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Blockchain technology to combat fraudulent activities on landed properties in Nigeria: A review

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Abstract:
Nigeria can significantly benefit from integrating blockchain technology to combat fraudulent transactions on landed properties. Blockchain technology advent can proffer solutions in the land management system in Nigeria due to its high potentials, like the immutability property, its capability to keep track of chain of transaction history which helps against forgery and double sales, also its decentralized properties which makes blockchain technology very accessible at any time anywhere without intermediaries who commonly exploit and defraud investors, with the maximum security and easier access of assets in marketing, has flaunt blockchain technology as a transparent and efficient tool which can bring law, order and tranquillity into the sector of land management which cannot be provided by a just digital system of land properties management. These research reviewed the eminent potentials of blockchain that can restored sanity and trust in landed properties management. Nigeria vast land gift can be harnessed for economic growth in which a very good investment strategy can be factor-out, be it in agriculture, real estate development, entertainment site and so on. However, these potential are unharnessed and undermined due to fraudulent activities that affects the sector both in the private and public sector which the resultant effect is on the economy of the nation. This paper detailed the potentials and a way forward to actualizes a free land management sector from fraud, communal and individual disputes using blockchain technology.

Keywords: *Asset, Blockchain, Fraud, Investment, Land Management*

1. Introduction

Land management is an integral part of an economy, which has serves various purpose to the growth of many developed nations economy (Zatsepina, *et al.,* 2023). Nigeria a nation with vast land should be on a competing stage with most developed countries of the world. Landed asset can be categorized into different forms such as real estate management, land purchase for businesses, and agricultural usage, this is very significant to any nation economy. Nigeria a country with a land mass of approximately 923,768 square kilometres (356,376 square miles) and with a GDP of around $1.49 trillion (2024 estimate). Its economy is driven by oil and gas, agriculture, and services while California a state in the United State of America (USA) covers about 423,970 square kilometres and has a GDP of over $3.6 trillion (2023 estimate), making it the world's fifth-largest economy. Its economy is driven by technology, entertainment, trade, and agriculture. To put that into perspective, Nigeria, it's slightly more than twice the size of California. However, Nigeria GDP often struggled behind by far compare to the GDP of California which is the fifth-largest making economy in the world. Nigeria Agriculture and Estate management accounts for about 18% of Nigeria's GDP and employs a significant portion of the workforce (Ahungwa et al, 2014), which is never an encouraging figure of the economic growth relative to the landmass its seat on (Bako and Balogun, 2023).

The country has vast lands, but productivity is relatively low due to disputes and mishap trust in the management of the sector. Conversely, California's economy generates significantly more output per land area compared to Nigeria, with these estimates. The disparity can be attributed to various factors that Nigeria's system is often criticized for being inefficient and fragmented. Nigeria's inefficiency to land administration management is estimated to have resulted in over $300 billion in dead capital, impacting on the country's GDP negatively, Adebiyi (2025). Nigeria, common scams on landed assets identified include Fake Certificates of Occupancy (C of O),

forge Certificate of Occupancy and false claiming leading to buyers losing millions of their investment. Others include, double-selling of landed properties, fraudsters sell the same property to multiple buyers and the exploitation in high demand of unregistered agents who collect deposits and vanish (Salawu, 2025).

Nigeria, real estate scams led to an estimated loss of ₦16.2 billion in 2025, according to the Economic and Financial Crimes Commission (EFCC). Over 60% of Nigeria's land lacks formal titles, contributing to disputes and insecure property rights. Nigeria, government in an effort to curb the menace in the sector, has introduced measures to combat real estate fraud, such as the Housing Fraud Detection and Reporting Portal, which allows citizens to report incidents of fraud. However, this haven't solved the pressing needs in the sector, due to many compromise which can be distant with the advent of block-tech potentials that can protect consumers from real estate scams and oversight of real estate professionals.

Land disputes are common, particularly in rural areas, due to unclear boundaries, customary tenure issues and inadequate land administration. The inaccessibility of land management system in rural areas, have contributed greatly to loss of lives in disputes, due to inefficiency of operations in the sector (Esoimeme, 2021). Nigeria's landed property lack formal land titles and boundaries this contributes significantly to disputes, however a more established system for land registry and recording property ownership that cannot be mutilate will help in land administration, making it more structured, with clear laws and regulations. These necessary steps will more formalized the likeliness of reducing the economic impact of land disputes.

The country's land market is highly fragmented, with various players trading outside government oversight, creating room for disputes that often escalates into crisis. A mitigation strategy to this menace is very clear, if boundaries are clearly spelt out and a decentralised platform is accessible anywhere and anytime, Hanif Khan (2025). Blockchain potentials such as immutability, decentralization, chain of records keeping is of great importance in curbing this factor that serves as a drawback to the system of land management.

