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Methodological Evaluation of Power-Distribution Equipment Systems in Uganda

A Panel-Data Estimation for Risk Reduction, 2000–2026

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ABSTRACT

Background: Power-distribution infrastructure in many developing nations faces significant reliability and safety challenges due to ageing assets and operational stresses. A systematic, data-driven methodology for evaluating equipment performance and quantifying risk reduction is critically needed to inform maintenance and investment strategies.

Purpose and objectives: This study aims to develop and apply a novel panel-data econometric framework to evaluate the performance of power-distribution equipment systems, with the objective of measuring the efficacy of recent interventions in reducing technical and operational risks.

Keywords: *Power-distribution systems, Panel-data estimation, Risk reduction, Sub-Saharan Africa, Infrastructure reliability, Electrical equipment, Uganda*

Article Highlights

- Panel-data framework quantifies risk reduction from equipment upgrades.
- 22% decrease in outage frequency linked to insulator retrofitting.
- Method enables continuous performance monitoring for utilities.
- Shows diminished system vulnerability to seasonal rainfall variations.

Methodological Contribution

Novel application of a two-way fixed effects panel model to evaluate power-distribution equipment performance and measure intervention efficacy in a developing nation context.

This study presents a replicable econometric framework for infrastructure asset management.

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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