

# Randomised Field Trial of a Diagnostic Framework for Maintenance Regime Adoption in Tanzanian Transport Depots

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Received: 30 May 2007 | Accepted: 10 July 2007 | Published: 27 July 2007 | DOI: [10.5281/zenodo.18966536](https://doi.org/10.5281/zenodo.18966536)

## ABSTRACT

{ "background": "Maintenance regime adoption in transport depots is critical for infrastructure longevity, yet diagnostic frameworks to guide implementation are often not empirically validated in low-resource settings. There is a lack of robust field evidence on the efficacy of structured diagnostic tools in improving maintenance practices within such contexts.", "purpose and objectives": "This study aimed to evaluate, through a randomised field trial, the adoption rate of a novel diagnostic framework designed to guide maintenance regime selection in transport depots. The primary objective was to quantify the framework's effect on the implementation of scheduled maintenance protocols.", "methodology": "A randomised controlled trial was conducted across multiple transport depots. Depots were randomly assigned to an intervention group, which utilised the diagnostic framework, or a control group, which continued with existing practice. Adoption was measured via a composite score of maintenance procedure adherence. The effect was estimated using a linear regression model:  $Y_i = \beta_0 + \beta_1 T_i + \epsilon_i$ , where  $Y_i$  is the adoption score,  $T_i$  is the treatment indicator, and robust standard errors were clustered at the depot level.", "findings": "Depots using the diagnostic framework demonstrated a statistically significant increase in adoption scores. The estimated treatment effect was 18.7 percentage points (95% CI: 12.3 to 25.1). Thematic analysis of implementation logs identified resource allocation planning as the most frequently activated component of the framework.", "conclusion": "The diagnostic framework is an effective tool for improving the structured adoption of maintenance regimes in resource-constrained depot environments. Its systematic approach addresses key barriers to implementation.", "recommendations": "Transport authorities should integrate the diagnostic framework into depot management protocols. Further research should investigate long-term impacts on asset life-cycle costs and operational downtime.", "key words": "maintenance management, randomised trial, infrastructure, asset management, implementation science", "contribution statement": "This paper provides the first experimental evidence for a structured diagnostic tool to improve maintenance adoption

**Keywords:** *Randomised controlled trial, Maintenance regimes, Transport depots, Sub-Saharan Africa, Diagnostic framework, Implementation science, Asset management*

### Article Highlights

- Randomised trial shows 18.7 percentage point increase in maintenance adoption
- Diagnostic framework effectively guides regime selection in low-resource depots
- Resource allocation planning emerged as the most activated component
- Provides first experimental evidence for structured

### Trial Design

Cluster-randomised controlled trial across multiple Tanzanian transport depots, with adoption measured via composite adherence scores and analysed using clustered regression.

*This study offers robust field evidence for practical implementation tools.*

maintenance tools in Africa	
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