



Field Evaluation of Municipal Infrastructure Asset Systems in Rwanda: A Randomized Field Trial on System Reliability Assessment

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Abstract

This study aims to evaluate municipal infrastructure asset systems in Rwanda through a randomized field trial designed to assess system reliability. A randomized field trial was conducted across selected municipalities in Rwanda. Data were collected using standardised surveys and equipment condition assessments. Statistical models were applied to analyse the data, including a logistic regression model to predict the probability of asset failure based on environmental factors. The findings indicate that 75% of surveyed municipal infrastructure assets exhibited reliability levels within acceptable parameters, with variations in performance attributed largely to climate conditions and maintenance practices. Despite initial challenges in data collection, this randomized field trial provided valuable insights into the reliability of municipal infrastructure systems in Rwanda. The study's methodology can serve as a benchmark for future evaluations. Future research should focus on expanding the geographical scope to include more municipalities and integrate predictive maintenance strategies based on system reliability metrics. The maintenance outcome was modelled as $Y \{ \} = \beta_0 + \beta_1 X \{ \} + u_i + v \text{arepsilon} \{ \}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Geographic, Sub-Saharan, Asset Management, Reliability Analysis, Randomization, Field Evaluation, Infrastructure Maintenance*

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