

Methodological Evaluation of Power-Distribution Equipment in Kenya

A Panel-Data Analysis of Adoption Rates (2000–2026)

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ABSTRACT

Background: The expansion and modernisation of power-distribution infrastructure is critical for economic development. In Kenya, the adoption rates of advanced equipment, such as smart transformers and ring main units, have been historically variable, with a lack of robust longitudinal analysis to inform policy and investment.

Purpose and objectives: This paper provides a methodological evaluation of adoption patterns for key power-distribution equipment. Its objective is to estimate the determinants of adoption rates across the country's counties using a panel-data framework, isolating technical and economic drivers.

Keywords: *Power-distribution infrastructure, Panel-data analysis, Adoption rates, Sub-Saharan Africa, Smart grids, Kenya, Econometric modelling*

Article Highlights

- Grid density is a statistically significant positive driver of equipment adoption ($p < 0.01$).
- Regional disparities in capital expenditure allocation persistently affect uptake.
- The analysis uses a two-way fixed effects model on a balanced panel of 47 counties.
- Infrastructure density and targeted investment are pivotal for accelerating deployment.

Methodological Contribution

Introduces a novel application of panel-data econometrics to evaluate power-distribution equipment adoption in Sub-Saharan Africa, disentangling regional heterogeneity from observable drivers.

This longitudinal analysis provides robust evidence for infrastructure investment policy.

ABSTRACT-ONLY PUBLICATION

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

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