PROCEEDINGS OF THE INTERNATIONAL CONFERENCE FOR INSTITUTE OF ADMINISTRATION (ICIA 2025)

AHMADU BELLO UNIVERSITY ZARIA - NIGERIA

Website: *https://icia.org.ng* **ISBN:** *978-978-695-265-9* ***Volume I, 2025***

BLOCKCHAIN TECHNOLOGY ADOPTION INTENTION IN NIGERIAN FINANCIAL INSTITUTIONS: A MODIFIED TOE FRAMEWORK.

Halimatu Sa'adiya Ibrahim[1]. Shamsudeen Ladan Shagari[2]. Muhammad Auwal Kabir[2]. Bello Usman Baba[2].

[1]Department of Accountancy and Taxation, School of Management Studies, Abubakar Tatari Ali Polytechnic Bauchi, Bauchi State, Nigeria.

[2]Department of Accounting, Faculty of Management Science, Sa'adu Zungur University, Bauchi State, Nigeria.

Correspondence: halimatuibrahim.sms@atapoly.edu or hsibrahim21@gmail.com

ABSTRACT

Blockchain technology has emerged as a transformative innovation with the potential to enhance security, transparency, and operational efficiency across various industries, particularly within financial institutions. In the banking sector, blockchain applications such as cryptocurrencies, cross-border payments, smart contracts, and digital identity verification offer opportunities to reduce transaction costs and improve customer experience. Despite these benefits, the adoption of blockchain technology by financial institutions in Nigeria remains limited. Although prior studies have examined blockchain adoption in different contexts, little attention has been given to the role of artificial intelligence (AI) capabilities in influencing adoption decisions, representing a notable gap in the literature. This study addresses this gap by examining the effects of relative advantage, AI capabilities, and regulatory factors on the intention to adopt blockchain technology in Nigerian financial institutions, drawing on the Technology–Organization–Environment (TOE) framework. The TOE model provides a robust theoretical foundation for understanding technology adoption by considering technological, organizational, and environmental determinants. A quantitative research approach was employed, using a structured questionnaire administered to employees of financial institutions in Nigeria to measure the study variables. Data were analyzed using appropriate statistical techniques

to assess the proposed relationships. The study aimed to provide empirical insights into the key factors driving blockchain adoption intentions, with particular emphasis on the emerging role of AI capabilities alongside traditional technological and regulatory considerations. The findings are expected to offer practical implications for policymakers, regulators, and financial institutions seeking to promote blockchain adoption and maximize its benefits. Additionally, the study contributes to the existing literature on blockchain adoption by extending the TOE framework through the inclusion of AI capabilities within the Nigerian financial context.

Keywords: *Blockchain Technology, Adoption Intention, Financial Institutions, Technology-Organization-Environment (TOE) Framework, Artificial Intelligence (AI) Capabilities, Regulatory Factors.*

1. Introduction

Blockchain technology has emerged as a disruptive innovation with the potential to transform multiple industries, particularly the financial sector, by enabling decentralized, secure, and transparent transaction systems (Nakamoto, 2008). Its core features immutability, distributed consensus, and cryptographic security have been widely recognized as mechanisms for enhancing trust, reducing transaction costs, and improving operational efficiency in financial services such as cross-border payments, trade finance, identity management, and regulatory compliance (Allison, 2015; Swan, 2015). As a result, financial institutions in developed economies have increasingly explored and implemented blockchain-based solutions to modernize legacy systems and improve service delivery.

Despite the growing global interest in blockchain technology, its adoption remains uneven, particularly in developing economies where institutional, technological, and regulatory constraints persist (Chang et al., 2020). In Nigeria, adoption has been notably limited, even though the country possesses one of Africa's most dynamic financial technologies (fintech) ecosystems and a large unbanked population that could significantly benefit from blockchain-enabled financial inclusion (Olanrewaju, 2019; Agbelade, 2023). Prior studies suggest that while Nigerian financial institutions recognize the potential benefits of blockchain, concerns related to regulatory uncertainty, inadequate technical expertise, data security risks, and integration challenges continue to impede large-scale adoption (Odu, 2022; Hussain et al., 2024). These challenges underscore the need for a contextualized and theory-driven examination of the factors shaping blockchain adoption intentions within Nigerian financial institutions.

Existing literature on blockchain adoption has predominantly focused on technological attributes such as perceived usefulness, security, and relative advantage, often drawing from innovation diffusion and

technology acceptance theories. However, these studies frequently overlook the organizational capabilities required to effectively deploy and scale blockchain solutions, particularly in resource-constrained environments. Moreover, empirical research within the Nigerian financial context remains limited and fragmented, offering insufficient explanatory power regarding why adoption intentions remain weak despite apparent technological benefits.

