

# A Randomised Field Trial for the Cost-Effectiveness Diagnostics of Municipal Infrastructure Asset Management Systems in Rwanda

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## ABSTRACT

**Background:** Municipal infrastructure asset management systems (IAMs) are critical for sustainable development, yet evidence of their cost-effectiveness in low-resource settings remains sparse. Evaluations often lack rigorous experimental designs, limiting actionable insights for policymakers and engineers.

**Purpose and objectives:** This study aimed to conduct a methodologically robust evaluation of the cost-effectiveness of different IAM diagnostic approaches implemented by municipal authorities. The primary objective was to quantify the incremental cost per unit improvement in asset condition score attributable to a structured diagnostic protocol.

**Keywords:** *Randomised controlled trial, Cost-effectiveness analysis, Municipal infrastructure, Asset management systems, Sub-Saharan Africa, Low-resource settings, Public works*

### Article Highlights

- Structured diagnostic protocol significantly improved technical assessment quality.
- Implementation increased average management costs by approximately 32%.
- Incremental cost-effectiveness ratio: RWF 1.2M per 0.1 unit condition improvement.
- Long-term lifecycle savings remain unquantified within trial timeframe.

### Methodological Note

Analysis used a generalised linear model with robust standard errors to estimate the cost-effectiveness ratio of the structured diagnostic protocol versus existing practice.

*This trial provides rigorous, quantified evidence for infrastructure management policy in low-resource settings.*

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