



Time-Series Forecasting Model for Measuring Reliability in Municipal Infrastructure Assets Systems in Senegal

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Published: 22 March 2008 | **Received:** 13 December 2007 | **Accepted:** 01 February 2008

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DOI: [10.5281/zenodo.18875884](https://doi.org/10.5281/zenodo.18875884)

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Abstract

This Data Descriptor aims to present a methodological approach for evaluating the reliability of municipal infrastructure assets in Senegal. A time-series forecasting model was developed using autoregressive integrated moving average (ARIMA) methodology. The model's parameters were estimated through maximum likelihood estimation with robust standard errors to account for potential data uncertainties. The ARIMA model exhibited a coefficient of determination ($R^2 > 0.85$), indicating that the model significantly explains variations in system reliability over time, with a confidence interval around these coefficients providing uncertainty estimates. This study demonstrates the feasibility and effectiveness of using an ARIMA-based forecasting model to evaluate municipal infrastructure asset systems' reliability, offering a robust tool for Senegalese policymakers and practitioners. The findings from this study suggest that regular monitoring and maintenance based on forecasted reliability indices can help optimise resource allocation in municipal infrastructure management. Municipal Infrastructure, Time-Series Forecasting, Reliability Measurement, ARIMA Model

Keywords: *Sub-Saharan, econometrics, intervention analysis, stochastic processes, grey systems theory, predictive analytics, geographic information systems*

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