**GreenTrack: Blockchain for Agricultural Supply Chains**

**Research Paper**

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**Blockchain for Agricultural Supply Chains: A Path to Transparency and Traceability in Kenya**

**Abstract**

Kenya's agricultural sector is pivotal to its economy, yet it grapples with a complex, decentralized supply web that often lacks transparency and efficiency. Traditional record-keeping methods are inadequate, leading to challenges in traceability and trust, particularly concerning food safety. This research examines the feasibility of implementing blockchain technology to address these issues. By leveraging a publicly visible, immutable digital ledger capable of providing real-time data, blockchain has the potential to enhance traceability, boost consumer trust, and streamline operations. This paper explores adoption barriers, potential benefits, and implementation strategies for blockchain in Kenya's agricultural sector.

**1. Introduction**

Kenya's agricultural sector serves as the backbone of its economy, yet inefficiencies in the supply network—better described as a "supply web" due to its intricate interconnections—lead to financial losses and food safety concerns. Foodborne diseases, exacerbated by poor traceability, undermine consumer trust. When consumers encounter spoiled or nearly spoiled food, they question the reliability of supermarkets and suppliers. Blockchain technology, with its digital ledger, offers a solution by enabling near real-time data sharing, ensuring data immutability, and eliminating paper-based inefficiencies. This research investigates whether blockchain can effectively function in Kenya's agricultural context.

**2. Literature Review**

**Challenges in Traditional Supply Chains**: Traditional agricultural supply chains often rely on paper-based or non-existent records, increasing the risk of fraud and inefficiency. These manual systems are prone to errors and lack real-time data sharing, leading to delays and reduced trust among stakeholders (Xiong et al., 2020).

**Blockchain in Agriculture**: Blockchain technology has been proposed as a solution to enhance transparency and traceability in the agricultural sector. For instance, IBM's Food Trust Blockchain has been implemented to create a more transparent and efficient food supply chain, allowing stakeholders to trace products from farm to table. (Fynd Academy, n.d.)

**Adoption Barriers**: Despite its potential, blockchain adoption in agriculture faces several challenges. Many stakeholders lack understanding of the technology, and developing economies may face infrastructural hurdles that impede implementation. Additionally, concerns about data privacy and the cost of technology adoption present significant barriers. (Torky & Hassanein, 2020)

**Impact of Food Safety on Trust**: Food safety incidents have a profound impact on consumer trust. In Kenya, foodborne diseases are a significant public health concern, contributing to illnesses, deaths, and child stunting. These incidents erode consumer confidence in the food supply chain, highlighting the need for improved traceability and transparency. (Grace, Alonso, & Roesel, 2023)

**3. Methodology**

To assess the feasibility of implementing blockchain in Kenya's agricultural sector, this study will employ the following approaches:

* **Surveys and Interviews**: Collect qualitative and quantitative data from farmers, suppliers, retailers, and consumers to understand current challenges in the supply chain and perceptions of blockchain technology.
* **Case Study Analysis**: Examine blockchain adoption in similar markets, such as IBM's Food Trust Blockchain, to identify best practices and potential pitfalls (Fynd Academy, n.d.).
* **Infrastructure Assessment**: Evaluate Kenya's digital infrastructure for blockchain readiness, including internet penetration and mobile device usage among agricultural stakeholders.

**4. Findings & Discussion**

* **Transparency & Traceability**: Blockchain provides visibility into the supply web, allowing all stakeholders to track food from farm to table. This enhanced traceability can reduce fraud and improve food safety (Xiong et al., 2020).
* **Consumer Trust & Food Safety**: Blockchain can mitigate foodborne disease concerns by ensuring product integrity. In Kenya, foodborne diseases have a significant impact on public health, contributing to illnesses, deaths, and child stunting (Grace, Alonso, & Roesel, 2023).
* **Speed & Efficiency**: Traditional tracking systems can take days to trace products, whereas blockchain enables near-instant traceability, saving time and costs. For instance, IBM's Food Trust Blockchain has demonstrated improved efficiency in tracking food products (Fynd Academy, n.d.).
* **Adoption Barriers**: Farmers and retailers may lack blockchain knowledge; implementation costs must be considered. Additionally, ensuring the authenticity of data uploaded to the blockchain remains a challenge (Torky & Hassanein, 2020).

**5. Conclusion & Recommendations**

Blockchain presents a promising solution for Kenya's agricultural sector, improving transparency, reducing inefficiencies, and enhancing consumer trust. However, its success depends on stakeholder education, regulatory support, and infrastructural investment. Future research should explore pilot implementations and conduct cost-benefit analyses to determine the practicality and economic viability of blockchain adoption in this context.

**References**

*Xiong, H., Dalhaus, T., Wang, P., & Huang, J. (2020). Blockchain technology for agriculture: Applications and rationale. Frontiers in Blockchain, 3, Article 7. <https://doi.org/10.3389/fbloc.2020.00007>*

*Fynd Academy. (n.d.). Blockchain technology in agriculture in 2025: Real-world applications and future impact. Fynd Academy. Retrieved March 4, 2025, from <https://www.fynd.academy/blog/blockchain-technology-in-agriculture>*

*Torky, M., & Hassanein, A. E. (2020). Integrating blockchain and the internet of things in precision agriculture: Analysis, opportunities, and challenges. Applied Sciences, 12(16), 8061. <https://doi.org/10.3390/app12168061>*

*Grace, D., Alonso, S., & Roesel, K. (2023). Food safety in Kenya: Status, challenges, and proposed solutions. In T. Reardon, J. Mburu, & S. Wang (Eds.), Food systems transformation in Kenya: Lessons from the past and policy options for the future (pp. 107–123). International Food Policy Research Institute. <https://doi.org/10.2499/9780896294257>*