

COMPARATIVE STUDY

Methodological Evaluation of Distribution Network Assets

A Randomised Field Trial for Efficiency Gains in South Africa

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ABSTRACT

Background: Ageing infrastructure and operational inefficiencies in electrical distribution networks present significant challenges for utilities in many regions. There is a pressing need for robust, field-validated methodologies to evaluate asset performance and identify efficiency interventions.

Purpose and objectives: This study aimed to conduct a comparative methodological evaluation of two prevalent approaches for assessing distribution network equipment efficiency. The primary objective was to determine which method yields more reliable and actionable data for informing maintenance and capital replacement strategies.

Keywords: *Distribution network assets, randomised field trial, efficiency gains, Sub-Saharan Africa, methodological evaluation, power distribution, asset management*

Article Highlights

- Randomised field trial compares time-based versus condition-based asset assessment.
- Condition-based method identified 34% more latent critical failures in key equipment.
- Resulted in 7.2 percentage point higher estimated efficiency gains for targeted interventions.
- Provides superior evidence base for efficiency-driven asset management decisions.

Methodological Insight

The study employed a randomised field trial design with performance modelled via a generalised linear mixed model, comparing two assessment protocols across multiple municipal service areas.

This study presents a field-validated methodological comparison for asset management.

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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