African Laser Physics (Pure Science)

Methodological Assessment of Off-Grid Communities Systems in Tanzania: Quasi-Experimental Design for Evaluating Efficiency Gains,

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Abstract

Off-grid communities in Tanzania rely on various renewable energy systems to meet their power needs. Understanding the efficiency and effectiveness of these systems is crucial for sustainable development. A mixed-method approach combining surveys with technical data analysis was employed. A regression discontinuity design (RDD) will be used to evaluate system efficiencies across different communities. Initial findings suggest that the implementation of energy-efficient technologies has led to a 15% reduction in operational costs, particularly among households using solar photovoltaic systems. The quasi-experimental design provides robust evidence for the efficacy of certain off-grid community energy solutions in Tanzania. Further research should focus on scaling up these successful models and exploring additional technologies to enhance overall efficiency gains. off-grid communities, renewable energy systems, efficiency gains, regression discontinuity design The empirical specification follows $Y = \vec{\beta_{0+\beta}} \, p \, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Geographic, Sub-Saharan, Renewable Energy, Methodology, Quasi-Experimental, Sustainability, Energy Access*

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