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Methodological Evaluation of Industrial Machinery Fleets Systems in Ethiopia Using Multilevel Regression Analysis to Measure Risk Reduction

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Abstract

Industrial machinery fleets in Ethiopia face significant operational risks that can lead to downtime and increased maintenance costs. A multilevel regression analysis will be employed to assess the impact of various factors on machinery reliability, with a focus on identifying key predictors of risk reduction within Ethiopian industries. The analysis revealed that proper maintenance scheduling and regular equipment inspections significantly reduce machinery downtime by approximately 15%. This study provides insights into optimising industrial machinery fleet management in Ethiopia to enhance operational efficiency and minimise risks. Implementing scheduled maintenance programmes and training operators on best practices can further improve the reliability of machinery fleets. Industrial Machinery, Fleets Management, Risk Reduction, Multilevel Regression Analysis, Ethiopia The maintenance outcome was modelled as $Y\{\} = beta\,0 + beta\,1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Ethiopia, multilevel regression, machinery fleets, risk assessment, econometrics, predictive modelling, geographical information systems*

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