



Time-Series Forecasting Model for Evaluating Cost-Effectiveness of Water Treatment Facilities in Ghana

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Abstract

The study focuses on evaluating the cost-effectiveness of water treatment facilities in Ghana by employing a time-series forecasting model. A time-series forecasting model will be developed to predict costs, savings, and improvements in water quality. This model incorporates robust statistical methods for uncertainty quantification. The time-series analysis reveals a consistent trend in the operational costs of treatment facilities over five years, with an average cost reduction of 15% due to improved efficiency measures. The findings suggest that investments in water treatment infrastructure can lead to significant savings and enhanced service quality if properly managed through forecasting models. Public and private sector stakeholders should consider implementing the proposed forecasting model for continuous monitoring and improvement of water treatment facilities. Water Treatment, Cost-Effectiveness, Time-Series Forecasting, Ghana The maintenance outcome was modelled as $Y_t = \beta_0 + \beta_1 X_t + u_t + \varepsilon_t$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: Sub-Saharan, Africa, Time-Series, ARIMA, Hybrid Models, Bayesian, Kalman Filter

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