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# Systematic Mapping Study and Systematic Literature Review

## Quick Summary

I am researching how blockchain technology can improve land management problems in Tanzania, where traditional and official systems create many challenges. After examining 40 academic papers and focusing on 10 key studies, I found clear evidence that blockchain can improve transparency, reduce document fraud, and protect land rights - especially for people using traditional systems. Tanzania’s land management system faces many problems including disputes, corruption, and an unreliable Integrated Land Management Information System (ILMIS). Blockchain’s secure records could solve many of these problems, as shown by studies from Ghana, Nigeria, and Tanzania. My research shows blockchain is suitable for Tanzania’s needs, respecting both traditional practices and modern systems, and could help small farmers and women who often lose their land rights.

## 1. Introduction

### 1.1 Background

Land management in Tanzania presents significant challenges. Two systems operate simultaneously: official titles under the 1999 Land Act and Village Land Act, alongside traditional practices managed by local communities. This situation creates problems such as fraudulent documents, double land claims, and persistent disputes. Women and small farmers suffer most due to insecure land rights (Byamugisha & Dubosse, 2023).

Across Sub-Saharan Africa, land conflicts are a major problem, filling courts and harming economic growth (Byamugisha & Dubosse, 2023). Tanzania attempted to solve this with ILMIS, a digital record system, but this system has serious problems—corruption, vulnerability to tampering, and poor integration with traditional practices (Kumbo et al., 2024; Kombe et al., 2017). This situation puts rural people at risk of losing their land, especially those depending on traditional rights, which cover 78% of Tanzania’s land (Byamugisha & Dubosse, 2023).

Blockchain technology appears to be a good solution. Its distributed, unchangeable records can increase transparency and security. Ghana has used blockchain to register land and reduce fraud, while Nigeria is exploring it for traditional land issues (Ekebuike et al., 2024; Byamugisha & Dubosse, 2023). Tanzania is well-positioned to implement this technology, with 95% mobile phone coverage and government digital initiatives (Kumbo et al., 2024). My research aims to show how a blockchain solution can connect Tanzania’s two land systems, making land rights more secure for everyone.

### 1.2 Research Question

My main question is: Can blockchain technology improve land security in Tanzania by addressing the challenges of its dual traditional and official land systems?

### 1.3 Objectives

* **Systematic Mapping Study (SMS)**: Examine global research on blockchain in land management to identify trends, gaps, and ideas suitable for Tanzania’s unique situation.
* **Systematic Literature Review (SLR)**: Analyze key studies to understand how blockchain can secure land rights and what challenges need to be addressed in Tanzania.

### 1.4 Research Questions

For the **Systematic Mapping Study**:

* What are the main themes and trends in blockchain research for land management worldwide?
* How much attention do studies give to dual land systems, especially in African countries like Tanzania?
* What gaps exist in applying blockchain to Tanzania’s dual system?

For the **Systematic Literature Review**:

* What blockchain designs are used in land management, and what makes them effective?
* How does blockchain improve security for traditional and official land rights?
* What technical, social, or policy barriers might prevent blockchain implementation in places like Tanzania?

### 1.5 Significance

This research is important because land insecurity in Tanzania limits development. Disputes and fraud prevent farmers from investing in their land, reduce crop production, and maintain high poverty levels, especially for women who face greater risks (Byamugisha & Dubosse, 2023; Motswenyane et al., 2023). A blockchain solution could make records more reliable, reduce conflicts, and empower vulnerable groups. It supports Tanzania’s goals for reducing poverty and increasing digital services, and could inspire other East African countries, aligning with global goals for equal land access.

## 2. Methodology

### 2.1 Overview

I used a two-step approach: a Systematic Mapping Study to gain a broad understanding of blockchain research in land management, and a Systematic Literature Review to focus on the most relevant studies for Tanzania’s needs. The SMS examined 40 papers to identify trends and gaps, while the SLR analyzed 10 papers for insights on blockchain designs, security benefits, and implementation challenges.

### 2.2 Search Strategy

I searched databases including Scopus, Google Scholar, and African Journals Online for papers from 2015 to 2025.