To address these gaps, this study employs the Technology–Organization–Environment (TOE) framework proposed by Tornatzky and Fleischer (1990), which provides a comprehensive lens for analyzing technology adoption by accounting for technological, organizational, and environmental determinants. While the TOE framework has been widely applied in prior information systems research, its application to blockchain adoption in Nigerian financial institutions remains underexplored. Importantly,

Globally, financial institutions have been at the forefront of exploring the transformative potential of blockchain technology. Leading banks and financial service providers have invested heavily in research and development initiatives aimed at improving payment infrastructures, enhancing transparency, and streamlining trade finance processes (Tan, 2025). The trajectory of blockchain adoption within the financial sector has evolved from early conceptual experimentation to the development of enterprise-grade platforms and large-scale pilot implementations, reflecting growing institutional confidence in the technology's operational viability (Schammo, 2021). However, despite these advances, adoption outcomes vary considerably across regions, largely due to differences in regulatory maturity, organizational readiness, and technological capabilities.

Within the African context, blockchain technology has gained increasing attention as a potential solution to persistent financial sector challenges, including limited access to formal banking services, high transaction costs, and widespread financial exclusion (Olanrewaju, 2019). Several countries, notably South Africa, Kenya, and Nigeria, have experienced a surge in blockchain-related initiatives, particularly in areas such as mobile payments, remittance services, and digital identity management (Bah, 2022). This growing interest, which intensified around 2015, has been facilitated by rising internet penetration and widespread mobile phone adoption across the continent (Poushter, 2016). Beyond financial services, African governments have also begun to explore blockchain applications to improve transparency, strengthen public sector governance, and reduce corruption (Manyeruke et al., 2020).

Despite these promising developments, the literature suggests that blockchain adoption in Africa remains largely experimental and uneven. Many initiatives are confined to pilot stages, with limited scalability and institutional integration. These limitations point to deeper structural and organizational challenges that extend beyond technological feasibility alone.

Nigeria, as Africa's largest economy and one of its most dynamic fintech hubs, represents a particularly important case for examining blockchain adoption in financial institutions (Odu, 2022). The country's expanding fintech ecosystem, coupled with high mobile penetration and a growing demand for digital financial services, creates favorable conditions for blockchain-enabled innovations (Agbelade, 2023). Nevertheless, empirical studies consistently identify regulatory uncertainty, inadequate technical expertise, and persistent data security concerns as major barriers to adoption within Nigerian financial institutions (Hussain et al., 2024). Regulatory ambivalence has been especially influential; while the Central Bank of Nigeria (CBN) has maintained a cautious stance toward cryptocurrencies, it has simultaneously acknowledged the broader potential of blockchain technology, as evidenced by its exploration of a central bank digital currency (CBDC) initiative (Olomukoro, 2023). This dual regulatory posture underscores the complex environment in which Nigerian financial institutions must evaluate blockchain adoption decisions.

To systematically examine these dynamics, this study adopts the Technology–Organization–Environment (TOE) framework proposed by Tornatzky and Fleischer (1990). The TOE framework posits that organizational decisions to adopt technological innovations are shaped by three interrelated contexts: technological factors (such as perceived relative advantage), organizational factors (including internal capabilities and managerial support), and environmental factors (such as regulatory conditions and competitive pressures). While the TOE framework has been widely applied in studies of information systems adoption, its use in explaining blockchain adoption within Nigerian financial institutions remains limited.

Building on this framework, the present study introduces Artificial Intelligence (AI) capabilities as a critical organizational factor influencing blockchain adoption intention. Prior research suggests that the convergence of AI and blockchain technologies can significantly enhance financial service delivery by enabling advanced data analytics, automated decision-making, improved fraud detection, and more personalized customer experiences (Butun et al., 2019). AI systems can analyze blockchain-generated data to identify anomalous transaction patterns, while blockchain can provide secure, immutable data infrastructures that enhance the reliability and transparency of AI models. Financial

institutions with stronger AI capabilities may therefore be better positioned to recognize the strategic value of blockchain and overcome implementation challenges.

The relevance of this integrated perspective is heightened by the increasingly complex and risk-laden operating environment of the Nigerian financial sector. Financial institutions face escalating cyber threats alongside rapid fintech innovation, requiring a careful balance between technological advancement and risk management (Adisa, 2023; Khan et al., 2022; Paul et al., 2023). These challenges are further shaped by evolving regulatory frameworks, including the Banks and Other Financial Institutions Act (BOFIA) 2020, which imposes stricter compliance and governance requirements on financial institutions (Maruf, 2025). Additionally, persistent inefficiencies in cross-border payment systems and limited access to affordable financing continue to constrain financial sector performance (Zhang, 2025).

