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Forecasting Adoption Rates in Water Treatment Facilities Using Time-Series Models: A Methodological Evaluation in Tanzania

Nyahigwa Magagila[1], **Kamali Mwakalasi**[2,3]

[1] Department of Mechanical Engineering, National Institute for Medical Research (NIMR)

[2] National Institute for Medical Research (NIMR)

[3] Department of Civil Engineering, Mkwawa University College of Education

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Correspondence: nmagagila@hotmail.com

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Author notes

Nyahigwa Magagila is affiliated with Department of Mechanical Engineering, National Institute for Medical Research (NIMR) and focuses on Engineering research in Africa.

Kamali Mwakalasi is affiliated with National Institute for Medical Research (NIMR) and focuses on Engineering research in Africa.

Abstract

Water treatment facilities in Tanzania face challenges related to adoption rates due to varying economic conditions and technological advancements. A time-series model, specifically an ARIMA (AutoRegressive Integrated Moving Average) model, was applied to historical data from water treatment facilities across Tanzania. Robust standard errors were used to account for uncertainty in the forecasting process. The ARIMA model showed a significant positive correlation between economic indicators and adoption rates of water treatment systems, with forecasts indicating a steady increase over the next five years. The use of time-series models provides valuable insights into predicting future trends in water treatment facility adoption in Tanzania, offering engineering solutions to enhance sustainability and efficiency. Further research should explore additional factors affecting adoption rates and validate these findings through longitudinal studies. Water Treatment Facilities, Adoption Rates, Time-Series Models, ARIMA, Forecasting, Tanzania The maintenance outcome was modelled as $Y\{\} = beta\,0 + beta\,1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Tanzania, Geographic Information Systems, Time-series Analysis, Econometrics, Forecasting, ARIMA, Stochastic Processes*

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