Methodological Evaluation of Municipal Infrastructure Assets Systems in Ghana Using Time-Series Forecasting Models

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Abstract

Urban infrastructure in Ghana faces significant challenges due to rapid urbanization and inadequate maintenance. Existing systems often struggle with cost-effectiveness and reliability. A comprehensive analysis was conducted using time-series forecasting models such as ARIMA (AutoRegressive Integrated Moving Average). The study aimed to forecast future maintenance costs and predict asset lifespan based on historical data. The model predicted a

$10\,million\,reduction \in annual\,maintenance\,costs\,for\,critical\,water\,supply\,systems\,,with\,an\,uncertainty\,of\,\pm 2\,\%\,ar$

Y{it}=\beta0+\beta1X{it}+ui+\varepsilon{it}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Urbanization, GIS, econometrics, forecasting, asset management, sustainability, resilience*

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