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Time-Series Forecasting Model for Measuring Adoption Rates of Water Treatment Facilities in Senegal

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Abstract

This Data Descriptor examines the adoption rates of water treatment facilities in Senegal over a single year to evaluate system performance and predict future trends. A time-series analysis was conducted using historical data on the number of installed water treatment facilities. A SARIMA (Seasonal AutoRegressive Integrated Moving Average) model with exogenous variables was applied to forecast future adoption rates based on current trends. The SARIMA model revealed a significant seasonal pattern in the number of new installations, showing an increase during the dry season and decrease during the rainy season. The model predicted that by , the number of installed facilities would have grown by approximately 5% from the previous year. The time-series forecasting model demonstrated its effectiveness in predicting adoption rates with a confidence interval of ±3%, indicating reasonable accuracy for policy planning and resource allocation decisions. Based on these findings, it is recommended that additional resources be allocated during the dry season to ensure timely service delivery and minimise water shortages. The maintenance outcome was modelled as $Y\{\} = beta\,0 + beta\,1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Sub-Saharan, watershed, econometrics, autoregression, intervention analysis, spatial data, stochastic processes*

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