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# Methodological Evaluation of Transport Maintenance Depot Systems in South Africa: Quasi-Experimental Design for Efficiency Measurement

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## Abstract

Transport maintenance depots (TMDs) play a crucial role in maintaining vehicle fleets across South Africa's diverse terrain and climatic conditions. A mixed-method approach combining quantitative data analysis and qualitative interviews was employed. Data were collected from 20 depots over a year, with efficiency metrics derived using regression models. The findings revealed that depot utilization rates varied significantly across different regions, with some sites operating at only 40% capacity, indicating substantial underutilization. Quasi-experimental design provided robust insights into TMD operational inefficiencies, revealing high variability in service delivery and cost structures. Strategic planning is recommended to optimise depot locations and operations based on regional specificities, aiming for more efficient use of resources. Transport Maintenance Depots, Quasi-Experimental Design, Efficiency Measurement, South Africa The maintenance outcome was modelled as $Y\{\} = beta0 + beta1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

**Keywords:** *Sub-Saharan, TMDs, econometrics, cluster sampling, data envelopment analysis, transportation infrastructure, reliability theory*

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