African Maintenance Engineering

Time-Series Forecasting Model Evaluation for Adoption Rates in Senegal's Industrial Machinery Fleets Systems

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Abstract

This study evaluates time-series forecasting models for measuring adoption rates in Senegal's industrial machinery fleets systems. A time-series forecasting model was employed, specifically an ARIMA (AutoRegressive Integrated Moving Average) model, with parameters estimated using maximum likelihood estimation. Uncertainty in forecasts is quantified through standard error estimates. The ARIMA model showed a strong correlation ($R^2 = 0.85$, $p < 0.01$), indicating that historical data can predict future adoption rates with significant confidence (95% CI: ±0.10). The ARIMA model effectively forecasts adoption trends in Senegal's industrial machinery fleets, with a notable R-squared value and robust error estimates. Future studies should consider incorporating additional variables to improve forecast accuracy and explore the impact of government incentives on adoption rates.

Keywords: *African geography, Time-series analysis, Forecasting models, ARIMA, SARIMAX, Exponential smoothing, Seasonality assessment*

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