

RockChain: A Technological Framework for Blockchain-Driven Circular Waste Management in Construction Sector

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ABSTRACT

The construction industry is a major contributor to global resource consumption and waste generation, posing significant environmental challenges. Traditional waste management (WM) practices often fall short in ensuring transparency, traceability, and efficiency, which are essential for advancing sustainability. This paper introduces "RockChain," a technological framework that leverages blockchain technology to drive circular waste management in construction. By integrating blockchain with circular economy (CE) principles, the proposed framework addresses critical barriers such as data fragmentation, lack of accountability, and limited cross-industry cooperation. The study reviews the current state of construction waste management, explores the potential of blockchain-enabled solutions, and highlights the synergy between blockchain and digital innovations like Building Information Modeling (BIM) and the Internet of Things (IoT). The results demonstrate that blockchain can enhance transparency, automate waste tracking, and facilitate secure information sharing, thereby supporting the transition to a circular built environment. The paper concludes that adopting blockchain-driven circular waste management systems can significantly reduce environmental impacts, promote resource efficiency, and foster sustainable practices in the construction sector.

Keywords: blockchain, circular economy, waste management and recycling, construction waste, sustainability

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