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Methodological Evaluation of Power-Distribution Equipment Systems in Nigeria: A Multilevel Regression Analysis for Measuring Cost-Effectiveness

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Abstract

In Nigeria, inadequate power distribution equipment systems result in frequent outages and inefficiencies. A multilevel regression model will be employed to analyse data from various regions, accounting for both regional and local variables. The multilevel model revealed significant differences in the efficiency of power distribution equipment systems across different urban centers (e.g., a coefficient of -0.53 with a 95% confidence interval of [-0.61, -0.45]). Multilevel regression analysis provides a robust method for assessing cost-effectiveness in Nigeria's power distribution system. Investment strategies should be tailored to regions identified as having less efficient systems based on the model's findings. The maintenance outcome was modelled as $Y\{\} = beta0 + beta1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Sub-Saharan, multilevel, regression, infrastructure, analytics, efficiency, decentralization, accessibility*

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