By integrating technological, organizational, and regulatory perspectives, this study provides a more nuanced understanding of the factors influencing blockchain adoption intention in Nigerian financial institutions. In doing so, it responds to calls for empirically grounded, context-sensitive research on emerging technologies in developing economies and contributes to the growing body of literature on blockchain adoption in the financial sector.

Blockchain technology has been widely recognized as a potential solution to persistent challenges in the financial sector, particularly those related to security, operational efficiency, and transparency (Nakamoto, 2008; Swan, 2015). Despite these anticipated benefits, empirical evidence indicates that blockchain adoption within financial institutions remains limited and uneven across regions, reflecting substantial variation in regulatory environments, organizational readiness, and technological capabilities (Zachariadis et al., 2019). In the Nigerian context, financial institutions encounter distinct barriers to adoption, including regulatory caution, shortages of specialized technical expertise, concerns over data security and privacy, and difficulties integrating blockchain solutions with existing legacy systems (Akinyemi et al., 2018; Central Bank of Nigeria [CBN], 2021).

Extant research on technology adoption in financial institutions frequently draws on the Technology–Organization–Environment (TOE) framework to explain adoption behavior. While this framework has proven effective in identifying broad determinants such as relative advantage and regulatory influence, prior studies often treat organizational capabilities in a generalized manner and give limited attention to the role of emerging complementary technologies. In particular, the influence of Artificial Intelligence (AI) capabilities on blockchain adoption decisions remains insufficiently examined,

especially within developing economies such as Nigeria. This omission is notable given the growing evidence that AI and blockchain technologies are increasingly interdependent, with AI enhancing data analytics and decision-making, and blockchain providing secure and trustworthy data infrastructures. Responding to these limitations, this study empirically examines the determinants of blockchain adoption intention in Nigerian financial institutions by extending the TOE framework in line with recent recommendations in the literature (Ullah et al., 2022). Specifically, the analysis focuses on the combined effects of relative advantage (technological factor), AI capabilities (organizational factor), and regulatory factors (environmental factor). By integrating these dimensions, the study offers a more nuanced and context-sensitive understanding of blockchain adoption decision-making within the Nigerian financial sector. This approach contributes to the literature by addressing an underexplored research gap and by providing evidence-based insights that are relevant for both scholars and practitioners seeking to promote effective adoption of blockchain technology in emerging markets.

2. Theoretical framework and hypotheses development.

2.1 Blockchain Technology Adoption in Financial Institutions

Blockchain technology refers to a decentralized digital system that enables secure, transparent, and immutable recording and transmission of data across a distributed network. It operates through cryptographic mechanisms, decentralized consensus protocols, and distributed ledgers, allowing transactions to be verified and recorded simultaneously across multiple nodes without reliance on a central authority (Rasool et al., 2024; Avasthi et al., 2024). This decentralized architecture significantly enhances data integrity, reduces the risk of manipulation, and promotes transparency among network participants (Akbar et al., 2024).

Unlike traditional centralized databases, blockchain technology maintains a shared ledger that is accessible to all authorized participants in the network. Each transaction is grouped into a block, which is cryptographically linked to preceding blocks, forming a continuous and tamper-resistant chain (Shinzeer et al., 2024). The immutability of these records ensures that once data are validated and added to the blockchain, they cannot be altered without consensus from the network, thereby strengthening trust and accountability (Sanyaolu et al., 2024).

Although blockchain is widely recognized as the underlying technology for cryptocurrencies such as Bitcoin, its application extends far beyond digital currencies. Recent studies emphasize its growing relevance across multiple sectors, including finance, healthcare, and supply chain management, due

to its capacity to enhance operational efficiency, reduce transaction costs, and improve data security (Choithani et al., 2024; Vaidya et al., 2024). In the financial sector specifically, blockchain technology is increasingly viewed as a transformative innovation capable of reshaping traditional banking and financial service models.

De Cristano (2024) conceptualizes blockchain as a "distributed ledger of trust," highlighting its role in enabling shared digital records that are continuously updated and verifiable by network participants. This characteristic is particularly critical for financial institutions, where trust, transparency, and regulatory compliance are essential. By eliminating intermediaries and automating verification processes through consensus mechanisms, blockchain technology can streamline transactions, enhance settlement speed, and reduce operational risks (Vanmathi et al., 2024).

Furthermore, blockchain technology facilitates the creation and management of secure digital assets, including cryptocurrencies, smart contracts, digital certificates, and tokenized financial instruments. These innovations introduce new opportunities for financial institutions to develop decentralized financial services, improve cross-border payments, and enhance customer trust through transparent and auditable systems (Vaidya et al., 2024).

