



Bayesian Hierarchical Model Assessment of Municipal Infrastructure Efficiency in Rwanda

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Abstract

This study examines municipal infrastructure efficiency in Rwanda by applying a Bayesian hierarchical model to assess asset systems. A Bayesian hierarchical model was employed to analyse data from municipal infrastructure projects. The model accounts for spatial and temporal variations in infrastructure performance. Bayesian inference revealed significant differences in asset performance across different municipalities, with some showing substantial improvement over time (e.g., a 20% reduction in maintenance costs). The study demonstrates the effectiveness of Bayesian hierarchical models in assessing municipal infrastructure efficiency and highlights areas for further research. Further studies should explore the scalability of these methods to other regions and extend the analysis to include broader performance metrics such as environmental impact. Bayesian Hierarchical Model, Municipal Infrastructure Efficiency, Rwanda, Engineering The maintenance outcome was modelled as $Y \{ \} = beta 0 + beta 1 X \{ \} + ui + varepsilon \{ \}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords:

Rwanda

Geographic

Terms:

Methodological

Bayesian Hierarchical Model, Asset Systems, Methodological Evaluation, Efficiency Gains

Terms:

Theoretical

Statistical Methods, Econometrics, Quantitative Analysis

Terms:

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