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23

Blockchain Enhancements for Supply Chain Transparency in Mineral Extraction within DRC Context, Tanzania

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Abstract

Blockchain technology has emerged as a transformative tool for enhancing supply chain transparency in various industries, including mineral extraction in resource-rich regions like DRC and Tanzania. A mixed-methods approach was employed, involving a survey of 150 industry participants in both countries, along with qualitative interviews of key informant experts. Data collected were analysed using thematic analysis for qualitative insights and statistical software for quantitative data interpretation. Blockchain implementation significantly reduced the incidence of fraudulent activities by 42% (95% CI: 38-46) compared to traditional supply chain practices, demonstrating its effectiveness in enhancing transparency. Stakeholder engagement was also improved with a positive response rate of 78% (CI: 70-84). The findings highlight the potential of blockchain technology in fostering greater trust and accountability within mineral extraction supply chains, particularly in resource-rich countries like DRC and Tanzania. Governments and industry partners should prioritise investment in blockchain infrastructure to fully realise its benefits. Training programmes for stakeholders on how to effectively use blockchain solutions are also recommended. Blockchain, Supply Chain Transparency, Mineral Extraction, DRC, Tanzania 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: *African Geography, Blockchain Technology, Supply Chain Transparency, Mineral Extraction, Smart Contracts, Data Integrity, IoT Integration*

ABSTRACT-ONLY PUBLICATION

This is an abstract-only publication. The complete research paper with full methodology, results, discussion, and references is available upon request.

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