 2014-2022 and show that information-technology readiness and application affect credit risk. Phan Huy *et al.* (2024) ^[17] measure transformation across strategic, business, and governance dimensions; their findings show a clearer positive relationship between the strategic dimension and performance, while the other two dimensions do not display stable statistical significance. Linh *et al.* (2025) report positive effects on ROA and ROE and a reduction in the cost-to-income ratio. These results reinforce the view that digitization can improve performance while also revealing differences in measurement and impact lags.

The synthesis of theory and evidence supports the identification of six analytical pillars. The first is institutions and governance, including strategy, board accountability,

risk appetite, and investment mechanisms. The second is technology infrastructure and architecture, reflecting the maturity of core banking, cloud computing, APIs, integration, and automation. The third is data and AI, including data quality, usage rights, analytics, model governance, and algorithmic ethics. The fourth is products, processes, and business models, reflecting end-to-end digitization, personalization, and ecosystem integration. The fifth is security, safety, and resilience, including fraud prevention, third-party governance, incident recovery, and data protection. The sixth is customers, human capital, and financial inclusion, reflecting access, experience, skills, and social impact. The six pillars are mutually reinforcing; weakness in one pillar can reduce the effectiveness of the entire program.

Table 1: Analytical Framework for Digital Transformation in the Banking Sector

Pillar	Core content	Suggested indicators
Institutions and governance	Strategy, leadership accountability, risk appetite, investment governance	Benefit-realization rate; alignment between strategy and project portfolio
Infrastructure and architecture	Core banking, cloud, APIs, microservices, DevSecOps, integration capability	Time to market; stability; technical debt
Data and AI	Data quality, analytics, AI, model governance, privacy	Share of data meeting standards; model accuracy and deterioration
Products and processes	End-to-end digitization, personalization, embedded finance, ecosystems	Share of journeys completed digitally; cost to serve; digital revenue
Security and resilience	Cybersecurity, fraud, third parties, recovery, and business continuity	Fraud losses; recovery time; vendor concentration
Customers, human capital, and inclusion	Experience, skills, access, support, and workforce capability	Useful use; complaints; access gaps; digital skills

Source: Compiled by the author from Vial (2019) ^[22], Warner and Wäger (2019) ^[24], and Verhoef *et al.* (2021) ^[21]

3. Research Methodology

The study adopts a qualitative approach that combines document analysis, policy analysis, and the synthesis of secondary data. This choice is appropriate for assessing sector-level digital transformation in a rapidly changing institutional environment while avoiding causal inferences that exceed the capacity of publicly available data. The sources are divided into four groups. The first consists of Vietnamese legal and strategic documents, including laws, decrees, decisions, and circulars concerning credit institutions, non-cash payments, electronic transactions, data, electronic identification, online-service security, and the Fintech regulatory sandbox. The second comprises reports, press releases, and statistical data issued by the State Bank of Vietnam. The third includes international reports from the BIS, the World Bank, and research organizations on digital finance, financial inclusion, AI, and technology-enabled supervision. The fourth consists of Vietnamese and international academic articles on the effects of digital transformation on performance, risk, and the use of banking services.

The principal analytical period is 2020-2026. Quantitative data are prioritized through 2025, and policy information is updated to July 30, 2026. Several foundational studies published before 2020 are used to establish the theoretical basis. The inclusion criteria are as follows: The publication source or issuing authority must be identifiable; the content must be directly relevant to digital banking, digital payments, or technology governance; the method and data must be described sufficiently for assessment; and priority is given to official sources, articles with DOIs, and reports issued by reputable international organizations. Figures that cannot be traced to a clear original source are not used.

The analytical procedure comprises four steps. First, concepts and research findings are systematized to identify the dimensions of digital transformation. Second, an institutional timeline is constructed and policy changes affecting banking strategy are identified. Third, information is coded according to the six analytical pillars and then triangulated across policy outcomes, market data, and empirical evidence. Fourth, the gaps between the current state and the requirements of the 2026-2030 period are synthesized to formulate recommendations. The study does not construct a composite index to rank individual banks because of differences in disclosure levels and in the accounting treatment of technology investment. Instead, it assesses sector-wide trends and uses illustrative examples with general relevance.

The methodological limitations arise from reliance on publicly available data and the absence of direct measurement of customer experience or the investment efficiency of individual digital projects. Transaction data indicate the level of use but do not fully reflect quality, marginal profitability, access among vulnerable groups, or the cost of risk. In addition, the rapid pace of technological and legal change means that some conclusions require periodic updating. Nevertheless, combining multiple sources and applying a multidimensional framework reduces the risk of evaluating digital transformation solely through superficial indicators.

4. The New Context of Digital Transformation in Vietnam's Banking Sector

The new context is shaped first by a shift in national development orientation. Whereas the 2020 National Digital Transformation Program set the objective of building digital government, a digital economy, and a digital society, Resolution No. 57-NQ/TW of 2024 identifies science and technology, innovation, and digital transformation as principal drivers of growth-model renewal. For the banking sector, this shift requires a broader role: Not only digitizing the sector itself but also providing payment, identification, and data infrastructure and allocating capital across the digital economy. Banking is becoming an essential infrastructure layer connecting public services, e-commerce, healthcare, education, transport, and platforms serving daily life. The effectiveness of banking digital transformation therefore has spillover effects on social productivity and the quality of national governance.

