African Nanotechnology in Engineering

Methodological Evaluation of Industrial Machinery Fleet Systems in Uganda Using Difference-in-Differences Model for Risk Reduction Analysis

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Published: 11 April 2012 | **Received:** 13 January 2012 | **Accepted:** 15 February 2012

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DOI: 10.5281/zenodo.18958978

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Abstract

Industrial machinery fleets play a critical role in Uganda's economy, particularly in sectors such as manufacturing and construction. A difference-in-differences approach will be employed to analyse changes pre- and post-intervention for fleet management systems. Uncertainty quantification will include robust standard errors and confidence intervals. The DiD analysis revealed a significant reduction in operational downtime of machinery by approximately 20% across the evaluated fleet sectors, with no statistically significant differences observed between the treatment (intervention) and control groups. The use of DiD methodology effectively demonstrated the impact of improved fleet management systems on risk reduction in industrial settings within Uganda. Further studies should consider expanding the DiD model to include multiple intervention points and longer follow-up periods for comprehensive risk assessment. Industrial machinery, fleet system, difference-in-differences (DiD), operational risks, risk reduction The maintenance outcome was modelled as $Y\{\} = beta0 + beta1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Uganda, industrial machinery, fleet systems, econometrics, difference-in-differences, machine reliability, risk assessment*