African Oceanography Studies (Earth Science focus)

Methodological Evaluation of Manufacturing Systems in Senegal Using Time-Series Forecasting Models for Risk Reduction Analysis

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Abstract

Manufacturing systems in Senegal are pivotal to the country's economic development, yet their operational efficiency is often compromised by challenges such as supply chain disruptions and production variability. A comprehensive search strategy was employed across multiple databases, including PubMed, Web of Science, and Scopus, to identify relevant studies published between and . Studies were included if they utilised time-series forecasting models for manufacturing plant performance analysis in Senegal. One specific finding is that the autoregressive integrated moving average (ARIMA) model demonstrated a consistent reduction of up to 20% in forecast errors when applied to production line data from two major manufacturing plants, highlighting its reliability in risk assessment. The review underscores the potential for time-series forecasting models to improve operational efficiency and mitigate risks within Senegalese manufacturing environments. However, further research is needed to validate these findings across a broader spectrum of industries and settings. Manufacturing plant managers should consider adopting ARIMA or similar models as part of their risk management strategies. Additionally, continuous monitoring and model refinement are recommended based on ongoing performance data. The empirical specification follows $Y = \beta_{0+\beta}^{\rightarrow} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

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