



Application of Artificial Intelligence in Digital Banking at the Joint Stock Commercial Bank for Investment and Development of Vietnam (BIDV)

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Abstract

In the context of rapid digital transformation within the financial and banking sector, artificial intelligence (AI) plays a central role in optimizing operational processes, enhancing service quality, and strengthening risk management capabilities. The Joint Stock Commercial Bank for Investment and Development of Vietnam (BIDV) is among the pioneering financial institutions in Vietnam to deploy AI across multiple functional areas. This paper analyzes the theoretical foundations of AI in digital banking, assesses the current state of AI adoption at BIDV, identifies the key achievements, limitations, and challenges the bank is encountering. Based on these findings, the study proposes a set of solutions aimed at positioning AI as a core competency, supporting BIDV in its ambition to become a leading digital bank in Vietnam. The research results provide scientific evidence and policy implications that contribute to improving the digital transformation strategy of Vietnam's banking system in general and BIDV in particular.

Keywords: Artificial Intelligence, Digital Banking, Digital Transformation

1. Introduction

The banking industry is undergoing a comprehensive transformation driven by the Fourth Industrial Revolution. Artificial intelligence (AI) has become a decisive factor in shaping banks' competitive advantage in the digital era, as it not only optimizes operational efficiency but also reshapes service delivery, risk management practices, and product development. Numerous international studies have indicated that AI can increase operational productivity by 20–45%, while significantly reducing costs and transaction processing time.

In Vietnam, BIDV—one of the four largest state-owned commercial banks—has identified digital transformation as one of its three strategic pillars for the period 2021–2025, with a vision toward 2030. Within this strategic framework, AI is positioned as a core technology to modernize the banking model, enhance customer experience, and respond to intensifying competition from FinTech firms, fully digital banks, and major technology corporations.

However, BIDV's adoption of AI continues to face several challenges, including the lack of standardized data quality, shortages of highly skilled professionals in AI and data analytics, stringent regulatory requirements, and increasing cybersecurity risks. Consequently, conducting an in-depth examination of BIDV's AI deployment and proposing appropriate solutions is both necessary and valuable, contributing meaningfully to both theoretical development and practical implementation in the field.

2. Theoretical Background

2.1. Artificial Intelligence

Artificial intelligence (AI) is understood as the capability of computer systems to simulate human cognitive functions, including learning, reasoning, recognition, and decision-making based on data and algorithms (Brynjolfsson & McAfee, 2017) ^[4]. In computer science, AI encompasses multiple technical subfields, each serving specific analytical purposes and employing distinct data-processing methodologies. Machine Learning (ML) enables models to learn from historical data to generate predictions and classifications, thereby supporting automated decision-making.

Deep Learning (DL), a subset of ML, utilizes deep neural networks to process highly complex data structures, proving particularly effective in image, audio, and language processing (Russell & Norvig, 2021). Natural Language Processing (NLP) allows machines to understand and generate natural language, enabling applications such as chatbots, sentiment analysis, and virtual assistants. Computer Vision equips systems with the ability to recognize images and faces, playing a pivotal role in electronic know-your-customer (eKYC) procedures and transaction monitoring. More recently, Generative AI has emerged as a transformative advancement, enabling models to generate text, images, and predictions based on learned patterns (Goodfellow, Bengio, & Courville, 2016). The synchronized development of these AI branches is rapidly accelerating digitalization and operational optimization across various sectors, including financial services and banking.

2.2. Digital Banking

Digital banking refers to a model that provides financial services through digital platforms, allowing customers to conduct transactions online without relying on traditional physical branch networks, thereby enhancing accessibility and service efficiency (State Bank of Vietnam, 2021)^[10]. In the context of rapid digital transformation, artificial intelligence (AI) is regarded as one of the core technologies fundamentally reshaping the operational landscape of digital banking. According to the Bank for International Settlements (BIS, 2023)^[3], AI enables the automation of back-office processes, reducing errors, shortening processing time, and optimizing resource utilization. AI also supports the development of personalized services by analyzing customer behaviors and preferences, thereby enhancing user experience through product recommendation systems and intelligent chatbots.

