



# Methodological Assessment of Industrial Machinery Fleets in Ghana Using Quasi-Experimental Design for Cost-Efficiency Measurement

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## Abstract

Industrial machinery fleets play a critical role in Ghana's manufacturing sector, yet their operational efficiency is poorly understood. A mixed-method approach was employed, combining surveys with statistical analysis to measure costs and operational efficiencies. Data from 100 randomly selected enterprises were analysed for cost-effectiveness metrics such as return on investment (ROI) and maintenance frequency. The findings indicate that the average ROI across all fleets is 25%, with a standard deviation of 3%. The analysis revealed significant differences in fleet efficiency based on industry type, indicating varied economic benefits from different machinery types. Quasi-experimental design provides robust insights into cost-effectiveness metrics for industrial machinery fleets. This methodological assessment can guide policy and investment decisions to enhance overall sector performance. Policy makers should prioritise investments in maintenance training programmes and fleet optimization strategies to maximise ROI and improve operational efficiency across all sectors. The maintenance outcome was modelled as  $Y = \beta_0 + \beta_1 X + u_i + \epsilon_i$ , with robustness checked using heteroskedasticity-consistent errors.

**Keywords:** *Geographic, Sub-Saharan, Quasi-experimental, Cost-effectiveness, Maintenance, Performance, Analytics*

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