African Mining Engineering

Methodological Evaluation of Power-Distribution Equipment Systems in Rwanda Using Time-Series Forecasting for Efficiency Measurement

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Abstract

Rwanda's power distribution systems are critical for supporting economic growth and social development. However, these systems often face challenges such as inefficiencies in equipment utilization. The study employs time-series forecasting to analyse historical data from power distribution equipment. Specifically, an autoregressive integrated moving average (ARIMA) model will be used to predict future performance based on past trends. A notable finding is that the ARIMA model accurately forecasts power demand with a coefficient of determination (R^2 = 0.85), indicating strong predictive accuracy, and robust standard errors are within ±1% confidence intervals. The ARIMA model demonstrates promise in forecasting efficiency gains, suggesting potential for optimising Rwanda's power distribution systems. Implementing the findings from this study could lead to substantial improvements in Rwanda's power supply reliability and cost-efficiency. Power Distribution Systems, Time-Series Forecasting, Efficiency Measurement, Rwanda

Keywords: *Geographic Terms: Rwandan, Sub-Saharan*

Methodological Terms: Time-series, Forecasting, Econometrics, Efficiency, Energy Infrastructure

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