

Randomised Field Trial of Process-Control System Diagnostics for Yield Optimisation in Tanzanian Manufacturing

Aisha Juma^{1,2} | Baraka Mwinyi^{3,4}

¹ Department of Civil Engineering, Muhimbili University of Health and Allied Sciences (MUHAS), Dar es Salaam

² Department of Electrical Engineering, State University of Zanzibar (SUZA)

³ Muhimbili University of Health and Allied Sciences (MUHAS), Dar es Salaam

⁴ Department of Civil Engineering, State University of Zanzibar (SUZA)

Correspondence: ajuma@yahoo.com

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ABSTRACT

Background: Manufacturing in developing economies faces persistent challenges in production efficiency and resource utilisation. Process-control diagnostics, while established in industrialised nations, lack rigorous field evidence of their impact on yield within the specific infrastructural and operational contexts of sub-Saharan Africa.

Purpose and objectives: This study aimed to conduct a methodologically robust evaluation of a structured process-control system diagnostic intervention. The primary objective was to quantify its causal effect on production yield within a randomised field trial setting in a Tanzanian manufacturing sector.

Keywords: *randomised controlled trial, process-control diagnostics, yield optimisation, Sub-Saharan Africa, manufacturing systems, industrial engineering, resource efficiency*

Article Highlights

- Randomised controlled trial shows 7.3pp yield increase from diagnostic intervention.
- Identifies calibration and maintenance bottlenecks as primary improvement mechanisms.
- Provides causal evidence for engineering diagnostics in Sub-Saharan African contexts.
- Recommends integrating structured protocols into routine operational management.

Methodological Note

Impact estimated via linear mixed-effects model with site-level random effects and clustered standard errors, isolating the causal effect of the diagnostic intervention.

This study offers robust field evidence for engineering-led process optimisation in developing industrial contexts.

ABSTRACT-ONLY PUBLICATION

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