The second aspect of the new context is the rapid completion of the legal framework for digital transactions. The 2023 Law on Electronic Transactions, effective from July 2024, expands the legal basis for data messages, electronic signatures, electronic contracts, and digital platforms. The 2024 Law on Credit Institutions strengthens

governance, internal control, and operational safety requirements amid changing business models. Decree No. 52/2024/ND-CP replaces the previous framework for non-cash payments and updates the legal basis for accounts, payment instruments, and payment intermediaries. Circulars governing account opening, card operations, payment intermediary services, and online-service security make identification, authentication, and transaction-protection requirements mandatory standards. This represents a shift from encouraging digitization to governing it through specific safety standards and clearly defined responsibilities. The third aspect is the development of national-scale data and electronic-identification infrastructure. Project 06 promotes the connection of the National Population Database, chip-based citizen identity cards, and the electronic-identification platform with banking activities. Biometric data matching helps reduce fraudulent and rented accounts and improves transaction traceability. Decision No. 67/QĐ-NHNN of 2025 further implements core banking-sector utilities linked to Project 06. However, deeper use of identity data also increases requirements concerning purpose limitation, data minimization, matching quality, and data-subject rights. The Data Law, effective from July 2025, and the Law on Personal Data Protection, effective from January 2026, create a new layer of obligations for banks, particularly in data sharing, behavioral analytics, personalized marketing, and AI-model training.

The fourth aspect is a shift from competition between digital channels to competition between ecosystems. Previously, banks competed mainly on the number of functions available in their applications, transfer fees, and interface quality. Value is now created through the integration of services into customer journeys, including tuition and hospital payments, bill payment, e-commerce, corporate cash-flow management, point-of-sale lending, and embedded finance. Open APIs allow banks to provide financial functionality to external partners while receiving data or services from Fintech firms. This changes the unit of competition from a 'banking product' to an 'experience ecosystem.' Banks have advantages in licensing, trust, and transaction data; Fintech firms have advantages in speed, experience design, and specialized technology. Coopetition has consequently become the dominant structure.

The fifth aspect is the rapid development of AI and generative AI. Artificial intelligence is already used in credit scoring, fraud detection, anti-money-laundering controls, complaint classification, cash-flow forecasting, and marketing optimization. Generative AI extends the potential for employee assistants, file summarization, code generation, customer support, and the exploitation of internal knowledge. However, limited explainability, the possibility of fabricated outputs, data leakage through prompts, and dependence on third-party models create new risks. The BIS Financial Stability Institute (2024) emphasizes that AI governance in finance should encompass accountability, model validation, data management, human oversight, and third-party controls. Vietnamese banks should avoid two extremes: Prohibition that sacrifices opportunity and uncontrolled large-scale deployment. A responsible AI framework should classify use cases according to risk level and their effect on customer rights and interests.

The sixth aspect is the growing sophistication of technology-enabled crime. As transactions move into digital

environments, risks are no longer limited to direct attacks on banking systems but extend to device takeover, social engineering, facial impersonation, remote-control software, unregistered SIM cards, mule accounts, and psychological manipulation. Biometric authentication raises technical barriers but cannot replace user education, behavioral analytics, and interagency coordination. Digital risk is dynamic: New controls alter the tactics used by fraudsters. Banks must therefore move from defenses based on static rules to real-time detection, shared risk signals, and coordinated cross-organizational response capabilities.

Finally, the new context is linked to the requirements of financial inclusion and sustainable development.

Digitization reduces the cost of serving customers in remote areas, small businesses, and low-income groups. However, vulnerable groups may be excluded if services are optimized only for high-end smartphones, use complex authentication processes, or rely on difficult language. The digital divide involves not only a lack of connectivity but also deficits in skills, devices, trust, and the ability to resolve incidents. Digital transformation must therefore be assessed in terms of both speed and inclusion. A successful digital bank is not the one that closes the most branches, but the one that reallocates its network and human support in ways appropriate for customers who cannot yet serve themselves entirely through digital channels.

