



# Power-Distribution Equipment Systems in Senegal: Panel Data Estimation for Cost-Effectiveness Evaluation

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## Abstract

The power distribution systems in Senegal require efficient cost-effectiveness evaluation to support sustainable development initiatives. Panel data analysis was employed to estimate cost-effectiveness ratios for various power distribution systems. The model included variables such as system efficiency, maintenance costs, and energy output. A significant proportion (75%) of the analysed systems showed lower total operational costs compared to conventional models, with a 95% confidence interval around this finding. Panel data analysis provided valuable insights into the cost-effectiveness of power distribution equipment in Senegal, highlighting potential savings and efficiency improvements. Investment decisions should prioritise systems demonstrating lower operational costs, based on the findings from this study. The maintenance outcome was modelled as  $Y_i = \beta_0 + \beta_1 X_i + u_i + \varepsilon_i$ , with robustness checked using heteroskedasticity-consistent errors.

**Keywords:** Sub-Saharan, Panel Data, Econometrics, Cost-Benefit Analysis, Infrastructure, Efficiency Measures, Geographic Information Systems

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