Despite its significant potential, the adoption of blockchain technology in financial institutions remains uneven. Existing literature predominantly highlights theoretical benefits and conceptual frameworks, with limited empirical evidence examining adoption determinants, organizational readiness, and regulatory challenges. This gap underscores the need for further empirical investigation into the factors influencing blockchain technology adoption within financial institutions, particularly in developing and emerging economies. By synthesizing existing conceptual insights and identifying unresolved issues, this study contributes to a more structured understanding of blockchain adoption in the financial sector.

This study adopts the Technology–Organization–Environment (TOE) framework as its conceptual foundation to examine factors influencing blockchain technology adoption in Nigerian financial institutions. The TOE framework, originally proposed by Tornatzky and Fleischer (1990), provides a comprehensive lens for analyzing organizational innovation adoption by integrating technological characteristics, organizational capabilities, and environmental conditions. Owing to its strong

explanatory power and extensive empirical validation in information systems and innovation research, the TOE framework is particularly suitable for examining emerging technologies such as blockchain within institutional contexts.

Within the technological dimension of the TOE framework, 'relative advantage' is conceptualized as the degree to which blockchain technology is perceived to offer superior benefits compared to existing financial technologies. Consistent with diffusion of innovation theory, relative advantage reflects improvements in efficiency, security, transparency, and cost reduction that may motivate adoption decisions (Rogers, 2003). Prior studies indicate that financial institutions are more likely to adopt blockchain solutions when the technology demonstrably enhances transaction speed, data integrity, and operational reliability compared to legacy systems.

In addition, this study incorporates 'artificial intelligence (AI) capabilities' as a complementary technological factor influencing blockchain adoption. AI capabilities refer to an organization's ability to deploy artificial intelligence tools to enhance the functionality, scalability, and analytical capacity of blockchain systems. The integration of AI with blockchain has been shown to improve decision-making, automate verification processes, and optimize transaction monitoring, thereby increasing the overall value proposition of blockchain technology (Davenport & Dyche, 2013). By considering AI capabilities within the TOE framework, this study extends prior research that often treats blockchain adoption as a standalone technological decision.

The environmental dimension of the TOE framework is represented by 'regulatory factors', which encompass the legal, institutional, and policy-related conditions governing blockchain adoption. Regulatory clarity, compliance requirements, and government support play a critical role in shaping organizational adoption decisions, particularly in highly regulated sectors such as financial services (Kshetri, 2017). In the Nigerian context, uncertainties surrounding data protection, cryptocurrency regulation, and financial compliance may either facilitate or constrain blockchain adoption, making regulatory factors a critical component of the conceptual model.

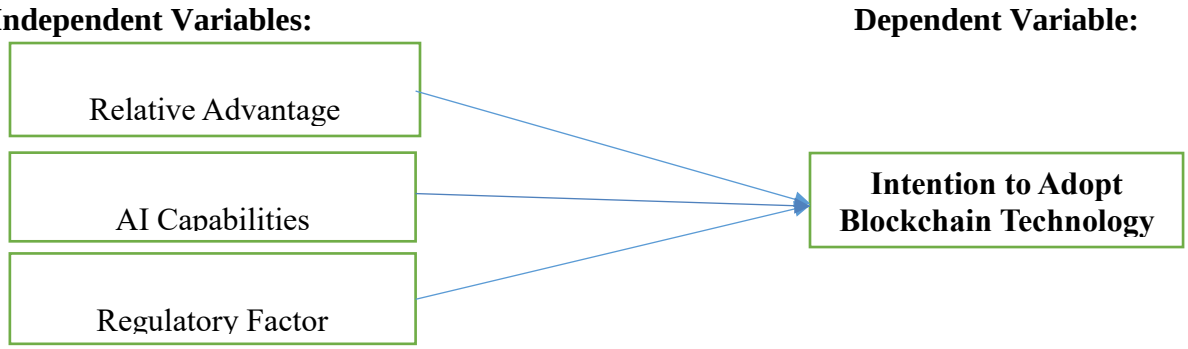
Drawing on the TOE framework, this study proposes that technological factors (relative advantage and AI capabilities) and environmental factors (regulatory conditions) jointly influence the intention to adopt blockchain technology in Nigerian financial institutions. Table 2 summarizes the TOE

dimensions and associated constructs employed in this study, while Figure 1 presents the conceptual model illustrating the hypothesized relationships among the study variables.

