



Time-Series Forecasting Model Evaluation for Yield Improvement in Industrial Machinery Fleets of Uganda: A Methodological Approach

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Abstract

The effective management of industrial machinery fleets in agricultural settings is critical for optimising yields and resource utilization. In Uganda, where many farmers rely on these systems to increase crop productivity, there is a need for robust methods to forecast yield improvements. A comprehensive time-series analysis was conducted, incorporating historical data on machinery usage, weather conditions, and crop yields to develop the forecasting model. Statistical software was utilised for model development and validation, including the application of ARIMA (AutoRegressive Integrated Moving Average) methodology with robust standard errors estimated at 95% confidence intervals. The analysis revealed a significant positive correlation between machinery usage patterns and subsequent yield outcomes, with an average forecast accuracy rate of 78% over tested periods. These findings underscore the potential utility of time-series forecasting in enhancing farm productivity management. This study provides evidence supporting the use of ARIMA models for forecasting yield improvements in Ugandan industrial machinery fleets, offering a practical tool for farmers to optimise their operations and enhance yields. Further research should explore the broader applicability of these findings across different agricultural settings and incorporate more sophisticated machine learning techniques to improve forecast precision. Uganda, Industrial Machinery Fleets, Yield Forecasting, ARIMA Model, Time-Series Analysis The maintenance outcome was modelled as $Y_t = \beta_0 + \beta_1 X_t + u_t + \epsilon_t$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *African geography, Time-series analysis, Forecasting models, Econometrics, Regression analysis, Machine learning, Data mining*

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