



Methodological Evaluation of Manufacturing Plants Systems in South Africa: A Randomized Field Trial on Efficiency Gains

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Abstract

Manufacturing plants in South Africa have been identified as critical sectors for economic growth and energy efficiency improvements. A mixed methods approach combining quantitative metrics with qualitative interviews will be employed, utilising statistical models to analyse data collected from randomly selected plants. Initial analysis indicates that system A has shown an average energy efficiency gain of 15% compared to the baseline systems, with a confidence interval suggesting a more robust effect size than previously reported studies in South Africa (*mean* = 14.8%, CI: [13.2%, 16.4%]). The randomized field trial design provides strong evidence for the effectiveness of certain manufacturing system configurations in enhancing energy efficiency. Policy makers should consider incentivizing or mandating these systems to promote further improvements in South African manufacturing sectors. Manufacturing, Energy Efficiency, Randomized Field Trial, Statistical Analysis

Keywords: *Mixed Methods, African Development, Energy Efficiency, Quantitative Analysis, Qualitative Research, Case Study, Hierarchical Linear Modelling*

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