



Methodological Evaluation of Municipal Infrastructure Assets Systems in Kenya Using Panel Data for Risk Reduction Assessment

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Abstract

Municipal infrastructure assets in Kenya are vulnerable to various risks such as natural disasters, operational inefficiencies, and financial mismanagement. A mixed-methods approach was employed, integrating quantitative (panel data analysis) and qualitative methodologies to comprehensively assess the municipal infrastructure assets. The study utilised a Random Effects Model (REM) to estimate the effects of various risk factors over time across different municipalities in Kenya. The panel data analysis revealed significant variations in asset management practices between urban and rural areas, with higher financial mismanagement rates observed in less developed regions. This highlights the necessity for tailored interventions specific to each municipality's context. This study underscores the importance of adopting a robust risk assessment framework that considers both quantitative metrics and qualitative insights to enhance the resilience of municipal infrastructure assets in Kenya. Implement a sector-wide training programme for asset managers, prioritise investments in less developed areas, and establish transparent financial oversight mechanisms to reduce risks associated with municipal infrastructure assets. Municipal Infrastructure Assets, Risk Assessment, Panel Data Analysis, Random Effects Model The maintenance outcome was modelled as $Y_i = \beta_0 + \beta_1 X_i + u_i + \text{varepsilon}_i$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: Kenya, Municipal Infrastructure, Panel Data, Risk Assessment, Econometrics, Geographic Information Systems, Sustainability Analysis

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