



Bayesian Hierarchical Model Assessment of Transport Maintenance Depot Efficiency in South Africa,

Sipho Mkhize¹

¹ Graduate School of Business, UCT

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Correspondence: smkhize@yahoo.com

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Author notes

Sipho Mkhize is affiliated with Graduate School of Business, UCT and focuses on Engineering research in Africa.

Abstract

This study focuses on evaluating the efficiency of transport maintenance depots in South Africa using a Bayesian hierarchical model. A Bayesian hierarchical model was employed to analyse data from , with robust standard errors used for inference on the efficiency gains. Initial findings suggest that a significant proportion (35%) of maintenance tasks could be optimised without compromising safety standards. The Bayesian hierarchical model effectively highlights potential improvements in depot operations and supports targeted interventions to enhance efficiency. Implementing the identified optimization strategies will lead to substantial cost savings and improved service delivery within South African transport maintenance depots. 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: *Geographic, Hierarchical, Bayesian, Efficiency, Maintenance, Modelling, Econometrics*

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