TIME SERIES ANALYSIS OF RAINFALL SOUTH – WESTERN PART OF NIGERIA: USING ARIMA MODEL (A CASE STUDY OF LAGOS STATE)

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ABSTRACT

Time series analysis and forecasting has become a major tool in different applications in meteorological phenomena, such as Rainfall, Temperature, Humidity, Drought, etc.

This work applies ARIMA model (p, d, q) (P, D, Q) to rainfall in South-Western part of Nigeria.

Various approaches, including, physical and mathematical models have been used to model rainfall. For the purpose of this work, the ARIMA model has been found to be one of the most appropriate models to carry out Time Series Analysis of rainfall, and has been therefore employed to analyze the rainfall data for south-western part of Nigeria.

This project work employs the Box – Jenkins methodology to build seasonal ARIMA model for the Time Series Analysis of Rainfall data of Lagos state which contains the monthly total rainfall (in mm) of Lagos State, ranging from January to December, covering the period of fifteen (15) years within 1996 to 2010 (The total of 180 Observations). The data was collected from Nigeria Meteorological Agency (NIMET) at Oshodi, Lagos, Nigeria, recorded by Ikeja Station.

Models applicable for a Seasonal data like rainfall is ARIMA $(p, d, q)(P, D, Q)$ where in this case p = 0, d = 0, q = 0 and Difference (D) = 12, i.e. the 12 months in a year. This gives

$$\Delta^0 \Delta^{12} X_t = X_t - X_{t-12}$$

$$= \Delta^{12} X_t = X_t - X_{t-12}$$

The estimated tentative model is given as $Y_t = \Delta^{12} \text{rainfall}_t = \text{rainfall}_t - \text{rainfall}_{t-12}$ then the estimated ARIMA (2, 0, 0) model is: $\hat{Y}_t = 0.10169 Y_{t-1} - 0.10217 Y_{t-2}$ and this model was used to forecast monthly rainfall for a period of one (1) year in South – Western part of Nigeria.