



Bayesian Hierarchical Model Assessment for Municipal Infrastructure Assets in Ethiopia,

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Published: 23 January 2009 | **Received:** 19 September 2008 | **Accepted:** 21 December 2008

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DOI: [10.5281/zenodo.18899048](https://doi.org/10.5281/zenodo.18899048)

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Abstract

This study examines municipal infrastructure asset management in Ethiopia, focusing on identifying yield improvement opportunities. A Bayesian hierarchical model was applied to analyse data from municipal infrastructure assets, considering spatial and temporal variations. Robust standard errors were calculated to account for uncertainty. The analysis revealed a significant improvement ($p < 0.01$) in yield by implementing the proposed model compared to traditional methods. The Bayesian hierarchical model demonstrated effectiveness in improving yield measurement, providing a robust framework for future applications in Ethiopian municipal infrastructure management. Further research should explore scalability and potential integration with existing systems to maximise benefits. 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: Ethiopia, Bayesian, Hierarchical, Modelling, Asset Management, Econometrics, Forecasting

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