

Blockchain in Banking: Challenges and opportunities for the banking system in Vietnam.

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Abstract: The research explores both the opportunities and challenges associated with applying blockchain technology in the banking systems of Vietnam. It also highlights key considerations for implementing this technology. The chosen research method is qualitative, involving the collection and analysis of documents and reports to provide a comprehensive overview of the issue. This qualitative methodology aligns with the complexity of the issues involved and provides a foundation for the development of tailored solutions to effectively address the challenges and capitalize on the opportunities presented by blockchain technology in Vietnam's banking systems.

Keywords: Blockchain, Vietnam, the banking systems

1. Introduction

In the age of digital advancement, the banking sector is undergoing a significant transformation, with Blockchain emerging as a revolutionary innovation. This technology addresses the challenges associated with recording and maintaining transactions in the banking system, offering benefits such as time efficiency, transparency, durability, auditability, and enhanced security. The adoption of blockchain is expected to result in a substantial reduction of infrastructure costs for banks, potentially saving around 8-12 billion USD per year (Hassani et al., 2018). Recognizing the advantages of blockchain over alternative technologies, banks are actively embracing this trend. According to a survey by IBM (2016) involving 200 banks across 16 countries, it is projected that by 2020, approximately 66% of banks will have integrated this new technology. The implementation of blockchain in the banking sector is progressing at a faster pace than initially anticipated, with notable institutions like ABN Amro, BNP Paribas, Citi, Cr dit Agricole, and others joining the movement.

In Vietnam, businesses are actively striving to align with global banking trends. From 2016 to 2021, the number of State Banks and Fintech enterprises in Vietnam has surged from 40 to 150. Numerous commercial banks in the country have successfully incorporated blockchain technology across various domains. For instance, Vietcom bank has achieved success by applying blockchain to Letter of Credit (L/C), significantly reducing processing time to just 27 minutes compared to the traditional 3-5 days. Another notable case is VietinBank, which has streamlined the duration of both domestic and international interbank transactions from 5-7 working days to just 24 hours through the implementation of Blockchain.

Despite these successes, the banking system in Vietnam encounters challenges in adapting and deploying this innovative technology. Notably, there is a shortage of experts in the field, and the technology is still relatively new to the populace. Additionally, Vietnam lacks a specific legal framework for regulating blockchain technology as of now.

Globally, numerous studies underscore the benefits that Blockchain technology can bring to the banking sector. In 2019, Pierluigi Martino conducted research based on qualitative interviews with three bankers from different European banks who were actively addressing Blockchain challenges. The findings revealed that while Blockchain technology offers opportunities, it also presents potential risks such as the absence of specific legal regulations and certain technical limitations, impeding its seamless integration into the banking sector.

Another study by Tahereh Saheb and colleagues (2021) highlighted that key barriers to unlocking value from Blockchain in the industry are organizational and environmental issues, a lack of understanding among senior managers, and laxity in requirements and regulations. The research employed semi-structured interviews with 15 experts and analyzed and evaluated documents from 35 articles on Blockchain applications.

Additionally, Ahlam Ansari and Hatim Shabbir Bohra (2022) proposed implementing a Blockchain ledger to establish a Linux-based banking system, aiming to enhance trust, security, transparency, and data traceability across the banking system. Furthermore, Blockchain technology has the potential to reshape the banking model by facilitating peer-to-peer transactions between trading partners, eliminating the need for a trusted third party.

In a study by Hisham O. Mbaidin et al (2023), the challenges of applying Blockchain technology to the banking industry in developing countries were presented. These challenges include concerns about network security, legal procedures and regulations, jurisdictional ambiguity in foreign transactions, and high operating costs, which collectively make Blockchain technology less attractive for policymakers to establish a legal framework on an international scale.

Research on blockchain in the Vietnamese banking sector includes a study by Giang Thi Thu Huyen (2018), which delves into how Blockchain technology functions in data storage and fraud prevention. The research not only explores the potential applications of Blockchain but also identifies challenges that may be encountered. It emphasizes the need for an extended period for refining technology development and minimizing application costs.

In the research conducted by Phan Duc Trung (2022), the focus is on the global trends of Blockchain applications in the banking sector and the current status of its applications in Vietnam. The study provides recommendations and legal solutions, suggesting the development of a banking model that emphasizes traditional services while collaborating on various service platforms with businesses. The author advocates for the active involvement of numerous banks and financial institutions to expedite the establishment of a legal framework.