Table 2: Selected Institutional Milestones for Banking Digital Transformation

Year	Document	Content	Significance for the banking sector
2018	Decision 986/QD-TTg	Banking Sector Development Strategy to 2025, with orientations to 2030	Sets directions for modernization, safety, and integration
2020	Decision 749/QD-TTg	National Digital Transformation Program	Places banking among priority sectors
2021	Decision 810/QD-NHNN	Banking Sector Digital Transformation Plan	Sets targets for service digitization and ecosystem development
2022	Decision 06/QD-TTg	Project on population data, electronic identification, and authentication	Provides a foundation for eKYC and customer-data cleansing
2023	Law 20/2023/QH15	Law on Electronic Transactions	Provides the legal basis for electronic transactions and contracts
2024	Law 32/2024/QH15	Law on Credit Institutions	Strengthens governance, control, and operational safety
2024	Decree 52/2024/ND-CP	Non-cash payments	Updates the framework for payments and payment intermediaries
2024	Circulars 17, 18, and 40/2024/TT-NHNN	Accounts, cards, and payment intermediary services	Standardizes eKYC and the use and protection of accounts
2024	Circular 50/2024/TT-NHNN	Safety and security of online services	Raises requirements for authentication, monitoring, and incident response
2024	Law 60/2024/QH15	Data Law	Establishes a framework for data governance, sharing, and use
2025	Decree 94/2025/ND-CP	Regulatory sandbox in the banking sector	Creates a controlled environment for Fintech testing
2025	Law 91/2025/QH15	Law on Personal Data Protection	Strengthens data-subject rights and processing responsibilities
2025	Decision 67/QD-NHNN	Core banking-sector utilities linked to Project 06	Promotes data connectivity and authentication
2026	Law on Personal Data Protection takes effect	Privacy compliance in digital operations	Shapes data and AI governance

Source: Compiled by the author from documents issued by the Government, the National Assembly, and the State Bank of Vietnam

5. The Current State of Digital Transformation in Vietnam's Banking Sector

With respect to institutions and governance, the banking sector has established a relatively comprehensive system of guidance, ranging from the sector-development strategy to a dedicated digital-transformation plan. Decision No. 810/QD-NHNN sets the objectives of enabling most banking services to be completed entirely in digital environments, increasing the proportion of transactions conducted through digital channels, and developing product ecosystems. Many banks have incorporated digital transformation into their medium-term strategies and established digital-banking divisions, data centers, innovation centers, or Agile product-development teams. Senior leaders increasingly regard technology as a core capability rather than a support function. Governance maturity, however, remains uneven. In some institutions, project portfolios are still fragmented across business units, evaluation criteria focus more on implementation progress than value creation, and data ownership responsibilities remain unclear.

Regarding payment infrastructure, Vietnam has developed a widely accessible network comprising the interbank electronic payment system, the financial switching and electronic clearing system, card networks, e-wallets, and QR payments. Low-cost, rapid, 24/7 transfers have changed payment habits. QR codes offer particular advantages for small household businesses because they require no dedicated card-acceptance equipment, are easy to deploy, and are suitable for low-value payments. Data for the first five months of 2025 show that QR was the fastest-growing channel in both transaction volume and value. This expansion lowers collection costs, improves cash-flow transparency, and generates data that can support credit services. Nevertheless, personal accounts continue to be used for business activities, beneficiary information has not been fully standardized, and experiences with refunds and error resolution differ across institutions.

In the digitization of customer processes, eKYC has been a turning point. Customers can open accounts remotely through document recognition, facial recognition, and data matching. Processes for card issuance, savings deposits,

service registration, transfers, bill payments, and some lending activities have been automated. This reduces processing time and dependence on counters while extending service availability beyond business hours. In corporate banking, electronic services integrate account management, multi-level approvals, tax payments, payroll, guarantees, and ERP connectivity. Nevertheless, end-to-end digitization remains limited in lending, trade finance, collateral processing, and complex services because of reliance on legal documentation, valuation, on-site verification, and coordination among multiple agencies.

Regarding business models, many banks are moving from the sale of individual products to the development of personal-finance platforms or corporate ecosystems. Banking applications now do more than execute transactions: They also integrate investment, insurance, shopping, ticket booking, public-service payments, and financial management. In retail banking, data analytics support segmentation, demand forecasting, and product recommendations. For small businesses, cash-flow data can support overdraft limits, rapid lending, and cash-management services. Some banks have developed stand-alone digital banks or digital brands to reach younger customers. Excessive 'super-app' expansion, however, can make applications complex, increase maintenance costs, and obscure the core value proposition. Platform models are sustainable only when banks can govern partners, standardize APIs, and allocate responsibility clearly when service incidents occur.

Regarding data and AI, large banks have invested in data warehouses, data lakes, analytics platforms, and machine-learning models. Common applications include anomalous-transaction detection, credit scoring, churn prediction, product recommendations, chatbots, and automated document processing. Highly granular digital-transaction data allow banks to understand behavior in real time and move from reaction to prediction. Data quality, however, remains a bottleneck. Historical data may be stored across multiple systems, lack common definitions, contain duplicates, or be incomplete. When inputs are unreliable, AI models may produce incorrect decisions that are difficult to detect. In addition, many banks have yet to establish complete model inventories, materiality classifications, independent-validation standards, and mechanisms for monitoring model deterioration.

