



Methodological Evaluation of Manufacturing Plant Systems in South Africa: A Randomized Field Trial for Cost-Effectiveness Analysis

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Abstract

Manufacturing plants in South Africa face significant operational inefficiencies that impact productivity and cost-effectiveness. A randomized field trial was conducted among ten randomly selected manufacturing plants in South Africa. The study employed statistical modelling techniques to assess system performance and costs. The implementation of targeted process optimization measures led to an average reduction in operational costs of 15,000 per month across the sample. *The randomized field trial demonstrated that specific interventions can significantly reduce costs.*

$$Y_{it} = \beta_0 + \beta_1 X_{it} + u_i + \varepsilon_{it}$$

with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Sub-Saharan, econometrics, randomized controlled trials, productivity measurement, resource allocation, stochastic modelling, performance indicators*

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