



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

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Abstract

Power-distribution equipment systems in Tanzania face significant challenges related to reliability and efficiency. A randomized controlled trial was conducted across five regions of Tanzania, assessing the impact of different system configurations on performance metrics such as power loss and downtime. The analysis revealed that a specific configuration reduced power losses by an average of 12.5% compared to traditional systems (95% confidence interval: -14.2% to -10.8%). The randomized field trial demonstrated the effectiveness of the new system in improving reliability and reducing operational risks. Implementing the recommended configuration is expected to result in significant cost savings and improved service delivery across Tanzania's power distribution networks. Power Distribution, Randomized Field Trial, Risk Reduction, Power Loss, Downtime The maintenance outcome was modelled as $Y = \beta_0 + \beta_1 X + u_i + \text{varepsilon}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: Tanzania, Geographic Information Systems (GIS), Power Distribution, Randomized Controlled Trial, Risk Assessment, Equipment Reliability, Performance Metrics

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