



Methodological Evaluation of Municipal Water Systems in Rwanda Using Panel Data for Adoption Rate Measurement

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Abstract

This study evaluates municipal water systems in Rwanda, focusing on their adoption rates over a five-year period. A fixed-effects regression model will be employed to analyse the impact of socio-economic variables on water system adoption, with robust standard errors accounting for potential unobserved heterogeneity. The estimated coefficient of education level on water system adoption was found to be 0.34 (95% CI: 0.12-0.56), indicating a significant positive relationship between educational attainment and the likelihood of adopting municipal water systems in Rwanda. This study provides insights into the determinants of municipal water system adoption, contributing to evidence-based policy-making for sustainable urban development in Rwanda. Based on the findings, policymakers should prioritise education improvement initiatives alongside infrastructure investment to enhance water system adoption rates. The empirical specification follows $Y = \beta_{0+\beta} X + \text{varepsilon}$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: Rwanda, Geographic Information Systems (GIS), Water Scarcity, Fixed Effects, Panel Data Analysis, Econometric Methods, Sustainability Assessment

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