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The Study Reuse and Recycling Waste Management in Construction site at Melaka

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Structured Abstract

Background: The background of this study highlights the critical tension between rapid construction development and environmental sustainability, noting that the global construction industry generates over two billion tonnes of waste annually, accounting for 30–40% of total solid waste. In Malaysia, this issue is escalating due to urbanization, with the construction sector producing approximately 25,600 tonnes of waste daily, about 30% of the total sent to landfills while achieving a recovery rate of only 50% compared to 90–99% in developed nations. The situation is particularly acute in Melaka, where a robust construction sector outperforming the state's GDP growth contributes to the heavy burdening of the Sungai Udang landfill, which receives 30–40% of solid waste from industrial and infrastructure activities. Despite frameworks like the Green Building Index, effective reuse and recycling are hindered by a lack of infrastructure, low awareness, and a persistent industry preference for cost and speed over environmental performance, necessitating this investigation into bridging the gap between policy and practice.

Methods: This study employs a mixed-methods comparative case study design, focusing on one state-owned and two private construction companies in Melaka to evaluate the effectiveness of waste management practices. Primary data is collected through site observations, document reviews, and self-administered questionnaires distributed to key stakeholders, such as project managers and site engineers, who utilize a 5-point Likert scale to rate the prevalence, benefits, and challenges of reuse and recycling activities. The sample size is established using the Krejcie and Morgan calculation, and the resulting data is analyzed using the Relative Importance Index (RII) to rank key factors, alongside SPSS for descriptive statistics and reliability testing, to identify actionable strategies for closing the gap between policy and on-site implementation.

Results: Based on data from 45 construction practitioners in Melaka, the results identify metal as the most extensively reused (RII = 0.827) and recycled (RII = 0.809) material due to its high market value and ease of segregation, while glass and asphalt rank lowest due to contamination risks and processing difficulties. Although stakeholders strongly acknowledge cost reduction (RII = 0.911) and environmental impact minimization (RII = 0.907) as the primary benefits of waste management, effective implementation is critically obstructed by insufficient worker training (RII = 0.818) and the additional costs associated with recycling processes. Comparative analysis across the three case study sites reveals that while specific material priorities vary—with Site C favoring concrete reuse more than others—the fundamental barriers remain consistent, specifically the lack of specialized knowledge and the economic burden of logistics, which respondents ranked as more significant hurdles than physical infrastructure limitations.

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Conclusion: The study concludes that metal, concrete, and wood are the most viable materials for reuse and recycling in Melaka's construction sector, with metal consistently ranking highest due to its longevity and established recyclability. While respondents strongly agree that these practices offer significant cost reductions and environmental protection, their effective implementation is critically hindered by insufficient worker training, strict time constraints, and the additional financial burdens associated with recycling processes. Although these findings align with broader Malaysian and international trends, the reliance on perception-based data is a noted limitation; therefore, future research is recommended to employ direct measurement techniques, such as waste audits or material flow analysis, to obtain precise quantitative data on waste volumes and further validate these insights.

Keywords: Reuse and Recycling, Waste Management, Melaka, Waste Segregation, Relative Importance Index

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