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Time-Series Forecasting Model Evaluation for Water Treatment Facilities in Ethiopia,

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Abstract

Water treatment facilities in Ethiopia have faced challenges in maintaining consistent operational reliability due to varying water quality inputs and fluctuating demand. A time-series forecasting model was applied using ARIMA (AutoRegressive Integrated Moving Average) methodology. Robust standard errors were used to account for uncertainty in predictions. The model identified a significant positive correlation between input water quality and system efficiency, with an R^2 value of 0.85 indicating substantial explanatory power. The ARIMA model demonstrated high predictive accuracy, contributing to improved reliability metrics by up to 20% in Ethiopian water treatment facilities. Implementing the model could lead to more efficient resource allocation and maintenance planning for future water treatment systems. water quality forecasting, time-series analysis, ARIMA, Ethiopian water treatment The maintenance outcome was modelled as $Y\{\} = beta0 + beta1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *African Geography, Time-Series Analysis, Forecasting Models, System Reliability, Econometrics, Stochastic Processes, Predictive Maintenance*

ABSTRACT-ONLY PUBLICATION

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