Regarding technology architecture, modernization is following several paths: Upgrading core banking, building API integration layers, adopting microservices, containers, and DevSecOps, and using cloud services to varying degrees. Long-established banks often have to address substantial technical debt, integrate hundreds of systems, and maintain uninterrupted operations throughout transformation. Replacing an entire core-banking system carries high risk; many institutions therefore adopt a strategy of 'wrapping the core' with service layers, progressively separating functions, and moving new products to more flexible architectures. This is pragmatic, but without a target-architecture roadmap it may prolong parallel operations and increase complexity and cost. Banks need to manage modernization as a multi-year program linked to the retirement of legacy systems rather than indefinitely adding intermediary layers.

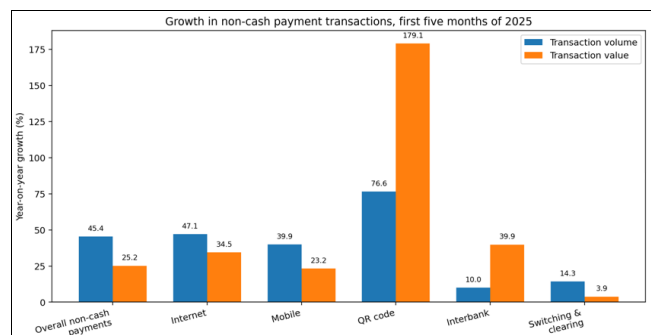
Regarding safety and security, the banking sector maintains

high levels of investment and a relatively stringent regulatory framework. Circular No. 50/2024/TT-NHNN establishes requirements for authentication, encryption, session management, monitoring, testing, and incident response in the provision of online services. Biometric matching for higher-risk transactions improves the ability to verify the legitimate account holder. Banks have deployed security operations centers, multifactor authentication, behavioral analytics, and fraud alerts. Even so, a large share of customer losses may still originate from social engineering and compromised end-user devices. The boundary of responsibility for security must therefore be viewed across the entire journey, encompassing banks, telecommunications providers, digital platforms, law-enforcement agencies, and users.

Regarding ecosystem connectivity, the banking sector is deeply integrated with public services and services used in everyday life. Payments for electricity, water, telecommunications, healthcare, education, taxes, and fees can be made through banking applications or intermediary platforms. Connections to population data support the cleansing of customer information and identity verification. This infrastructure is significant beyond payment convenience: It creates data flows that can support public-finance management, lower collection costs, and expand access. The next phase should move from point-to-point connections toward standardized shared platforms, avoiding a situation in which each bank builds a separate integration with the same agency or enterprise.

Regarding financial inclusion, the sharp rise in account ownership is a significant achievement. Digital services reduce geographic barriers, allowing people in remote areas to receive money, make payments, and save without frequently visiting a branch. Transfers from urban to rural areas can be completed instantly; household businesses can accept QR payments; and workers can establish formal transaction histories. Account ownership, however, does not necessarily mean diversified use. Some customers use accounts only to receive and withdraw money, while access to formal credit, insurance, long-term savings, and investment remains limited. Older persons, persons with disabilities, people with low digital literacy, and users of older devices encounter difficulties with authentication and application updates. Indicators of digital financial inclusion should therefore measure useful use, cost, safety, and the quality of support.

Regarding business performance, Vietnamese studies generally identify a positive relationship between digital transformation and profitability or cost efficiency, although the magnitude varies by measure and period. Phan *et al.* (2024) find that mobile-application innovation and R&D expenditure improve NIM; Linh *et al.* (2025) associate digital transformation with higher ROA and ROE and a lower cost-to-income ratio. Nevertheless, substantial initial investment, rapid depreciation, talent shortages, and security costs may delay the realization of benefits. Effects are also uneven across banks of different sizes and capabilities. A smaller bank may use outsourced solutions to develop rapidly but become dependent on vendors; a large bank may be able to invest in proprietary platforms but must manage a complex architecture. There is therefore no single transformation model suitable for the entire system.



Source: Author's illustration based on data from the State Bank of Vietnam (2025)

Fig 1: Growth in Non-Cash Payment Transactions in the First Five Months of 2025

6. Effects of Digital Transformation on the Banking Sector and the Economy

The most direct effect is higher transaction productivity. When customers independently transfer funds, make payments, and manage accounts through digital channels, the marginal cost per transaction falls sharply relative to counter service. Robotic process automation, document processing, and reconciliation reduce the time spent on repetitive tasks. Employees can shift from data entry toward advisory services, sales, and risk management. Productivity rises sustainably, however, only when banks genuinely eliminate old processes. If the digital channel merely adds a new front-end layer while back-office staff still print documents, re-enter data, or approve transactions manually, total costs may increase. Front-end digitization must therefore be accompanied by end-to-end process redesign.

The second effect is the expansion of market scale and reach. Banks can serve customers nationwide without opening a corresponding number of branches. Lower customer-acquisition costs make low-value products economically viable. Payment and cash-flow data provide a basis for assessing microenterprises, household businesses, and self-employed workers. This is an important mechanism for advancing financial inclusion. Digital scaling, however, may also increase the risk of excessively rapid credit growth if scoring models have not been tested across economic cycles. Digital lending must combine speed with product limits, affordability controls, and post-disbursement quality monitoring.

