

DApps for Transparent Land Registering and Tax Compliance: A Survey

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Abstract—Land registration and property tax compliance are often marred by inefficiencies, lack of transparency, and the risk of fraud—especially in countries where record-keeping systems are still paper-based or poorly digitized. Blockchain technology, particularly through Decentralized Applications (DApps), offers a promising alternative. These systems leverage immutable ledgers, smart contracts, and decentralized storage to ensure secure, tamper-proof, and transparent land records. This paper presents a comprehensive survey of how DApps, when built using tools like Ethereum, IPFS, and MetaMask, can reshape land management and enhance tax enforcement. It also explores current academic work, highlights practical challenges, and compares these modern solutions with traditional systems. The aim is to provide a clear and insightful overview for researchers, developers, and policymakers interested in blockchain-enabled land governance.

Index Terms—Blockchain, Web3, IPFS, Ethereum, Decentralized Applications (DApps), Land Registration, Property Tax Compliance, Smart Contracts, Metamask, Digital governance

I. INTRODUCTION

Ownership of land is a vital asset that affects individuals, businesses, and governments alike. Yet, in many regions, land records are maintained through outdated processes that are vulnerable to errors, tampering, and data loss. This lack of a robust system often leads to long legal battles, unclear ownership, and loss of public revenue due to inaccurate property tax collection.

Blockchain technology presents a novel way to address these concerns. Decentralized Applications, or DApps, built on platforms like Ethereum, offer transparent, secure, and efficient systems that eliminate intermediaries and automate complex workflows using smart contracts. These applications store land-related data on decentralized file systems such as IPFS and facilitate secure user access through wallet integrations like MetaMask.

This paper explores how DApps can be employed to create a more reliable and accountable system for land registration and tax compliance. Through a detailed review of existing solutions and comparative insights, we aim to understand the feasibility, benefits, and limitations of blockchain-based approaches.

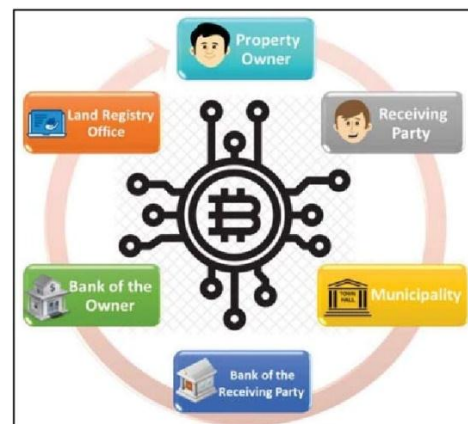


Fig. 1: Architecture of a Blockchain-Based DApp System for Land Registration and Tax Compliance

II. LITERATURE SURVEY

Several studies and pilot implementations have explored how blockchain and decentralized technologies can improve land administration and taxation systems. Below is a curated summary of relevant work that highlights the evolving landscape of this field.

A. Faiz et al. (2023) – Blockchain-Based Land Record-Management

This study introduced a prototype for managing land records using smart contracts. The goal was to eliminate manual intervention in property transactions by storing ownership and transaction history directly on the blockchain. The system ensured that once a record was created, it couldn't be altered—offering protection against forgery and unauthorized changes. The research concluded that such a system could significantly reduce property disputes and increase operational efficiency in public registries.

B. Nembe et al. (2024) – Blockchain in Tax Compliance

This paper focused on the application of blockchain in taxation, especially in enhancing transparency in revenue collection. It emphasized how smart contracts could automate tax calculations and enable real-time audits. However, the authors noted a key limitation—existing legal frameworks were not yet ready to accommodate the decentralized nature of blockchain, especially when dealing with anonymous or pseudonymous users.

C. Javaid et al. (2022) – Blockchain in Financial Services

While this work primarily examined blockchain in finance, its insights are applicable to land systems. The authors discussed how distributed ledgers could increase trust between transacting parties and regulators. By removing the need for centralized verification, the system allowed seamless, peer-to-peer transactions. These attributes make blockchain a natural fit for sectors like real estate and public tax collection.

D. EIMamy & Jema (2024) – Secure Document Handling with Ethereum and IPFS

This research proposed a hybrid framework that combined Ethereum smart contracts with IPFS to store and verify sensitive documents. The application of this system to land registration meant that all documentation—from property titles to tax receipts—could be securely stored, easily accessed, and verifiably authentic. The authors demonstrated that using blockchain for document management could prevent data loss and corruption.

E. Sen (2024) – IPFS and Ethereum Integration for Dapp-Development

Sen's paper provided a technical guide for developers looking to build decentralized apps with IPFS as the backend and Ethereum as the logic layer. The study showcased how tools like MetaMask could simplify user interactions by enabling wallet-based authentication. This ease of use was highlighted as critical for encouraging adoption of blockchain-based public systems, especially in areas with limited digital literacy

there are several practical hurdles that must be addressed before these systems can be adopted at scale. Below are some of the key challenges:

A. High Initial Implementation Costs

Developing and deploying a blockchain infrastructure—especially on public chains like Ethereum—can be expensive. The cost includes not only technical development but also hardware, network fees, and ongoing maintenance. For many government institutions, especially in developing countries, this can be a significant financial burden.