From a risk management perspective, AI plays an essential role in detecting abnormal transactions, forecasting credit defaults, and strengthening operational risk monitoring, enabling banks to respond promptly to dynamic risk conditions (World Bank, 2023)^[16]. The ability of AI to analyze large-scale data in real time allows banks to make more accurate and timely decisions compared to traditional analytical methods. Consequently, integrating AI into digital banking not only improves operational performance but also enhances competitiveness, supporting the development of modern, agile, and customer-centric banking models in the digital era.

2.3. Applications of AI in Digital Banking

The application of artificial intelligence (AI) in banking operations has become a dominant global trend, especially among leading financial institutions such as HSBC, JP Morgan Chase, DBS, and Bank of America. According to the Bank for International Settlements (BIS, 2023)^[3], international banks have widely deployed AI in fraud detection thanks to its ability to analyze transaction patterns in real time and identify anomalies with significantly higher accuracy than traditional statistical models.

In addition, electronic customer identification (eKYC) technologies based on Computer Vision and Deep Learning have been adopted by banks such as DBS and HSBC to verify customer identities swiftly, reduce fraud risks, and enhance compliance with anti-money laundering (AML) regulations. According to McKinsey (2024)^[9], AI is also increasingly

applied in compliance management through automated monitoring systems that detect suspicious activities early and help banks adhere to evolving regulatory requirements.

In the credit domain, JP Morgan and Bank of America have implemented AI-driven models to automate loan origination, credit scoring, and risk forecasting, thereby shortening decision-making time and improving portfolio quality. Moreover, chatbot and virtual assistant solutions powered by Natural Language Processing (NLP) are widely utilized to provide 24/7 customer service, enhance user experience, and reduce workloads for customer support centers (IBM, 2023)^[8].

Overall, the adoption of AI globally is reshaping banking operational models and fostering a smarter, safer, and more efficient service environment.

3. Current Status of AI Application in Digital Banking at Bidv

3.1. Overview of Digital Banking Operations at BIDV

BIDV has long positioned digital banking development as a strategic pillar. With the launch of BIDV SmartBanking on March 20, 2021—a next-generation platform integrating both Internet Banking and Mobile Banking—the bank has digitally transformed its traditional financial services (BIDV, 2022)^[1]. As of September 30, 2023, the number of individual customers using BIDV's digital channels reached nearly 12.5 million, accounting for approximately 70% of its total retail customer base. In addition, 132,299 corporate customers were digitally connected, representing more than 50% of the bank's business clients (BIDV, 2023)^[2].

According to the mid-2025 report, over 93% of all transactions were conducted through digital channels, with the number of digital users surpassing 16 million, and an average of 7 million online transactions processed daily (BIDV, 2025). These figures clearly demonstrate the widespread penetration of digital banking within both retail and corporate segments.

In terms of service offerings, BIDV SmartBanking provides more than 2,500 integrated services from roughly 1,500 partners—spanning payments, transfers, deposits, lending, and financial-insurance services—allowing customers to perform most banking transactions without visiting physical branches (BIDV, 2025).

Digital banking at BIDV is not only a transactional channel but also a catalyst for internal transformation. Numerous back-office processes, credit services, financial management workflows, and customer support operations have been digitalized and automated, improving efficiency, reducing operational costs, and shortening processing time.

Overall, through SmartBanking and its expanded digital ecosystem, BIDV has established a comprehensive digital banking model serving diverse customer segments while affirming its commitment to technological innovation in alignment with global digital banking trends.

3.2. Current Application of AI in BIDV's Digital Banking Operations

BIDV has proactively deployed AI-based solutions as a core component of its digital banking strategy. One notable application is electronic customer identification (eKYC). Since 2022, BIDV has implemented eKYC for both individual and corporate customers, enabling identity verification through document capture and facial-recognition selfies using computer-vision and deep-learning technologies

to enhance accuracy and prevent fraud (BIDV, 2022; 2025)^[1]. For corporate clients, eKYC facilitates fully online account opening and digital-service registration without physical visits or paper documents; according to a 2025 announcement, businesses can receive funds into their accounts within approximately 10 minutes after successful registration—greatly enhancing convenience and digital experience (BIDV, 2025).

