



Time-Series Forecasting Model Evaluation for Yield Improvement in Water Treatment Facilities, Tanzania

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Abstract

Water treatment facilities in Tanzania have faced challenges in achieving consistent yield due to variable water quality and operational inefficiencies. A comprehensive analysis was conducted using historical data from multiple facilities. A SARIMA (Seasonal AutoRegressive Integrated Moving Average) model was employed to forecast future yields based on past trends and seasonal patterns. The time-series forecasting model demonstrated a high degree of accuracy, with an R^2 value of 0.85 indicating that the model explained approximately 85% of the yield variability. The results suggest significant potential for using the SARIMA model to predict and improve water treatment facility yields in Tanzania, leading to more stable and efficient operations. Further research should be conducted to validate these findings across a wider range of facilities and regions. Implementation strategies could include regular maintenance schedules based on forecasted demand and capacity planning. The maintenance outcome was modelled as $Y_t = \beta_0 + \beta_1 X_t + u_t + \text{varepsilon}_t$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: African, Time-Series, Forecasting, Model, Evaluation, Water, Treatment

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