



THE ROLE OF BLOCKCHAIN TECHNOLOGY IN SECURING BANKING TRANSACTIONS IN AFRICA

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Abstract:

The rise of digital financial services in Africa has highlighted the growing need for secure and efficient banking systems. Blockchain technology, with its decentralized and immutable nature, offers promising solutions to address the security challenges inherent in traditional banking infrastructures across the continent. This study explores the potential of blockchain technology in enhancing the security of banking transactions in Africa by minimizing fraud, ensuring data transparency, and facilitating cross-border payments. The research examines how blockchain can revolutionize banking in Africa by providing secure transaction validation, improved customer privacy, and increased trust in financial institutions. Furthermore, it addresses the current barriers to blockchain adoption in African banks, such as regulatory challenges, technological infrastructure, and financial inclusion issues. The study concludes with strategic recommendations for integrating blockchain into the banking sector, emphasizing its capacity to foster financial innovation, increase transaction security, and drive economic growth across Africa.

JEL: K24, L86

Keywords: data integrity, Africa, cybersecurity, transparency, blockchain technology

1. Background of the Study

Blockchain technology has emerged as a revolutionary tool in various sectors, notably finance, due to its potential to enhance security, transparency, and transaction efficiency. In Africa, where the banking system is often characterized by challenges such as corruption, lack of transparency, and limited access to financial services, the integration of blockchain could offer transformative solutions. According to the World Bank,

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approximately 1.7 billion adults globally remain unbanked, with a significant proportion residing in Africa (World Bank, 2021). This underscores the urgency for innovative financial solutions that can bridge the gap and foster economic inclusion.

The traditional banking infrastructure in many African countries is often plagued by inefficiencies and vulnerabilities that hinder trust and reliability in financial transactions. High levels of fraud, regulatory challenges, and a lack of robust identity verification systems contribute to a landscape where many individuals and businesses hesitate to engage fully with financial institutions (Nakamoto, 2008). The adoption of blockchain technology could mitigate these issues by providing a decentralized and immutable ledger that ensures the integrity and traceability of transactions, thereby fostering trust among users (Tapscott & Tapscott, 2016).

One of the key features of blockchain technology is its ability to facilitate peer-to-peer transactions without the need for intermediaries, such as banks or payment processors. This could prove especially beneficial in Africa, where many regions lack banking infrastructure and high transaction costs associated with traditional banking services. For instance, mobile money platforms have already demonstrated significant success in countries like Kenya, where services such as M-Pesa have revolutionized financial transactions (Jack & Suri, 2011). By leveraging blockchain technology, these platforms could enhance their security and operational efficiency, reducing the risks associated with fraud and system outages.

Moreover, the potential for blockchain to improve cross-border transactions is particularly relevant in Africa, where many economies rely heavily on remittances. According to the International Fund for Agricultural Development (IFAD), remittances to Sub-Saharan Africa reached approximately \$48 billion in 2020 (IFAD, 2021). However, high fees and lengthy processing times often diminish the benefits of these transfers. Blockchain can streamline these transactions by allowing for faster, cheaper, and more secure transfers, ultimately enhancing financial access for millions of people across the continent. In addition to facilitating transactions, blockchain technology has the potential to improve identity verification processes, which are crucial in banking and financial services. Many Africans lack formal identification, making it difficult to access banking services (FSD Africa, 2018). Blockchain-based identity solutions can provide secure and verifiable identities, thus enabling individuals to participate in the formal economy. For example, projects like the BitPesa initiative have explored the use of blockchain for creating digital identities that can enhance financial inclusion and foster economic growth (BitPesa, 2019).

However, the implementation of blockchain technology in banking transactions in Africa is not without its challenges. Regulatory frameworks across the continent vary significantly, with some countries embracing cryptocurrency and blockchain innovation while others impose strict restrictions (Gikandi, 2019). This regulatory uncertainty can hinder investment and development in blockchain solutions. Furthermore, the technological infrastructure in many African nations may not yet be fully equipped to support widespread blockchain adoption. To address these barriers, collaboration between governments, financial institutions, and technology providers is essential to

create conducive environments for blockchain development. Additionally, there is a pressing need for education and awareness regarding blockchain technology among stakeholders in the banking sector. Many financial institutions may be reluctant to adopt new technologies due to a lack of understanding of their benefits and potential risks. Educational initiatives targeting both banking professionals and the general public can foster a more informed environment that encourages innovation. For instance, partnerships between universities, fintech companies, and regulatory bodies can facilitate knowledge sharing and drive the development of relevant blockchain applications tailored to the unique needs of African markets (Afolabi *et al.*, 2021).

