Methodological Evaluation and Time-Series Forecasting for Yield Improvement in Nigerian Industrial Machinery Fleets

Amina Suleiman-Jallo[1]|**Oluwaseun Adebayo**[2]|**Chinweike Okonkwo**[3,4]

Department of Sustainable Systems, Agricultural Research Council of Nigeria (ARCN) • *Department of Sustainable Systems, Obafemi Awolowo University, Ile-Ife* • *American University of Nigeria (AUN)* • *Department of Mechanical Engineering, Obafemi Awolowo University, Ile-Ife*

Correspondence: asuleimanjallo@yahoo.com

ABSTRACT

Background: The operational efficiency of industrial machinery fleets is a critical determinant of productivity in developing economies. In Nigeria, systemic underperformance and a lack of predictive maintenance frameworks lead to significant yield losses and capital expenditure waste. Current evaluations are often reactive, lacking robust, data-driven methodologies for forecasting and improvement.

Purpose and objectives: This paper aims to develop and evaluate a methodological framework for the systematic assessment of machinery fleets. Its core objective is to construct a time-series forecasting model to predict yield performance and quantify potential improvements from targeted interventions.

Keywords: *Industrial machinery, time-series forecasting, yield improvement, Nigerian manufacturing, predictive maintenance, fleet management, developing economies*

Article Highlights

- Hybrid ARIMAX model explains 78% of variance in machinery yield metrics.
- Forecasts 22% yield improvement via optimised preventive maintenance scheduling.
- Vibration analysis data proved a statistically significant exogenous variable.
- Provides a methodological shift from reactive to predictive fleet management.

Methodological Contribution

Develops a hybrid ARIMAX framework integrating operational and maintenance factors for time-series forecasting of industrial machinery yield in a developing economy context.

This study presents a data-driven framework for predictive maintenance in Nigerian manufacturing.

📄 ABSTRACT-ONLY PUBLICATION

This is an abstract-only publication. The complete research paper with full methodology, results, discussion, and references is available upon request.

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