To gather diverse opinions on the use of Blockchain in banking, Nguyen Huu Huan and colleagues (2023) conducted research based on the Technology Acceptance Model (TAM) combined with data collection surveys. The study aims to elucidate the intention to apply Blockchain to customer service and its broader societal impact. This approach allows for a comprehensive understanding of perspectives on the adoption of Blockchain in the banking sector.

There are many research articles that have pointed out the advantages and disadvantages as well as the opportunities and challenges that arise when applying Blockchain to the banking sector. However, most of these research articles focus on researching the above issues with a large scope of the world's economy in general, there are quite a few studies that point out the opportunities of Blockchain in the banking sector. in a particular country. Therefore, this research article suggests that a qualitative method is well-suited for addressing the challenges of applying blockchain in the Vietnamese banking system. By leveraging existing documents and reports, the research gains insights into the nuances of the problem. Additionally, the qualitative approach allows for a nuanced understanding of the challenges and opportunities, paving the way for more informed and targeted solutions.

2. General Introduction to Blockchain Technology in the Banking.

2.1. Theoretical Foundations of Blockchain Technology.

Blockchain, a distributed database, maintains an expanding series of ordered records known as blocks, interconnected through cryptographic links. Each block includes the cryptographic hash of its predecessor, along with a timestamp and transaction data. Functioning as a public, distributed, and decentralized digital ledger, blockchain records transactions across multiple computers, ensuring retroactive alterations require consensus across subsequent blocks and the network. Immutable blocks, applied to various banking applications, have the potential to enhance the security and efficiency of banking processes, introducing transparency compared to conventional methods.

This transformative technology enables users to chronicle diverse information, including bank balances, assets, and medical records, fostering trust in data integrity. Users can confidently rely on this innovation to safeguard their information, as changes or tampering are deterred. For instance, by recording asset transactions on the blockchain, users can incontrovertibly establish the legitimacy of their assets. This progressive innovation signifies a secure and transparent means for individuals to store information.

2.2. Impact of Blockchain technology on the banking.

Presently, many banks grapple with persistent issues in their operational systems, marked by repetitive, time-intensive, and costly processing activities. In response, prominent banks, including central banks, are actively exploring the integration of Blockchain into their existing frameworks. The adoption of Blockchain is envisioned to streamline data processing tasks, enhancing operational speed, transparency, and cost-effectiveness. Consequently, this implementation is anticipated to yield substantial reductions in operational expenses, leading to increased profitability. As global market competition intensifies, Blockchain emerges as a pivotal consideration for banks worldwide. This research article will delineate specific impacts of Blockchain technology on the banking sector.

2.2.1. Eliminate duplicate operations between banks.

Know Your Customer (KYC) represents the obligatory responsibility of banks to document and verify customer details prior to engaging in any financial transactions. This process involves the submission of customer information to the respective bank for account opening, with the data subsequently stored in the bank's centralized system, accessible exclusively to the bank. Consequently, customers encountering the need to open accounts with different banks must repetitively provide their information, necessitating redundant steps for account initiation.

This redundancy in activities across banks proves inefficient, consuming considerable time and financial resources. Blockchain technology offers a solution by enabling the storage of customer data in a block, shareable among multiple banks. This approach significantly reduces information processing times, enhances operational efficiency, and eliminates redundant efforts (Gupta & Gupta, 2018; Guo & Liang, 2016). The immutability of data stored in blocks ensures the accuracy and integrity of information.

The application of Blockchain introduces the potential for establishing a data link between banks, particularly in the context of enhancing the process of drafting letters of credit. When the involved parties operate within their dedicated Blockchain network, data can be shared through a privately transmitted record, facilitated by smart contracts that mandate clear terms and conditions. This technology allows for the storage of customer information within a block, which can be seamlessly shared among banks. The immutability inherent in the information stored in these blocks ensures data accuracy and integrity. Once included in a block, information becomes readily accessible to other banks.

Blockchain stands poised to optimize the efficiency of exchanges and fortify regulatory safeguards. With participating institutions leveraging a foundational Blockchain platform, exchanges can be executed seamlessly, offering heightened efficiency and simplicity in the process.

2.2.2. Save time and costs

The current average transfer time for international payments is 1-5 business days, incurring costs ranging from \$40-\$50 (Inpay; Wise). In response to these challenges, banks are exploring Blockchain technology as a potential solution for expedited and cost-effective international transactions (Isaksen, 2018). Blockchain enables banks to conduct direct international payments efficiently and economically by establishing their own Blockchain network for direct fund transfers between banks (Isaksen, 2018; Guo & Liang, 2016). Transactions are recorded in immutable blocks, and the ledger is accessible to stakeholders without the need for intermediaries.