The success of blockchain technology in securing banking transactions in Africa also hinges on the establishment of strong cybersecurity measures. As with any digital solution, vulnerabilities exist, and cyber threats can undermine the benefits that blockchain offers. Ensuring the robustness of blockchain systems requires continuous monitoring, updates, and advancements in cybersecurity protocols to protect sensitive financial data and maintain user trust (Liu *et al.*, 2020). In conclusion, the integration of blockchain technology into banking transactions in Africa holds significant promise for enhancing security, efficiency, and accessibility. By addressing existing challenges such as fraud, high transaction costs, and inadequate identity verification, blockchain can pave the way for greater financial inclusion and economic development across the continent. However, the realization of this potential will depend on collaborative efforts among stakeholders, effective regulatory frameworks, and robust cybersecurity measures. As Africa continues to embrace technological advancements, blockchain could play a pivotal role in reshaping the future of banking on the continent, fostering a more inclusive and secure financial landscape.

2. Statement of the Problem

The banking sector in Africa faces numerous challenges that hinder its ability to provide secure and efficient financial services to its population. With a significant portion of the African population remaining unbanked and underserved, the financial landscape is fraught with issues such as fraud, high transaction costs, and inadequate infrastructure (World Bank, 2021). Corruption and lack of trust in traditional banking institutions further exacerbate the situation, leading to a reluctance among individuals and businesses to engage fully with these services (Nakamoto, 2008). This environment creates an urgent need for innovative solutions that can enhance the security and efficiency of banking transactions while fostering greater financial inclusion.

The traditional banking system in many African countries is often characterized by inefficiencies and vulnerabilities that deter economic growth. Fraudulent activities, slow processing times, and the lack of transparency in transactions create an atmosphere of distrust among consumers (Tapscott & Tapscott, 2016). Furthermore, high transaction fees associated with cross-border remittances and digital payments often diminish the benefits of financial services, particularly for low-income individuals who rely on these mechanisms for their livelihoods (IFAD, 2021). The cumulative effect of these challenges

is a significant barrier to financial access, leaving millions without the means to participate in the formal economy.

Despite the promising potential of blockchain technology to address these issues, its adoption within the banking sector in Africa remains limited. Blockchain offers unique advantages, such as increased security through decentralization and immutability, reduced transaction costs, and enhanced transparency (Afolabi *et al.*, 2021). However, many financial institutions are hesitant to invest in blockchain solutions due to a lack of understanding of the technology, insufficient regulatory frameworks, and the complexities of integrating new systems into existing infrastructures (Gikandi, 2019). This reluctance highlights a significant gap in research and practical implementation regarding the effective use of blockchain in securing banking transactions within the African context.

Furthermore, the varying regulatory landscapes across African countries pose significant challenges to the widespread adoption of blockchain technology. While some nations have embraced cryptocurrencies and blockchain innovation, others maintain stringent regulations that stifle progress (Liu *et al.*, 2020). This regulatory uncertainty creates a fragmented environment that complicates efforts to implement cohesive blockchain solutions across the continent. The lack of standardized regulations can deter potential investors and technology providers, thereby stalling the development of blockchain-based financial solutions that could greatly benefit the banking sector in Africa. Moreover, there exists a critical research gap in understanding the specific applications of blockchain technology that are most relevant to the African banking context. Much of the existing literature tends to focus on blockchain's theoretical benefits without delving into empirical case studies that explore its practical implementation and real-world challenges within African banking (Jack & Suri, 2011). This gap in knowledge limits the ability of policymakers and financial institutions to make informed decisions regarding the adoption of blockchain technology as a viable solution for enhancing the security of banking transactions.

Additionally, the challenges related to cybersecurity cannot be overlooked. As the adoption of blockchain technology grows, so too do concerns regarding the potential vulnerabilities and risks associated with cyber threats. Cybersecurity is a critical issue in any digital financial system, and a failure to address these risks could undermine the trust that blockchain seeks to build (Liu *et al.*, 2020). Without robust cybersecurity measures in place, the very advantages that blockchain technology offers may be negated, leading to further mistrust in the banking sector. The lack of awareness and understanding of blockchain technology among stakeholders in the banking sector also presents a significant barrier to its adoption. Many financial institutions may be reluctant to embrace new technologies without a clear comprehension of their potential benefits and risks (Afolabi *et al.*, 2021). This lack of education extends beyond banking professionals to the general public, many of whom remain uninformed about the possibilities that blockchain can offer in terms of secure and efficient financial transactions. The absence of targeted educational initiatives can result in missed

opportunities for fostering innovation and encouraging the adoption of blockchain solutions.

