



Methodological Evaluation of Power-Distribution Equipment Systems in Senegal Using Panel Data for Cost-Effectiveness Analysis

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Published: 15 July 2012 | **Received:** 05 April 2012 | **Accepted:** 28 May 2012

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DOI: [10.5281/zenodo.18960865](https://doi.org/10.5281/zenodo.18960865)

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Abstract

This study focuses on evaluating the cost-effectiveness of power-distribution equipment systems in Senegal, a West African country with significant energy infrastructure challenges. A fixed effects regression model was employed to analyse the data, accounting for potential time-invariant factors affecting costs. Panel data analysis revealed that the average annual savings from optimised equipment configurations were approximately 150,000 per year, demonstrating a significant reduction in operational expenses. The findings suggest that strategies for energy efficiency can be implemented. The regression model is represented as $Y_{it} = \beta_0 + \beta_1 X_{it} + u_i + \varepsilon_{it}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: Sub-Saharan, econometric, panel analysis, cost-benefit, infrastructure assessment, renewable integration, energy efficiency

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