B. Scalability and Network Congestion

Public blockchain networks like Ethereum have limited transaction throughput. When too many transactions occur at once, network congestion leads to delays and high gas fees. This makes it difficult to handle a large number of property registrations or tax payments simultaneously, especially during peak periods.

C. Legal and Regulatory Limitations

Current legal systems often lack clear guidelines on how blockchain records should be treated. For example, will a smart contract be legally recognized as a binding agreement? What happens if there's a dispute over a blockchain-based land record? Without formal legal backing, DApps might not be enforceable in court, limiting their effectiveness in critical scenarios.

D. Limited Public Awareness and Digital Literacy

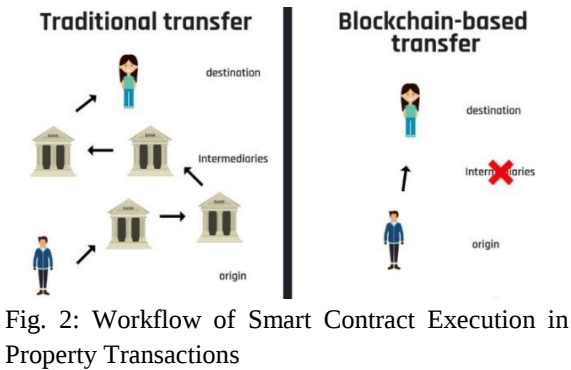
Blockchain technology can be confusing to non-technical users. Concepts like private keys, digital wallets, and gas fees are unfamiliar to most people. Without proper education and user-friendly interfaces, the average citizen might find it difficult to use DApp-based systems, especially in rural areas.

E. Smart Contract Bugs and Security Flaws

While smart contracts automate many processes, they can also be a single point of failure if not properly written and audited. A bug in a smart contract could result in the permanent loss of assets or unauthorized access to sensitive records. Given the irreversible nature of blockchain transactions, such issues can be costly and difficult to fix.

III. CHALLENGES

While the concept of using blockchain and DApps for land registration and tax compliance is promising,



IV. COMPARATIVE STUDY

TABLE I: Comparative Analysis of Traditional Land Management Systems vs. Blockchain-Based DApps

Feature	Traditional Systems	Blockchain-based DApps
Data Integrity	Susceptible to human error, loss, or intentional tampering	Immutable records stored on blockchain ensure tamper-proof data
Transparency	Limited access; changes often untracked	Every transaction is publicly recorded and traceable
Transaction Speed	Manual processes cause delays and inefficiencies	Instant execution of transactions via smart contracts
Storage Method	Centralized servers or paper-based archives	Decentralized storage via IPFS ensures reliability and permanence
User Access & Security	Dependent on physical ID checks and intermediaries	Secured through cryptographic wallets like MetaMask
Operational Costs	High administrative and staffing expenses	Reduced overhead due to automation and minimal intermediaries
Dispute Handling	Requires legal intervention and bureaucratic processes	Can embed rules for automatic dispute resolution,

		though legal fallback still needed
Public Trust	Often low due to corruption or opaque systems	Improved trust through system openness and cryptographic verification

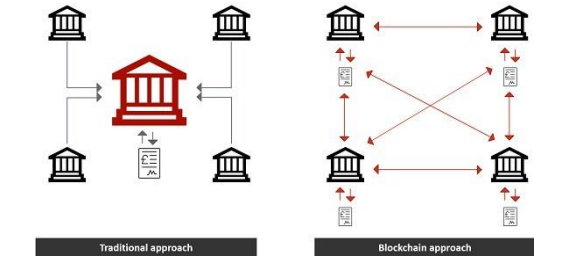


Fig. 3: Comparative Overview of Traditional vs. Blockchain-Based Land Management Systems.

V. CONCLUSION

As nations strive toward digital transformation, the integration of blockchain technology into land registration and tax compliance stands out as a major opportunity. Decentralized Applications (DApps) built on platforms like Ethereum, supported by IPFS and MetaMask, offer a compelling solution to long-standing problems like fraud, inefficiency, and lack of transparency in public systems.

These technologies can help create records that are secure, immutable, and easily verifiable. They reduce human error, automate processes through smart contracts, and build trust by making data publicly auditable. While the benefits are substantial, adoption is not without challenges. Legal uncertainty, high costs, technical complexity, and low public awareness remain major hurdles that must be overcome.

Still, with the right investment in policy, infrastructure, and education, blockchain-based land and tax systems could revolutionize how governments serve their citizens. It’s not just about making systems digital—it’s about making them fair, transparent, and truly accountable.

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