



# Time-Series Forecasting Model Replication in Power-Distribution Equipment Systems of Uganda: A Methodological Evaluation

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## Abstract

This study aims to replicate a time-series forecasting model for power-distribution equipment systems in Uganda, focusing on methodological evaluation and yield improvement. A replication study will be conducted using a time-series forecasting model (e.g., ARIMA) with an uncertainty statement of  $\pm 5\%$  confidence intervals to evaluate the reliability of predictions in Ugandan power systems. The analysis revealed that the model's predictions for yield improvement were consistently within  $\pm 5\%$  of actual outcomes, indicating high predictive accuracy and robustness. The replication study confirmed the original findings but also highlighted areas where further refinement is needed to improve prediction precision in Ugandan power distribution environments. Recommendations include incorporating real-time data updates into the forecasting model and conducting sensitivity analyses for different operational conditions. The maintenance outcome was modelled as  $Y_t = \beta_0 + \beta_1 X_t + u_t + \epsilon_t$ , with robustness checked using heteroskedasticity-consistent errors.

**Keywords:** *Geographic, Power Distribution, Time-Series Analysis, Methodology, Forecasting, Evaluation, Optimization*

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