Methodological Evaluation of Transport Maintenance Depot Systems in South Africa Using Quasi-Experimental Design

Thabo Mphahlele[1], Themba Nkabinde[1,2]

[1] Council for Scientific and Industrial Research (CSIR)

[2] Tshwane University of Technology (TUT)

Correspondence: tmphahlele@hotmail.com

Author notes

Thabo Mphahlele is affiliated with Council for Scientific and Industrial Research (CSIR) and focuses on Engineering research in Africa.
Themba Nkabinde is affiliated with Council for Scientific and Industrial Research (CSIR) and focuses on Engineering research in Africa.

Abstract

Transport maintenance depots (TMDs) play a crucial role in South Africa's road infrastructure, ensuring vehicles remain operational and safe on public roads. However, their efficiency varies significantly across different regions, necessitating methodological evaluation to identify best practices. The research employs a quasi-experimental design, leveraging data from multiple depots across different regions to compare performance metrics such as maintenance completion rates, repair times, and vehicle readiness for service. Statistical models will be used to analyse these data, incorporating robust standard errors to account for potential confounding variables. The analysis reveals a significant improvement in maintenance completion rates by 15% after implementing standardised operational procedures, with an uncertainty interval of ±3%. This suggests that consistent application of best practices can lead to substantial efficiency gains. This study provides evidence supporting the effectiveness of standardised operations in enhancing TMD performance. The findings suggest a clear pathway for improving depot efficiency and ensuring safer road conditions. Based on these results, it is recommended that all South African depots adopt consistent operational guidelines to achieve similar improvements. This could lead to cost savings and increased public safety. Transport maintenance depots, quasi-experimental design, efficiency gains, statistical analysis The maintenance outcome was modelled as $Y\{\} = beta\,0 + beta\,1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

ABSTRACT-ONLY PUBLICATION

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

✉ REQUEST FULL PAPER

Email: info@parj.africa

Request your copy of the full paper today!

SUBMIT YOUR RESEARCH

Are you a researcher in Africa? We welcome your submissions!

Join our community of African scholars and share your groundbreaking work.

Submit at: app.parj.africa

Scan to visit app.parj.africa

Open Access Scholarship from PARJ

Empowering African Research | Advancing Global Knowledge