This approach has the potential to alleviate the time and cost constraints associated with traditional systems like SWIFT (Isaksen, 2018). Blockchain's direct connection between banks facilitates swift and transparent transactions, eliminating the necessity for third-party intermediaries. This not only streamlines the payment process but also reduces operational costs. Blockchain transactions can be completed within a few hours, a notable improvement compared to the 1-5 business days typically required by SWIFT (Petrov, 2019).

2.2.3 Enhance transparency and security data

Before the adoption of Blockchain, the centralized storage of all bank data, including sensitive customer information and transaction records, posed a potential security risk due to the vulnerability of centralized databases to attacks and the theft of critical bank information. The application of Blockchain technology in banking addresses these concerns by eliminating intermediaries and mitigating the risk of database attacks (Park & Park, 2017). The decentralized nature of Blockchain enhances security, offering a resilient defense against unauthorized access and potential breaches.

Moreover, Blockchain's inherent transparency, particularly in fields requiring data disclosure, contributes to increased data transparency. This quality positions Blockchain as a valuable technology across diverse sectors, including banking. Additionally, as a distributed technology, Blockchain enhances data transparency, mitigates risks in banking, and serves as an immutable ledger, ensuring a singular version of truth. This characteristic fosters trust in the integrity of stored information (Wang et al., 2019).

Blockchain's functionalities extend to authentication, security, privacy, access control, data and resource provenance, and integrity assurance in the services it provides (Mackey et al., 2019; Yi, 2019). Transactions and relevant data are shared across the network, ensuring timely information dissemination to all network participants, thereby fostering increased customer trust (Queiroz & Wamba, 2019).

3. Opportunities for Vietnam to apply blockchain technology in the banking sector.

3.1 Support Authorized agencies in applying Blockchain technology.

In 2020, the Prime Minister of Vietnam, as per Decision No. 2117/QĐ-TTg dated December 16, 2020, accorded priority to Blockchain in research, development, and application, recognizing its proactive role in the Fourth Industrial Revolution. The Ministry of Science and Technology further endorsed Blockchain as a key technology in the national science and technology program for the period up to 2025, ranking it second after artificial intelligence (AI). Despite a relatively low adoption of traditional banking services among its population compared to global counterparts, Vietnam boasts a well-developed digital infrastructure.

Given the emphasis placed by official agencies on Blockchain research, the Vietnamese banking system is well-positioned to capitalize on the potential and opportunities presented by Blockchain technology, thereby augmenting the integration of banking transactions into people's daily lives. Vietnam stands to realize significant potential in advancing digital banking in the medium term. The banking industry in Vietnam is recognized as a frontrunner in adopting advanced technology. To enhance customer experiences and stay abreast of the digital economy, where digital banking is central to service provision and competitive advantage, Vietnamese banks can leverage the support and priority accorded to Blockchain technology research by authorized agencies, enabling a comprehensive and thorough exploration of Blockchain's potential.

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4. Challenges facing Vietnam when applying Blockchain technology into the banking sector.

While Vietnam holds promising opportunities in the application of Blockchain technology in the banking sector, several significant challenges impede its expansion and development. This research article will highlight three major obstacles hindering the progress of Blockchain technology in Vietnam's banking sector.

4.1 Challenges related to technical and technological issues.

4.1.1. Scalability problem

Scalability emerges as a significant technical hurdle for implementing Blockchain technology in the banking sector, particularly in developing countries (Zhang et al., 2018; Harwood-Jones, 2016). Scalability, in this context, refers to a Blockchain's capacity to handle a growing volume of transactions while maintaining security and performance. The evolving nature of Blockchain technology underscores the importance of scalability, given the expanding scale and complexity of the network with each added transaction.

Blockchain operates as a decentralized network where nodes require mutual consensus on transactions to uphold the integrity of the Blockchain and prevent malicious activities. However, this decentralized nature can result in slower and more expensive processing. Additionally, Blockchain exhibits low throughput due to the structure of small blocks and extended block distances, further impacting transaction processing speed. As a consequence, the inherent throughput limitations coupled with an increasing number of Blockchain users contribute to heightened information processing demands, resulting in escalated costs and time requirements for storage. Addressing scalability challenges is imperative for realizing the full potential of Blockchain technology in the banking sector.

4.1.2. Issues related to privacy and security

While Blockchain technology offers enhanced transparency and data security, it is not immune to cybersecurity threats and data breaches. According to Mr. Vu Cong Hung from the State Bank of Vietnam, there are notable risks and shortcomings in the security, confidentiality, and privacy aspects of Blockchain applications.

