



Time-Series Forecasting Model Evaluation for Cost-Effectiveness in Ugandan Industrial Machinery Fleets Systems,

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Abstract

Industrial machinery fleets in Uganda have seen significant growth over the past decades, necessitating effective management strategies to ensure cost-effectiveness and operational efficiency. The methodology involves collecting historical data on maintenance costs, operational efficiency metrics, and fleet sizes from to . A time-series forecasting model is developed using an ARIMA (AutoRegressive Integrated Moving Average) approach with uncertainty quantified through robust standard errors. The analysis revealed a clear trend in maintenance costs over the study period, with a significant proportion of cost fluctuations attributed to equipment age and usage patterns. The time-series forecasting model demonstrated high predictive accuracy for future maintenance expenditures, providing managers with valuable insights for optimising fleet operations and resource allocation. Managers are advised to implement the recommended model in their decision-making processes to enhance cost-effectiveness and operational sustainability of industrial machinery fleets. ARIMA, time-series forecasting, Ugandan industry, maintenance costs, cost-effectiveness 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.

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