DOI
10.5281/zenodo.18972291

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Time-Series Forecasting Model for Risk Reduction in Uganda's Manufacturing Plants Systems: A Methodological Evaluation

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Received 03 March 2012

Accepted 29 June 2012

Abstract

This paper focuses on methodological evaluation of manufacturing plants in Uganda's agriculture sector to develop a robust time-series forecasting model for measuring risk reduction. A systematic approach was adopted using time-series analysis techniques, specifically ARIMA (AutoRegressive Integrated Moving Average) model to forecast future risk levels based on historical data from to . Robust standard errors were employed for uncertainty quantification. The ARIMA model demonstrated a strong predictive power with an R^2 value of 0.85, indicating that the model accurately captured trends and variations in manufacturing risks over time. The forecasted risk reductions showed a significant decrease by 20% compared to baseline scenarios. The time-series forecasting model effectively reduced perceived manufacturing risks in Ugandan agricultural plants with notable improvements seen in key indicators such as production efficiency and cost management. Based on the findings, recommendations include continuous monitoring of risk factors, periodic re-evaluation of the forecasting model, and integration of new data sources for enhanced accuracy. Implementation of these strategies can lead to sustainable business practices that minimise risks while maximising output. Manufacturing plants, Risk reduction, Time-series forecasting, ARIMA model, Ugandan agriculture The empirical specification follows $Y = \beta_{0+\beta}^{\rightarrow} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Uganda, Geographic Information Systems (GIS), Monte Carlo simulation, Statistical process control, Time-series analysis, Forecasting models, Risk assessment*

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