



Power-Distribution Equipment Systems in Ghana: A Field Trial for Yield Improvement Evaluation

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Abstract

Power distribution systems play a critical role in ensuring reliable power supply to various sectors of Ghana's economy. A randomized field trial was conducted in Ghana's capital city, targeting small-scale enterprises. Equipment performance data were collected over an 18-month period using advanced statistical models to assess yield improvements. The analysis revealed that the implementation of a specific hybrid power-distribution system led to a 20% increase in overall efficiency compared to traditional systems, with a confidence interval for this improvement being $\pm 5\%$. This finding suggests substantial potential gains from adopting such systems. This study provides empirical evidence on the effectiveness of different power distribution equipment configurations and highlights their significant impact on system yield. The findings offer practical insights for policymakers and utility providers in Ghana's energy sector. Based on this research, it is recommended that a phased rollout strategy be implemented to gradually introduce more efficient systems into existing networks, followed by continuous monitoring and evaluation of performance metrics. Power Distribution Systems, Field Trial, Yield Improvement, Statistical Models, Confidence Intervals The maintenance outcome was modelled as $Y = \beta_0 + \beta_1 X + u_i + \epsilon$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Sub-Saharan, Randomization, Evaluation, Infrastructure, Supply Chain, Optimization, Performance Metrics*

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