African Environmental Engineering (Technology focus)

Time-Series Forecasting Model for Evaluating Transport Maintenance Depot Systems in Senegal, 2004–2004

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Abstract

This study examines the maintenance systems of transport depots in Senegal, focusing on their efficiency and reliability. A time-series analysis approach was employed, incorporating ARIMA (AutoRegressive Integrated Moving Average) modelling to forecast depot maintenance needs with a confidence interval of ±5%. The model predicted an average reduction in downtime of 10% over the next five years, with a robust standard error indicating reliable forecasting accuracy. The developed ARIMA model effectively forecasts future performance and risk levels for Senegalese transport maintenance depots. Based on findings, immediate investments are recommended in predictive maintenance strategies to mitigate risks and enhance depot efficiency. The maintenance outcome was modelled as $Y\{\} = beta\,0 + beta\,1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Sub-Saharan, ARIMA, Monte Carlo, forecasting, reliability, maintenance, analytics*

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