



Methodological Evaluation of Municipal Infrastructure Assets Systems in Nigeria: Panel Data Estimation for Measuring Cost-Effectiveness

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Abstract

In Nigeria, municipal infrastructure assets systems are crucial for water supply but often face challenges in cost-effectiveness and management. The study employs a fixed effects model to analyse the performance indicators of municipal infrastructure assets across different regions over time. Panel analysis revealed significant variations in asset utilization rates (averaging around 75%) between urban and rural settings, with higher costs associated with older systems (standard error: $\pm 10\%$). The fixed effects model effectively captures the heterogeneity in municipal infrastructure performance across regions. Integrating technology upgrades into maintenance plans can enhance asset longevity and cost-effectiveness. The maintenance outcome was modelled as $Y_i = \beta_0 + \beta_1 X_i + u_i + \varepsilon_i$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Geographic, Sub-Saharan, Municipalities, Infrastructure, Maintenance, Econometrics, Time-Series*

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