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Methodological Evaluation of Water Treatment Facilities in Kenya Using Time-Series Forecasting Models for Risk Reduction Analysis

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Abstract

Water treatment facilities in Kenya face challenges related to water quality maintenance and operational efficiency. A case study approach was employed to assess existing water treatment facilities. Time-series forecasting models were applied using ARIMA (AutoRegressive Integrated Moving Average) methodology to predict future operational risks based on historical data. $ARIMA(p,d,q)$ model was used for forecasting with a confidence interval of ±5%. The time-series forecasting models identified significant seasonal patterns in water quality that could be mitigated through preventive maintenance and resource allocation strategies. Implement predictive maintenance schedules and allocate resources based on forecasted demand to enhance system reliability and reduce operational risks.

Keywords: *Kenya, Water Treatment Systems, Time-Series Analysis, Forecasting Models, Risk Assessment, Methodology, Engineering Evaluation*

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