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Bayesian Hierarchical Model for System Reliability Assessment in Kenyan Transport Maintenance Depots

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Abstract

Transport maintenance depots in Kenya are critical for ensuring safe vehicle operations. However, their reliability systems need to be evaluated and improved. A Bayesian hierarchical model was employed to evaluate the system reliability of these depots. Uncertainty quantification was achieved through credible intervals. The model identified a significant variation (35%) in repair times across different depot locations, necessitating targeted interventions. The Bayesian hierarchical approach effectively highlighted disparities and provided actionable insights for enhancing depot reliability. Implementing targeted maintenance schedules based on the findings is recommended to reduce repair times by 30%. Bayesian Hierarchical Model, System Reliability, Transport Maintenance Depots, Kenya The maintenance outcome was modelled as $Y\{\}=beta0+beta1X\{\}+ui+varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Kenya, Bayesian hierarchical model, Hierarchical modelling, System reliability, Markov chain Monte Carlo, Empirical Bayes, Reliability assessment*

ABSTRACT-ONLY PUBLICATION

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