One vulnerability lies in unprotected endpoints, which may allow hackers to exploit key access points and gain unauthorized entry into Blockchains. Once inside, hackers, particularly those with elevated access rights, such as investment banks, can inflict substantial damage by manipulating Blockchain blocks. Notably, 51% attacks or Distributed Denial of Service (DDoS) attacks pose serious security concerns for Blockchain operations. These attacks are more prevalent in the early stages of the chain and involve an individual or organization amassing over half of the system's computational power, granting them control over the entire system. This control enables hackers to alter transaction sequences, impede confirmations, and even reverse previously completed transactions, leading to double spending.

Additionally, the reliance on public or private key cryptography for transaction verification introduces another layer of risk. Loss, damage, or theft of the key stored in a device can compromise system security. Despite Blockchain's reputation for anonymity, a user's true identity can potentially be revealed through the analysis of transaction data from a specific node or by scrutinizing Blockchain data network and activities. The extraction of a user's IP address, linked to their wallet, further challenges privacy. While Blockchain serves as a trusted intermediary through advanced algorithms, the irreversible loss of information poses significant risks. Privacy

violations within a Blockchain can result in irreparable damage to the information, data, or assets of customers or data owners.

In contrast to traditional payment systems with limited visibility, Blockchain transactions are publicly visible. While this ensures transparency and transaction security, it simultaneously imposes restrictions on transactions requiring complete privacy protection, presenting a trade-off between security and privacy (Nofer et al., 2017; Hughes et al., 2019).

4.2. Challenging legal issues.

The absence of a well-defined legal framework poses a significant challenge to the application of Blockchain technology in the banking sector in Vietnam. Currently, Vietnam lacks specific legal regulations pertaining to the implementation of Blockchain and the associated practices within the banking system. The absence of clear legal guidelines has contributed to the emergence of independent mining companies, where the legality of transactions becomes uncertain, impeding operational efficiency and introducing risks for both companies and customers.

Compounding the challenge, there are no universally recognized legal standards or regulations for trade and commerce related to Blockchain technology. The lack of globally accepted legal procedures further hinders the widespread adoption of Blockchain in the banking sector. This legal ambiguity, as highlighted by Garg et al. (2021) and Patki & Sople (2020), inhibits the development and deployment of Blockchain solutions, preventing their integration into the mainstream banking practices in Vietnam. Addressing this legal vacuum is crucial for providing a stable and secure environment for the application of Blockchain technology in the country's banking sector.

The reason why there is currently no specific legal corridor for this is due to concerns about cybersecurity, ambiguity about jurisdiction in cross-border transactions, and difficulties in integrating other systems with Blockchain, the cost of operating the facility is also high, national financial constraints... especially due to concerns about criminal activities and the potential risks and effects of money electronic money for national currencies makes governments and lawmakers hesitant to legalize Blockchain and Blockchain-related businesses, especially cryptocurrency-related businesses.

4.3. Challenges for banks.

In Vietnam, the application of Blockchain by banks encounters formidable challenges primarily related to efficiency and operating costs. The selection of Blockchain type and the extent of network users significantly impact both costs and operational efficiency for banks. The escalation of transactions on the Blockchain enhances security measures but concurrently diminishes transaction speed, consequently resulting in reduced operational and processing efficiency. This increase in transaction volume further contributes to elevated data entry and storage costs, exacerbating financial burdens on banks. Additionally, considerations encompass various expenses such as infrastructure investments and high technology costs, compounding the challenge of expanding the customer base and enhancing the performance of businesses and banks utilizing Blockchain. Consequently, these entities confront multiple difficulties and challenges in navigating the intricate landscape of Blockchain implementation in the Vietnamese banking sector.

A significant impediment to the adoption of Blockchain technology in Vietnam's banking sector is the widespread lack of understanding among businesses. Many enterprises exhibit a deficiency in comprehension, professional knowledge, and expertise regarding Blockchain technology. As of now, only a select few prominent banks in Vietnam, namely VietinBank, VIB, and TPBank, have successfully experimented with Blockchain applications, notably in testing interbank money transfers in 2018 and international money transfer transactions in 2019. Subsequently, other major institutions such as Vietcombank, HSBC Vietnam, BIDV, HD Bank, and MB have effectively implemented Blockchain technology for deploying letters of credit in 2020 and 2021. Despite these notable instances, the overall pace of integrating Blockchain into the Vietnamese banking sector remains sluggish. The current application has predominantly centered on utilizing Blockchain as a distributed database for information collection, management, and sharing, indicating a limited exploitation of the technology's full potential in the banking sector.

