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RESEARCH ARTICLE

THE STRENGTH OF BLOCKCHAIN TECHNOLOGY AS AN ADVANCED SECURITY SYSTEM FOR THE NIGERIAN FINANCIAL SECTOR (FINTECH) IN FINANCIAL TRANSACTIONS

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ABSTRACT

Blockchain technology is revolutionizing the financial technology sector (FinTech) by increasing security and transparency. In Nigeria, its adoption has the potential to revolutionize financial services, reducing the risks associated with traditional banking. This study examines the role of blockchain in securing financial transactions, examining its benefits and challenges in the Nigerian context. The research methodology includes a comprehensive literature review, qualitative analysis of blockchain applications and a case study approach. Data were collected from academic journals, industry reports and legal documents. The findings highlight blockchain's significant potential to improve Nigeria's financial sector by increasing security and transparency through features such as decentralization, immutability, and cryptographic security. However, challenges related to regulation, scalability, and education must be addressed to ensure effective adoption. The study emphasizes blockchain's ability to create a secure, transparent, and inclusive financial ecosystem, while recommending steps to overcome the identified challenges for successful implementation. The methodology employed in this study involves a comprehensive review of existing literature, a qualitative analysis of current blockchain applications in the FinTech sector, and a case study approach to assess the impact of blockchain technology in Nigeria. Data were collected from peer-reviewed academic journals, industry reports, and regulatory documents to provide a well-rounded understanding of the blockchain landscape. Findings: In terms of gender distribution, 66.6% of the participants were male, indicating a gender disparity in blockchain and technology interactions. The majority of participants were between 25 and 44 years of age, and each group accounted for 25%, representing the participation of people of working age. Regarding education, 41.6% of the participants have a bachelor's degree, which indicates the educational requirements related to jobs in blockchain and fintech. In terms of employment, 58.3% of participants had a job, indicating that blockchain technology is the most important to those currently employed. The financial and healthcare sectors have the highest score, each with 25 percent of participants, indicating the use of the blockchain in these industries. In addition, 66.6% of the participants were familiar with blockchain technology, which indicates a high level of awareness among the public, although they are more educated and knowledgeable. The gender gap in blockchain and FinTech participation calls for initiatives to promote diversity and inclusivity. The age distribution shows that blockchain technology appeals primarily to individuals in the middle stages of their careers, likely due to their familiarity with digital advancements. The high representation of bachelor's degree holders underscores the need for advanced education in blockchain-related fields. The high employment rate among participants suggests that blockchain is particularly relevant to those currently working, likely due to its potential to enhance job functions. The finance and healthcare sectors' dominance among participants reflects the direct impact of blockchain on these industries, while the significant awareness of blockchain technology points to a readiness for adoption, though continuous education is needed to broaden understanding. ***Implications****: This study demonstrates the potential of blockchain technology to improve security, reduce fraud, improve financial inclusion and contribute to economic growth, in the Nigerian financial sector. For these benefits to be fully realized, it is necessary to address challenges related to regulation, scale and training. Blockchain can play an important role in building a safe and efficient financial ecosystem and move Nigeria towards economic progress*.

KEYWORDS

Advanced Security System, Blockchain Technology, Fintech, Financial Transactions, Nigerian Financial Sector, security challenges, Blockchain adoption, and decentalization.

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Introduction

Blockchain technology has the potential to revolutionize the financial services industry in Nigeria by addressing issues such as fraud, lack of transparency, and inefficiencies in financial transactions. Despite its promising features, including decentralization and immutability, the adoption of blockchain technology in Nigeria's financial sector is still in its early stages due to various challenges such as regulatory uncertainties, scalability issues, and a lack of awareness and education. This study seeks to investigate the role of blockchain technology in securing financial transactions in Nigeria and address key questions regarding its benefits and challenges to adoption. By providing insights into these aspects, the study aims to facilitate the transformation of the Nigerian financial sector through the effective implementation of blockchain technology.

What is Blockchain technology?

The blockchain serves as a decentralized and distributed digital ledger system that ensures the secure recording and verification of transactions over a computer network. Initially designed to support Bitcoin, this technology evolved to have various uses beyond digital money. The key characteristics of blockchain include its decentralized nature and the ability to maintain a transparent and tamper-proof record of transactions. Nigeria's financial sector is facing numerous challenges related to security, fraud, and transparency. With the rise of fintech and the increasing digitization of financial transactions, the importance of strong security measures has become increasingly urgent. Blockchain technology, which is known for its decentralized and tamper-resistant nature, is a promising solution to addressing these challenges.

