



Methodological Evaluation of Regional Monitoring Networks in Ghana: Time-Series Forecasting for Adoption Rates Analysis

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Abstract

Regional monitoring networks in Ghana have been established to track environmental indicators such as air quality and water pollution. However, the effectiveness of these networks varies, necessitating a comprehensive evaluation. A systematic review approach was employed to assess the methodologies used by different networks. Time-series models were applied to forecast adoption rates based on historical data, including ARIMA and LSTM neural network models. The ARIMA model showed a mean absolute error (MAE) of 12.5% in forecasting adoption rates for water quality monitoring networks across Ghana's regions. This study highlights the need for standardization in data collection and analysis to improve the consistency and reliability of regional monitoring systems. Standardised protocols should be developed, and cross-regional comparisons using robust statistical methods should be encouraged to enhance network effectiveness. Regional Monitoring Networks, ARIMA Model, Time-Series Forecasting, Adoption Rates Analysis, Ghana The empirical specification follows $Y = \beta_{0+\beta} p X + \text{varepsilon}$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Sub-Saharan, econometric, spatial analysis, panel data, time-series, stochastic frontier, cross-sectional*

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