



Time-Series Forecasting Model Replication for Municipal Infrastructure Asset Efficiency in Ghana,

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Abstract

This study aims to replicate a previously published time-series forecasting model for municipal infrastructure asset efficiency in Ghana. The replication will follow the methodology outlined in the original study, including data collection, preprocessing, and application of a time-series forecasting model. The specific model used is an AutoRegressive Integrated Moving Average (ARIMA) model with uncertainty quantified using robust standard errors. In this replication, the ARIMA(2,1,3) model was applied to municipal infrastructure asset data from Ghana, showing a significant improvement in forecasting accuracy compared to the original study's results. The replication confirms the effectiveness of the ARIMA model for time-series analysis in evaluating municipal infrastructure asset efficiency and supports its use as a robust methodological tool. Recommendation is made to further validate this model using additional datasets from different municipalities within Ghana to enhance its generalizability. The maintenance outcome was modelled as $Y_t = \beta_0 + \beta_1 X_t + u_t + \text{var}\epsilonpsilon_t$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: Ghanaian, Geographic Information Systems, Monte Carlo Simulation, Time Series Analysis, Forecasting Models, Econometrics, Geographic Data Analysis

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