Blockchain Technology

Table 1. Illustrating the comparisons of various consensus algorithms used in blockchain systems.

Consensus Algorithm	Examples	Transactions per Second (TPS)	Block Confirmation Time (s)	Public/Private Blockchain	Key Features
PoW	Bitcoin, Ethereum	Bitcoin: 7	Bitcoin: 6000	Public/ Private	High energy consumption, probabilistic finality, reduced 51%, the likelihood of an attack occurring
PoS	Ethereum 2.0, Cardano	Ethereum : 15	Ethereum: 15	Public/ Private	Reduced energy consumption, probabilistic the ultimate conclusion of a matter, higher security
DPoS	EOS, BitShares	EOS: 3996	EOS: 0.5	Public/ Private	Reduced energy consumption, probabilistic the ultimate conclusion of a matter, easier to organize a 51% attack occurs.
PoET	Hyperledger Sawtooth	2300	Not specified	Private	Reduced energy consumption, probabilistic conclusiveness.
PBFT	Hyperledger Fabric	3500	Seconds level	Private	Reduced energy consumption, immediate,conclusiveness, resilient to Sybil attacks
DAG	IOTA	250	120	Public/ Private	Low energy consumption, probabilistic finality, scalable

Methodology

This study utilized a multi-disciplinary approach to investigate the use of blockchain technology in securing financial transactions within the Nigerian fintech sector. The research methodology involved a thorough review of existing literature, an analysis of current blockchain applications, and case studies on five prominent blockchain platforms in Nigeria. Data was gathered from various sources, including academic journals, industry reports, legal documents, questionnaires, and online interviews.

The selected case studies focused on platforms like eNaira App, eversend, BoundlessPay, TransactFin, and MoneX Exchanger, showcasing the diverse applications of blockchain in financial services such as digital currency, cross-border transfers, and financial inclusion. The study assessed these platforms through online questionnaires distributed to users and interviews with industry experts, exploring perceptions on security, efficiency, usability, and the advantages of blockchain-based services over traditional financial systems. This hybrid approach provided valuable insights into the impact of blockchain technology on economic security in Nigeria and identified key challenges to its adoption.

Blockchain Background

This section begins with a general introduction to the structure of blockchain, and intelligent contracts are examined. It offers a contrast between different open-source blockchain executions designed for FinTech, with the goal of guaranteeing that readers possess a strong comprehension of blockchain technology and its crucial characteristics for financial technology. A blockchain is a type of decentralized and distributed ledger technology designed to record transactions across a network of computers. The key feature of a blockchain is that once a transaction is recorded, it cannot be changed without altering all subsequent blocks, making it a secure and

tamper-proof method for storing data. This ensures data integrity and security by using cryptographic techniques. The key features of blockchain that enhance security include the following.

- ✓ **Decentralization**: Eliminate single points of failure and reduce the risk of systemic fraud. **Transparency:** All transactions are visible to network participants, enhancing trust and accountability.
- ✓ **Immutability:** Once recorded, transactions cannot be altered to ensure the integrity and authenticity of data.
- ✓ **Cryptographic Security:** Transactions are encrypted, providing a high level of security against unauthorized access. Guo et. al. (2022).

The Adoption of Blockchain Technology in the Financial Sector

Fintech firms are increasingly adopting blockchain-powered financial services because of their enhanced security, scalability, and efficiency in contrast to conventional financial services. Table 1 outlines the five key attributes of blockchain that are crucial for Fintech, while Table 2 provides a summary of the top five blockchain implementation comparisons. Bello, O. (2021).

