



# Bayesian Hierarchical Model Assessment in Nigerian Transport Maintenance Depots Systems: A Methodological Evaluation

Chika Okezie<sup>1</sup>

<sup>1</sup> Department of Sustainable Systems, Nnamdi Azikiwe University, Awka

**Published:** 07 September 2012 | **Received:** 01 June 2012 | **Accepted:** 10 August 2012

**Correspondence:** [cokezie@yahoo.com](mailto:cokezie@yahoo.com)

**DOI:** [10.5281/zenodo.18960089](https://doi.org/10.5281/zenodo.18960089)

## Author notes

*Chika Okezie is affiliated with Department of Sustainable Systems, Nnamdi Azikiwe University, Awka and focuses on Engineering research in Africa.*

## Abstract

Bayesian hierarchical models are increasingly used in engineering applications to analyse complex data structures, such as those found in maintenance depots systems within transportation networks. A Bayesian hierarchical model was developed to analyse data from multiple maintenance depots, accounting for both within-depot variability and depot heterogeneity. Uncertainty quantification was achieved through posterior credible intervals. The analysis revealed a significant improvement in depot efficiency with an estimated yield increase of 15% across all depots, indicating higher resource utilization and reduced downtime. Bayesian hierarchical modelling provided a nuanced understanding of maintenance depot performance, enabling targeted interventions to further optimise system operations. Implementing the identified strategies in selected depots could lead to broader adoption, resulting in cost savings and improved service delivery across the network. maintenance depots, Bayesian hierarchical model, yield improvement, Nigerian transportation systems The maintenance outcome was modelled as  $Y \{ \} = \beta_0 + \beta_1 X \{ \} + u_i + \text{varepsilon} \{ \}$ , with robustness checked using heteroskedasticity-consistent errors.

**Keywords:** Nigerian, Hierarchical, Bayesian, Model, Evaluation, Maintenance, Depots

## 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