

Methodological Evaluation and Panel-Data Estimation of Efficiency Gains in Uganda's Industrial Machinery Fleets

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ABSTRACT

Background: The operational efficiency of industrial machinery fleets is a critical determinant of productivity and economic growth in developing economies. In Uganda, a lack of systematic, data-driven methodologies for assessing and benchmarking fleet performance hinders targeted interventions and capital investment planning.

Purpose and objectives: This study aims to develop and apply a robust panel-data econometric framework to quantify efficiency gains within Uganda's industrial machinery sector. The primary objective is to isolate the measurable impact of systematic maintenance regimes and operator training programmes on fleet availability and fuel economy.

Keywords: *panel-data estimation, industrial machinery fleets, operational efficiency, Sub-Saharan Africa, developing economies, stochastic frontier analysis, productivity measurement*

Article Highlights

- Panel-data analysis of 127 heavy machinery units across multiple Ugandan industrial sites.
- Structured maintenance shows a significant, positive effect on operational availability.
- Operator training impact varies considerably across different equipment types.
- Provides an evidence-based framework for data-centric fleet management.

Methodological Framework

A two-stage approach combining a survey of management practices with a fixed-effects panel model using cluster-robust standard errors.

This study offers a replicable model for quantifying efficiency drivers in industrial asset management.

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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