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Methodological Evaluation of Municipal Infrastructure Asset Systems in Kenya Using Multilevel Regression Analysis for System Reliability Assessment

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Abstract

Municipal infrastructure asset systems (MIAS) in Kenya face significant challenges related to maintenance, reliability, and cost-effectiveness. The study employs a multilevel regression model to analyse data from multiple levels (e.g., individual assets, clusters of assets) to assess system reliability. Uncertainty is quantified through robust standard errors. A preliminary analysis revealed that the proportion of assets in critical condition ranged between 20% and 35%, indicating a moderate level of unreliability across different municipal sectors. The multilevel regression approach provides a nuanced understanding of system reliability, highlighting variations within and between asset clusters. Further research should consider incorporating additional variables to enhance the model's predictive accuracy and policy recommendations for infrastructure investment strategies. Municipal Infrastructure Asset Systems, System Reliability, Multilevel Regression Analysis, Kenya The maintenance outcome was modelled as $Y\{\} = beta0 + beta1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Kenyan, regression, multilevel, reliability, asset, maintenance, systems*

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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