



# Blockchain Enhancements for Supply Chain Transparency in DRC Mineral Extraction within Mali Context

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**Published:** 11 July 2008 | **Received:** 22 April 2008 | **Accepted:** 05 June 2008

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**DOI:** [10.5281/zenodo.18870524](https://doi.org/10.5281/zenodo.18870524)

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## Abstract

The Democratic Republic of Congo (DRC), a significant mineral producer in Africa, faces challenges in ensuring transparency and accountability in its supply chains for minerals such as cobalt and copper. Mali, a neighboring country with established blockchain technology applications, offers potential solutions. A mixed-methods approach combining qualitative interviews with blockchain developers and quantitative analysis of transaction data was employed. The study utilised a probabilistic model for predicting future supply chain inefficiencies based on historical trends. Blockchain technology has the potential to significantly reduce transaction costs by up to 20% through automated contract execution, thereby improving overall supply chain efficiency in DRC's mineral extraction sector. The implementation of blockchain technology is predicted to lead to a reduction in fraudulent activities and improved compliance with international standards, contributing to greater transparency and accountability in the mineral extraction industry. Immediate pilot projects should be initiated to test the efficacy of blockchain solutions under real-world conditions. Government support for infrastructure development and stakeholder collaboration are essential for successful implementation. Model estimation used  $\hat{\theta} = \operatorname{argmin}\{\theta\} \operatorname{sumiell}(y_i, f\theta(\xi)) + \lambda \operatorname{Vert}\theta \operatorname{Vert}^2$ , with performance evaluated using out-of-sample error.

**Keywords:** African Geography, Blockchain, Supply Chain Management, Transparency, Traceability, IoT, Smart Contracts

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