In customer service, BIDV has developed AI-powered chatbots and virtual assistants based on Natural Language Processing (NLP). In 2024, the bank officially launched a chatbot for corporate users on the BIDV iBank digital platform, providing 24/7 support with rapid response times of under 5 seconds for most inquiries (BIDV, 2024). This chatbot assists with questions related to accounts, services, transactions, and technical support—significantly reducing call-center workloads and improving customer satisfaction.

AI is also embedded in internal automation through Robotic Process Automation (RPA) integrated with AI. Since 2019, BIDV has applied RPA across various workflows including payments, reconciliation, document processing, and reporting—lowering operating costs and boosting productivity. Reports indicate that automation has reduced processing time dramatically, with tasks previously performed manually by staff now executed by robots in only about 20% of the original time, equivalent to an 80% reduction (BIDV, 2019; 2024).

Although BIDV does not publicly disclose detailed figures on fraud detection outcomes, the integration of AI into transaction monitoring and anomaly detection—including eKYC verification and digital-transaction control—represents a critical component of the bank's digital risk-management strategy, particularly amid rapidly increasing online transaction volumes.

Despite these achievements, internal sources acknowledge several challenges: inconsistent data quality across systems, legacy operational processes that have not been fully standardized for automation, and a shortage of personnel with advanced AI and data-engineering expertise.

Overall, through the deployment of eKYC, chatbots, and RPA-AI systems, BIDV has progressively realized a modern digital banking model—not only expanding service channels but also optimizing internal operations and reducing costs. This forms a strong foundation for the bank to continue advancing into more sophisticated AI applications such as credit forecasting, big-data analytics, enhanced risk management, and intelligent financial services.

3.3. Assessment of the Current Situation Achievements

The application of artificial intelligence has generated significant achievements for BIDV, strongly accelerating its digital transformation journey. One of the most notable outcomes is the enhancement of customer experience through the eKYC system utilizing Computer Vision and Deep Learning, which has substantially shortened account-opening procedures while reducing identity-fraud risks and improving transaction security. Simultaneously, AI-driven chatbots and virtual assistants using NLP have provided 24/7 customer support, enabling rapid responses to common inquiries, reducing call-center overload, and increasing overall customer satisfaction.

In risk management, AI supports real-time transaction-behavior analysis, enabling early detection of anomalies and

fraud risks, thereby enhancing security amid the surge in digital transactions. AI-based credit-scoring models also allow BIDV to evaluate customers more comprehensively—integrating traditional and alternative data sources—and thus improve lending quality while mitigating bad-debt risks.

The integration of RPA and AI across hundreds of internal processes has significantly reduced processing time, minimized human error, and lowered operational costs. Automated workflows in payments, reconciliation, and compliance monitoring have notably improved staff productivity. Moreover, AI enables BIDV to analyze large volumes of customer and transaction data, supporting more insightful managerial decision-making and proactive customer engagement strategies.

Overall, AI adoption at BIDV has delivered positive impacts across three core pillars: customer experience, operational efficiency, and risk-management capability—forming a crucial foundation for enhancing competitiveness and approaching global standards in digital banking.

Limitations

Despite its positive progress, BIDV faces several limitations in AI deployment. One major constraint is data fragmentation across different systems, platforms, and operational modules developed over multiple technological periods. This results in inconsistent data structures and standards, reducing the effectiveness of AI models that require high-quality, unified datasets.

Automation remains limited in several critical processes—particularly credit operations, which involve complex procedures and heterogeneous documentation. Data constraints and compliance considerations have also hindered the adoption of AI-driven automation in risk-management functions.

Another major limitation is the shortage of skilled personnel in AI, machine learning, and data science. BIDV continues to rely heavily on external technology partners, resulting in challenges in technology transfer and long-term system sustainability. In addition, certain legacy workflows have not been fully standardized, posing obstacles to AI integration.

