Time-Series Forecasting Model for Evaluating Transport Maintenance Depot Efficiency in Kenya

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Abstract

This study examines transport maintenance depots in Kenya, focusing on their efficiency and proposes a time-series forecasting model to evaluate these systems. A time-series analysis approach was employed using historical data from various maintenance depots. A seasonal autoregressive integrated moving average (SARIMA) model was selected for its robustness in handling temporal dependencies and seasonality commonly observed in depot operations. The model's parameters were estimated through maximum likelihood estimation, with confidence intervals provided to account for the uncertainty inherent in forecasting. The time-series analysis revealed a significant positive trend in maintenance efficiency over recent years, indicating improvements that can be attributed to enhanced operational procedures and technological advancements. This study confirms the effectiveness of using SARIMA models for evaluating transport maintenance depot performance. The findings suggest that continued investment in technology and standardised training could further enhance depot efficiency. Based on this research, it is recommended that Kenyan transport authorities consider implementing predictive analytics to optimise depot operations and allocate resources more effectively. The maintenance outcome was modelled as $Y\{\}=beta\,0+beta\,1\,X\{\}+ui+varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Kenya, Geographic Information Systems (GIS), Time Series Analysis, Forecasting Models, Performance Evaluation, Maintenance Depot Efficiency, Econometrics*

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