Table 2. Showing the Characteristics of Blockchain technology

Attributes	Explanation
Distribution (decentralization)	There is no longer a necessity for a third party to validate transactions on the blockchain. Instead, the network is responsible for verifying these transactions through the use of a consensus algorithm.
Security	The use of asymmetric-key cryptography allows for secure transactions and interactions within the blockchain network. Hash functions further enhance the security by creating unique digital fingerprints for each block in the chain, making it virtually impossible for malicious actors to alter the data without detection.
Data Integrity	The chain of blocks is designed to maintain a secure and unalterable ledger, with each block linked to the next through cryptographic hashes. This ensures that any attempt to modify the data within the blockchain would be immediately detected by the network. Therefore, the blockchain stands as an immutable and tamper-proof system for recording and verifying transactions.
Ability to Audit	This process allows for verification and tracing of transactions, promoting transparency among the various nodes in the blockchain network.
Fast Settlement	Blockchain has the capability to expedite cross-border money transfers more efficiently than conventional methods by removing the necessity for intermediaries' validation and decreasing the time taken for transaction processing. This technology streamlines the process by allowing direct peer-to-peer transactions, which ultimately leads to quicker settlement times.

The information in Table 3. Showing the Best Five Blockchain Implementation Comparison

Characteristics/ Platforms	Bitcoin	R3 Corda	Quorum	Hyperledger Fabric	Ethereum
The platform	comprehensive platform that caters to various blockchain needs and applications	Financial-focused DLT	A finance-oriented distributed ledger technology (DLT) running on the Ethereum network	Designed specifically for Business-to-Business use, with a focus on blockchain modules.	Serves as a versatile platform for a wide range of blockchain solutions.
Governance	Bitcoin developers	R3	ConsenSys	Linux Foundation	Developers of the Ethereum platform
Blockchain Type	Public	Private	Private	Private	Public/Private
The method of entry	No constraints	Access need	Access need	Access need	No constraints
Consensus Mechanism	PoW	Own Implementations (Notary	RAFT, IBFT, PoA	Multiple	PoW, PoS
Smart Contract	No	Yes	Yes	Yes	Yes
Digital Currency	Native token (BTC/XBT)	None	None	Internal token	Ethers and tokens through smart contracts
Throughput (Transactions/Sec)	170	750	300	300	1.040 (ETH1.0) 3,000 (ETH2.0)

Nigerian Blockchain Policy and Regulation

Through the Nigerian Information Technology Development Agency, the Nigerian government has acknowledged the potential of blockchain technology to establish innovative transaction channels and enhance the digital economy through the Nigerian Information Technology Development Agency (NITDA). Various regulatory

frameworks and guidelines have been proposed to govern the use of blockchain and ensure compliance with existing financial regulations. (Nitda, 2021)

Key regulatory considerations include the following.

- ✓ **Securities and Exchange Commission (SEC) Rules:** Governing the issuance and trading of digital assets.
- ✓ **Central Bank of Nigeria (CBN) Framework:** Regulations for financial institutions using blockchain.
- ✓ **National Blockchain Policy:** Framework for the adoption and implementation of blockchain technology in Nigeria. (Timi-Koleolu & Okpo, 2023).

Fintech Background

FinTech, or Financial Technology, refers to the use of innovative technologies to deliver financial services. Key Fintech technologies include artificial intelligence, blockchain, and cloud computing. Fintech has significantly affected traditional financial services by providing accessible, efficient, and secure solutions.

Evolution of FinTech

Financial technology, commonly known as FinTech, predates the emergence of blockchain technology, and has undergone significant changes over the years. This evolution can sometimes be perplexing for those unfamiliar with the industry. In one context, FinTech is associated with centralized finance (CeFi), where conventional financial tools, such as instant messaging and cloud computing are leveraged to offer various financial services. Throughout this paper, the latter meaning will be used unless otherwise indicated. Renduchintala, et. al. (2022).

Phases of FinTech Development

Subsequent phases, such as FinTech 2.0, with the introduction of the first ATM by Barclays, and FinTech 3.0, which emerged after the 2007-2008 financial crisis, have further shaped the landscape of financial technology. The rise of cryptocurrencies and distributed ledger technology in FinTech 3.0 marked a significant shift towards decentralization and transparency in financial transactions. The ongoing FinTech 4.0 era, accelerated by the COVID-19 pandemic, has seen a surge in digital payments and services provided by major tech companies, reflecting the growing demand for digitization and innovation in the financial sector. Renduchintala, et. al. (2022).

FinTech Today

Today's FinTech landscape is vibrant and diverse, with over 8,775 financial service startups in North America; 7,385 Across Europe, the Middle East, and Africa collectively, there are 3,890 companies; while in the Asia-Pacific region, there are 4,765 companies. These organizations have embraced a range of technologies such as artificial intelligence (AI), machine learning (ML), deep learning (DL), and blockchain. Renduchintala, et. al. (2022).

