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Methodological Evaluation of Transport Maintenance Depot Systems in Nigeria Using Time-Series Forecasting Models for Cost-Effectiveness Analysis

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Abstract

The efficiency of transport maintenance depots in Nigeria has been identified as a critical area for improvement to enhance vehicle reliability and reduce operational costs. The study employs ARIMA (AutoRegressive Integrated Moving Average) model for time series analysis to forecast future costs and optimise resource allocation. Robust standard errors are used to assess the uncertainty associated with these forecasts. A notable finding is a projected reduction in maintenance costs by approximately 15% over the next decade, driven by optimised inventory management strategies. The application of ARIMA models has provided insights into cost-saving opportunities within transport maintenance depots, demonstrating their utility for enhancing operational efficiency. Implementing these forecasting models can help in better resource planning and strategic decision-making to improve depot performance and reduce costs. The maintenance outcome was modelled as $Y\{\} = beta0 + beta1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

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