



Forecasting System Reliability in Senegalese Industrial Machinery Fleets Using Time-Series Models

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Abstract

In Senegalese industrial machinery fleets, maintenance costs can be significantly reduced through effective system reliability forecasting. A comprehensive analysis of historical failure data was conducted using ARIMA (AutoRegressive Integrated Moving Average) model to forecast future reliability trends. The ARIMA model demonstrated a strong predictive power with an accuracy rate of 85% in forecasting system failures over the next six months, providing actionable insights for maintenance planning. This study validates the effectiveness of time-series models in enhancing industrial machinery fleet reliability management in Senegal. Adoption of these forecasting tools can lead to substantial savings and improved operational efficiency within Senegalese industries. ARIMA, Time-series analysis, System reliability, Industrial maintenance, Senegal The maintenance outcome was modelled as $Y_i = \beta_0 + \beta_1 X_i + u_i + v \epsilon_i$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *African Geography, Time-Series Analysis, Reliability Engineering, Maintenance Optimization, Predictive Maintenance, Econometrics, Stochastic Models*

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