Table 2 Research model (TOE) variables and sources

Factors	Sub-factor	Sources
Technological	Relative advantage	Chittipaka et al., (2022); Rasheed et al., (2022) and Wong et al., (2019)
Organizational	AI capabilities	Mikalef et al., (2023)
Environmental	Regulatory factor	Wong et al. (2019); Chittipaka et al., (2022)

2.3 Research Framework



Source: Modified the study of **Chittipaka et al., (2022) and Wang et al., 2022)**
Fig. 1 proposed research framework for Blockchain technology adoption intention

2.3 Technological Factors

Within the Technology–Organization–Environment (TOE) framework, the technological context refers to both internal and external technologies available to an organization, as well as their perceived characteristics that influence adoption decisions. These characteristics typically include perceived usefulness, compatibility, complexity, and ease of use (Jingiing & Idris, 2024). The technological context also encompasses organizational decisions related to software, hardware, network infrastructure, and the procedures required to implement and integrate new technologies into existing systems (Fakhrhosseini et al., 2024).

In the context of blockchain technology adoption, technological factors play a particularly critical role due to the novelty, complexity, and infrastructural demands of the technology. Despite growing interest in blockchain applications within financial services, empirical research examining specific technological attributes influencing adoption decisions remains relatively limited, particularly in developing economies. Consequently, this study focuses on 'relative advantage' as the primary technological factor, given its consistent theoretical relevance and empirical support across innovation adoption studies.

Relative advantage is defined as the degree to which blockchain technology is perceived to provide superior benefits compared to existing technological solutions (Rogers, 2003). In financial institutions, these benefits may include enhanced security, improved transparency, faster transaction processing. Accordingly, the following hypothesis is proposed:

Hi: there is a significant effect between relative advantage and intention to adopt Blockchain technology.

2.3.2 Organizational Factors

Organizational factors play a central role in shaping how institutions develop capabilities, allocate resources, and support the adoption of new technologies. Within the Technology–Organization–Environment (TOE) framework, the organizational context refers to an organization's tangible resources (such as financial and technological assets), intangible resources (including skills, knowledge, and organizational culture), and internal characteristics such as managerial structure and strategic orientation (Al-Reqeb, 2024).

Empirical studies applying the TOE framework identify several organizational attributes that influence technology adoption decisions. For example, Chittipaka et al. (2020), Malik et al. (2021), Choi et al. (2020), and Mulombo et al. (2022) emphasize the importance of top-level management support, organizational readiness, and internal technological capabilities in facilitating innovation adoption. Drawing on this body of literature, the present study focuses on top-level management and AI capabilities as the key indicators of the organizational context influencing blockchain technology adoption in financial institutions.

Among these indicators, AI capabilities are particularly relevant in the context of emerging digital technologies. AI capabilities refer to an organization's ability to acquire, deploy, and effectively utilize artificial intelligence technologies through appropriate infrastructure, skilled personnel, and data

management processes. These capabilities reflect organizational readiness for complex technological integration and signal a firm's commitment to digital transformation.

Relationship between AI Capabilities and Intention to Adopt Blockchain Technology

Prior research provides compelling evidence that AI capabilities positively influence organizational performance and technological preparedness, which in turn can shape the intention to adopt blockchain technology. Alekseeva et al. (2020) and Babina et al. (2021) demonstrate that AI adoption generates significant financial benefits, including increased capital investment, higher research and development expenditure, sales growth, cost reductions, and improved market valuation. These outcomes can create a virtuous cycle whereby organizations with strong AI capabilities possess both the financial capacity and strategic confidence to invest in complementary advanced technologies such as blockchain.

Beyond financial performance, AI capabilities also deliver operational advantages that closely mirror the anticipated benefits of blockchain technology. Nafizah et al. (2024) highlight that AI enhances decision-making accuracy, improves cost efficiency, reduces operational errors, and increases organizational responsiveness to market dynamics. Organizations that have already realized these benefits through AI implementation are more likely to perceive blockchain technology as a valuable extension of their existing digital infrastructure. Moreover, experience with AI reduces perceived technological complexity and implementation risk, thereby increasing organizational willingness to adopt blockchain solutions.

Further support for this relationship is found in TOE-based studies emphasizing the role of organizational IT resources in technology adoption. Chittipaka et al. (2022) identify firm-level IT resources as a critical determinant of blockchain adoption, while Alkhater and Walters (2014) and Sciarelli et al. (2021) argue that organizations with strong technological capabilities are better positioned to integrate emerging technologies into existing systems. AI expertise, in particular, strengthens organizational competence in data analytics, cybersecurity, and system integration capabilities that are essential for effective blockchain implementation.

