



Methodological Evaluation of Manufacturing Systems Efficiency in Tanzanian Plants: A Randomized Field Trial,

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Abstract

Manufacturing systems in Tanzanian plants are often inefficient due to various operational challenges. A mixed-method approach was employed, including process mapping, statistical analysis of production data, and interviews with managers. Randomization ensured unbiased comparison across different plants. Manufacturing processes in Tanzanian plants showed an average improvement of 15% in efficiency compared to baseline conditions, with significant reductions in waste and energy consumption observed. The randomized field trial demonstrated the effectiveness of the applied methodologies in enhancing manufacturing plant performance. Further studies should focus on implementing continuous improvement practices and expanding the evaluation across a wider range of industries. Manufacturing efficiency, Tanzanian plants, Randomized field trial, Performance optimization The empirical specification follows $Y = \beta_{0+\beta} p X + \text{varepsilon}$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Tanzania, Manufacturing Systems, Efficiency Analysis, Methodology, Lean Production, Quality Management, Statistical Process Control*

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