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Smart City Initiatives for Urban Waste Management Optimization in Nairobi: Enhancing Resource Recovery Rates and Environmental Quality

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Abstract

Urban waste management in Nairobi faces significant challenges related to inadequate infrastructure, inefficient collection systems, and limited public awareness of recycling benefits. These issues contribute to high levels of waste mismanagement and environmental degradation. A mixed-methods approach was employed, including quantitative data collection through surveys and IoT sensors for tracking waste generation patterns. Qualitative insights were gathered from interviews with stakeholders and case studies of successful smart city projects. Initial findings suggest a 20% increase in waste diversion rates due to the implementation of real-time monitoring systems that provide immediate feedback on waste management performance, leading to more efficient resource recovery strategies. Smart city initiatives have demonstrated potential for improving urban waste management practices and environmental sustainability in Nairobi. However, further research is needed to validate these preliminary results and explore scalability across different contexts. Communities should be actively engaged through education programmes on the benefits of recycling. Local authorities need to invest in more robust waste collection infrastructure supported by smart technology solutions. The maintenance outcome was modelled as $Y\{\} = beta0 + beta1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Nairobi, Geographic Information Systems (GIS), Data Mining, Waste Segregation, Resource Recovery, Sustainable Development, Smart Cities*

ABSTRACT-ONLY PUBLICATION

This is an abstract-only publication. The complete research paper with full methodology, results, discussion, and references is available upon request.

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