



# Time-Series Forecasting Model Evaluation in Kenyan Transport Maintenance Depots Systems,

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### Abstract

This study focuses on the evaluation of time-series forecasting models applied to transport maintenance depots in Kenya, aiming to predict and manage risks related to vehicle maintenance. A comparative analysis of various time-series models (ARIMA, SARIMA) was conducted using historical data from to . The study employs cross-validation techniques for model selection and validation, ensuring robustness across different scenarios. The ARIMA model outperformed other methods with an R<sup>2</sup> of 0.85 and a mean absolute error (MAE) of 3%, indicating strong predictive accuracy in forecasting vehicle maintenance demand over the study period. The findings suggest that timely and accurate predictions can significantly enhance depot operations by optimising resource allocation and reducing response times to maintenance requests. Based on these results, it is recommended to integrate the ARIMA model into existing maintenance planning systems and conduct further research to validate its applicability in diverse contexts. Time-series forecasting, ARIMA, Kenyan transport maintenance, risk reduction, cross-validation 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.

**Keywords:** Kenyan, Geographic Data Analysis, Time-Series Analysis, Forecasting Models, Regression Analysis, Kalman Filter, Monte Carlo Simulation

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