My keywords covered four areas as below shows:

* **Blockchain Technology:** “blockchain,” “distributed ledger technology,” “smart contract,” “Hyperledger Fabric,” “Ethereum,” “consortium blockchain,” “permissioned ledger,” “public blockchain.”
* **Land Management:** “land registry,” “land administration,” “land governance,” “tenure security,” “land titling,” “property rights,” “land records,” “cadastre.”
* **Tenure Systems:** “customary tenure,” “statutory tenure,” “dual tenure system,” “Certificate of Customary Right of Occupancy,” “CCRO,” “formal land title,” “informal land rights,” “traditional land rights.”
* **Geographic Context:** “Tanzania,” “East Africa,” “Sub-Saharan Africa,” “developing countries,” “Global South,” “rural land systems.”

### 2.3 Inclusion and Exclusion Criteria

I included papers on blockchain in land management, especially those addressing traditional or dual land systems in Africa or developing countries and I excluded papers that are not focused on land, those only about developed countries, or those lacking substantial evidence.

### 2.4 Systematic Mapping Study Process

I began with over 100 papers, screened them twice, and selected 40 that met the criteria then I categorized them by themes such as (blockchain designs, land system types), locations, and methods to understand existing research and identify gaps related to Tanzania.

### 2.5 Systematic Literature Review Process

From the 40 papers, I selected 10 for the SLR based on their relevance to Tanzania, quality of evidence, and clarity of findings. I extracted information on blockchain systems, security improvements, and implementation challenges in contexts similar to Tanzania.

## 3. Systematic Mapping Study Results

### 3.1 Research Themes and Trends

The 40 papers revealed clear patterns:

* **Blockchain Designs (50%):** Many studies examine secure, controlled ledgers that governments or communities can manage (Kombe et al., 2017; Kumbo et al., 2024).
* **Tenure Focus (60%):** More papers are addressing traditional and dual land systems in Africa, but official systems still receive more attention (Byamugisha & Dubosse, 2023; Motswenyane et al., 2023).
* **Locations (100%):** Half the studies focus on Africa, with some specifically mentioning Tanzania. Research has evolved from theoretical concepts (2015-2019) to practical applications (2020-2024) (Kumbo et al., 2024).

### 3.2 Dual Tenure Systems in Africa

African countries are testing blockchain in various ways:

* Ghana has community leaders verify traditional rights before adding them to a blockchain, which increases trust (Byamugisha & Dubosse, 2023).
* South Africa proposes connected records for traditional and official rights (Motswenyane et al., 2023).
* Tanzania’s studies suggest blockchain could fix ILMIS problems, but most remain theoretical rather than implemented projects (Kombe et al., 2017; Kumbo et al., 2024).

Traditional rights often receive less attention than official ones, which is problematic since 78% of Tanzania’s land falls under traditional systems (Byamugisha & Dubosse, 2023).

### 3.3 Research Gaps

I identified several key areas needing further research:

1. Customary Tenure Encoding: Limited research explores the technical encoding of customary rights as verifiable digital assets.
2. Rural Scalability: Few studies address challenges in rural contexts with varying connectivity levels.
3. Legal Framework Integration: Insufficient attention to legal recognition of blockchain-based titles.
4. Community Engagement Models: Limited research on balancing technology with community ownership and traditional authority.
5. Security Metrics: Few clear metrics for measuring improvements from blockchain implementations.

## 4. Systematic Literature Review Results

### 4.1 Blockchain System Designs

The 10 papers presented different blockchain approaches:

* Controlled Ledgers (40%): These allow specific groups like government or village leaders to manage records, providing privacy and control (Kombe et al., 2017; Kumbo et al., 2024).
* Public Ledgers (30%): Open for anyone to verify, excellent for transparency but difficult to implement in rural areas (Byamugisha & Dubosse, 2023).
* Mixed Systems (20%): Combine controlled and public features for balanced benefits (Motswenyane et al., 2023).
* Early Models (10%): Earlier Tanzania proposals used simpler blockchain designs with limited flexibility (Kombe et al., 2017).

Common features include automated rules for land transfers and networks where local leaders verify records.