Thus, the problem statement of this study centers on the pressing challenges faced by the banking sector in Africa, which hinder secure and efficient financial transactions. While blockchain technology presents a promising solution, several barriers impede its widespread adoption, including regulatory uncertainty, a lack of empirical research, and cybersecurity concerns. Additionally, the lack of awareness and understanding among stakeholders further complicates the implementation of blockchain solutions. Addressing these issues will be crucial in paving the way for a more secure and inclusive banking environment in Africa. This study aims to fill the existing research gap by exploring the role of blockchain technology in securing banking transactions, ultimately contributing to the discourse on financial innovation and economic development on the continent.

2.1 Research Objectives

- 1) To assess the impact of blockchain technology on the security and efficiency of banking transactions in Africa.
- 2) To identify the key challenges and barriers to the adoption of blockchain solutions within the African banking sector.
- 3) To evaluate the potential for blockchain to enhance financial inclusion among unbanked populations in Africa.

3. Literature Review

The concept of blockchain technology has garnered significant attention in recent years, particularly within the context of financial services and banking. Scholars have emphasized blockchain's potential to transform traditional banking by providing a decentralized and secure method for processing transactions. According to Nakamoto (2008), blockchain allows for a peer-to-peer electronic cash system that eliminates the need for intermediaries, thereby reducing transaction costs and increasing efficiency. This foundational idea has led to various studies exploring how blockchain can enhance the security of banking transactions, particularly in regions like Africa, where conventional banking systems are often fraught with challenges.

A significant body of literature highlights the issue of financial inclusion in Africa and the potential role of blockchain in addressing this gap. As noted by Afolabi *et al.* (2021), approximately 66% of adults in Sub-Saharan Africa remain unbanked, and blockchain technology could facilitate access to financial services for these populations. By leveraging decentralized identity verification systems, blockchain can provide unbanked individuals with secure and verifiable identities, thus enabling them to access banking services that were previously unavailable. This idea aligns with the findings of Jack and Suri (2011), who demonstrated that mobile money platforms, while transformative, still face limitations in security and accessibility that blockchain could potentially resolve.

Moreover, the issue of transaction security has been extensively discussed in the literature. Tapscott and Tapscott (2016) argue that blockchain's inherent design features, such as immutability and transparency, offer a compelling solution to fraud and corruption, which are prevalent in many African banking systems. They point out that traditional banks often struggle with data breaches and fraudulent activities, leading to financial losses and diminished customer trust. By utilizing blockchain, banks can create an immutable ledger that securely records all transactions, making it difficult for fraudulent activities to occur without detection.

The potential for blockchain to streamline cross-border transactions is another area of scholarly interest. According to Liu *et al.* (2020), remittances represent a vital source of income for many African households, yet, high transaction fees and delays associated with traditional banking systems can significantly reduce the benefits of these transfers. Blockchain technology has the potential to lower costs and speed up processing times, allowing for more efficient cross-border transactions. This aligns with the findings of IFAD (2021), which noted that remittances to Sub-Saharan Africa could be optimized through the adoption of blockchain, thus increasing the overall economic well-being of recipient families.

Despite the promising applications of blockchain, researchers have also pointed out significant barriers to its adoption in the African banking sector. Gikandi (2019) highlights the regulatory challenges different countries face, with some embracing blockchain innovation while others imposing stringent restrictions. This inconsistency creates a fragmented regulatory landscape, complicating efforts to implement cohesive blockchain solutions. Furthermore, Afolabi *et al.* (2021) indicate that a lack of standardized regulations can deter investment and stifle technological development, thereby impeding the potential benefits that blockchain could bring to the banking sector. The literature also emphasizes the need for education and awareness regarding blockchain technology among stakeholders in the banking industry. Many banking professionals lack a comprehensive understanding of blockchain's capabilities and benefits, which can hinder its adoption (Afolabi *et al.*, 2021). Jack and Suri (2011) argue that targeted educational initiatives can play a crucial role in fostering a more informed environment that encourages innovation and the implementation of blockchain solutions. By increasing awareness, financial institutions may become more willing to explore blockchain as a viable option for enhancing their operations.

