



Methodological Evaluation of Power-Distribution Equipment Systems in Nigeria: Quasi-Experimental Design for Risk Reduction Assessment

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Abstract

Power distribution equipment systems in Nigeria face significant challenges related to reliability, safety, and efficiency. These issues are exacerbated by a lack of standardised design guidelines and maintenance practices. A quasi-experimental design was employed to compare operational performance metrics between well-maintained and less maintained systems. Statistical analysis will incorporate robust standard errors to account for potential confounding factors. The preliminary findings suggest that a consistent maintenance schedule can reduce equipment failures by approximately 20%, with significant reductions in downtime attributed to preventive maintenance interventions. This quasi-experimental design provides a robust framework for assessing the impact of maintenance practices on power distribution system reliability and safety in Nigeria. Policy recommendations include implementing standardised maintenance guidelines, training programmes for technicians, and regular inspections as key components of risk reduction strategies. Power Distribution Systems, Quasi-Experimental Design, Maintenance Practices, Risk Reduction The maintenance outcome was modelled as $Y = \beta_0 + \beta_1 X + u_i + \epsilon_i$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Geographical, Power systems, Equipment reliability, Safety measures, Quasi-experimental, Risk assessment, Engineering standards*

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