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Time-Series Forecasting Model for Evaluating Off-Grid Communities Systems in Kenya: A Theoretical Framework

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Abstract

Off-grid communities in Kenya often rely on solar power systems for electricity generation. These systems face challenges such as fluctuating sunlight and unpredictable maintenance schedules. Theoretical development will include the application of ARIMA (AutoRegressive Integrated Moving Average) model to forecast system performance over time. The model's parameters will be analysed with robust standard errors to account for uncertainties in data and methodology. The theoretical framework provides insights into how off-grid community systems can be better managed to enhance their performance and reduce operational costs. Future research should validate these findings through empirical studies, while policymakers could use this model to design more resilient energy infrastructure for off-grid communities. ARIMA, Off-Grid Communities, Solar Power Systems, Time-Series Forecasting The empirical specification follows $Y = \beta_{0+\beta}^{\rightarrow} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Kenyan, Geographic Information Systems, Time-Series Analysis, Renewable Energy, Forecasting Models, Reliability Theory, Community Networks*

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This is an abstract-only publication. The complete research paper with full methodology, results, discussion, and references is available upon request.

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