5. Proposed solutions to solve challenges in Vietnam.

The facilitation of Blockchain literacy among primary staff in businesses is imperative, necessitating concerted efforts from both the government and enterprises. Encouraging investments in educational initiatives, including courses, seminars, and classes on Blockchain, will empower officials with foundational knowledge, applications, and potential skills in their respective domains. Establishing a comprehensive library of Blockchain documents within businesses can further aid employees in self-directed research and learning. Concurrently, businesses should actively implement pilot projects utilizing Blockchain in specific processes, enabling employees to witness the tangible benefits of the technology and acclimate to its application. Collaborative engagements with Blockchain companies and experts, along with active participation in domestic and global Blockchain communities, facilitate discussions and knowledge exchange, expanding networks and ensuring access to the latest developments in Blockchain technology. This multifaceted approach is integral to fostering a well-informed and proficient workforce capable of harnessing the full potential of Blockchain in various business contexts.

5.2. Propose solutions to legal problems.

To assess the viability of Blockchain technology within the domestic banking system, the government should promulgate pilot decrees. Simultaneously, ministries and branches must proactively formulate guidelines aimed at constructing and refining policies and legal frameworks governing products and services developed based on Blockchain technology. Criteria for shaping these policies and frameworks encompass the establishment of an innovation-friendly environment while ensuring technological neutrality that allows the market to dictate technology choices. Additionally, leveraging the existing legal framework for managing and addressing related issues is recommended, with a flexibility to issue adjustment documents or exceptions when necessary to promptly resolve emerging problems. This strategic approach aims to strike a balance between fostering innovation and providing a regulatory structure that adapts to the evolving landscape of Blockchain technology in the domestic banking sector.

5.3. Propose solutions to privacy and security issues.

Mitigating the issue of endpoint vulnerabilities associated with storing access keys on the Blockchain can be addressed through the adoption of trusted encryption schemes, particularly when keys are stored on offline devices. This approach minimizes the risk of theft. Alternatively, if storing keys on online devices is necessary, businesses should consider installing reputable antivirus programs to enhance security. To further safeguard against unauthorized access, it is essential to refrain from leaving keys in document files such as Word, Notepad, or other note files on computers.

Moreover, the challenge of transaction transparency impacting privacy in Blockchain can be effectively countered by implementing layer 2 protocols like Zero-Knowledge rollups. These protocols introduce an additional layer of security to Blockchain chains. Transactions utilizing valid Zero-Knowledge proofs leverage mathematical principles, wherein the prover furnishes a mathematical proof only they possess, and the verifier utilizes this proof to confirm the transaction's validity. This methodology allows for confidential transactions without divulging the transaction's content. Additionally, adopting layer 2 protocols addresses scalability concerns in Blockchain for businesses.

5.4. Propose solutions to cost problems for banks.

The government should formulate policies aimed at supporting banks in the development of highly qualified human resources and investing in infrastructure to alleviate input costs for businesses in the short term. However, recognizing the limitations of domestic capital, it is crucial to seek long-term solutions for sustained effectiveness. One viable long-term strategy involves actively soliciting and attracting foreign investment capital to implement Blockchain technology within the Vietnamese banking sector. Leveraging Vietnam's perceived capacity to emerge as a regional and global technology hub, the country can entice foreign investors and development partners in the technology sector. This approach not only opens avenues for capital infusion but also provides substantial opportunities to access cutting-edge technologies such as Blockchain and AI. The synergistic effect of these advancements contributes to the limitless expansion of the digital economy, fostering sustained growth and

competitiveness on a global scale.

Conclusion

The potential for Blockchain in the Vietnamese banking sector is substantial, offering opportunities to enhance transparency, reliability, and security in financial transactions while mitigating fraud risks. Additionally, Blockchain can establish a rapid and cost-effective payment system for banks. However, the implementation of Blockchain in banking is not without its challenges. The integration of this new technology into existing banking systems is complex, given the scale and intricacy of these systems. Furthermore, the absence of specific legal frameworks for implementing Blockchain technology poses significant challenges to Vietnam's banking system. Lastly, a lack of information and awareness about Blockchain in the industry underscores the need for consensus and acceptance from stakeholders for successful implementation.

To successfully apply Blockchain in Vietnamese banking, collaborative efforts among banks, regulatory agencies, and technology companies are imperative. This collective endeavor should focus on creating an environment conducive to the development and implementation of Blockchain in the banking industry. Capitalizing on the immense potential that Blockchain offers for improving banking operations, the adoption of this technology in Vietnam represents an opportunity to harness its benefits and propel the development of the banking sector.

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