

Research and application of Blockchain technology in tea traceability in Thai Nguyen

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Abstract: This study investigates the application of blockchain technology to enhance traceability in the tea supply chain of Thái Nguyên province, Vietnam. Given the region's reputation for high-quality tea, counterfeiting and opaque supply chains undermine consumer trust and producer value. The research proposes a decentralized framework leveraging blockchain's immutable ledger to record critical data points—from cultivation and harvesting to processing and distribution. By integrating smart contracts and IoT sensors, the system ensures real-time, tamper-proof verification of product origin and handling. The methodology includes system architecture design, prototype development, and performance evaluation against traditional traceability methods. Findings demonstrate that blockchain significantly improves data transparency, reduces fraud, and enables consumers to verify provenance via QR codes. However, challenges such as scalability, stakeholder adoption, and infrastructure costs are identified. This study concludes that blockchain offers a viable solution for authenticating Thái Nguyên tea, providing a model for agricultural supply chain management in developing regions.

Keywords: Blockchain, traceability, Thai Nguyen tea, application