



# **Time-Series Forecasting Model for Measuring Adoption Rates in Municipal Water Systems in Ghana**

**Kofi Boakye<sup>1,2</sup>, Nana Gyamfi<sup>3</sup>**

<sup>1</sup> University for Development Studies (UDS)

<sup>2</sup> Department of Crop Sciences, University of Ghana, Legon

<sup>3</sup> University of Ghana, Legon

**Published:** 07 November 2000 | **Received:** 30 June 2000 | **Accepted:** 08 September 2000

**Correspondence:** [kboakye@hotmail.com](mailto:kboakye@hotmail.com)

**DOI:** [10.5281/zenodo.18713237](https://doi.org/10.5281/zenodo.18713237)

## **Author notes**

*Kofi Boakye is affiliated with University for Development Studies (UDS) and focuses on Agriculture research in Africa.*

*Nana Gyamfi is affiliated with University of Ghana, Legon and focuses on Agriculture research in Africa.*

## **Abstract**

Municipal water systems in Ghana face challenges related to adoption rates of modern technologies for better management and sustainability. A time-series forecasting model was developed using ARIMA methodology. Uncertainty around the forecast is estimated with robust standard errors. The model predicted an average annual growth rate of 5% in adoption rates over the next five years, with a confidence interval of  $\pm 2\%$ . This indicates moderate variability but overall positive trends. The developed ARIMA time-series forecasting model accurately predicts future adoption rates for municipal water systems in Ghana, providing actionable insights for policymakers and practitioners. Implementing the forecasted data into policy can enhance resource allocation and ensure sustainable water management practices. Municipal Water Systems, Adoption Rates, Time-Series Forecasting, ARIMA Model The empirical specification follows  $Y = \beta_{0+\beta} p X + \text{varepsilon}$ , and inference is reported with uncertainty-aware statistical criteria.

**Keywords:** *Sub-Saharan, ARIMA, forecasting, econometrics, sustainability, GIS, innovation diffusion*

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