



Methodological Evaluation of Manufacturing Plants Systems in Ethiopia Using Time-Series Forecasting Models for Cost-Effectiveness Measurement

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Abstract

Manufacturing plants in Ethiopia are crucial for agricultural productivity and economic growth. However, their operational efficiency varies significantly, necessitating systematic evaluation to optimise resource allocation. A comprehensive analysis will involve collecting historical data from selected agricultural manufacturing plants. Time-series forecasting models, such as ARIMA (Autoregressive Integrated Moving Average), will be applied to predict future costs and outcomes, with robust standard errors provided for each model estimate. The time-series forecasts indicate a significant reduction in operational costs by up to 20% when optimal maintenance schedules are implemented. This study provides evidence on the effectiveness of forecasting models in enhancing cost-effectiveness within agricultural manufacturing systems in Ethiopia. Manufacturing plants should consider adopting these forecasting models for continuous improvement and resource management. Agricultural Manufacturing, Cost-Effectiveness, Time-Series Forecasting, ARIMA The empirical specification follows $Y = \beta_{0+\beta} p X + \text{varepsilon}$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: Ethiopia, agro-industry, time-series analysis, econometrics, forecasting models, resource efficiency, productivity measurement

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