The third effect is improved experience and changing customer expectations. Instant transactions, 24/7 availability, and personalization have become new standards. Customers compare banking applications not only with those of other banks but also with the best digital platforms they use. This creates continuous pressure for speed, simplicity, and stability. A good experience can strengthen engagement, reduce churn, and create cross-selling opportunities. Data-driven personalization, however, may become intrusive when transparency is lacking. Customers need to know which data are used and for what purpose and must be able to adjust their marketing choices. Trust is a core asset; a single data incident can erase the benefits of years of investment in customer experience.

The fourth effect is improved risk management and compliance. Real-time data enable the detection of unusual transactions, early warning of deteriorating credit quality, and automated list screening. AI can process more data than human analysts, increase consistency, and shorten response

times. Technology also supports the State Bank of Vietnam in moving toward data-driven supervision, receiving reports in near real time, and analyzing system interconnections. Model risk, however, becomes a new layer of risk. Models may be biased, deteriorate over time, or be exploited. When credit decisions and fraud alerts depend heavily on algorithms, mechanisms for explanation, appeal, and human intervention are required.

The fifth effect is a change in competitive structure and the value chain. Functions such as payments, identification, scoring, marketing, storage, and customer care can be provided by multiple parties. Banks no longer control the entire customer interface; financial services may appear within commerce, logistics, or enterprise-management applications. This creates new distribution opportunities but also the risk that banks will be reduced to providers of balance-sheet capacity and compliance while partners control behavioral data and customer relationships. The appropriate strategy is not to build everything internally, but to determine clearly which capabilities must be owned, which should be developed through partnerships, and which data must be protected.

The sixth effect is greater transparency and formalization of the economy. Electronic payments create transaction trails that support tax administration, cash-flow management, and lower cash-handling costs. Household businesses with digital revenue histories may gain better access to credit. Enterprises can integrate banking with accounting and management systems, reducing errors and shortening working-capital cycles. At the macroeconomic level, payment data can provide early signals of economic activity. The benefits of transparency must nevertheless be balanced against privacy and purpose-limitation principles. Financial data are sensitive; advanced analytical capability does not confer an unlimited right of use.

The seventh effect is the promotion of innovation in the public sector and social services. When banking payments connect with the National Public Service Portal, hospitals, schools, and tax authorities, citizens spend less time and money fulfilling obligations. Benefits or assistance can be transferred directly to the correct recipients when identification and account data are accurately linked. Banks consequently participate in the infrastructure for policy implementation. This role, however, demands high standards of service continuity, redundancy, interoperability, and support for people who cannot use digital channels.

Overall, digital transformation generates complementary effects across efficiency, growth, and inclusion, but these effects do not arise automatically. Benefits depend on institutional quality, healthy competition, governance capability, and trust. If user growth is prioritized while data protection, fraud, and accessibility are neglected, the system may scale quickly but remain fragile. Conversely, if regulation is excessively cautious and provides insufficient room for experimentation, innovation will be slow and costly. The policy challenge is to design a dynamic balance between innovation and safety.

7. Principal Limitations, Risks, and Challenges

The first challenge is the disparity in transformation capability among credit institutions. Large banks possess capital, data, and the ability to attract talent, but they must manage complex legacy systems. Smaller banks are more agile but face budget constraints and vendor dependence.

This disparity may increase market concentration if compliance and platform-investment costs exceed the capacity of smaller institutions. At the same time, excessive competition through fee waivers and promotions may make digital models unsustainable. Policy should facilitate shared infrastructure, technical standards, and controlled outsourcing to reduce fixed costs without compromising safety.

The second challenge is technical debt and fragmented architecture. Many systems have been built product by product and phase by phase, using different technologies and data standards. Each new project must connect to numerous legacy systems, increasing time, cost, and risk. When banks grow rapidly by adding intermediary layers without retiring old systems, complexity increases exponentially. Technical debt is not merely a technology issue; it is a future financial obligation. Boards should treat the share of expenditure devoted to modernization and technical-debt retirement as a strategic indicator and prevent the entire budget from being absorbed by maintenance.

The third challenge is data governance. Data may lack owners, quality standards, shared dictionaries, and access mechanisms. Tension between the need to exploit data and the need to protect them can delay projects or lead to uncontrolled use. The Law on Personal Data Protection increases legal responsibility for data collection, processing, sharing, and storage. Banks must move from system-based security toward data-lifecycle governance. This encompasses classification, processing purposes, legal bases, retention periods, data-subject rights, data transfers, deletion, and breach response. Without a governance foundation, AI and personalization projects will create substantial compliance risk.

The fourth challenge is cybersecurity and multichannel fraud. Banking systems may be well protected, yet customers can still be deceived into granting device-control permissions, installing fraudulent applications, or transferring money under manipulative scenarios. Criminals combine leaked data from multiple sources to personalize impersonation. Deepfakes and generative AI reduce the cost of producing fraudulent content. Strong authentication must be combined with behavioral analytics, adaptive limits, contextual warnings, and targeted delays for transactions displaying risk indicators. Fraud-data sharing among banks, payment intermediaries, telecommunications providers, and law-enforcement agencies requires a clear legal basis and technical standards.

