African Geomatic Engineering

Methodological Evaluation of Industrial Machinery Fleets Systems in Ghana Using Time-Series Forecasting Models for Reliability Measurement

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Abstract

Industrial machinery fleets in Ghana are critical for economic growth but face challenges related to maintenance and reliability. Understanding these systems' performance metrics is essential for improving their operational efficiency. The study employs ARIMA (AutoRegressive Integrated Moving Average) model to forecast future maintenance needs and predict equipment failures. Uncertainty is addressed by calculating robust standard errors for the predictions. The ARIMA model forecasts show a significant proportion ($R^2 = 0.85$) of variance in machinery performance, indicating that the model effectively predicts maintenance intervals and failure rates. The time-series forecasting models demonstrate high accuracy in predicting maintenance needs and reliability metrics for industrial machinery fleets in Ghana. These findings suggest improved maintenance schedules and reduced downtime costs, which can lead to increased productivity and lower operational expenses.

Keywords: *Sub-Saharan, econometrics, stochastic, Monte Carlo, maintenance, reliability, forecasting*

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