Segments of Fintech

FinTech services can be categorized into three main segments:

- ✓ **Payments Services**: Offering the most significant portion of the market is characterized by the adoption of novel and simplified payment systems that operate without the need for centralized entities in the FinTech space.
- ✓ **Deposits and Lending**: Streamlining loan and refinancing processes, this segment applies big data principles to make financial services more accessible.
- ✓ **Investment Management Services**: Helping novice investors make informed decisions. This segment offers user-friendly interfaces for managing investment and trading. Renduchintala, et. al. (2022).

Nigerian Financial Sector

The Nigerian financial sector comprises various financial institutions, including banks, insurance companies, and fintech start-ups. The sector has seen technological progress, and the growing appetite for digital financial services is the key driver behind this rapid growth. The shift towards digital solutions has revolutionized the way financial services are accessed and utilized. With the continuous development of technology, the trend of increasing demand for digital financial services is likely to persist in the near future. However, challenges such as fraud, inefficiency, and a lack of transparency persist.

Financial Transactions

Financial transactions in Nigeria involve the transfer of money or financial assets between the parties. Traditional systems often face issues, such as delays, high transaction costs, and vulnerability to fraud. The blockchain technology offers solutions to these problems by enabling secure, transparent, and efficient transactions. Bello, O. (2021).

Literature Review

A comprehensive literature review revealed that blockchain technology can revolutionize the financial industry by enhancing security and transparency. Numerous studies underscore the advantages of blockchain technology in combating fraud, increasing transaction efficiency, and streamlining processes within the financial sector by providing reliable transaction records. (Kayani & Hasan, 2024; Renduchintala et al., 2022).

Blockchain as a proven a game-changer in the Nigerian financial sector

1. **Decentralization and Trustless Environment:** By operating without central authority, the blockchain ensures transparency and security in transactions. The decentralized nature of blockchain technology fosters a more trustworthy environment for financial interactions, ultimately reducing the potential for fraudulent activities. In Nigeria, where belief issues are prevalent, a trustless blockchain environment can improve the security of financial transactions significantly.
2. **Immutable and Tamper-Proof:** The transactions stored in a blockchain are permanent, indicating that they cannot be changed or removed after being included in the record. This characteristic guarantees the integrity of financial records and reduces the risk of manipulation and fraudulent activity. In a country where financial fraud is a persistent issue, the

tamper-proof nature of the blockchain can enhance the overall security of transactions.

3. **Smart Contracts for Automated and Secure Transactions:** Smart and Self-executing contracts, also known as smart contracts, can automate and enforce terms that are directly coded into the system. This innovative technology eliminates the need for intermediaries, ensures that agreements are executed as intended without the possibility of human error or manipulation, and secures various aspects of financial transactions. This can streamline processes, reduce the risk of human error, and enhance overall efficiency. Implementing smart contracts in the Nigerian financial sector could lead to more reliable and secure financial interaction.
4. **Enhanced Transparency:** The transparent nature of blockchain guarantees that every approved participant can obtain identical real-time information. This level of openness ensures a level playing field for all parties involved, promoting fairness and efficiency in decision-making processes. This can help to build trust between stakeholders and regulators, thereby contributing to a healthy financial ecosystem. For the Nigerian financial sector, plagued by a lack of transparency in the past, Blockchain transparency could be a transformative force.
5. **Reduced Intermediaries and Cost Savings:** Blockchain eliminates the need for multiple intermediaries in financial transactions and reduces associated costs and potential points of failure. In a country striving for financial inclusion and cost-effective solutions, blockchain's ability to cut down on intermediaries can contribute to a more efficient and affordable financial system. Rjoub et. al. (2023).

Challenges and Considerations

Although the strengths of the blockchain technology are evident, it is crucial to acknowledge its challenges and limitations.

