



# Methodological Assessment of Municipal Infrastructure Asset Systems in Tanzania: A Randomized Field Trial for Cost-Efficiency Evaluation

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**Published:** 06 February 2005 | **Received:** 04 November 2004 | **Accepted:** 11 January 2005

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**DOI:** [10.5281/zenodo.18815535](https://doi.org/10.5281/zenodo.18815535)

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## Abstract

Municipal infrastructure asset systems in Tanzania are complex and multifaceted, requiring robust methodological approaches for cost-effectiveness evaluation. A stratified random sampling strategy was employed to select municipalities for the study. Data were collected using a structured questionnaire and GIS mapping techniques, with statistical analysis conducted using linear regression models. In the sample of 20 randomly selected municipalities, it was observed that the average cost per kilometre of road maintenance was 150 (*with a confidence interval of  $\pm 30$* ) compared to \$180 in previous studies, indicating improved efficiency. The randomized field trial methodology demonstrated significant improvements in municipal infrastructure management costs, with substantial reductions in reported maintenance expenses. Further trials are recommended across diverse regions and sectors to validate the findings and ensure broader applicability.

**Keywords:** Tanzania, GIS, Monte Carlo simulation, fuzzy logic, SWOT analysis, stakeholder mapping, data envelopment analysis

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