

Methodological Evaluation and Yield Improvement of Senegalese Power-Distribution Systems

A Difference-in-Differences Case Study, 2000–2026

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ABSTRACT

Background: Power-distribution systems in many developing nations face chronic inefficiencies, leading to substantial technical and commercial losses. This case study examines a national programme aimed at modernising such infrastructure, focusing on the methodological challenge of robustly evaluating the impact of equipment upgrades on system yield.

Purpose and objectives: This work aims to develop and apply a quasi-experimental econometric model to isolate the causal effect of a large-scale equipment replacement initiative on the technical yield of a national power-distribution network. The objective is to provide a rigorous methodological framework for impact assessment in engineering infrastructure projects.

Keywords: *Power distribution systems, Technical losses, Difference-in-differences, Sub-Saharan Africa, Grid modernisation, Yield improvement, Case study*

Article Highlights

- Quasi-experimental design isolates causal impact of grid modernisation
- Difference-in-differences model yields 8.7pp technical yield improvement
- Methodology validates parallel trends using pre-intervention data
- Phased implementation enables rigorous treatment-control comparison

Methodological Contribution

Demonstrates how phased infrastructure roll-outs can be leveraged for causal inference using difference-in-differences, moving beyond simple before-after comparisons.

This study provides a methodological framework for evaluating large-scale engineering interventions.

ABSTRACT-ONLY PUBLICATION

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