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Technological Acceptance and Community Engagement in Solar Energy Microgrids of Off-Grid Villages in Kenya: A Theoretical Framework Study

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Abstract

Solar energy microgrids are increasingly being implemented in off-grid villages of Kenya to provide reliable electricity. Despite their potential benefits, successful adoption and engagement require understanding technological acceptance and community participation. A mixed-methods approach will be employed, combining qualitative interviews with quantitative surveys to gather data on local perceptions and usage patterns of solar energy microgrids. The theoretical framework identifies key factors such as technological reliability and local governance structures as crucial for successful solar energy microgrid adoption in off-grid Kenyan villages. Policy recommendations include fostering community-led initiatives and improving technology adaptability to enhance acceptance rates and sustainability of solar energy microgrids. The empirical specification follows $Y = \beta_{0+\beta}^{\rightarrow} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Kenya, Microgrids, Solar Energy, Community Engagement, Technological Adoption, Socio-Technical Systems, Sustainability Studies*