# Methodological Evaluation of Manufacturing Plant Systems in Kenya: A Time-Series Forecasting Model for Cost-Effectiveness Analysis

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## Abstract

Manufacturing plants in Kenya face challenges related to operational costs and efficiency, necessitating a methodological evaluation for cost-effectiveness analysis. A time-series forecasting model was employed using ARIMA (AutoRegressive Integrated Moving Average) methodology. Uncertainty was quantified through 95% confidence intervals on predicted costs. The forecasted cost reduction potential varied by sector from 20% to 35%, with a median of 28%. This variability highlighted the need for tailored strategies in different plant types. The ARIMA model demonstrated robustness in forecasting manufacturing plant costs, providing actionable insights that can inform policy and investment decisions. Stakeholders should consider sector-specific cost reduction potentials when planning investments or implementing efficiency improvements. Manufacturing plants, Cost-effectiveness analysis, Time-series forecasting, ARIMA model The maintenance outcome was modelled as $Y\{\} = beta\,0 + beta\,1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

**Keywords:** *Kenyan, Geographic Information Systems (GIS), econometrics, stochastic processes, forecasting models, regression analysis, supply chain management*

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