

Methodological Evaluation and Panel-Data Estimation of Cost-Effectiveness in Kenya's Industrial Machinery Fleets (2000–2026)

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ABSTRACT

Background: The cost-effectiveness of industrial machinery fleets is a critical determinant of productivity and competitiveness in developing economies. In Kenya, a lack of longitudinal, fleet-level data and robust analytical frameworks has hindered evidence-based asset management and policy formulation.

Purpose and objectives: This study aims to methodologically evaluate the determinants of cost-effectiveness within Kenya's industrial machinery fleets and to develop a panel-data estimation model for quantifying these relationships over time.

Keywords: *Cost-effectiveness, Panel-data estimation, Industrial machinery fleets, Sub-Saharan Africa, Econometric modelling, Kenya, Fleet management*

Article Highlights

- Unbalanced panel dataset constructed from 127 industrial machinery fleets in Kenya.
- Two-way fixed effects model quantifies determinants of cost-effectiveness over time.
- Identifies a pronounced negative inflection point at seven years of service.
- Recommends panel-data analytics for strategic lifecycle costing and maintenance.

Methodological Contribution

First application of a longitudinal panel-data model to fleet cost-effectiveness in Sub-Saharan Africa, using a novel composite metric of availability and cost per operational hour.

This study provides empirical evidence to inform fleet renewal cycles and maintenance policy in Kenya's industrial sector.

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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