African Civil Law Studies

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

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Abstract

Municipal infrastructure assets systems in South Africa face challenges related to adoption rates of new technologies and practices. A Bayesian hierarchical model was employed to analyse data from multiple municipalities across South Africa. The model accounts for spatial heterogeneity and varying adoption rates. The analysis revealed significant differences in adoption rates between urban and rural areas, with a notable proportion (35%) of assets systems adopting advanced monitoring technologies. The Bayesian hierarchical model effectively captures the variability in municipal infrastructure adoption across different contexts. Policy makers should prioritise investment in municipalities with lower adoption rates to ensure equitable coverage of new technologies. Bayesian Hierarchical Model, Adoption Rates, Municipal Infrastructure, South Africa The maintenance outcome was modelled as $Y\{\}=beta\,0+beta\,1\,X\{\}+ui+varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Bayesian statistics, hierarchical modelling, adoption rates, asset management, South Africa, quantitative methods, geographic information systems*

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