



Methodological Evaluation of Power-Distribution Equipment Systems in Uganda: A Randomized Field Trial for Risk Reduction Analysis

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Abstract

Power distribution equipment systems in Uganda have faced challenges leading to frequent outages and inefficiencies. A randomized field trial was conducted across five regions, with a sample size of 100 distribution points randomly selected for detailed analysis. Data collection included operational performance metrics and customer satisfaction surveys. The analysis revealed that implementing smart metering systems reduced power outages by 25% compared to traditional methods (95% confidence interval: -20% to -30%). The randomized field trial demonstrated the effectiveness of smart metering in enhancing reliability and customer satisfaction. Ugandan utilities should consider integrating smart metering systems into their power distribution infrastructure for improved service delivery. The maintenance outcome was modelled as $Y_i = \beta_0 + \beta_1 X_i + u_i + \epsilon_i$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Geographic, Sub-Saharan, Randomization, Sampling, Infrastructure, Evaluation, RiskAnalysis*

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