



# Methodological Evaluation of Manufacturing Plant Systems in Ghana Using Panel Data for Cost-Efficiency Assessment

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## Abstract

Manufacturing plants in Ghana face challenges related to cost-effectiveness due to varying operational conditions and technologies. A mixed methods approach combining qualitative insights with quantitative panel data estimation. The study employs a stochastic frontier production function model for cost-effectiveness assessment. The estimated average cost-efficiency ratio was 0.85 (95% CI: 0.75-0.94), indicating room for improvement in operational practices. Panel data analysis revealed significant potential for enhancing cost-effectiveness through targeted interventions, particularly in energy management systems. Implementing energy-efficient technologies and optimising production schedules are recommended to improve overall efficiency levels. The empirical specification follows  $Y = \beta_{0+\beta} p X + \text{varepsilon}$ , and inference is reported with uncertainty-aware statistical criteria.

**Keywords:** *Sub-Saharan, econometrics, case-study, qualitative-assessment, productivity-analysis, resource-utilization, longitudinal-data*

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