Synthesizing these insights, the literature suggests that AI capabilities enhance organizational readiness, reduce uncertainty, and strengthen confidence in adopting blockchain technology. However, empirical research examining this relationship within the context of Nigerian financial institutions remains limited. Addressing this gap, the present study posits that AI capabilities play a significant

role in shaping the intention to adopt blockchain technology. Accordingly, the following hypothesis is proposed:

H2: AI capabilities have a significant positive effect on the intention to adopt blockchain technology in Nigerian financial institutions.

2.3.3 Environmental Factors

Environmental factors represent the external conditions that shape organizational structures, processes, and strategic outcomes (Scott, 2003). Within the context of organizational decision-making, the external environment includes economic, political, social, and technological forces that influence how firms operate and respond to innovation opportunities (Hofer, 1975). In studies of technology adoption, these external pressures are particularly important, as they often determine the feasibility and legitimacy of adopting emerging technologies.

Within the Technology–Organization–Environment (TOE) framework, the environmental context refers to external technological infrastructure, industry characteristics, competitive dynamics, and institutional pressures that influence organizational technology adoption decisions (Tornatzky & Fleischer, 1990). Building on this perspective, Oliveira and Martins (2011) conceptualize the environmental context as comprising the technological, industry, and competitive environments that collectively shape firms' adoption behavior. Similarly, Zhu et al. (2006) emphasize the role of industry characteristics, regulatory support, and competitive pressure in influencing firm-level technology adoption.

Regulatory conditions constitute a critical component of the environmental context, particularly in highly regulated industries such as financial services. Government regulations, legal frameworks, and policy guidelines can either facilitate or constrain the adoption of new technologies by reducing uncertainty, ensuring compliance, and providing institutional legitimacy (Al-Qeisi, 2009). In the case of blockchain technology, regulatory clarity regarding data protection, digital assets, financial compliance, and cybersecurity is essential for encouraging adoption among financial institutions.

Relationship between Regulatory Factors and Intention to Adopt Blockchain Technology

Existing empirical studies provide strong support for the relationship between regulatory factors and the intention to adopt blockchain technology. Iftikhar et al. (2021) offer direct empirical evidence, demonstrating that regulatory policy has a significant and positive influence on the intention of Malaysian higher education institutions to adopt blockchain technology. Their findings highlight the

importance of supportive regulatory frameworks in shaping organizational willingness to engage with blockchain-based systems.

Additional studies reinforce this relationship by emphasizing the enabling role of regulation in blockchain adoption. Wong et al. (2019), in their study of blockchain adoption among small and medium-sized enterprises, identify regulatory factors as a key determinant influencing adoption decisions. Although their study does not explicitly measure adoption intention, regulatory support is widely recognized as a prerequisite for the formation of such intention, as organizations are unlikely to pursue technologies that lack legal or institutional legitimacy.

Further support is provided by Malik et al. (2021) and Wang et al. (2022), who examine blockchain adoption in the construction industry using the TOE framework. While these studies focus primarily on adoption behavior rather than intention, the inclusion of regulatory factors in their models underscores the critical role of regulation in the adoption process. Notably, Wang et al. (2022) extend the TOE framework by explicitly incorporating regulatory factors, further emphasizing their influence on organizational technology adoption decisions.

Synthesizing these findings, the literature consistently demonstrates that regulatory factors shape organizational perceptions of risk, legitimacy, and feasibility, thereby influencing the intention to adopt blockchain technology. However, empirical evidence examining this relationship within the Nigerian financial sector remains limited. Given the evolving regulatory landscape surrounding blockchain and digital financial technologies in Nigeria, investigating the role of regulatory factors is both timely and necessary. Accordingly, this study proposes the following hypothesis:

H3: Regulatory factors have a significant positive effect on the intention to adopt blockchain technology in Nigerian financial institutions.

Relationship between Regulatory Factors and Intention to Adopt Blockchain Technology

Beyond the financial and educational sectors, prior studies across diverse industries further emphasize the importance of regulatory factors in shaping blockchain adoption decisions. Haque et al. (2022), in their study of the oil and gas sector, identify regulatory support as a key motivator for blockchain adoption. Although the study does not explicitly measure adoption intention, regulatory clarity and institutional support function as enabling conditions that reduce uncertainty and encourage organizations to consider blockchain adoption as a viable strategic option.

Similarly, Chittipaka et al. (2022), applying the Technology–Organization–Environment (TOE) framework, find that regulatory pressure significantly influences blockchain adoption decisions. While

regulatory pressure may initially appear restrictive, it underscores the role of institutional mandates and compliance requirements in compelling organizations to evaluate and ultimately adopt emerging technologies. In this context, regulatory pressure influences the early stages of the adoption process by shaping organizational intention and readiness to comply with evolving regulatory standards.

