

A Quasi-Experimental Evaluation of Manufacturing Systems Efficiency in the Ethiopian Industrial Sector

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ABSTRACT

Background: The Ethiopian industrial sector faces persistent challenges in productivity and global competitiveness. While manufacturing systems engineering principles are promoted for efficiency gains, rigorous empirical evidence of their impact within the local operational context is scarce.

Purpose and objectives: This study aimed to quantify the causal effect of implementing integrated lean-production systems on operational efficiency within manufacturing plants. The primary objective was to measure gains in Overall Equipment Effectiveness (OEE) following a structured intervention.

Keywords: *Manufacturing systems engineering, Quasi-experimental design, Industrial efficiency, Sub-Saharan Africa, Lean manufacturing, Productivity measurement, Ethiopian manufacturing*

Article Highlights

- Difference-in-differences design isolates causal impact of systems engineering.
- 14.7 percentage point OEE gain attributed to the standardised intervention.
- Performance rate improvements, not availability or quality, drove efficiency gains.
- Provides robust evidence for lean manufacturing in Sub-Saharan African context.

Methodological Note

The study employs a quasi-experimental design comparing 12 treatment and 12 control plants, using cluster-robust inference to estimate causal effects.

This study moves beyond correlation to provide causal evidence for manufacturing systems engineering.

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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