



# Methodological Evaluation of Manufacturing Plant Systems in Kenya Using Time-Series Forecasting Models for Efficiency Measurement

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## Abstract

Manufacturing plants in Kenya are increasingly adopting time-series forecasting models to enhance their operational efficiency. A comprehensive search was conducted using academic databases. Studies were screened based on predefined inclusion criteria, including studies that utilised time-series forecasting for performance evaluation in Kenyan manufacturing plants. Data analysis included qualitative synthesis and meta-regression models. The review identified a consistent trend of improving efficiency gains with the application of time-series forecasting models, though variations existed between sectors (e.g., agriculture vs. industry). Time-series forecasting models have demonstrated potential for enhancing operational efficiency in Kenyan manufacturing environments, but further research is needed to validate sector-specific applicability and model robustness. Manufacturers should consider validating their time-series forecasting models through cross-validation techniques and incorporating feedback loops into the model development process. Policy makers could support this by promoting model validation practices among manufacturers. The empirical specification follows  $Y = \beta_{0+\beta} p X + \text{varepsilon}$ , and inference is reported with uncertainty-aware statistical criteria.

**Keywords:** Kenya, Manufacturing, Efficiency, Time-Series, Forecasting, Econometrics, Sustainability

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