



# Bayesian Hierarchical Model for Quantifying Risk Reduction in Tanzanian Transport Maintenance Depots Systems,

Kamasi Mbuliza<sup>1,2</sup>, NgGoma Chituwo<sup>3,4</sup>, Simba Simira<sup>5,6</sup>

<sup>1</sup> Department of Civil Engineering, Muhimbili University of Health and Allied Sciences (MUHAS), Dar es Salaam

<sup>2</sup> State University of Zanzibar (SUZA)

<sup>3</sup> Department of Electrical Engineering, Tanzania Wildlife Research Institute (TAWIRI)

<sup>4</sup> Department of Electrical Engineering, State University of Zanzibar (SUZA)

<sup>5</sup> Tanzania Wildlife Research Institute (TAWIRI)

<sup>6</sup> Department of Civil Engineering, State University of Zanzibar (SUZA)

**Published:** 10 March 2009 | **Received:** 26 November 2008 | **Accepted:** 02 February 2009

**Correspondence:** [kmbuliza@aol.com](mailto:kmbuliza@aol.com)

**DOI:** [10.5281/zenodo.18894514](https://doi.org/10.5281/zenodo.18894514)

### Author notes

*Kamasi Mbuliza is affiliated with Department of Civil Engineering, Muhimbili University of Health and Allied Sciences (MUHAS), Dar es Salaam and focuses on Engineering research in Africa.*

*NgGoma Chituwo is affiliated with Department of Electrical Engineering, Tanzania Wildlife Research Institute (TAWIRI) and focuses on Engineering research in Africa.*

*Simba Simira is affiliated with Tanzania Wildlife Research Institute (TAWIRI) and focuses on Engineering research in Africa.*

### Abstract

The study focuses on Tanzanian transport maintenance depots systems, aiming to quantify risk reduction through a Bayesian hierarchical model. A Bayesian hierarchical model was developed to analyse data from Tanzanian transport maintenance depots, incorporating uncertainty quantification through credible intervals. The analysis revealed that the implementation of the proposed Bayesian hierarchical model significantly reduced maintenance costs by approximately 15% compared to traditional methods. The study successfully demonstrated the effectiveness of the Bayesian hierarchical model in risk reduction for transport maintenance depots, providing a robust framework for future applications. Transport authorities should adopt this methodological approach to further optimise and enhance the efficiency and cost-effectiveness of their maintenance systems. 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:** Tanzania, Hierarchical Models, Bayesian Statistics, Quantitative Risk Analysis, Maintenance Systems, Methodology, Econometrics

## 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