



Methodological Evaluation of Power-Distribution System Risk Reduction in Tanzanian Coastal Areas Using Quasi-Experimental Design

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Published: 16 October 2008 | **Received:** 20 May 2008 | **Accepted:** 13 September 2008

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DOI: [10.5281/zenodo.18871127](https://doi.org/10.5281/zenodo.18871127)

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Abstract

The Tanzanian coastal regions face significant power distribution challenges due to infrastructure limitations and environmental factors. A quasi-experimental design was utilised to assess the impact of various power distribution equipment configurations on risk reduction. Data collection included surveys and direct observations from randomly selected coastal villages across Tanzania. The analysis revealed that specific types of solar-powered systems significantly reduced risk levels by up to 40% compared to traditional diesel generators, with a median improvement in reliability observed over a year. This study confirms the efficacy of certain power distribution technologies in enhancing safety and stability on Tanzania's coastal areas, offering practical recommendations for policy makers. The findings suggest that policymakers should prioritise investment in solar-powered systems to mitigate risks associated with inadequate electricity supply in Tanzanian coastal regions. coastal engineering, risk reduction, power distribution system, quasi-experimental design 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, Quasi-Experimental Design, Risk Assessment, Renewable Energy Integration, Network Optimization

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