Methodological Evaluation of Industrial Machinery Fleet Systems in South Africa: Randomized Field Trial for Efficiency Gains

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Abstract

Industrial machinery fleets play a crucial role in South Africa's manufacturing sector, yet their operational efficiency is often suboptimal. A randomized controlled trial was conducted with a sample size of 50 machinery fleets across various industries. The trial measured operational metrics including fuel consumption, maintenance costs, and productivity outputs over a six-month period using statistical modelling techniques. The analysis revealed that implementing targeted maintenance schedules led to an average reduction in fuel consumption by 12%, with a confidence interval of ±3% (95%). Randomized field trials have proven effective for evaluating the efficiency of industrial machinery fleets. The findings suggest significant potential for operational improvements. Based on this study, targeted maintenance programmes should be integrated into fleet management strategies to maximise operational efficiencies in South African industries. Industrial Machinery Fleet Systems, Randomized Field Trial, Efficiency Gains, Statistical Modelling The maintenance outcome was modelled as $Y\{\} = beta0 + beta1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords:

Geographic

Terms:

South

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Terms:

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Operational

Efficiency

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