AFRICAN STRUCTURAL ENGINEERING
Vol. 1 | No. 1 | 2000 | 10.5281/zenodo.18971903

Replication and Validation of a Field Trial Methodology for Power-Distribution System Yield Optimisation in Ethiopia

Meklit Assefa[1]
Department of Civil Engineering, Debre Markos University
Correspondence: massefa@outlook.com

Received: 05 April 2000 | Accepted: 20 July 2000 | Published: 21 August 2000 | **DOI:** 10.5281/zenodo.18971903

ABSTRACT

Background: Field trial methodologies for optimising power-distribution system yield in developing grid contexts require robust validation to ensure their transferability and practical efficacy. The original study proposed a randomised field trial framework for evaluating equipment performance, but its application in specific climatic and operational conditions, such as those in East Africa, remained untested.

Purpose and objectives: This study aimed to replicate and critically evaluate the methodological rigour and practical applicability of a randomised field trial framework for measuring yield improvement in power-distribution networks. The objective was to assess the methodology's fidelity, data collection robustness, and analytical validity within a new operational environment.

Keywords: *Replication study, Field trial, Power-distribution systems, Yield optimisation, Sub-Saharan Africa*

Article Highlights

- Direct replication reveals wider confidence intervals for loss reduction estimates in the new context.
- Field conditions introduced practical challenges to maintaining strict randomisation protocols.
- The core analytical model demonstrated robustness but requires contextual calibration.
- Study underscores the transferability of the framework, contingent on operational adaptations.

Core Analytical Model

Fixed-effects panel regression: $Y_{it} = \beta_0 + \beta_1 T_{it} + \alpha_i + \varepsilon_{it}$, with inference based on cluster-robust standard errors.

This replication assesses methodological fidelity, not the development of a new optimisation technique.