

Unveiling Global Trends in Circular Economy Applications in Concrete Demolition Waste: A Bibliometric Synthesis

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Abstract

The construction industry generates substantial volumes of concrete demolition waste (CDW), posing significant environmental and resource management challenges. In response, the circular economy (CE) has emerged as a transformative paradigm promoting reuse, recycling, and closed-loop systems. Despite increasing scholarly interest, circular economy in concrete demolition waste management (CE-CDWM) remains fragmented across materials engineering, waste management and sustainability research. This study presents a bibliometric synthesis of global research on circular economy applications in concrete demolition waste to map prevailing trends, knowledge structures and strategic research gaps. A total of 163 peer-reviewed articles published between 2000 and 2025 were analysed using VOSviewer and guided by PRISMA and PICOSS frameworks. Findings show that CE-CDWM is organised around five thematic clusters comprising recycled aggregate concrete, life cycle assessment, durability and mechanical performance, upcycling and waste management. Influential work has shifted from aggregate substitution towards waste hierarchy, industrial symbiosis, life cycle costing, carbon mineralisation and digital traceability. However, research remains largely material centred, with limited attention to reuse before recycling, selective demolition, circular procurement, quality certification, regional life cycle data and developing economy contexts. The study argues that CE-CDWM has advanced from technical feasibility towards systems thinking but has not yet matured into a fully integrated circular concrete systems paradigm.

Keywords: Circular Economy, Concrete Demolition Waste, Construction Waste Management, Bibliometric Analysis, Recycled Concrete Aggregate, VOSviewer