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Reliability Assessment of Industrial Machinery Fleets in South Africa through Randomized Field Trial

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Abstract

Industrial machinery fleets are crucial for maintaining operational efficiency in South Africa's manufacturing sector. However, their reliability remains a significant challenge, leading to frequent breakdowns and maintenance costs. A randomized field trial was conducted to evaluate the reliability of industrial machinery fleets. The sample size included 150 machines across various industries, randomly selected for testing under controlled conditions. Data were collected using a custom-designed software tool that recorded operational data throughout the trials. The findings indicate an average system availability rate of 92% with a standard deviation of 3%, suggesting a reliable fleet performance but room for improvement in specific machinery types. This study provides insights into the reliability of industrial machinery fleets, highlighting areas that require further investigation and potential improvements. Based on the findings, recommendations include targeted maintenance schedules and predictive analytics to enhance overall system reliability. Industrial Machinery Reliability Assessment Randomized Field Trial South Africa The maintenance outcome was modelled as $Y\{\} = beta\,0 + beta\,1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Sub-Saharan, reliability assessment, randomized trials, asset management, maintenance strategies, predictive analytics, stochastic modelling*

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