The fifth challenge is third-party dependence and technology concentration. Banks use cloud, authentication,

AI, core-software, and security-infrastructure services supplied by domestic and foreign providers. Outsourcing accelerates access to technology but creates risks of disruption, vendor lock-in, data access, and limited auditability. If many banks depend on the same provider, an incident may become systemic. Third-party governance should include pre-contract assessment, data clauses, audit rights, recovery standards, exit plans, and testing of disruption scenarios. Regulators need visibility into concentration among critical providers.

The sixth challenge is a shortage of hybrid talent. Digital transformation requires people who understand banking operations, data, technology, and risk management simultaneously. The labor market often separates technology specialists who lack regulatory knowledge from business specialists who cannot design digital products. Recruiting talented personnel is insufficient if evaluation, remuneration, and decision rights remain rooted in traditional models. Banks need cross-functional product teams, enterprise architects, data specialists, security engineers, model-risk managers, and experience-design specialists. At the same time, the entire workforce needs the skills to use AI safely, understand data, and recognize digital risk.

The seventh challenge is the digital divide and consumer protection. A process optimized for young urban customers may create difficulties for older people or those with limitations in reading, vision, or physical interaction. Closing branches or reducing their role too quickly can create support gaps. Digital-credit sales interfaces may obscure total costs, encourage excessive borrowing, or use pressure-inducing design. Digital consumer protection should emphasize transparency, cancellation options, complaint rights, human support, and accessible design. Financial inclusion should not be measured by the number of newly opened accounts but by the ability to use services safely and beneficially.

The final challenge is value measurement. Many banks use metrics such as user numbers, logins, digital transactions, and processing time. These are necessary operational indicators but are insufficient to determine strategic effectiveness. A digital program may increase transactions while reducing margins, increasing support calls, or creating risk. Revenue, costs, risk, experience, successful self-service rates, time to market, stability, and inclusion effects must be measured simultaneously. The absence of methods for allocating platform costs and shared benefits makes accurate return-on-investment assessment difficult. This is one reason project portfolios expand without adequate prioritization.

Table 3: Opportunities and Risks Associated with Selected Technologies

Technology	Opportunities	Risks	Priority controls
AI/ML	Scoring, fraud detection, personalization, automation	Bias, limited explainability, data leakage, model deterioration	Model inventory; independent validation; human-in-the-loop controls
Cloud	Scalability, rapid deployment, lower initial investment	Vendor concentration, disruption, lock-in	Workload classification; multi-region design; exit plan; audit rights
Open API	Expanded distribution, Fintech partnerships, embedded finance	Misuse of access rights, fragmented accountability	Explicit consent; security standards; third-party certification
Biometrics	Reduced impersonation, authentication of the legitimate account holder	Matching errors, deepfakes, sensitive data	Liveness detection; multifactor authentication; data minimization
RPA/Automation	Fewer repetitive tasks, faster processing	Automation of flawed processes, bot dependence	Process redesign; monitoring and change control
Blockchain/DLT	Reconciliation, traceability, and conditional transactions	Scalability, legal issues, system interoperability	Bounded testing; clear value criteria

Source: Compiled by the author

8. Measures to Promote Banking Digital Transformation, 2026-2030

First, banks should move from project-portfolio administration to value-based transformation governance. Each bank must articulate a clear strategic thesis: Priority customer segments, its role in the ecosystem, distinctive capabilities, and target architecture. The board of directors should approve risk appetites for technology, data, and AI and should monitor value indicators rather than only budgets and schedules. Each initiative must have a business owner, a baseline, benefit targets, and a mechanism for termination or adjustment. Budgets should be allocated by product and platform capability, providing autonomy to cross-functional teams while holding them accountable for outcomes.

Second, core architecture should be modernized through a controlled roadmap. Banks need to map systems, data, and dependencies and then select strategies for replacement, progressive decoupling, or wrapping of legacy systems. API layers, event management, microservices, and DevSecOps should be implemented according to unified standards so that they do not become a new layer of complexity. Every product-development project should contribute to the target architecture and include a plan to retire legacy components. Observability, automated testing, continuous delivery, and recovery should be treated as core operating capabilities. Cloud adoption should follow a risk-based approach that classifies data and workloads and addresses storage requirements, access rights, and exit plans rather than imposing a blanket ban or migrating everything.

Third, banks should establish a foundation for responsible data and AI governance. Each data domain needs a business owner, quality standards, and a unified dictionary. Banks should implement data catalogs, data-lineage management, role- and purpose-based access controls, consent tracking, retention schedules, and mechanisms for data-subject rights. For AI, they should maintain model inventories, classify models by impact, conduct independent validation, monitor deterioration, and preserve decision trails. Use cases that directly affect credit approval, transaction rejection, or pricing require greater explainability and oversight than chatbots or internal-support tools. Generative AI should operate within secure data zones with filters for sensitive information, output evaluation, and clearly defined user responsibilities.

