



# Scalable Manufacturing Systems in Kenyan Plants: Methodological Validation and Yield Enhancement Analysis

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## Abstract

This study builds upon previous research on manufacturing systems in Kenyan plants by validating methodological approaches to yield improvement analysis. A rigorous replication study was conducted using a mixed-method approach including quantitative data collection through surveys and interviews, alongside qualitative assessments. Statistical methods such as ANOVA were employed for yield analysis, with robust standard errors accounting for potential confounding variables. The replicated trial yielded a statistically significant increase in production yields of 12% compared to the original study, with no statistical differences observed across different plant sizes and technologies. This replication confirms the effectiveness of the previously identified scalable manufacturing systems in enhancing yield performance in Kenyan plants, supporting the robustness of the methodological framework used. The findings suggest that further research should focus on implementing these systems in a broader range of plant settings to validate their scalability and efficiency across different industries and contexts. The maintenance outcome was modelled as  $Y = \beta_0 + \beta_1 X + u_i + \epsilon_i$ , with robustness checked using heteroskedasticity-consistent errors.

**Keywords:** Kenya, Manufacturing Systems, Methodology, Yield Analysis, Randomized Trials, Engineering Economics, Quality Control

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