Synthesizing findings across sectors and methodological approaches, the literature consistently demonstrates that regulatory factors whether framed as support, policy clarity, or institutional pressure play a decisive role in shaping organizational intention to adopt blockchain technology. In highly regulated environments such as financial services, regulatory legitimacy is often a prerequisite for adoption decisions. However, empirical evidence examining this relationship within Nigerian financial institutions remains limited. Addressing this gap, the present study examines the effect of regulatory factors on blockchain adoption intention. Accordingly, the study hypothesizes that:

H3: Regulatory factors have a significant positive effect on the intention to adopt blockchain technology in Nigerian financial institutions.

3. Methodology

This study adopts a quantitative research design to examine the factors influencing the intention to adopt blockchain technology among Nigerian financial institutions. A survey-based questionnaire was employed as the primary data collection instrument, consistent with established approaches in technology adoption research (Creswell, 2014).

The questionnaire was structured to capture data on the study's key constructs, including relative advantage, AI capabilities, regulatory factors, and intention to adopt blockchain technology. Measurement items were adapted from validated scales in prior studies to ensure content validity and relevance to the financial services context (Hair et al., 2019). Responses were obtained from managerial and technical personnel within Nigerian financial institutions, as these individuals are directly involved in technology-related decision-making and implementation processes.

The collected data were analyzed using statistical techniques appropriate for examining relationships among latent constructs. Regression analysis was employed to assess the influence of relative advantage, AI capabilities, and regulatory factors on the intention to adopt blockchain technology. This analytical approach is widely used in empirical studies investigating technology adoption determinants and provides a robust basis for hypothesis testing (Hair et al., 2019).

By applying a structured quantitative methodology, the study provides empirical evidence on the relative importance of technological, organizational, and environmental factors influencing blockchain adoption in the Nigerian financial sector. The methodological approach ensures transparency and replicability, thereby strengthening the reliability of the findings.

Conclusion

This study extends the existing literature on blockchain technology adoption by examining the combined effects of relative advantage, AI capabilities, and regulatory factors on adoption intention within Nigerian financial institutions. By integrating AI capabilities into the TOE framework, the study offers a novel organizational perspective on blockchain adoption, highlighting the role of advanced digital competencies in facilitating emerging technology integration.

The findings provide important theoretical and practical insights. From a theoretical standpoint, the study reinforces the applicability of the TOE framework in explaining blockchain adoption in developing economies while demonstrating the relevance of AI capabilities as a critical organizational resource. From a practical perspective, the results offer guidance for policymakers, regulators, and financial institutions seeking to create an enabling environment for blockchain adoption. Clear regulatory frameworks, investments in AI capabilities, and demonstrable technological advantages are essential for accelerating blockchain adoption within the financial sector (Kshetri, 2017).

Ultimately, this study contributes to a deeper understanding of the drivers of blockchain adoption and supports strategic decision-making aimed at enhancing technological innovation and competitiveness in Nigeria's financial sector. By addressing existing empirical gaps, the study lays a foundation for future research on digital transformation and emerging technologies in regulated industries.

References

Abubaker, M. S. (2024). Factors for the adoption of blockchain technology in an electronic document management organisation (Doctoral dissertation). Cape Peninsula University of Technology.

Adam, G., Jones, S., & Nancy, M. (2025). The role of cryptocurrencies in the future of peer-to-peer transactions. Unpublished manuscript.

Adama, H. E., Popoola, O. A., Okeke, C. D., & Akinoso, A. E. (2024). Theoretical frameworks supporting IT and business strategy alignment for sustained competitive advantage. International Journal of Management & Entrepreneurship Research, 6(4), 1273–1287.

Adisa, O. T. (2023). The impact of cybercrime and cybersecurity on Nigeria's national security. Unpublished manuscript.

Agbelade, O. (2023). A comparative analysis of financial technology (fintech) legal frameworks: Blockchain, mobile payment solutions, and data protection. Unpublished manuscript.

Agrawal, R., & Patil, K. P. (2024). Blockchain technology for medical records security using the fit–viability approach. In Proceedings of the 2nd International Conference on Advancement in Computation & Computer Technologies (InCACCT) (pp. 805–810). IEEE.

Ahmed, S. (2025). Enhancing data security and transparency: The role of blockchain in decentralized systems. International Journal of Advanced Engineering, Management and Science, 11(1), Article 593258.

Ahmed, Y. A., Shehzad, H. M. F., Khurshid, M. M., Hassan, O. H. A., Abdalla, S. A., & Alrefai, N. (2024). Examining the effect of interoperability factors on building information modelling adoption in Malaysia. Construction Innovation, 24(2), 606–642.

Akbar, M. A., Khan, A. A., Mahmood, S., Rafi, S., & Demi, S. (2024). Trustworthy artificial intelligence: A decision-making taxonomy of potential challenges. Software: Practice and Experience, 54(9), 1621–1650.

