



# Methodological Assessment of Transport Maintenance Depot Systems in Kenya Using Panel Data for System Reliability Measurement

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## Abstract

Transport maintenance depots (TMDs) are critical infrastructure components in Kenya's transportation network, ensuring the reliability and efficiency of vehicle operations. Panel data techniques were employed using mixed effects models to analyse the impact of maintenance practices, vehicle age, and operational conditions on system availability over a five-year period. A significant proportion (45%) of TMDs experienced downtime due to unexpected failures, necessitating improved predictive maintenance strategies. The study highlights the importance of regular equipment checks and timely software updates in enhancing system reliability. Implement a comprehensive preventive maintenance programme and conduct periodic condition assessments to reduce downtime and improve overall system performance. transport maintenance depots, panel data analysis, system reliability, predictive maintenance The maintenance outcome was modelled as  $Y_i = \beta_0 + \beta_1 X_i + u_i + \epsilon_i$ , with robustness checked using heteroskedasticity-consistent errors.

**Keywords:** Kenya, Transport Maintenance Depots, Panel Data, System Reliability, Time Series Analysis, Econometrics, Geographic Information Systems

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