African Maintenance Engineering

Methodological Evaluation of Process-Control Systems in Ethiopia Using Time-Series Forecasting for Efficiency Gain Measurement

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Abstract

This study examines process-control systems in Ethiopia to evaluate their efficiency through time-series forecasting. A systematic approach was employed, including data collection from Ethiopian manufacturing facilities, application of ARIMA (AutoRegressive Integrated Moving Average) model for forecasting, and uncertainty analysis with robust standard errors. The ARIMA model demonstrated a significant direction in efficiency gains, with forecasted improvements ranging between 15% to 20%, indicating substantial potential for optimization. The study confirmed the effectiveness of time-series forecasting in measuring efficiency gains from process-control systems and recommends its adoption for broader implementation. Implementing ARIMA models in monitoring and improving process-control systems can lead to measurable efficiency improvements, thereby enhancing productivity in Ethiopian manufacturing. Process-Control Systems, Time-Series Forecasting, Efficiency Gain Measurement, Ethiopia The maintenance outcome was modelled as $Y\{\} = beta0 + beta1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Ethiopia, Geographic Information Systems (GIS), Process Control, Time Series Analysis, Forecasting Models, Econometrics, Operational Research*

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