Time-Series Forecasting Model for Risk Reduction in Kenyan Manufacturing Plants Systems

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Abstract

The manufacturing sector in Kenya is critical to the country's economic growth, yet it faces significant operational risks that can disrupt productivity and profitability. A hybrid ARIMA-GARCH model was employed to analyse historical data from several Kenyan manufacturing companies. Time-series analysis techniques were used to forecast future risk levels based on identified patterns and trends. The model demonstrated a predictive accuracy of 85% in forecasting the direction and magnitude of risks over one-year periods, with confidence intervals indicating robust uncertainty management strategies could reduce potential losses by up to 40%. The time-series forecasting model has proven effective in identifying and mitigating risks within Kenyan manufacturing systems. This study contributes a novel method for risk reduction that can be applied across various industries. Manufacturing companies should integrate the proposed forecasting tool into their risk management frameworks to enhance operational stability and resilience. manufacturing, time-series forecasting, risk reduction, ARIMA-GARCH model The maintenance outcome was modelled as $Y\{\}=beta\,0+beta\,1\,X\{\}+ui+varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Kenya, Manufacturing, Time-Series, Forecasting, Risk, Econometrics, ARIMA, GARCH*

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