



## Bayesian Hierarchical Model Evaluation of Transport Maintenance Depots in Senegal,

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### Abstract

Bayesian hierarchical models have been increasingly used in post-harvest technology to evaluate the impact of transport maintenance depots (TMDs). These models are particularly useful for understanding complex systems where multiple factors interact. A Bayesian hierarchical model was employed to analyse data collected from Senegalese farmers over two years. This approach allows for the integration of multiple sources of information, including yield measurements, storage conditions, and transportation logistics. The analysis revealed that TMDs significantly improved crop yields by an average of 15% in regions with optimal infrastructure, while those with suboptimal infrastructure showed only a modest improvement at around 7%. This pattern highlights the importance of consistent maintenance for maximum yield benefits. This study provides empirical evidence supporting the effectiveness of TMDs as key components in enhancing agricultural productivity. The findings suggest that regular monitoring and maintenance are essential to maximise their impact. Policy makers should prioritise investment in maintaining infrastructure at TMDs to ensure they function optimally, thereby contributing to sustained yield improvements across Senegal's agricultural sector. The maintenance outcome was modelled as  $Y_i = \beta_0 + \beta_1 X_i + u_i + \varepsilon_i$ , with robustness checked using heteroskedasticity-consistent errors.

**Keywords:** African Geography, Hierarchical Modelling, Bayesian Statistics, Transport Infrastructure, Maintenance Systems, Yield Analysis, Post-Harvest Technology



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