- ✓ **Regulatory Framework:** While blockchain technology offers immense potential to improve financial transactions, the absence of a clear and complete regulatory framework represents an important obstacle to its generalized adoption in Nigeria. As Timi-Koleolu & Okpo (2023) pointed out, a well-defined regulatory environment can provide legal certainty, which is essential to promote confidence and ensure compliance within the sector. However, existing regulatory policies in Nigeria are still in their infancy, and there is an ambiguity surrounding the classification of cryptocurrencies, intelligent contracts and financial services based on blockchain. This uncertainty can dissuade financial institutions and fintech companies to fully take advantage of blockchain technology due to fears of non-compliance or potential legal repercussions. To remedy this, political decision-makers must collaborate with industry stakeholders to create a framework that balances innovation with consumer protection, responds to concerns about anti money laundering (AML) requirements and the know your client or customer (KYC) and provides clear guidelines for the use of blockchain in financial services.
- ✓ **Scalability:** Scalability remains one of the most pressing challenges in adopting blockchain in Nigeria's rapidly growing financial sector. As transaction volumes increase, blockchain networks often struggle to process large volumes of transactions quickly and efficiently, which can result in longer processing times and higher transaction costs. This problem is particularly pronounced in a dynamic market like Nigeria, where the financial sector is growing rapidly and transaction volumes are high. For blockchain technology to be viable in such an environment, solutions such as layer 2 scaling techniques (e.g., state channels, sidechains) or the introduction of more scalable blockchain protocols (e.g., sharding or proof-of-stake consensus mechanisms) are crucial. Additionally, implementing hybrid models that combine traditional database structures with blockchain technology could help enhance scalability while maintaining the transparency and security that blockchain offers.
- ✓ **Education and Awareness:** There need for widespread education and awareness campaigns to familiarize stakeholders with blockchain technology, including financial institutions, regulators, and the public. Building understanding and trust is a critical component of successful blockchain integration.

Results

Table 4: Gender distribution among Blockchain App users

Gender	No. Participants	proportion of Participants
Men	40	66.6%
Women	20	33.3%
Total	**60**	**100%**

Summary: The majority of participants 66.6% were men, indicating a gender disparity in blockchain app usage within Nigerian Fintech, with women constituting 33.3 percent.

Table 5: Distribution of age among Blockchain App users

Age Group	No. Participants	Proportion of Participants
18-24	10	16.6%
25-34	15	25%
35-44	15	25%
45-54	10	16.6%
55 and above	10	16.6%
Totality	**60**	**100%**

Summary: The age groups 25-34 and 35-44 had the highest representation, comprising 25% of the participants.

Table 6: illustrates the educational levels among blockchain App users.

Educational Level	No. Participants	Proportion of Participants
Secondary School	5	8.3%
Bachelor's Degree	25	41.6%
Master's Degree	15	25%
PhD	15	25%
Totality	**60**	**100%**

Summary: Half of the Participants had a bachelor's degree, which made it the most common educational level.

Table 7: Employment Status among Blockchain App Users

Employment Status	Number of Participants	Proportion of Participants
Employed	35	58.3%
Unemployed	10	16.6%
Student	15	25%
Totality	**60**	**100%**

Summary: A significant majority of Participants 58.3% were employed, with 25% being student.

Table 8: Showing the Industry Sector among Blockchain App Users

Industry Sector	Number of Participants	Proportion of Participants
Finance	15	25%
Technology	10	16.6%
Education	10	16.6%
Healthcare	15	25%
Others	10	16.6%
Totality	**60**	**100%**

Summary: The finance and health sectors had the highest Proportion of Participants (25%).

Table 9: Showing the level of Awareness of Blockchain App among Users

Awareness Level	No. Participants	Proportion of Participants
Aware	40	66.6%
Unaware	20	33.3%
Totality	**60**	**100%**

Summary: A significant majority (66.6%) of participants were aware of blockchain technology while 33.3% were unaware.

Discussion

Gender Distribution: The gender distribution among participants revealed a significant disparity, with males accounting for 80% and females accounting for 40%. This imbalance suggests a gender gap in sectors related to fintech and blockchain technology. This finding indicates the need for policies and initiatives aimed at encouraging female participation in these areas to ensure diversity and inclusivity.

Age Distribution: The age distribution shows that the majority of participants fall within the 25-34 and 35-44 age groups, each representing 25% of the total participants. This indicates that the prime working-age population is highly engaged in fintech and Blockchain technology. This suggests that these technologies appeal primarily to individuals in the middle stages of their careers, likely because of their familiarity with digital advancements and professional responsibilities, which require up-to-date financial technology solutions.

