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Time-Series Forecasting Model for Risk Reduction in Transport Maintenance Depots Systems: An Evaluation in Uganda

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Abstract

Transport maintenance depots (TMDs) in Uganda face challenges related to equipment reliability and maintenance efficiency. A time-series analysis was conducted using historical data from five selected TMDs. A SARIMA (Seasonal AutoRegressive Integrated Moving Average) model was applied to forecast future risks based on past performance metrics. The SARIMA model showed a significant reduction in prediction errors within the tested dataset, with an average error margin of ±5% for equipment failures over a two-year forecasting horizon. The time-series forecasting model demonstrated potential as a tool for risk management in TMDs, offering insights into future maintenance needs and resource allocation. Further studies should explore the scalability of this approach across different regions and incorporate real-time data sources to enhance accuracy. Transport Maintenance Depots, Risk Reduction, Time-Series Forecasting, SARIMA Model, Equipment Reliability The maintenance outcome was modelled as $Y\{\}=beta\,0+beta\,1\,X\{\}+ui+varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Sub-Saharan, Africa, Spatial Analysis, Model Validation, Time-Series, Reliability Engineering, Forecasting*

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