Time-Series Forecasting Model for Measuring Adoption Rates in Process-Control Systems in Senegal: A Methodological Evaluation

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Abstract

Process-control systems (PCSs) are pivotal in optimising industrial processes in Senegal, where they play a significant role in enhancing productivity and reducing costs. A time-series forecasting model was applied to analyse historical data from industrial sites in Senegal. The Box-Jenkins ARIMA method was utilised for modelling and estimating the parameters. The analysis revealed that the adoption rates of PCSs increased by an average of 15% over a five-year period, with significant fluctuations observed during economic downturns. This study provides insights into the effectiveness of time-series forecasting in measuring PCS adoption trends and highlights the need for consistent data collection to enhance model accuracy. Further research should focus on developing more sophisticated models that account for external factors influencing PCS adoption rates, such as economic conditions and technological advancements. The maintenance outcome was modelled as $Y\{\} = beta\,0 + beta\,1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

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