2. Blockchain technology potentials in combating fraudulent act on landed assets.

Blockchain technology is an emergent field in computer science known for its transparency, efficiency, and accessibility, regardless of location (Pandey et al, 2023). The application of blockchain technology to land management systems can restore trust and confidence in the sector of landed assets management, (Ameyaw, P. D., and de Vries, W. T. (2023). Key properties of blockchain technology, including immutability, decentralized access, and efficient operation, can prevent potential fraud and ensure secure record-keeping, (Dong, et al, 2023). The susceptibility of landed properties to fraudulent activities, such as unnecessary registration processes and excessive spending, can be mitigated through blockchain technology. Its immutability feature ensures a secure form of record-keeping (Ramasamy, L. K., and Khan, F. (2024), which is particularly prominent in places where fraudulent land transactions are rampant. By utilizing blockchain technology, the rampant situation of land ownership disputes and records vulnerability can be relieved.

Blockchain-based platforms can facilitate faster, more secure, and more efficient property transactions, reducing the need for intermediaries and increasing transparency in governance, such as land registry (Bayounis et al, 2023). This helps maintain accurate and up-to-date land records, reducing the risk of errors and disputes. The notable applications of blockchain technology in property ownership and title management offer a secure, transparent, and immutable record of property ownership, reducing the risk of disputes and errors. The adoption of blockchain technology in the management of landed properties can transform the sector by increasing transparency, efficiency, and accuracy, while reducing costs. It can also improve trust among stakeholders, (Zingdul et al, 2024) due to the transparent and immutable nature of the blockchain ledger. Additionally, blockchain-based platforms provide a transparent and tamper-proof record of property valuations, enabling fractional ownership of real estate projects and increasing accessibility and liquidity.

Technically, a blockchain is composed of blocks filled with data and associated with the previous block. A new block is created and chained to the previous block whenever new data or a modification occurs. Each new block needs to be algorithmically approved before it's added to the chain, and it has a timestamp that indicates when it has been added. Each block contains a unique hash value and preserves the value of the previous block. If any changes accrued in a block, the hash value changed, and the following blocks indicate the difference when comparing the two hash values of the same block. What makes the blockchain special is that it has distributed duplicates of the Blockchain on what's called a node. Nodes are any electronic devices that contain a replica of the Blockchain, and they are connected to the chain, which gives us transparency.

However, there are challenges to the full implementation of the secure land management system using block-tech, such as regulatory frameworks, scalability, and interoperability. Despite these challenges, the great potentials of block-tech like transparency and immutability to ensure that all transactions are time-stamped and recorded on a public ledger, making it difficult to alter or manipulate records, thereby reducing fraud and eliminating the risk of double sales, forged documents, and other forms of land-related fraud. Necessitate the widespread adoption of blockchain technology in the land management sector for a better purpose which requires education and training of industry and governmental professionals.

3. Blockchain literature reviewed

According to (Bayounis, *et al.,* 2023), a blockchain-based solution can solve commercial real estate (CRE) industry problems according to the country's legislation by

protecting the real estate from third parties and intermediaries to ensure that the data remains secure and immutable. In their study, the find out that blockchain creates a competitive environment by reducing financial returns to third parties and holding information for several decades.

Additionally, Adejumo and Ogburie, (2025), explore how blockchain can enhance security, transparency, and trust in financial transactions. By leveraging a distributed ledger, blockchain ensure that all financial records are cryptographically secured and timestamped, making unauthorized alterations nearly impossible. They further, evaluate blockchain's effectiveness in securing financial transactions, ensuring regulatory compliance, and improving financial accountability using various analysis techniques such as qualitative and quantitative analysis. Conclusively, derived from extensive mathematical modeling, statistical analyses, and real-world data, highlight the transformative impact of blockchain integration in reducing financial fraud, optimizing auditing processes, and improving financial accountability. the found out, the potentials of blockchain can enhance effectiveness of financial transaction free from fraudulent act but underscored scalability as a major challenge.

More so, a study by Addula, *et al.* (2024) examines and integrates existing literature on the convergence of artificial intelligence and blockchain technologies within the banking sector. The strategy merges qualitative and quantitative methods to deliver a holistic understanding of the integration's advantages and limitations of blockchain technology and AI in banking. The study affirmed that, blockchain is the organized modern finance that is gaining much interest in finance by answering persistent problems like efficiency, security, and transparency.

Similarly, Adanigbo, *et al.* (2023) explore the potential of blockchain and IoT integration, evaluate the effectiveness in overcoming current barriers, and identify future trends that could shape the next generation of financial systems using machine leaning algorithm to enhance scalability of the system. The integration of blockchain and Internet of Things can accommodate a wider blockchain-based system efficiently.

Furthermore, Laila, *et al.* (2024), proposed a land administrative registry system, that is blockchain-based application, to reduced latency of land registry procedures. The study uncovered a significant improvement in the utilization of blockchain-based application in registration of land, which enhances transaction efficiency but fails to address challenges like scalability.