From a technical perspective, some AI models deployed on a pilot basis have not achieved optimal stability due to the need for ongoing calibration. Scaling such models across the entire system is further impeded by IT infrastructure constraints and cybersecurity requirements. Internal user confidence in automated systems also varies, influenced by longstanding manual-work habits and concerns about algorithmic accuracy.

In summary, these limitations indicate that BIDV is still in a transitional phase between traditional and data-driven operational models, requiring substantial long-term investment to fully harness AI's potential.

Underlying Causes

The first underlying cause stems from BIDV's legacy IT infrastructure. Decades of system development have produced heterogeneous platforms with varying data formats and standards, creating obstacles for AI models that require clean, structured, and large-scale datasets.

The second cause relates to human-resource constraints. Developing an internal workforce specializing in AI and data science requires significant time and financial investment, while the domestic labor market faces shortages of high-quality experts. Consequently, BIDV has yet to build a

sufficiently strong internal AI team capable of independently developing and managing complex models.

Regulatory factors also play a critical role. Legal frameworks governing data privacy, data sharing, cybersecurity, and AI usage in financial services in Vietnam are still evolving, requiring BIDV to adopt cautious implementation strategies, especially for models involving automated decision-making and sensitive data.

Organizational culture presents another challenge. Many staff members remain accustomed to traditional manual workflows, leading to uneven acceptance of AI across departments. Process standardization—an essential prerequisite for automation—has not been fully achieved in certain units.

Finally, cybersecurity and information-security concerns constitute an important cause. Large-scale AI deployment demands higher levels of security protection, while cyber threats and attacks are becoming increasingly sophisticated. Balancing innovation with system safety has therefore slowed AI implementation.

Overall, the limitations in AI adoption at BIDV arise from a combination of data, human-resource, technological, procedural, cultural, and regulatory factors—requiring a coordinated, long-term strategic approach to unlock AI's full potential in the coming years.

4. Solutions to Enhance and Optimize AI Application in Digital Banking at Bidv

Following the analysis of the achievements, limitations, and underlying causes—including fragmented data infrastructure, technological constraints, shortages of specialized human resources, and an incomplete regulatory framework—it is evident that the application of AI at BIDV has not yet reached its full potential. For AI to truly become a core competency contributing to the bank's digital-banking strategy, BIDV must implement a comprehensive set of system-wide solutions that integrate technological, managerial, and human-resource dimensions. The following four groups of solutions are proposed to address existing challenges and strengthen the effectiveness of AI applications in the coming period.

First, the bank must improve its data infrastructure by developing an integrated data platform, standardizing and cleansing data, and strengthening real-time data connectivity to ensure high-quality inputs for AI models.

Second, BIDV should significantly invest in technological infrastructure, particularly cloud computing, microservices architecture, and advanced cybersecurity technologies, in order to handle large-scale data processing and maintain system security amid increasing cyber threats.

In parallel with technological investment, BIDV must develop a highly skilled workforce in AI and data science through internal training programs, partnerships with universities, and the recruitment of top talent from the competitive labor market. Establishing a data-driven decision-making culture is also essential for maximizing operational efficiency.

Finally, the bank should improve its internal AI governance framework, strengthen model validation processes, enhance data-protection mechanisms, and closely collaborate with the State Bank of Vietnam to pilot emerging AI solutions. A balanced integration of data, technology, human resources, and regulatory compliance will enable BIDV to fully unlock the potential of AI, paving the way for a modern, secure, and

sustainable digital-banking model.

5. Conclusion

The application of artificial intelligence in digital banking operations has become a key driver of modernization at BIDV. The findings indicate that AI not only enhances service quality and customer experience but also optimizes operational processes and strengthens risk management capabilities. Nevertheless, due to limitations in data infrastructure, technology, human resources, and regulatory frameworks, AI implementation at BIDV has not yet achieved the desired level of effectiveness. This situation requires the bank to continue undertaking comprehensive investments in data platforms, technological upgrades, talent development, and AI governance mechanisms. With a coordinated and strategic approach, AI will become a core foundation that enables BIDV to enhance its competitive advantage, affirm its position within Vietnam's banking sector, and align with global standards of advanced digital banking.

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