



# Bayesian Hierarchical Model Assessment in Tanzanian Transport Maintenance Depots Systems,

Mawanda Sserunkuma<sup>1</sup>, Kazimba Mwakisambwa<sup>2</sup>, Magogo Kinyanjui<sup>3</sup>

<sup>1</sup> State University of Zanzibar (SUZA)

<sup>2</sup> Department of Civil Engineering, State University of Zanzibar (SUZA)

<sup>3</sup> University of Dar es Salaam

**Published:** 06 May 2008 | **Received:** 18 December 2007 | **Accepted:** 25 March 2008

**Correspondence:** [msserunkuma@hotmail.com](mailto:msserunkuma@hotmail.com)

**DOI:** [10.5281/zenodo.18870814](https://doi.org/10.5281/zenodo.18870814)

## Author notes

*Mawanda Sserunkuma is affiliated with State University of Zanzibar (SUZA) and focuses on Engineering research in Africa.*

*Kazimba Mwakisambwa is affiliated with Department of Civil Engineering, State University of Zanzibar (SUZA) and focuses on Engineering research in Africa.*

*Magogo Kinyanjui is affiliated with University of Dar es Salaam and focuses on Engineering research in Africa.*

## Abstract

This study evaluates the effectiveness of transport maintenance depots in Tanzania by applying Bayesian hierarchical models to assess risk reduction strategies. Bayesian hierarchical models were employed to analyse data from multiple depots, allowing for the incorporation of varying levels of uncertainty and providing insights into system performance variability across different locations and conditions. The analysis revealed significant differences in failure rates among depots, with some showing a 20% reduction in maintenance costs compared to baseline estimates. Bayesian hierarchical models effectively highlight variations in depot performance, enabling targeted interventions to improve overall efficiency and safety of Tanzanian transport systems. Based on the findings, recommendations include prioritising depots with lower failure rates for investment and training programmes to enhance maintenance capabilities. 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:** *African geography, Bayesian hierarchical models, Methodological evaluation, Risk assessment, Transport maintenance depots, Statistical methods, Geographic information systems*

## 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](mailto: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](http://app.parj.africa)



Scan to visit [app.parj.africa](http://app.parj.africa)

**Open Access Scholarship from PARJ**

Empowering African Research | Advancing Global Knowledge