Also, Okoli, *et al.* (2024) examines the potential of blockchain technology to address these systemic issues, prolonged processing times, high registration costs, insufficient technical skills, unqualified staff, excessive land charges, and an unclear legal framework. The find out that blockchain's decentralized and secure framework offers transformative potential by enhancing transparency, reducing fraud, and streamlining land registration processes. The concludes, that adopting blockchain could significantly reduce registration timelines, lower costs, improve transparency, and foster economic growth through a reliable and secure land tenure system. Blockchain technology offers a promising solution to the system's entrenched inefficiencies, providing a transparent, secure, and decentralized platform for land records management.

Similarly, Martinez, *et al.* (2024), explores the synergistic effects of AI and Blockchain on enhancing the security of financial transactions through advanced real-time fraud detection, anomaly identification, and decentralized transaction verification. The findings reveal that integrating AI with Blockchain not only significantly improves the security by enabling the real-time detection of anomalies but also upholds the integrity and transparency of transactions across distributed ledgers and suggests further research on the scalability of AI-Blockchain integrations and their broader application across various industries, pointing towards a transformative impact on global financial practices.

According to Bello, *et al.* (2024), integrating machine learning (ML) and blockchain technologies presents a ground-breaking approach to real-time fraud detection and prevention, addressing the growing complexity and sophistication of financial fraud schemes This integration leverages the strengths of both technologies: the predictive power of ML algorithms and the transparency, security, and immutability of blockchain, The uncovered that the synergy not only enhances the security and reliability of financial transactions but also paves the way for more advanced and automated compliance systems, ultimately strengthening the financial ecosystem against fraudulent threats.

4. Blockchain Technology Implementation for Efficient Management

A chronological approach all through the requirement stage gathering, development stage, implementation stage and maintenance of blockchain-based secure land management system which can serve its purpose efficiently:

4.1 Feasibility study

Identify the specific land fraud issues to be addressed (e.g., fake property titles, unauthorized transactions), through literature reviewing on blockchain technology application and also literatures on landed properties investment. Focus group discussion were used to obtain necessary requirement from stakeholders, including government agencies, property owners, and real estate professionals.

4.2 Data collection and analysis

This involves collation of data and segmenting it into appropriate requirement such as functional and non-functional requirement for development of the system.

4.3 Blockchain platform selection

Choose a suitable blockchain platform for development (e.g., Ethereum, Hyperledger Fabric) based on it factors like scalability, security, and smart contract functionality.

4.4 Smart contract development

Design and develop a smart contract application to manage land ownership and transaction data. And implement rules and logic to prevent fraudulent activities common to landed properties. Smart contracts can automate the verification and transfer of land ownership, reducing the need for intermediaries and minimizing the risk of errors. One of the most notable trends is the rise of smart contracts, which are self-executing contracts with the terms of the agreement directly written into code. Smart contracts eliminate the need for intermediaries, enabling secure, automated, and transparent financial transactions. This automation streamlines financial operations, reducing delays, costs, and the potential for human error.

4.5 Data modelling and storage

Design a data model to store land ownership and transaction data on the blockchain for accessibility or query. Ensure data integrity and security through encryption and access controls in this stage of development.

4.6 User Interface development

Create a user-friendly interface for stakeholders to interact with the blockchain application and ensure the interface is accessible on various devices and platforms.

4.7 Integration with existing systems

Integrate the blockchain application with the existing land registry systems and other relevant databases and ensure seamless data exchange and synchronization within the system. Integrating blockchain technology with existing land registry systems will ensure a seamless adoption and minimize disruptions.

4.8 Testing and deployment

Conduct thorough testing of the blockchain application, including smart contracts and user interface to see it efficiency, this validation is necessary to see that the system can mitigate the risk of fraudulent acts common with landed properties. Deploy the application on a test network and then on the mainnet for proper usage.

4.9 Education and adoption

Educate stakeholders on the order of operation of the system Educating the public about the benefits and functionality of blockchain-based land registries is crucial for successful adoption.

4.10 Maintenance and updates

Regular monitoring and maintaining of the blockchain application to ensure its security and performance, is intact. Update the application as needed to adapt to changing regulations and requirements concerning the scheme.

5. Conclusion

Investors' reluctance to patronage in landed properties has been due to the duplication of sales, unnecessary cost due to uncalled processes involvement, certificate forgery, longer time of registry, and others. This challenges dwindles the economy as investors do not have the courage on their finances being secured due to lack of a transparent, cost-effective system and a system with multi operational segment. Technical and Infrastructural Limitations in implementing blockchain technology requires significant investment in infrastructure and technical expertise. Regulatory challenges existing laws and regulations may need to be adapted to accommodate blockchain-based land registries. Political resistance from vested interests and political actors may hinder the adoption of blockchain technology. By addressing these challenges and leveraging the benefits of blockchain technology, Nigeria can create a more secure, efficient, and transparent land registry and management system.

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