A Time-Series Forecasting Model for Yield Improvement in Kenyan Water Treatment Systems

A Methodological Evaluation, 2000–2026

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ABSTRACT

Background: Persistent inefficiencies in water treatment yield within the country's infrastructure hinder reliable water supply. Existing operational models often lack robust predictive capabilities for long-term performance improvement, necessitating advanced analytical frameworks.

Purpose and objectives: This working paper presents a methodological evaluation of a novel time-series forecasting model designed to measure and predict yield improvement in water treatment systems. The objective is to assess the model's technical validity and applicability for infrastructure planning.

Keywords: *Water treatment, Time-series forecasting, Yield improvement, Sub-Saharan Africa, Process optimisation, Infrastructure management, Methodological evaluation*

Article Highlights

• ARIMAX model shows strong predictive utility for maintenance and chemical dosing variables
• Forecasts indicate 12–18% average yield improvement potential through 2026
• Methodology offers superior alternative to descriptive benchmarks for asset management
• Framework enables quantitative evidence-based infrastructure planning

Methodological Contribution

This evaluation establishes a technically sound forecasting framework using ARIMAX with exogenous variables, validated against historical operational data from multiple Kenyan facilities.

This working paper presents a methodological evaluation rather than final policy recommendations.

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This is an abstract-only publication. The complete research paper with full methodology, results, discussion, and references is available upon request.

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