African Nanotechnology Applications (Technology)

Bayesian Hierarchical Model for Measuring Cost-Effectiveness of Transport Maintenance Depots in Ethiopia

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Abstract

This study focuses on evaluating the cost-effectiveness of transport maintenance depots (TMDs) in Ethiopia's logistics system. A Bayesian hierarchical model was employed to analyse data from multiple depots across different regions of Ethiopia. The model accounts for spatial variability in cost-effectiveness and incorporates uncertainty through robust standard errors. The analysis revealed significant variation in the cost-effectiveness of TMDs, with some depots showing substantial cost savings compared to others. Bayesian hierarchical modelling provides a nuanced approach to understanding cost-effectiveness, enabling targeted improvements in depot operations and resource management. Based on findings, recommendations include prioritising the expansion of more cost-effective depots and enhancing maintenance practices for improved efficiency. The maintenance outcome was modelled as $Y\{\} = beta0 + beta1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *African Geography, Cost-Benefit Analysis, Hierarchical Modelling, Bayesian Statistics, Econometrics, Logistics Systems, Transport Economics*

ABSTRACT-ONLY PUBLICATION

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