Educational Level: Half of the Participants held a bachelor's degree, which is indicative of the educational prerequisites typically associated with roles in the fintech and blockchain sectors. The presence of participants with master's, Ph.D., and bachelor's degrees (25% and 41.6%, respectively) underscored the advanced levels of expertise and knowledge required in these fields. This finding emphasizes the importance of higher education and specialized training in fostering a skilled workforce capable of driving innovation and adopting advanced technologies.

Employment Status: The high employment rate (70%) among participants suggests that blockchain and fintech are predominantly of interest to those currently employed. This could be due to the relevance of these technologies in enhancing job function and career progression. The 20% unemployment rate and 10% student representation highlight the potential of these technologies to offer new career opportunities and to attract talent.

Industry Sector: The finance and health sector's dominance (25%) among participants aligns with the nature of the study, focusing on fintech and blockchain implications for financial transactions. Technology, education, and other sectors each represent 10%, reflecting the interdisciplinary impact of blockchain technology. This diversity in industry representation suggests a broad interest in the applicability of blockchain technology across various sectors.

Awareness of Blockchain Technology: A significant majority (66.6%) of the participants were aware of blockchain technology, indicating a high level of awareness and potential readiness for adoption within the sample population. This awareness is crucial for successful implementation and integration of blockchain solutions in Nigeria's financial sector. However, 20% were unaware of the need for continuous education and awareness campaigns to ensure widespread understanding and acceptance.

Implication of the Study

This study highlights the capabilities of blockchain technology, showcasing its potential for various applications and industries to transform Nigeria's financial sector by providing a secure and efficient financial transaction system. Blockchain can increase trust, reduce fraud, improve financial inclusion, and contribute to economic growth.

Recommendations

To fully realize the benefits of blockchain technology in Nigeria, the following recommendations are made:

- ✓ **Develop Clear Regulatory Frameworks:** To ensure compliance and promote adoption.
- ✓ **Invest in Blockchain Knowledge and transfer:** are essential for developing a proficient workforce that can effectively implement and oversee blockchain solutions.
- ✓ **Enhance Technological Infrastructure:** To support the widespread adoption of blockchain technology.

- ✓ **Promote Public Awareness:** To increase understanding and acceptance of blockchain technology among financial institutions and the general public.

Conclusion

Blockchain technology has great potential to revolutionize Nigeria's fintech sector by increasing the security, efficiency and inclusiveness of financial transactions. Its core strengths such as decentralization, immutability, smart contracts, transparency and cost reduction make it a powerful solution to many of the existing challenges in the sector. However, for blockchain to reach its full potential, it is essential to address several crucial challenges.

First, regulatory frameworks must be prioritized. Nigerian policymakers must work with industry stakeholders to establish clear and comprehensive guidelines that foster innovation while protecting against risks such as money laundering and fraud. A balanced regulatory environment can provide legal certainty, encourage investment, and build trust in blockchain applications. Without this clarity, financial institutions and financial companies can remain undecided to completely interact with blockchain technology.

Second, scalability is still an important obstacle. To keep pace with the rapid growth of the Nigerian financial sector, blockchain networks must evolve to handle increasing transaction volumes without sacrificing speed or cost-effectiveness. Solutions such as layer-2 scaling techniques, sharding, or adopting proof-of-stake mechanisms can mitigate these limitations, allowing blockchain to operate efficiently in a high-demand environment. Additionally, education and awareness campaigns are crucial. While a substantial portion of the population shows awareness of blockchain, there is still a knowledge gap, particularly among regulators and the broader public. Continued efforts to build understanding and trust in blockchain technology will facilitate smoother integration and adoption across all sectors.Specific Recommendations:

Develop a comprehensive regulatory framework: Policymakers should work with fintech stakeholders to draft clear guidelines and ensure compliance with national and international standards. This will ensure legal certainty, encourage innovation and reduce the risks associated with non-compliance.

Improved technological infrastructure: Investments in blockchain infrastructure, including scalable solutions and hybrid models, are essential to adapt Nigeria's growing financial ecosystem. Invest in blockchain knowledge transfer: Expanding educational initiatives and professional development programs at universities will ensure a skilled workforce that can manage and operate blockchain technology. Promote public awareness campaigns: To broaden blockchain acceptance, financial institutions and the public sector should launch campaigns to inform the public about the benefits and applications of blockchain technology.

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