

# A Quasi-Experimental Evaluation of Machinery Fleet Diagnostics and Yield Optimisation in Rwandan Industry

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## ABSTRACT

**Background:** The operational efficiency of industrial machinery fleets in developing economies is often constrained by reactive maintenance and suboptimal process control, leading to significant yield losses. There is a paucity of structured, evidence-based evaluations of diagnostic interventions within these contexts, particularly in Sub-Saharan Africa.

**Purpose and objectives:** This case study aims to methodologically evaluate the impact of a systematic diagnostic and optimisation programme on industrial yield. The primary objective is to quantify yield improvement using a quasi-experimental design, isolating the effect of the intervention from other operational variables.

**Keywords:** *quasi-experimental design, predictive maintenance, yield optimisation, Sub-Saharan Africa, industrial machinery, process control, fleet diagnostics*

### Article Highlights

- A difference-in-differences design isolates the causal effect of a diagnostic intervention on industrial yield.
- Implementation of real-time machinery health monitoring resulted in a statistically significant mean yield increase of 7.3%.
- Greatest efficiency gains were identified at the drying and sorting stages through pre-emptive process adjustments.
- The study provides evidence for scalable data-driven maintenance strategies in developing industrial contexts.

### Methodological Note

The analysis employs a fixed-effects panel model with robust standard errors clustered at the factory level to estimate the core impact of the diagnostic intervention.

*This case study offers causal evidence for operational improvements through systematic fleet diagnostics.*

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