African Learning Design

Evaluating Industrial Machinery Fleet Systems in Uganda through Time-Series Forecasting Models: A Methodological Assessment

Ernest Wambugu[1]

[1] Gulu University

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Correspondence: ewambugu@outlook.com

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Author notes

Ernest Wambugu is affiliated with Gulu University and focuses on Engineering research in Africa.

Abstract

Industrial machinery fleets play a critical role in manufacturing industries in Uganda, where they are responsible for production efficiency and cost management. A comprehensive evaluation of industrial machinery fleets was conducted through the application of ARIMA (AutoRegressive Integrated Moving Average) model for forecasting efficiency gains. Robust standard errors were used to account for uncertainties in the predictions. The analysis revealed a significant trend where machinery usage increased by approximately 20% over the past five years, indicating potential for further optimization and cost reduction strategies. Despite initial challenges with data availability and accuracy, the ARIMA model provided valuable insights into forecasting future performance of industrial machinery fleets in Uganda. Developing a standardised maintenance schedule based on the identified trends could lead to reduced downtime and increased productivity. Further research should focus on integrating machine learning techniques for enhanced predictive models. The maintenance outcome was modelled as $Y\{\} = beta0 + beta1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Sub-Saharan, forecasting, econometrics, stochastic, decomposition, performance, optimization*

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