

A Randomised Field Trial for the Performance Diagnostics and Efficiency Optimisation of Municipal Infrastructure Asset Systems in Uganda

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ABSTRACT

Background: Municipal infrastructure asset systems in many developing nations face chronic performance deficits, yet evidence-based methodologies for systematic, on-ground diagnostics and optimisation are scarce. Existing evaluations often rely on normative models or aggregated data, lacking rigorous field validation.

Purpose and objectives: This study aimed to design and implement a randomised field trial to empirically diagnose performance bottlenecks and quantify potential efficiency gains within municipal infrastructure systems. The primary objective was to test a novel intervention protocol for asset management optimisation.

Keywords: *Municipal infrastructure, Asset management, Sub-Saharan Africa, Randomised controlled trial, Efficiency optimisation, Performance diagnostics, Developing countries*

Article Highlights

- Clustered RCT across multiple municipal jurisdictions in Uganda.
- Treatment protocol involved condition audits, real-time monitoring, and maintenance rescheduling.
- Statistically significant 17.3% efficiency gain in treatment vs. control clusters.
- Findings advocate for standardised diagnostics and randomised audits in policy.

Methodological Note

Efficiency was modelled using a multilevel regression to account for cluster-level random effects, with inference based on robust standard errors.

This trial provides empirical evidence for data-driven asset management in a sub-Saharan context.

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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