



Methodological Evaluation of Water Treatment Facilities in Rwanda Using Time-Series Forecasting for Adoption Rate Measurement

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Abstract

Water treatment facilities in Rwanda have been implemented to improve access to clean water, but their adoption rates vary significantly across different regions. A time-series forecasting model was applied to historical data on water treatment facility installations and usage patterns. The model's accuracy was assessed through cross-validation techniques, providing robust estimates of future adoption trends. The time-series model identified a clear upward trend in the number of households adopting water treatment facilities over the last decade, with an estimated growth rate of 5% per annum based on the forecasting model. The study concludes that while there is significant potential for further adoption, current strategies need to be refined to ensure equitable and sustainable coverage of all Rwandan regions. Recommendations include targeted policy interventions focusing on rural areas with lower adoption rates and enhanced community engagement programmes to accelerate the uptake of water treatment facilities. The maintenance outcome was modelled as $Y_t = \beta_0 + \beta_1 X_t + u_t + v_t \epsilon_t$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Geographic, Africa, Spatial Analysis, Systems Engineering, Forecasting Models, Econometrics, Hybrid Models*

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