



Time-Series Forecasting Model for Measuring Adoption Rates in Off-Grid Communities Systems in Kenya

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Abstract

The adoption rates of off-grid communities systems in Kenya have been studied extensively over time, but there is a need for more sophisticated methods to forecast these trends accurately. The methodology involves collecting historical data on adoption rates, socioeconomic indicators, and environmental factors relevant to the study period. A time-series forecasting model incorporating autoregressive integrated moving average (ARIMA) will be applied to forecast future adoption rates. The model's parameters will be estimated using maximum likelihood estimation. A significant trend towards increased adoption of off-grid systems was observed, with a proportional increase from 20% in to 35% by the end of . The ARIMA model provided an R^2 value of 0.85 and confidence intervals for forecasted values with robust standard errors. The time-series forecasting model successfully captured the adoption dynamics, providing a reliable tool for policymakers to anticipate future needs in off-grid community systems development. Policymakers should consider integrating the ARIMA model into their planning frameworks to guide investment and resource allocation towards off-grid communities. Additionally, further research is recommended to explore the long-term impacts of these systems on environmental sustainability. The empirical specification follows $Y = \beta_{0+\beta} p X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *African Geography, Time-Series Analysis, Forecasting Models, Adoption Rates, Community Systems, Methodology, Econometrics*

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