African Broadcasting Studies

# Methodological Evaluation of Municipal Water Systems in Uganda Using Panel Data Estimation for Efficiency Gains

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## Abstract

Ugandan municipal water systems face challenges in delivering efficient service to a growing population, necessitating methodological evaluation. The study employs fixed effects models with robust standard errors to analyse the efficiency of municipal water systems across Ugandan districts. Panel data from - are utilised to account for temporal and spatial variations in service delivery effectiveness. Panel-data analysis reveals a significant variation (proportion) in system performance among different Ugandan municipalities, with some achieving efficiency gains through improved management practices. The findings suggest that targeted interventions aimed at enhancing managerial oversight could lead to substantial improvements in municipal water service delivery across Uganda. Local authorities should prioritise the implementation of best-practice management strategies and continuous monitoring to achieve sustainable improvement in water system efficiency. Model estimation used $\hat{\{}\theta\}=argmin\{\theta\}sumiell(yi,f\theta(\xi))+\lambda lVert\theta rVert\,2^{2}$, with performance evaluated using out-of-sample error.

**Keywords:** *Geographic, Panel Data, Fixed Effects, Efficiency Measurement, Econometrics, Sustainability, Water Supply Systems*

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