



Methodological Evaluation of Power-Distribution Equipment Systems in Uganda: A Randomized Field Trial

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Abstract

Efficient power distribution systems are crucial for economic development in Uganda, where rural electrification remains a challenge. A randomized controlled trial was conducted with a sample size of 120 villages across Uganda. The study used a mixed-method approach combining quantitative data from electricity usage measurements and qualitative feedback surveys to assess system performance and user satisfaction. The analysis revealed that the use of solar-powered inverters significantly reduced operational costs by an average of 35% compared to conventional diesel generators, demonstrating cost-effectiveness in both financial and environmental terms. User acceptance was high with a 70% satisfaction rate. This study provides empirical evidence on the most cost-effective power-distribution equipment configurations for rural Ugandan settings. Policy makers should consider subsidizing the installation of solar-powered inverters to accelerate rural electrification and support sustainable energy access. 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:

Ugandan

Geographic

Terms:

Methodological

Randomization

Evaluation

Cost-effectiveness

Sampling

Controlled

Terms:

trial

Theoretical

Infrastructure

Technological

Electricity

Terms:

innovation

access

Sustainability
Economic impact analysis

assessment

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