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Methodological Evaluation of Off-Grid Communities Systems in Uganda: Panel Data Estimation for Adoption Rates

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Abstract

Off-grid communities in Uganda rely on various renewable energy systems for electricity generation, including solar photovoltaic (PV) and biomass cookstoves. The adoption rates of these systems vary significantly among different socio-economic groups. The research employs a mixed-methods approach, combining qualitative ethnographic data collection through participant observation and semi-structured interviews with quantitative panel data analysis. Panel data from government records and community surveys are utilised to estimate the adoption rates of off-grid energy systems across different socio-economic groups in Uganda. A key finding is that biomass cookstove adoption among rural women in low-income households has a significant positive correlation ($p < 0.05$) with increased household income, indicating economic incentives play a crucial role in the decision-making process. The study concludes that panel data analysis provides robust insights into understanding the factors influencing off-grid energy system adoption rates within Ugandan communities. Future research should consider longitudinal studies to better understand the long-term impacts of these systems on socio-economic development and environmental sustainability in Uganda. off-grid, renewable energy, adoption rates, panel data, qualitative methods The empirical specification follows $Y = \vec{\beta_{0+\beta}} \, p \, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *African, Geographical, Participatory, Renewable, Energy, Anthropology, Quantitative*

ABSTRACT-ONLY PUBLICATION

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