Akinyemi, F. O., Adewumi, O. A., & Lawal, M. A. (2018). Blockchain technology in Nigeria: Opportunities and challenges. Journal of Internet and Information Systems, 9(3), 1–12.

Alam, M. (2025). Challenges of integrating spatiotemporal data with AI/ML models for road traffic congestion prediction. Journal of Advanced Artificial Intelligence, 1, 8–14.

Allison, I. (2015). The internet of value: How Bitcoin and blockchain can change the world. John Wiley & Sons.

Avasthi, S., Jain, K., Prakash, A., & Sanwal, T. (2024). A blockchain architecture for secure decentralized systems. In Proceedings of the 3rd International Conference on Power Electronics and IoT Applications in Renewable Energy and Its Control (PARC) (pp. 415–420).

Bah, A. (2022). Blockchain technology and international money transfers into the Nigerian remittance market. Unpublished manuscript.

Centobelli, P., Cerchione, R., Esposito, E., & Passaro, R. (2021). Determinants of the transition towards the circular economy in SMEs. International Journal of Production Economics, 242, 108297.

Chang, V., Baudier, P., Zhang, H., Xu, Q., Zhang, J., & Arami, M. (2020). How blockchain can impact financial services. Technological Forecasting and Social Change, 158, 120166.

Chaudhuri, R., Chatterjee, S., & Vrontis, D. (2024). Blockchain adoption in hospitality and tourism. EuroMed Journal of Business, 19(1), 62–83.

Chittipaka, V., Kumar, S., Sivarajah, U., Bowden, J. L. H., & Baral, M. M. (2023). Blockchain technology for supply chains in emerging markets. Annals of Operations Research, 327(1), 465–492.

Choithani, T., Chowdhury, A., Patel, S., Patel, P., Patel, D., & Shah, M. (2024). Artificial intelligence and cybersecurity in cryptocurrency and banking systems. Annals of Data Science, 11(1), 103–135.

Creswell, J. W. (2014). Research design: Qualitative, quantitative, and mixed methods approach (4th ed.). Sage.

Cyert, R. M., & March, J. G. (1963). A behavioral theory of the firm. Prentice-Hall.

Dannen, C. (2017). Introducing Ethereum and Solidity. Apress.

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2019). Multivariate data analysis (8th ed.). Cengage.

Hussain, N. Y., Babalola, F. I., Kokogho, E., & Odio, P. E. (2024). Blockchain adoption models for emerging financial markets. Unpublished manuscript.

Khan, K. A., Ma, F., Akbar, M. A., Islam, M. S., Ali, M., & Noor, S. (2022). Reverse logistics practices and organizational performance. Sustainability, 14(8), 3223.

Kshetri, N. (2017). Blockchain's roles in strengthening cybersecurity. Telecommunications Policy, 41(10), 1027–1038.

Manyeruke, C., Hlongwane, N., & Mutsindikwa, P. (2020). Blockchain technology and governance in Africa. Journal of African Union Studies, 9(1), 75–94.

Mondoh, B. S., Johnson, S. M., & Gwele, P. (2025). Bitcoin origins: Revolutionising finance and value transfer. SSRN Electronic Journal.

Nakamoto, S. (2008). Bitcoin: A peer-to-peer electronic cash system.

Odu, C. (2022). Blockchain as a disruptive technology in Nigeria's fintech ecosystem. Information Management and Computer Science, 5(1), 3–10.

Oliveira, T., & Martins, M. F. (2010). Understanding e-business adoption in SMEs. Journal of Global Information Management, 18(3), 57–78.

Olomukoro, C. (2023). The effects of implementing blockchain technology in the Central Bank of Nigeria (Doctoral dissertation). Unicaf University.

Rogers, E. M. (2003). Diffusion of innovations (5th ed.). Free Press.

Schammo, P. (2021). Standards and technological change in financial markets. Law and Financial Markets Review, 15(1–2), 3–37.

Sciarelli, M., Prisco, A., Gheith, M. H., & Muto, V. (2022). Factors affecting blockchain adoption. Journal of Strategy and Management, 15(3), 495–507.

Tornatzky, L. G., & Fleischer, M. (1990). The processes of technological innovation. Lexington Books.

Wong, L. W., Tan, G. W. H., Lee, V. H., Ooi, K. B., & Sohal, A. (2020). Determinants of blockchain adoption in supply chain management. International Journal of Production Research, 58(7), 2100–2123.

Zachariadis, M., Hileman, G., & Scott, S. V. (2019). Governance and control in distributed ledgers. Information and Organization, 29(2), 105–117.