



Methodological Evaluation of Transport Maintenance Depot Systems in Rwanda Using Panel Data for Risk Reduction Measurement

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Abstract

Rwanda's transport sector is a critical component of its economy, with maintenance depots playing a pivotal role in ensuring vehicle reliability and safety. Panel data techniques were employed to analyse the impact of various factors on maintenance efficiency, focusing on depots across Rwanda's key sectors. The analysis revealed a significant reduction in vehicle downtime attributed to improved predictive maintenance practices. This study provides empirical evidence supporting the effectiveness of structured maintenance strategies in reducing operational risks for transport systems. Further research should explore scalability and cost-effectiveness implications of these findings across broader geographical regions. The maintenance outcome was modelled as $Y_i = \beta_0 + \beta_1 X_i + u_i + \varepsilon_i$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Rwanda, Maintenance Depots, Panel Data, Econometrics, Transport Systems, Risk Analysis, Geographic Information Systems*

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