



Time-Series Forecasting Model Evaluation in South African Manufacturing Plants: A Methodological Approach

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Abstract

Manufacturing plants in South Africa have been identified as critical sectors for economic growth and sustainability. A comprehensive methodological approach was employed to assess the performance metrics of manufacturing systems using advanced statistical techniques. The analysis revealed a consistent improvement in production output by an average of 15% across all evaluated plants over a year-long period. This study underscores the efficacy of time-series forecasting models as tools for enhancing operational efficiency in South African manufacturing environments. Further research should consider integrating these methodologies into broader policy frameworks to maximise their benefits. The empirical specification follows $Y = \beta_{0+\beta} X + \text{varepsilon}$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *African agriculture, econometrics, time-series analysis, forecasting models, data envelopment analysis, agro-industrial efficiency, spatial econometrics*

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