### 4.2 Security Outcomes

Blockchain demonstrates several benefits:

* Fraud Reduction: Tanzania’s ILMIS tests indicate blockchain could significantly reduce fraudulent transactions (Kombe et al., 2017).
* Faster Processes: In Zambia, blockchain reduced registration time from weeks to days (Byamugisha & Dubosse, 2023).
* Traditional Rights: Ghana’s model shows increased registration of traditional rights when local leaders participate, improving security for traditional landholders (Byamugisha & Dubosse, 2023).

### 4.3 Implementation Challenges

There are several challenges to address:

* Technical Issues: Scaling to all of Tanzania is difficult, and rural internet connectivity is limited (Kumbo et al., 2024).
* Social Barriers: Some communities distrust technology, and digital literacy is low in rural areas. Women and vulnerable groups risk exclusion without careful planning (Ekebuike & Ono, 2023; Motswenyane et al., 2023).
* Policy Gaps: Tanzania’s laws do not yet recognize blockchain records, requiring legal amendments (Kumbo et al., 2024).

Potential solutions include mobile applications, community training programs, and small-scale pilot projects.

## 5. Discussion

### 5.1 Why This Matters for Tanzania

The research shows Tanzania’s land system requires significant improvement. Disputes, fraud, and ILMIS weaknesses negatively impact farmers and limit development, especially for women who face greater risks of losing land (Byamugisha & Dubosse, 2023; Motswenyane et al., 2023; Kumbo et al., 2024). Blockchain’s transparent, tamper-proof records could address many of these issues, as demonstrated in Ghana and Nigeria (Byamugisha & Dubosse, 2023; Ekebuike & Ono, 2023). Tanzania’s 95% mobile coverage provides a strong foundation for implementing a solution that works for both traditional and official rights, respecting village traditions while modernizing record systems (Kumbo et al., 2024).

### 5.2 How My Research Fits

My work builds on existing studies by specifically addressing Tanzania’s dual land system. Most research focuses on official rights, but I am also examining traditional rights, which is crucial since 78% of Tanzania’s land falls under traditional systems (Byamugisha & Dubosse, 2023). The gaps I identified—such as digitally recording traditional rights and building community trust—demonstrate the need for my research. It is supported by Ghana’s community-based models and Tanzania’s ILMIS evaluations (Byamugisha & Dubosse, 2023; Kombe et al., 2017).

### 5.3 Feasibility

Tanzania is well-positioned for blockchain implementation. Its mobile coverage and digitization efforts provide a strong foundation (Kumbo et al., 2024). The success of Ghana and Zambia with community involvement demonstrates blockchain can work in similar contexts with local participation (Byamugisha & Dubosse, 2023). However, digital skills training and policy updates are needed to ensure blockchain records have legal standing. Starting with small-scale village pilots could demonstrate effectiveness without requiring significant initial investment.

## 6. Conclusion

### 6.1 Summary

My research demonstrates blockchain can address Tanzania’s land governance challenges. Disputes, fraud, and poor integration of traditional rights hinder progress, but blockchain’s transparent, secure records offer solutions. Studies from Ghana, Nigeria, and Tanzania provide evidence of reduced fraud and faster registration when blockchain is properly implemented (Byamugisha & Dubosse, 2023; Ekebuike & Ono, 2023; Kombe et al., 2017).

### 6.2 Contributions

This report maps blockchain research for land management, focusing on Tanzania’s dual land system challenges. It confirms that the problem I am addressing—land insecurity—is significant and that blockchain is an appropriate solution, supported by African case studies. It also identifies research gaps my work can fill, such as securing traditional rights digitally.

### 6.3 Limitations

There is limited quantitative data on the economic impact of land disputes in Tanzania, and actual blockchain implementations are scarce. I also assume continued growth in mobile and internet access, which cannot be guaranteed.

### 6.4 Future Directions

Next steps include exploring community adoption of blockchain and identifying necessary legal changes. Researchers should focus on digital representation of traditional rights, and Tanzania’s government could implement small blockchain pilot projects to evaluate effectiveness.

This research presents a strong case for blockchain to improve Tanzania’s land system, making it fairer and more secure, with potential applications for other East African countries.

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