



# Methodological Assessment of Power-Distribution Equipment Systems in Tanzania Using Quasi-Experimental Design for Risk Reduction Analysis

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## Abstract

The reliability of power distribution systems is critical for sustainable development in Tanzania, particularly given its growing energy demands and infrastructure challenges. A mixed-methods approach incorporating both quantitative analysis and qualitative observations was employed. The study utilised a stratified random sampling method to ensure representativeness across different regions in Tanzania. The preliminary findings suggest that the implementation of advanced monitoring systems significantly reduces power outages by approximately 20% compared to traditional methods, although further data collection is needed for definitive conclusions. This study provides a robust framework for evaluating and improving power distribution reliability in Tanzania through targeted interventions. Policy makers are encouraged to integrate advanced monitoring systems into their infrastructure development plans to enhance energy security and resilience. The maintenance outcome was modelled as  $Y = \beta_0 + \beta_1 X + u + v + \epsilon$ , with robustness checked using heteroskedasticity-consistent errors.

**Keywords:** *Tanzania, Quasi-Experimental Design, Power-Distribution Systems, Reliability Analysis, Risk Assessment, Mixed-Methods, Geographic Information Systems*

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