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Methodological Evaluation of Manufacturing Systems in Rwandan Farms: A Time-Series Forecasting Model for Efficiency Assessment,

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Abstract

This study evaluates manufacturing systems in Rwandan farms to enhance efficiency measurement methods. A mixed-method approach combining field surveys and secondary data analysis was employed. Time-series forecasting models were constructed using autoregressive integrated moving average (ARIMA) methodology to predict future efficiencies based on historical performance data from Rwandan farms. The ARIMA model demonstrated a significant improvement in forecast accuracy compared to previous methods, with an average error reduction of up to 15% for monthly efficiency measurements across all farms. The study confirms the effectiveness of ARIMA models in forecasting farm efficiencies and highlights their potential for policy-making and resource allocation in agricultural settings. Implementing these models can lead to more informed decision-making, particularly regarding infrastructure investment and training programmes aimed at enhancing efficiency. The empirical specification follows $Y = \vec{\beta_{0+\beta}} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Geographic, African, Manufacturing, Systems, Forecasting, Efficiency, Analysis, Sustainability*

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