

# Methodological Evaluation and Panel-Data Estimation for Cost-Effectiveness in Nigeria's Power-Distribution Equipment Systems

DOI: [10.5281/zenodo.18965949](https://doi.org/10.5281/zenodo.18965949) | Received: 26 March 2019 | Accepted: 05 May 2019 |

Published: 12 June 2019

Chinwe Okonkwo<sup>1</sup>

<sup>1</sup> Covenant University, Ota

Correspondence: [cokonkwo@hotmail.com](mailto:cokonkwo@hotmail.com)

DOI: [10.5281/zenodo.18965949](https://doi.org/10.5281/zenodo.18965949)

Received: 26 March 2019 | Accepted: 05 May 2019

## ABSTRACT

**Background:** Persistent inefficiencies and high capital costs in power-distribution networks hinder reliable electricity supply. A rigorous, data-driven framework for evaluating the cost-effectiveness of equipment systems is required to inform infrastructure investment and maintenance strategies.

**Purpose and objectives:** This paper aims to develop and apply a panel-data econometric methodology to measure the cost-effectiveness of power-distribution equipment systems. The objective is to identify the technical and operational factors that significantly drive lifetime costs versus performance.

**Keywords:** *Power-distribution networks, Cost-effectiveness analysis, Panel-data estimation, Sub-Saharan Africa, Infrastructure asset management, Econometric modelling, Grid reliability*

### Article Highlights

- Develops a novel panel-data econometric model for equipment cost-effectiveness.
- Identifies transformer loading ratio as the primary driver of lifetime costs.
- Provides a replicable framework for infrastructure asset-performance management.
- Analysis based on utility operational records from Nigeria's distribution networks.

### Core Methodology

A two-way fixed effects estimator models normalised annualised cost against a performance index and technical covariates, using cluster-robust standard errors for inference.

*This study offers a data-driven framework for evaluating infrastructure investment strategies.*

## **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](mailto: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](http://app.parj.africa)



Scan to visit [app.parj.africa](http://app.parj.africa)

### **Open Access Scholarship from PARJ**

Empowering African Research | Advancing Global  
Knowledge