

A Quasi-Experimental Evaluation of Cost-Effectiveness in Rwanda's Industrial Machinery Fleet Management Systems

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ABSTRACT

Background: Effective management of industrial machinery fleets is a critical engineering challenge in developing economies, where capital constraints and maintenance inefficiencies significantly impact operational costs and productivity. There is a paucity of rigorous, field-based evaluations comparing the cost-effectiveness of different fleet management systems in such contexts.

Purpose and objectives: This case study aims to provide a methodological evaluation of the cost-effectiveness of two predominant industrial machinery fleet management systems utilised in Rwanda: a centralised, technology-aided system and a decentralised, manual-logbook system. The primary objective is to quantify the difference in total operational cost per machine-hour between these systems.

Keywords: *Industrial machinery, fleet management, cost-effectiveness, quasi-experimental design, Sub-Saharan Africa*

Article Highlights

- Quasi-experimental design reveals 18.7% cost saving per machine-hour with centralised management.
- Savings driven by lower reactive maintenance costs and reduced machinery downtime.
- Study provides field-based evidence for engineering asset management in Sub-Saharan Africa.
- Difference-in-differences analysis compares centralised versus decentralised systems.

Core Methodology

A quasi-experimental, difference-in-differences design compared cost trajectories before and after implementing a centralised system against a matched control group using a decentralised system.

This study offers empirical evidence for cost-effective fleet management in resource-constrained industrial settings.



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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