



Investigating Barriers to Sustainable Waste Material Adoption in Concrete Production: A Study in the Sri Lankan Construction Industry

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Despite extensive research demonstrating the technical feasibility of incorporating waste materials as partial replacements in concrete production, real-world implementation remains significantly limited. Studies have identified successful applications of tire rubber as coarse and fine aggregate replacement up to 10%, crushed glass particles as sand and cement replacement up to 10–15%, and concrete demolition waste as coarse aggregate replacement up to 30%. This study addresses the critical research-to-practice gap by exploring multifaceted barriers preventing engineers and clients from adopting these sustainable alternatives—a novel contribution that systematically investigates implementation barriers within the construction industry in Sri Lanka. Key barrier categories were identified through a comprehensive literature review and stakeholder consultations specific to the construction industry. Economic feasibility concerns, supply chain infrastructure deficiencies, technical performance uncertainties, awareness gaps, and reluctance to adopt new technologies were recognized as primary barriers. Experts identified the following main concerns: direct costs and initial processing expenses often outweigh indirect benefits like carbon footprint reduction; maintaining reliable supplies of recycled materials for large-scale projects presents significant supply chain challenges; lack of building code compliance, insufficient technical knowledge, and inadequate guidelines hinder adoption among professionals; and cultural resistance may prevent acceptance beyond technical considerations. These findings are context-specific to the construction industry in Sri Lanka, with limited generalizability to other regions without comparable conditions. These concerns must be studied thoroughly within the legal, economic, environmental, and social conditions of the country to motivate adoption. This requires quantitative data collection and analysis, outlining clear pathways for developing practical strategies: regulatory framework development, financial incentive mechanisms, quality-controlled supply chains, and professional training programs tailored to the construction landscape. These evidence-based efforts facilitate sustainable construction practices and ensure valuable research transitions from academic inquiry to practical implementation, benefiting future generations.

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