

A Randomised Field Trial Methodology for Evaluating Distribution Network Reliability and Yield Improvement in Kenya

Wanjiku Mwangi¹, Kamau Kariuki²

Department of Mechanical Engineering, Pwani University | Department of Mechanical Engineering, Strathmore University

Correspondence: wmwangi@hotmail.com

Received: 15 March 2019 | Accepted: 25 April 2019 | Published: 22 May 2019 | DOI: [10.5281/zenodo.18967697](https://doi.org/10.5281/zenodo.18967697)

ABSTRACT

Background: Power distribution networks in sub-Saharan Africa face persistent challenges with reliability and technical losses, yet robust field methodologies for evaluating equipment interventions are lacking. Existing studies often rely on modelled or aggregated data, which may not capture real-world performance under local operating conditions.

Purpose and objectives: This article presents a novel methodological framework for conducting a randomised field trial to empirically evaluate the impact of specific equipment upgrades on network reliability and yield (energy delivered) within a national utility. The objective is to establish a rigorous, replicable protocol for causal inference in a live distribution network.

Keywords: *Randomised controlled trial, Distribution network reliability, Sub-Saharan Africa, Technical losses, Power distribution systems, Field experiment methodology*

Article Highlights

- Presents a cluster-randomised design for evaluating equipment upgrades on live networks.
- Methodology is powered to detect a 15% reduction in network interruption duration.
- Uses difference-in-differences analysis with cluster-robust standard errors.
- Provides a replicable protocol for causal inference in utility-scale trials.

Design Note

The article presents a methodological framework and power analysis, not empirical results from a completed trial.

This protocol is designed for implementation by utilities and researchers.

ABSTRACT-ONLY PUBLICATION

This is an abstract-only publication. The complete research paper with full methodology, results, discussion, and references is available upon request.

REQUEST FULL PAPER

 **Email:** info@parj.africa

Request your copy of the full paper today!

SUBMIT YOUR RESEARCH

**Are you a researcher in Africa? We
welcome your submissions!**

Join our community of African scholars and share
your groundbreaking work.

 **Submit at:** app.parj.africa



Scan to visit app.parj.africa

Open Access Scholarship from PARJ

Empowering African Research | Advancing Global
Knowledge