Comparative Methodological Assessment of Municipal Infrastructure Assets Systems in Ghana Using Multilevel Regression Analysis for Cost-Effectiveness Measurement

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Abstract

This study examines municipal infrastructure asset systems in Ghana, focusing on their efficiency and cost-effectiveness. A multilevel regression model will be employed to analyse data at both the municipal and national levels, accounting for potential confounding variables such as population density and economic indicators. The multilevel regression analysis revealed that incorporating socioeconomic factors significantly improved the accuracy of cost-effectiveness measurements. The study concludes with recommendations on how to optimise municipal infrastructure asset systems in Ghana based on the findings. Recommendations include integrating socioeconomic data into future assessments and implementing targeted interventions where necessary. The maintenance outcome was modelled as $Y\{\} = beta\,0 + beta\,1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Geographic, Multilevel, Regression, Asset Management, Efficiency, Sustainability, Cost-Benefit Analysis*

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