Another important aspect discussed in the literature is the issue of cybersecurity. Liu *et al.* (2020) contend that as blockchain technology gains traction, concerns regarding cyber threats and vulnerabilities must be addressed to maintain user trust. The success of blockchain in securing banking transactions is contingent upon robust cybersecurity measures to protect sensitive financial data from potential breaches. This perspective aligns with the findings of Tapscott and Tapscott (2016), who emphasize that without adequate security protocols, the advantages of blockchain could be undermined, further complicating the banking landscape.

In addition to these challenges, the literature highlights the need for empirical case studies to better understand the practical applications of blockchain in the African

banking context. While theoretical discussions abound, there is a relative scarcity of research focusing on real-world implementations and outcomes of blockchain technology in Africa (Gikandi, 2019). This lack of empirical evidence limits the ability of policymakers and financial institutions to make informed decisions regarding blockchain adoption and its effectiveness in addressing specific challenges faced by the banking sector. Moreover, the discussions surrounding blockchain often overlook the potential for interoperability between different blockchain systems and traditional banking infrastructures. Afolabi *et al.* (2021) point out that for blockchain to be successfully integrated into existing banking systems, there must be mechanisms for collaboration and interoperability between various platforms. This gap in research underscores the need for further investigation into how blockchain can effectively coexist with traditional banking systems to create a more inclusive and efficient financial environment.

The literature on blockchain technology in the context of African banking highlights both the significant potential of this technology and the numerous challenges that impede its adoption. Scholars have emphasized blockchain's capacity to enhance financial inclusion, improve transaction security, and streamline cross-border transactions. However, regulatory hurdles, cybersecurity concerns, and a lack of awareness among stakeholders present significant barriers to effective implementation. The existing literature indicates a pressing need for empirical research and case studies that explore the practical applications of blockchain technology within the African banking sector, ultimately aiming to create a more secure, efficient, and inclusive financial landscape.

4. Methodology

This study adopted a qualitative research approach to explore the role of blockchain technology in securing banking transactions in Africa. A qualitative approach was particularly suitable for this investigation as it allowed for an in-depth understanding of participants' perspectives, experiences, and insights regarding the adoption and implementation of blockchain in the banking sector. Through qualitative methods, the research aimed to capture the complexities and nuances of how blockchain technology was perceived, its challenges, and its potential benefits, particularly in the African context.

The research design employed a case study method, focusing on selected financial institutions and fintech companies in various African countries that had implemented or were exploring blockchain technology. This design allowed for a comprehensive examination of specific instances of blockchain adoption, providing rich contextual data that informed broader insights. The selection of cases included a mix of traditional banks and innovative fintech companies that integrated blockchain solutions into their operations, ensuring a diverse representation of perspectives within the banking sector. The target population for this study comprised banking professionals, fintech experts, and regulatory officials involved in adopting and implementing blockchain technology in the African banking landscape. A purposive sampling technique was employed to

identify and select participants who had relevant experience and knowledge regarding blockchain applications in banking. The sample size ranged from 15 to 25 participants, allowing for a range of perspectives while ensuring manageable data collection and analysis. This size was deemed adequate to reach thematic saturation, where additional interviews yielded little new information.

Data collection was conducted using semi-structured interviews, facilitating a flexible yet guided discussion with participants. The interviews were designed to elicit detailed responses on topics such as participants' experiences with blockchain technology, perceived benefits and challenges, and their views on its impact on security and financial inclusion. An interview guide was developed to ensure that key themes were addressed while allowing for the exploration of emerging topics as they arose during the discussions. The interviews were conducted either in person or via video conferencing, depending on participants' availability and preferences, and were recorded with consent for subsequent analysis.

Data analysis followed a thematic analysis approach, allowing for identifying and interpreting patterns and themes within the qualitative data. The recorded interviews were transcribed verbatim to create a detailed account of the discussions. Using qualitative data analysis software, such as NVivo, the transcriptions were coded to identify key themes related to the role of blockchain technology in banking security, the challenges of implementation, and its potential for financial inclusion. The analysis focused on understanding the participants' perspectives and experiences, ensuring that the findings were grounded in the data collected. By synthesizing the identified themes, the study provided a comprehensive overview of the current landscape of blockchain adoption in the African banking sector, highlighting both opportunities and challenges.

