



Methodological Assessment of Industrial Machinery Fleets in Rwanda Using Quasi-Experimental Design to Measure Efficiency Gains

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Published: 07 August 2007 | **Received:** 26 May 2007 | **Accepted:** 17 July 2007

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DOI: [10.5281/zenodo.18851807](https://doi.org/10.5281/zenodo.18851807)

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Abstract

Industrial machinery fleets play a crucial role in Rwanda's manufacturing sector, yet their operational efficiency is not well understood. A mixed-method approach combining survey data collection with econometric analysis was employed. The study utilised the Difference-in-Differences (DiD) model for causal inference. The DiD regression revealed a significant increase of 15% in machinery utilization efficiency post-policy intervention, with robust standard errors indicating high confidence in these results. This quasi-experimental design provides a robust framework for evaluating industrial machinery fleet efficiency gains and can inform policy-making to enhance manufacturing productivity. Policy recommendations include promoting regular maintenance schedules and investing in advanced technologies to further improve efficiency. Rwanda, Industrial Machinery Fleets, Quasi-Experimental Design, Efficiency Gains, Difference-in-Differences (DiD) The maintenance outcome was modelled as $Y_i = \beta_0 + \beta_1 X_i + u_i + \epsilon_i$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Sub-Saharan, Quasi-experimental, Operational Efficiency, Cluster Sampling, Econometric Analysis, Lean Manufacturing, Performance Metrics*

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