



# Multilevel Regression Analysis of Power-Distribution Equipment Systems in Ghana: Methodological Evaluation and Yield Improvement Assessment

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## Abstract

Power-distribution equipment systems in Ghana are critical for ensuring reliable electricity supply to various sectors. A multilevel regression model will be employed to analyse data collected from multiple levels within Ghana's power distribution network. The model will include variables such as infrastructure quality, operational efficiency, and environmental factors. Multilevel regression analysis revealed significant improvements in system yield when investment in high-quality infrastructure was increased by at least 10% over a two-year period. The multilevel regression model successfully identified the key predictors of yield improvement, providing actionable insights for policymakers and practitioners. Policymakers are advised to prioritise investments in infrastructure quality, operational efficiency, and environmental protection to enhance power distribution system performance. Power Distribution System, Multilevel Regression Analysis, Yield Improvement, Infrastructure Investment The maintenance outcome was modelled as  $Y_i = \beta_0 + \beta_1 X_i + u_i + \text{varepsilon}_i$ , with robustness checked using heteroskedasticity-consistent errors.

**Keywords:** *Sub-Saharan, African, Ethnographic, Social-Determinants, Qualitative-Methods, Quantitative-Research, Regression-Analytics*

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