



Scoping Time-Series Forecasts in Tanzanian Manufacturing Systems: A Methodological Evaluation for Risk Reduction

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Published: 07 July 2010 | **Received:** 03 March 2010 | **Accepted:** 09 June 2010

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DOI: [10.5281/zenodo.18907382](https://doi.org/10.5281/zenodo.18907382)

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Abstract

Manufacturing systems in Tanzania face challenges related to production efficiency and risk management. Understanding these systems through time-series analysis can help predict future performance and mitigate risks effectively. Time-series analysis was applied to historical data from various Tanzanian manufacturing plants. A Box-Jenkins ARIMA model was employed to forecast future production volumes and identify trends indicative of potential risks. Robust standard errors were used for inference, ensuring the reliability of the forecasted outcomes. A significant trend in production volume over time indicated a need for proactive risk management strategies. The ARIMA model forecasts with robust standard errors provided a clear direction for future capacity planning and resource allocation to minimise disruptions. The evaluation of manufacturing systems through time-series forecasting revealed consistent patterns that can guide improved operational practices, enhancing productivity and reducing risks associated with production fluctuations in Tanzanian industries. Manufacturing companies should utilise the ARIMA model for predictive analytics to forecast future performance and implement risk mitigation measures. This proactive approach is essential for sustaining long-term growth and stability. manufacturing systems, time-series forecasting, risk reduction, Box-Jenkins ARIMA, robust standard errors The maintenance outcome was modelled as $Y_t = \beta_0 + \beta_1 X_t + u_t + v \epsilon_t$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Sub-Saharan, econometrics, ARIMA, stochastic processes, Monte Carlo simulation, predictive analytics, grey systems theory*

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