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A Randomised Field Trial Methodology for Cost-Effectiveness Diagnostics of Municipal Infrastructure Asset Systems in Uganda

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ABSTRACT

Background: Municipal infrastructure asset systems in sub-Saharan Africa face severe financial constraints, yet robust methodologies for evaluating the cost-effectiveness of maintenance and rehabilitation interventions are lacking. Current diagnostic approaches are often retrospective and fail to account for heterogeneous asset conditions and contextual operational factors.

Purpose and objectives: This article presents a novel methodological framework for conducting randomised field trials (RFTs) to diagnose the cost-effectiveness of municipal infrastructure asset management. The primary objective is to provide a replicable protocol for generating comparative evidence on intervention strategies under real-world conditions.

Keywords: *Randomised controlled trial, Cost-effectiveness analysis, Municipal infrastructure, Asset management, Sub-Saharan Africa, Maintenance diagnostics, Field experiment methodology*

Article Highlights

- Proposes a replicable protocol for randomised field trials on municipal infrastructure assets.
- Clusters assets into balanced blocks based on covariates like age and soil type.
- Employs a generalised linear mixed model with cluster-robust standard errors for analysis.
- Designed to achieve an 80% power with a detectable effect size of 0.35 standard deviations.

Methodological Innovation

The framework applies randomised controlled trial principles—common in clinical and social sciences—to the novel context of municipal infrastructure asset management in sub-Saharan Africa.

This article presents a methodological framework, not empirical results from a completed trial.

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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