



Methodological Evaluation of Industrial Machinery Fleets in Ethiopia: Quasi-Experimental Design for Efficiency Gains

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Abstract

Industrial machinery fleets in Ethiopia face challenges related to efficiency, maintenance, and cost management. A quasi-experimental design was employed with a pre-post intervention analysis using mixed methods including surveys, machine performance data, and expert assessments to measure the impact of new maintenance protocols on fleet efficiency. The analysis revealed that implementing optimised maintenance schedules led to an average improvement in machinery uptime by 15% compared to baseline conditions. The quasi-experimental design successfully demonstrated the potential for enhancing industrial machinery efficiency and cost-effectiveness through strategic intervention measures. Future studies should consider integrating predictive analytics into maintenance strategies to further optimise fleet performance. 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: *African, econometrics, experimental design, productivity, regression, sampling, sustainability*

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