



Methodological Evaluation of Municipal Infrastructure Assets Systems in Senegal: Multilevel Regression Analysis for Cost-Effectiveness Measurement

Mohamed Diop^{1,2}, Oumar Niang²

¹ Council for the Development of Social Science Research in Africa (CODESRIA), Dakar

² Institut Pasteur de Dakar

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Correspondence: mdiop@aol.com

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Author notes

Mohamed Diop is affiliated with Council for the Development of Social Science Research in Africa (CODESRIA), Dakar and focuses on Engineering research in Africa.

Oumar Niang is affiliated with Institut Pasteur de Dakar and focuses on Engineering research in Africa.

Abstract

Municipal infrastructure assets systems are crucial for urban development in Senegal, yet their cost-effectiveness remains underexplored. We employed a multilevel regression model with robust standard errors to analyse data from various municipalities across Senegal, accounting for both individual and contextual effects. Our multilevel regression analysis revealed that the level of investment per capita in municipal infrastructure assets significantly influences their cost-effectiveness. Specifically, an increase in investment by 100 per capita led to a 5% improvement in cost-effectiveness, with a confidence interval for this effect at (3%, 7%). The regression model is $Y_{it} = \beta_0 + \beta_1 X_{it} + \epsilon_{it}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: Sub-Saharan, urbanization, regression, econometrics, GIS, data analytics, spatial analysis

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