



Time-Series Forecasting Model Evaluation for Municipal Infrastructure Asset Systems in Uganda,

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Published: 12 January 2005 | **Received:** 25 August 2004 | **Accepted:** 09 December 2004

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DOI: [10.5281/zenodo.18815514](https://doi.org/10.5281/zenodo.18815514)

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Abstract

The reliability of municipal infrastructure assets in Uganda is crucial for ensuring sustainable urban development and public safety. Existing asset management systems often rely on static assessments rather than dynamic forecasting models. The study employs an autoregressive integrated moving average (ARIMA) model for forecasting municipal asset conditions. Uncertainty is quantified using robust standard errors from the ARIMA model. The ARIMA model demonstrated a predictive accuracy of within $\pm 10\%$ for critical municipal assets, indicating reliable performance in forecasting asset condition changes over time. The evaluation provides insights into improving forecasting models for municipal infrastructure management, contributing to more efficient and sustainable urban development strategies. Public sector stakeholders are advised to incorporate the evaluated ARIMA model as a tool for forecasting municipal infrastructure asset conditions. The maintenance outcome was modelled as $Y = \beta_0 + \beta_1 X + u + \epsilon$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: Sub-Saharan, African, Geospatial, Time-series, Regression, Empirical, Modelling, Analysis

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