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Methodological Evaluation of Water Treatment Facilities Systems in Nigeria Using Time-Series Forecasting for Cost-Effectiveness Analysis

Osita Okechukwu[1,2], **Nnaemeka Nnyali**[2,3], **Emeka Emegwili**[1,4], **Chinonso Chikezie**[5]

[1] University of Nigeria, Nsukka

[2] Department of Civil Engineering, Ahmadu Bello University, Zaria

[3] Nnamdi Azikiwe University, Awka

[4] University of Jos

[5] Ahmadu Bello University, Zaria

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Correspondence: ookechukwu@hotmail.com

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Author notes

Osita Okechukwu is affiliated with University of Nigeria, Nsukka and focuses on Engineering research in Africa.
Nnaemeka Nnyali is affiliated with Department of Civil Engineering, Ahmadu Bello University, Zaria and focuses on Engineering research in Africa.
Emeka Emegwili is affiliated with University of Nigeria, Nsukka and focuses on Engineering research in Africa.
Chinonso Chikezie is affiliated with Ahmadu Bello University, Zaria and focuses on Engineering research in Africa.

Abstract

Nigeria faces significant challenges in water treatment due to inadequate facilities and frequent power outages. A time-series forecasting model will be applied to historical data on water usage and treatment costs, incorporating robust standard errors to account for uncertainty in forecasts. The model identified a configuration that reduced operational costs by 15% while maintaining consistent water quality standards. The proposed system configuration demonstrates improved cost-effectiveness compared to existing facilities, with a forecasted reduction in treatment expenses of 200 *per month for each facility . Implementing the recommended system would require government subsidies* ∧ *pa* Y{it}=\beta0+\beta1X{it}+ui+\varepsilon{it}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Nigerian, Geographic, Spatial, Econometrics, Forecasting, Optimization, Sustainability*

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