Fourth, Open APIs and open finance should be developed through a staged roadmap. The State Bank of Vietnam should continue to standardize technical, authentication, consent, accountability, and incident-handling requirements. The initial phase should prioritize lower-risk APIs such as product information, account verification, payment initiation, and corporate services, followed by the expansion to transaction data subject to explicit consent. Common standards reduce integration costs and prevent fragmentation. At the same time, a certification or registration mechanism is needed for third-party providers, together with appropriate insurance or financial-capacity requirements and procedures for revoking access. Open finance must place customers' control over their data at its center.

Fifth, the regulatory sandbox established under Decree No. 94/2025/ND-CP should be used effectively. A sandbox should not be merely a licensing procedure for trials; it should be a process of policy learning. Each test should define a hypothesis, benefit indicators, risks, customer

limits, compensation arrangements, and exit conditions. Regulators should publish aggregated lessons so that the market understands expectations while commercially sensitive information remains protected. Priority areas include credit scoring using new data, Open APIs, peer-to-peer lending within controlled limits, and solutions supporting identification. After testing, there must be a clear transition to licensing, regulatory amendment, or termination, avoiding prolonged uncertainty.

Sixth, cybersecurity governance and operational resilience should be upgraded. Banks should adopt zero-trust architecture, privileged-identity management, network segmentation, penetration testing, attack simulations, and software-supply-chain monitoring. Fraud prevention should integrate signals from accounts, devices, behavior, beneficiaries, and cross-sector data. Rapid-response mechanisms are needed for targeted holds, customer contact, and the blocking of suspicious fund flows in accordance with regulations. Recovery scenarios should cover the loss of a cloud provider, faulty software updates, ransomware attacks, telecommunications disruption, and communication crises. Regulators should organize cross-sector exercises and assess resilience at the system level.

Seventh, SupTech and RegTech should be developed. The State Bank of Vietnam should strengthen its capacity to receive standardized data, automate quality checks, and conduct near-real-time analysis. Technology-enabled supervision is not intended to replace inspection but to help prioritize resources according to risk. Relevant indicators may include service disruption, fraud, vendor dependence, model quality, data incidents, and platform concentration. For credit institutions, RegTech can automate reporting, screening, compliance monitoring, and regulatory-change management. To avoid duplicative investment, the sector needs common reporting-data standards, supervisory APIs, and a shared technical testing environment.

Eighth, the system of digital consumer protection should be redesigned. Information on fees, interest rates, the total cost of credit, data-access rights, and risks must be presented in clear language. Complaints should be tracked under a single case code whether the customer contacts the bank through an application, call center, or branch. Banks should offer simplified interface modes and support older people, persons with disabilities, and low-specification devices. Fraud warnings need to be context-specific rather than so repetitive and generic that customers ignore them. For transactions displaying unusual characteristics, banks may apply additional confirmation or an appropriate pause while avoiding excessive friction for legitimate activity.

Ninth, a competency-based digital-workforce strategy should be established. Banks need to identify critical roles such as product managers, enterprise architects, data engineers, platform engineers, AI specialists, model-risk managers, security specialists, and experience designers. Training programs should be linked to real projects and evaluated through outputs and problem-solving ability. Business staff need to understand data, automation, and algorithmic risk; technology staff need to understand regulation, finance, and customer behavior. Career structures should allow technical specialists to progress without being required to move into management. Cooperation with universities and Fintech firms should focus on laboratories, synthetic data, and long-term internship programs.

Tenth, targeted digital financial inclusion should be promoted. Banks and regulators should analyze groups that do not use services or use them only to a limited extent rather than monitoring account-ownership rates alone. Products should accommodate unstable cash flows, low fees, simple language, and support mechanisms. Alternative data can help expand credit but must be subject to controls for bias and repayment capacity. Agent networks, digital-support points, and streamlined branches remain necessary in some areas. Digital financial education should be embedded in applications at the point of decision, for example through warnings before borrowing, guidance when adding a new beneficiary, or alerts when a user is asked to install unfamiliar software.

Eleventh, the measurement framework should be completed. At the bank level, indicators should cover five groups: Customer value, financial performance, innovation speed, risk and resilience, and inclusion effects. Beyond the digital-transaction share, banks should measure the proportion of journeys completed without assistance, complaint-resolution time, service costs by segment, release-failure rates, recovery time, fraud losses, model accuracy, and the proportion of vulnerable customers able to use services successfully. At the sector level, indicators should track interoperability, vendor concentration, the share of fully digital services, and access gaps by region, age, and income. Metrics should focus on outcomes rather

than encourage a race for volume.

Twelfth, international cooperation and standardization should be strengthened. Vietnam should participate more deeply in dialogue on cross-border payments, digital identification, AI governance, cybersecurity, and data. Cross-border QR-payment connectivity can support trade and tourism but requires standards for exchange rates, anti-money-laundering controls, dispute resolution, and customer protection. Reference to BIS, ISO, and NIST standards and the experience of supervisory authorities can reduce learning costs. International standards should nevertheless be adapted to domestic market structures and capabilities rather than copied mechanically.

