

Methodological Evaluation and Panel-Data Estimation for Yield Improvement in Tanzanian Industrial Machinery Fleets

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ABSTRACT

Background: Industrial machinery fleets are critical for national infrastructure development, yet systematic methodologies for evaluating their operational yield in developing economies are scarce. Existing approaches often lack the longitudinal rigour needed to isolate technical efficiency gains from other factors.

Purpose and objectives: This study aims to develop and apply a robust panel-data econometric framework to measure and explain yield improvement within industrial machinery fleets. The objective is to identify key technical and operational determinants of efficiency gains.

Keywords: *Industrial machinery fleets, yield improvement, panel-data estimation, Sub-Saharan Africa, operational efficiency, developing economies, maintenance management*

Article Highlights

- Panel-data framework isolates technical efficiency from other operational factors.
- Predictive maintenance shows significant yield gains versus blanket training programmes.
- Fixed-effects model accounts for substantial unobserved machine heterogeneity.
- Standardised digital records are critical for longitudinal sector analysis.

Core Methodology

Unbalanced panel dataset analysed via fixed-effects estimation: $Y_{it} = \alpha_i + \beta_1 X_{1,it} + \beta_2 X_{2,it} + \varepsilon_{it}$, with cluster-robust inference.

This study provides an econometric framework for evaluating technical efficiency in industrial machinery.



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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