



Time-Series Forecasting Model for System Reliability Evaluation in Ugandan Manufacturing Plants

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Abstract

Manufacturing plants in Uganda face challenges related to system reliability due to varying operational conditions and resources. A time-series forecasting model was developed using ARIMA (AutoRegressive Integrated Moving Average) methodology. Uncertainty in predictions is quantified with robust standard errors. The forecasted system reliability showed an upward trend over the past five years, indicating potential improvements in operational efficiency if addressed. The time-series forecasting model provided insights into future system performance but requires further validation and adaptation to local conditions. Further research should explore the impact of technological upgrades on system reliability and implement the model for predictive maintenance strategies. ARIMA, Ugandan manufacturing, Time-series analysis, System reliability The maintenance outcome was modelled as $Y_t = \beta_0 + \beta_1 X_t + u_t + v_t \epsilon_t$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: Uganda, Reliability Engineering, Time-Series Analysis, ARIMA Models, Forecasting Theory, System Dynamics, Econometrics

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