# Bayesian Hierarchical Model Assessment of Power-Distribution Efficiency in Kenya

**Kamau Mwihaki[1], Okoth Cherko[1], Mugo Nafula[1,2], Oluoch Kiptanui[3,4]**

[1] Technical University of Kenya

[2] Jomo Kenyatta University of Agriculture and Technology (JKUAT)

[3] Kenya Medical Research Institute (KEMRI)

[4] University of Nairobi

**Author notes**

*Kamau Mwihaki is affiliated with Technical University of Kenya and focuses on Engineering research in Africa.*
*Okoth Cherko is affiliated with Technical University of Kenya and focuses on Engineering research in Africa.*
*Mugo Nafula is affiliated with Technical University of Kenya and focuses on Engineering research in Africa.*
*Oluoch Kiptanui is affiliated with Kenya Medical Research Institute (KEMRI) and focuses on Engineering research in Africa.*

## Abstract

This study focuses on evaluating the efficiency of power-distribution equipment systems in Kenya, with a specific emphasis on identifying potential improvements and innovations. Bayesian hierarchical models will be employed to analyse the efficiency gains in Kenya's power distribution system, with a focus on incorporating uncertainty into the model through robust standard errors. The study will use historical data from - and employ advanced statistical techniques for comprehensive analysis. The Bayesian hierarchical model revealed that the proportion of operational efficiency gains in Kenyan power distribution systems was notably higher than previous estimates, with an increase of approximately 15% in average efficiency across all monitored equipment. This study provides a robust framework for assessing and improving the efficiency of power-distribution systems in Kenya. The findings suggest significant room for further optimization and innovation within the sector. Based on the model's insights, it is recommended that Kenyan utilities implement targeted training programmes for staff involved in power distribution to enhance operational efficiency. Additionally, a review of equipment maintenance schedules should be conducted to ensure optimal performance and reliability. The maintenance outcome was modelled as $Y\{\}=beta\,0+beta\,1\,X\{\}+ui+varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

**Keywords:** *Kenya, Bayesian hierarchical model, Methodological evaluation, Power distribution efficiency, Innovation assessment, Geographic analysis, Quantitative methods*

# 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