



Power-Distribution Equipment Systems in Rwanda: Methodological Evaluation and Yield Improvement Assessment

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Abstract

Power-distribution equipment systems are crucial for efficient energy delivery in Rwanda's rural areas, where electricity access is limited. A randomized controlled trial was conducted across three villages, each with varying initial power distribution systems. Data on electricity consumption and voltage levels were collected over six months using standard meteorological equipment. In Village A, which received improved power-distribution equipment, there was a statistically significant increase in average daily energy consumption by 15% ($p < 0.05$) compared to Village B with unchanged systems. The findings suggest that upgrading power distribution systems can substantially enhance rural electrification and support sustainable development goals. Policy makers should prioritise investment in upgraded power-distribution equipment as a key strategy for improving energy access in Rwanda's rural regions. Power Distribution Systems, Rural Electrification, Energy Access, Yield Improvement

The maintenance outcome was modelled as $Y = \beta_0 + \beta_1 X + u_i + \varepsilon_i$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: Rwanda, Power-Distribution Systems, Randomized Controlled Trial, Methodology, Engineering Evaluation, Yield Assessment, Geographic Analysis

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