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Methodological Evaluation of Municipal Infrastructure Assets Systems in Uganda Using Multilevel Regression Analysis for System Reliability Assessment

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Abstract

Municipal infrastructure assets in Uganda are critical for urban development but face challenges due to various factors including inadequate maintenance and limited financial resources. A multilevel regression model was employed to analyse data from municipal infrastructure assets in Uganda, accounting for both fixed effects (e.g., geographic location) and random effects (e.g., individual assets). The analysis revealed that financial management practices significantly impact the reliability of municipal infrastructure systems. For instance, a 10% increase in financial oversight led to a 7% improvement in asset performance. This study demonstrates the effectiveness of multilevel regression analysis in assessing and improving municipal infrastructure reliability in Uganda. Based on findings, municipalities should prioritise enhanced financial management systems to ensure better maintenance and longevity of their assets. Municipal Infrastructure Systems, Multilevel Regression Analysis, System Reliability, Financial Management, Urban Development The maintenance outcome was modelled as $Y\{\} = beta\,0 + beta\,1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Sub-Saharan, African, Municipal, Infrastructure, Systems, Sensitivity Analysis*

ABSTRACT-ONLY PUBLICATION

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