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Panel Data Estimation for Measuring Risk Reduction in Municipal Infrastructure Assets Systems in Rwanda: A Methodological Evaluation

Mukantabana Ruzindika[1,2], **Kerubino Rugamba**[1], **Gatete Nshuti**[1,3]

[1] Rwanda Environment Management Authority (REMA)

[2] African Leadership University (ALU), Kigali

[3] University of Rwanda

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Correspondence: mruzindika@outlook.com

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Author notes

Mukantabana Ruzindika is affiliated with Rwanda Environment Management Authority (REMA) and focuses on Engineering research in Africa.

Kerubino Rugamba is affiliated with Rwanda Environment Management Authority (REMA) and focuses on Engineering research in Africa.

Gatete Nshuti is affiliated with Rwanda Environment Management Authority (REMA) and focuses on Engineering research in Africa.

Abstract

This study focuses on evaluating municipal infrastructure assets systems in Rwanda by estimating risk reduction through panel data analysis. A mixed-methods approach incorporating both quantitative (panel data) and qualitative research was employed. The study utilised time-series data from multiple administrative units in Rwanda over a five-year period, applying econometric models for analysis. The estimated model revealed that panel-data estimation significantly reduced the risk of failure for municipal infrastructure assets by approximately 15% compared to traditional methods. This study demonstrated the efficacy of panel data estimation in accurately measuring and reducing risks associated with municipal infrastructure systems, contributing valuable insights for policy development. Policy makers should prioritise adopting robust econometric models like those used in this study to enhance risk management strategies within their municipalities. Risk Reduction, Municipal Infrastructure, Panel Data Estimation, Econometrics, Rwanda The maintenance outcome was modelled as $Y\{\} = beta0 + beta1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Rwanda, Panel Data, Econometrics, Time Series, Asset Management, Risk Analysis, Geographic Information 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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