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Bayesian Hierarchical Model for Measuring Adoption Rates in Municipal Infrastructure Assets Systems in Rwanda

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Abstract

The adoption rates of municipal infrastructure assets systems in Rwanda have been a subject of interest for researchers aiming to understand their efficiency and impact. The research employs a Bayesian hierarchical model to analyse data collected from various municipalities in Rwanda. This approach allows for the estimation of average and varying adoption rates across different regions, accounting for potential heterogeneity. Analysis revealed significant variation in adoption rates among municipal districts in Rwanda, with some areas showing adoption rates as high as 75% compared to others at around 20%. The Bayesian hierarchical model provides a nuanced understanding of the factors affecting infrastructure asset adoption and can be used for targeted interventions. Future research should consider longitudinal data collection to track changes in adoption rates over time, while policymakers could use this information to inform future investment strategies. The maintenance outcome was modelled as $Y\{\} = beta0 + beta1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Geographic, Hierarchical, Bayesian, Adoption, Asset, Evaluation, Rwanda*

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