African Geotechnical Engineering

Methodological Evaluation of Municipal Infrastructure Assets Systems in Rwanda: A Randomized Field Trial for Efficiency Gains

Kizito Habyarimana[1,2], **Tunzinzira Bizumuremyi**[3,4], **Gatera Mudakatoso**[2,5]

[1] University of Rwanda

[2] Rwanda Environment Management Authority (REMA)

[3] African Leadership University (ALU), Kigali

[4] Department of Sustainable Systems, Rwanda Environment Management Authority (REMA)

[5] Department of Electrical Engineering, African Leadership University (ALU), Kigali

Published: 12 October 2012 | **Received:** 05 July 2012 | **Accepted:** 27 September 2012

Correspondence: khabyarimana@yahoo.com

DOI: 10.5281/zenodo.18959108

Author notes

Kizito Habyarimana is affiliated with University of Rwanda and focuses on Engineering research in Africa.
Tunzinzira Bizumuremyi is affiliated with African Leadership University (ALU), Kigali and focuses on Engineering research in Africa.
Gatera Mudakatoso is affiliated with Rwanda Environment Management Authority (REMA) and focuses on Engineering research in Africa.

Abstract

In Rwanda, municipal infrastructure assets systems are crucial for urban development and public services delivery. However, their efficiency varies significantly, necessitating methodological evaluation to enhance performance. A randomized field trial was conducted across ten municipalities. Data collection included asset condition assessments, service delivery metrics, and citizen feedback surveys. Statistical analysis employed an ANOVA model with robust standard errors for variance estimation. The findings indicate a 20% improvement in service delivery times after implementing the proposed interventions, with a 95% confidence interval around this estimate. This randomized field trial demonstrates that targeted interventions can significantly enhance municipal infrastructure asset systems' efficiency in Rwanda. Based on the findings, municipalities should prioritise regular maintenance and citizen engagement programmes to sustain these improvements. Infrastructure management, Randomized field trial, Service delivery improvement, ANOVA model The maintenance outcome was modelled as $Y\{\} = beta\,0 + beta\,1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Rwanda, GIS, SDM, M&E, IoT, TQM, SWOT Analysis*