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# **Adoption Barriers to Blockchain Timber Traceability: An Analysis of Licensed Small-Scale Loggers in Zambia's Miombo Woodlands**

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## | Abstract

The Miombo woodlands of Zambia are a key source of Mukula (*Pterocarpus chrysothrix*) timber. Blockchain technology is proposed to improve timber traceability and curb illegal logging, yet its uptake by licensed small-scale loggers, crucial local actors, is not well documented. This study aimed to identify and analyse the specific barriers preventing the adoption of blockchain-based timber traceability systems among licensed small-scale loggers in Zambia's Miombo woodlands. A qualitative, exploratory research design was employed. Data were collected through in-depth, semi-structured interviews with a purposively selected sample of licensed small-scale loggers and supporting stakeholders. Thematic analysis was used to identify and categorise the emergent barriers. Four primary barrier categories were identified: technological, economic, institutional, and social. Economic viability was the dominant concern, with most respondents viewing implementation costs as prohibitive without a clear financial return. Significant gaps in technological literacy and mistrust in data governance were also prominent. The adoption of blockchain for timber traceability is hindered by a complex mix of factors beyond technical availability. For small-scale operators, economic disincentives and a lack of perceived value are critical obstacles that technology-centric deployment models overlook. Future initiatives should develop phased, cost-shared implementation models that demonstrate clear economic

benefit to loggers. Complementary programmes must build digital capacity and foster trust through transparent, inclusive design and governance structures. blockchain, timber traceability, adoption barriers, small-scale loggers, Miombo woodlands, Zambia, sustainable forestry This research provides empirical evidence on socio-technical adoption barriers from the perspective of loggers, a viewpoint often absent in forestry technology literature. It contributes a grounded analysis of implementation challenges for blockchain traceability within a specific tropical timber context.

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