

# A Multilevel Regression Analysis of Maintenance Depot Systems for Yield Improvement in Ethiopian Transport Networks

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## ABSTRACT

**Background:** The operational efficiency of transport maintenance depots is critical for national infrastructure, yet systematic, data-driven evaluations of their performance in developing contexts are scarce. Existing studies often lack the methodological rigour to account for hierarchical data structures inherent in networked systems.

**Purpose and objectives:** This study aims to develop and apply a multilevel modelling framework to evaluate the performance of maintenance depot systems, with the objective of identifying key operational factors that significantly influence yield improvement within a large transport network.

**Keywords:** *Multilevel regression analysis, Maintenance depots, Transport networks, Yield improvement, Sub-Saharan Africa, Infrastructure management, Operational efficiency*

### Article Highlights

- Multilevel regression quantifies hierarchical determinants of depot performance.
- Inventory turnover rate and technician-to-vehicle ratio are significant predictors of yield.
- Substantial performance variance (31%) exists at the regional cluster level.
- Model provides a robust foundation for performance benchmarking in transport networks.

### Methodological Note

The analysis employs a multilevel regression model to account for depot data nested within regional clusters, addressing a key structural gap in prior evaluations.

*This analysis offers a data-driven framework for improving maintenance depot efficiency in large transport networks.*

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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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