



Methodological Assessment of Off-Grid Community Systems in Kenya: A Panel Data Approach for Risk Reduction Analysis

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Abstract

Off-grid community systems in Kenya are increasingly used to provide electricity for rural areas, but their effectiveness and reliability remain uncertain. A panel-data approach will be employed to analyse the impact of off-grid community systems on reliability, using robust standard errors to account for potential biases. The analysis revealed that the proportion of days with stable electricity supply varied significantly across different communities, highlighting regional disparities in system performance. This study suggests that while some off-grid systems in Kenya are highly reliable, others struggle due to infrastructure and maintenance issues. Policy recommendations will focus on improving system resilience and funding mechanisms. Investment strategies should prioritise areas with the lowest reliability, and community engagement programmes must be strengthened to ensure sustainable operation of these systems. The empirical specification follows $Y = \beta_{0+\beta}^{-1} p X + \text{varepsilon}$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: Kenya, Off-grid Systems, Panel Data, Rural Electrification, Methodology, Risk Analysis, Sustainability Assessment

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