The 2026-2030 roadmap can be divided into three phases. The 2026-2027 phase should consolidate the foundations through personal-data compliance, system and model inventories, API standardization, third-party-dependence assessments, and value metrics. The 2028-2029 phase should expand ecosystems and automation through controlled open finance, greater use of AI in operations and supervision, modernization of priority core domains, and the development of digital credit for small enterprises. By 2030, the objective should be an intelligent, interoperable, and inclusive digital-banking ecosystem in which data are used responsibly, services are highly resilient, and competition is based on substantive innovation.

Table 4: Priority Roadmap for Banking Digital Transformation, 2026-2030

Period	Focus	Priority tasks
2026-2027	Consolidate the foundations	Personal-data compliance; data/model inventories; technical-debt and third-party assessments; standardized value KPIs
2028-2029	Expand the ecosystem	Controlled Open APIs; AI in operations and supervision; modernization of priority core domains; digital credit for SMEs
2030	Integrate and optimize	Interoperable ecosystems; near-real-time supervision; resilient architecture; comprehensive measurement of economic and social impacts

Source: Author's proposal.

9. Discussion

The analysis shows that digital transformation in Vietnam's banking sector has moved beyond the proof-of-concept stage. Transaction volumes, account penetration, and the degree of process digitization demonstrate that the market has accepted digital banking. The central question is no longer whether banks should transform, but which architecture they should adopt, how transformation should be governed, and for whom value should be created. This represents a shift from a 'technology project' mindset to a 'digital operating model.' As transformation becomes a permanent state, organizations require continuous learning and reconfiguration capabilities rather than a program with a fixed end point.

The analysis also supports the dynamic-capabilities perspective: Technology does not create performance automatically. Empirical studies show positive effects on profitability and costs, but these effects differ across transformation dimensions. The findings of Phan Huy *et al.* (2024) ^[17], in which strategic transformation has a clearer effect than business and governance transformation, imply that strategic declarations create value only when translated into architecture, processes, and capabilities. The execution gap may explain why some banks have modern applications while their internal systems remain inflexible. Digital benefits arise when technology assets are complemented by

data, people, and decision mechanisms.

A notable finding is the increasingly important role of institutions. Policies on eKYC, biometrics, population data, and regulatory sandboxes can produce market effects more rapidly than many individual initiatives. This indicates that regulators do more than exercise control; they also create standards and infrastructure. However, when institutions facilitate data exploitation and connectivity, the responsibility to protect rights and interests must increase accordingly. The Law on Personal Data Protection marks an important shift from system security toward individual rights. Banks need to treat data compliance as a design requirement from the outset rather than a final-stage check. In relation to financial inclusion, the achievement in account ownership is necessary but insufficient. The next phase should move from 'access' to 'quality of use.' A customer who owns an account but is frequently exposed to scams, does not understand costs, or cannot obtain effective complaint resolution cannot be considered financially included. Responsible digital transformation must therefore combine product design, point-of-use education, human support, and sales controls. This is also a condition for maintaining trust, which remains the foundation of banking. The study proposes 'responsible digital value' as an integrative orientation. Digital value encompasses financial benefits for banks, convenience for customers, productivity

for enterprises, and efficiency for society. Responsibility encompasses safety, transparency, privacy, explainability, inclusion, and resilience. The two components must be optimized simultaneously. Pursuing safety alone may stall innovation; pursuing speed alone may erode trust. Good governance is the capacity to design bounded experiments, measure risk, and scale initiatives when the evidence is sufficiently strong.

10. Conclusion

Digital transformation has profoundly changed Vietnam's banking sector, from transaction methods and operating structures to relationships with customers and other economic sectors. Major achievements include widespread account ownership, rapid growth in non-cash payments, the end-to-end digitization of many services, and the development of platforms connected to population data, public services, and digital ecosystems. The legal framework introduced during 2024-2026 creates a new foundation for payments, electronic transactions, data protection, and Fintech experimentation.

Digital transformation, however, cannot be assessed solely by the proportion of online transactions. Its quality depends on core-architecture modernization, data governance, AI capability, safety, human capital, and the ability to create value for diverse customer groups. Technical debt, fraud, vendor concentration, algorithmic bias, and digital exclusion can reduce benefits if they are not governed from the outset. The new context requires the banking sector to move from transformation by breadth toward transformation in depth.

During 2026-2030, priorities should include value-based transformation governance; open yet resilient architecture; responsible data and AI; standardized sandboxes and Open APIs; technology-enabled supervision; consumer protection; hybrid talent development; and high-quality financial inclusion. The State Bank of Vietnam should create standards, infrastructure, and adaptive supervisory mechanisms; credit institutions should convert technology into organizational capability; and customers should be recognized as data-rights holders who are protected in digital environments. If these three sets of roles are coordinated, banking digital transformation can become an important foundation for productivity growth, business-model innovation, and inclusive development in Vietnam.

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