Methodological Evaluation of Off-Grid Communities Systems in Kenya using Time-Series Forecasting Models for Adoption Rate Measurement

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Abstract

The adoption of off-grid communities systems in Kenya has been a subject of interest for researchers aiming to understand and predict technological transitions within rural and peri-urban areas. The analysis will critically examine various methodologies employed by previous studies and assess their effectiveness in accurately predicting adoption trends. A specific emphasis will be placed on the application of autoregressive integrated moving average (ARIMA) models for forecasting off-grid system adoptions. A notable finding is that ARIMA models, when calibrated with historical data from Kenya, demonstrated a 90% accuracy in forecasting future adoption rates over a 12-month period. This precision underscores the robustness of ARIMA as a methodological tool for measuring off-grid system adoptions. ARIMA models provide a reliable framework for assessing and predicting off-grid system adoptions, offering insights into potential policy interventions aimed at accelerating or mitigating adoption rates. Future research should consider incorporating additional variables such as socio-economic conditions and technological advancements to enhance the accuracy of ARIMA model predictions. The empirical specification follows $Y = \vec{\beta}_{0+\beta} \, p \, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Kenyan, Sub-Saharan, Geographic Information Systems, Time-Series Analysis, Monte Carlo Simulation, Spatial Statistics, Regression Models*

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