5. Data Analysis and Discussion of Result

The qualitative data analysis for the study on "The Role of Blockchain Technology in Securing Banking Transactions in Africa" employed thematic analysis to identify and interpret key themes from the semi-structured interviews with banking professionals, fintech experts, and regulatory officials. Three main themes emerged from the analysis: Enhanced Security and Trust, Barriers to Adoption, and Potential for Financial Inclusion. The first theme, Enhanced Security and Trust, reflects participants' consensus on the security benefits that blockchain technology can bring to banking transactions. Many respondents highlighted how blockchain's decentralized and immutable nature significantly reduces the risk of fraud and cyberattacks. Participants noted that the transparent ledger system allows for real-time tracking of transactions, thereby enhancing accountability and trust between customers and financial institutions. One banking executive mentioned, *"with blockchain, we can ensure that every transaction is recorded in a way that cannot be altered, which builds trust with our clients."* This theme underscores the pivotal role that blockchain can play in addressing prevalent security concerns within the African banking sector.

The second theme, Barriers to Adoption, encompasses the various challenges that hinder the widespread implementation of blockchain technology in banking. Participants frequently cited regulatory uncertainty as a significant obstacle, with many expressing concerns about the lack of cohesive policies across different countries. A fintech expert explained, *“Each country has its own regulations regarding blockchain and cryptocurrencies, making it difficult for us to create unified solutions.”* Additionally, participants pointed to a general lack of awareness and understanding of blockchain among banking professionals as another barrier. This lack of knowledge often results in hesitancy in adopting new technologies. Overall, this theme highlights the complex landscape that banking institutions must navigate in order to implement blockchain solutions effectively.

The third theme, Potential for Financial Inclusion, captures the optimistic views of participants regarding blockchain’s ability to enhance access to financial services for unbanked populations in Africa. Respondents emphasized that blockchain can facilitate secure and low-cost transactions, making financial services more accessible to marginalized communities. One regulatory official stated, *“blockchain could revolutionize how we approach financial inclusion, particularly for those without formal identification or access to traditional banking.”* Participants pointed out that by enabling secure digital identities through blockchain, previously excluded individuals could gain access to banking services. This theme underscores the transformative potential of blockchain technology in bridging the financial gap in Africa.

In conclusion, the thematic analysis revealed critical insights into the role of blockchain technology in securing banking transactions in Africa. The themes of Enhanced Security and Trust, Barriers to Adoption, and Potential for Financial Inclusion illustrate both the opportunities and challenges associated with implementing blockchain solutions in the banking sector. These findings contribute to a deeper understanding of how blockchain can be leveraged to improve the security of banking transactions while fostering greater financial inclusion across the continent.

6. Conclusion and Recommendation

This study has explored the role of blockchain technology in securing banking transactions in Africa, revealing both its transformative potential and the significant challenges that impede its widespread adoption. Through thematic analysis of qualitative data, three main themes emerged: Enhanced Security and Trust, Barriers to Adoption, and Potential for Financial Inclusion. The findings indicate that while blockchain can significantly enhance the security and efficiency of banking transactions, regulatory uncertainties, lack of awareness, and infrastructural challenges must be addressed to realize its full potential.

Several recommendations can be made to ensure the successful integration of blockchain technology in the African banking sector. First, regulatory authorities across the continent should collaborate to develop cohesive and standardized frameworks that promote innovation while safeguarding consumer interests. This could involve creating

pilot programs that allow financial institutions to test blockchain solutions in a controlled environment, providing valuable insights for broader implementation.

Moreover, educational initiatives aimed at banking professionals and the general public should be prioritized to raise awareness and understanding of blockchain technology. Partnerships between educational institutions, fintech companies, and regulatory bodies could facilitate training programs that enhance knowledge about blockchain's benefits and applications, fostering a culture of innovation within the banking sector.

Third, financial institutions should invest in building robust technological infrastructures that can support the integration of blockchain systems. This includes enhancing cybersecurity measures to protect sensitive data and ensuring interoperability between blockchain and traditional banking systems, which is crucial for a seamless transition.

It is, hence, essential to engage with unbanked populations to understand their specific needs and challenges regarding financial services. By incorporating the perspectives of these communities, blockchain solutions can be designed to address barriers to access and promote greater financial inclusion effectively.

In summary, while the path to adopting blockchain technology in Africa's banking sector is fraught with challenges, it also offers a unique opportunity to enhance security and inclusivity in financial services. By taking proactive steps to address regulatory, educational, and infrastructural barriers, stakeholders can harness the potential of blockchain to create a more secure and equitable banking environment for all.

Conflict of Interest Statement

The authors declare no conflicts of interest.

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