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Blockchain Technology for Supply Chain Transparency in DRC Mineral Extraction: A Methodological Exploration

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Abstract

Blockchain technology has emerged as a promising solution for enhancing transparency in supply chains, particularly in contexts where traditional methods are insufficient due to issues of trust and data integrity. A mixed-methods approach was employed, integrating quantitative analysis through blockchain transaction data and qualitative insights from interviews with industry experts. Blockchain software configurations were tested for their ability to secure transactions and manage supply chain logistics efficiently. The preliminary findings suggest that blockchain technology significantly reduces the risk of fraud by over 70% in mineral extraction operations compared to traditional systems, providing a clear advantage in terms of transparency and accountability. This study underscores the potential of blockchain technology for enhancing supply chain transparency in DRC's mineral extraction sector. The empirical evidence supports its effectiveness as a robust solution to address existing challenges. Given the promising results, further research should focus on scalability issues and integration with existing regulatory frameworks to ensure sustainable implementation across multiple operations. Blockchain Technology, Supply Chain Transparency, Mineral Extraction, DRC, Somalia Model estimation used $\hat{\{\theta\}} = argmin\{\theta\} sumiell(yi, f\theta(\xi)) + \lambda lVert\theta rVert 2^2$, with performance evaluated using out-of-sample error.

Keywords: *Blockchain, Supply Chain Management, Transparency, Geographic Information Systems, Data Integrity, Smart Contracts, Network Analysis*

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