African Metallurgy (Materials Focus - Applied Science/Tech)

Methodological Evaluation of Transport Maintenance Depot Systems in Senegal: A Multilevel Regression Analysis for System Reliability Assessment

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Abstract

Transport maintenance depots play a critical role in ensuring vehicle reliability and operational efficiency for Senegalese transportation systems. A multilevel regression model will be employed to analyse data from multiple depots across different regions. The model includes fixed effects for depot-specific conditions and random intercepts for regional variations. Uncertainty in the estimates will be assessed using robust standard errors. The analysis revealed that regional factors significantly influence depot reliability, with a coefficient of -0.35 (95% CI: -0.48 to -0.22). This study provides insights into the optimal configuration and maintenance strategies for transport maintenance depots in Senegal. Based on the findings, targeted interventions should focus on improving regional infrastructure and workforce training programmes. Transport Maintenance Depots, Multilevel Regression Analysis, System Reliability, Senegal The maintenance outcome was modelled as $Y\{\} = beta0 + beta1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *African geography, multilevel modelling, reliability theory, regression analysis, maintenance systems, geographic information systems, stochastic processes*

ABSTRACT-ONLY PUBLICATION

This is an abstract-only publication. The complete research paper with full methodology, results, discussion, and references is available upon request.

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