



Methodological Evaluation of Industrial Machinery Fleets in South Africa: A Randomized Field Trial for Risk Reduction Analysis

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Abstract

The management of industrial machinery fleets in South Africa is crucial for ensuring operational efficiency and safety in construction projects. A randomized field trial was conducted across two major construction sites in South Africa. The study used statistical analysis to assess the effectiveness of different fleet management systems. The analysis revealed that implementing predictive maintenance schedules significantly reduced machinery failure rates by 30% compared to traditional inspection-based approaches, with a confidence interval of $\pm 5\%$. Randomized field trials are effective tools for evaluating and improving industrial machinery fleet management in South Africa. The findings suggest significant potential for reducing operational risks through proactive strategies. Construction companies should consider adopting predictive maintenance schedules to enhance their machinery fleets' reliability and safety. Industrial Machinery Fleets, Risk Reduction, Predictive Maintenance, Construction Management The maintenance outcome was modelled as $Y = \beta_0 + \beta_1 X + u + \epsilon$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Sub-Saharan, African, GIS, statistical, machine-learning, experimental, econometrics*

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