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Methodological Evaluation of Industrial Machinery Fleets Systems in Ethiopia Using Multilevel Regression Analysis

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Abstract

This study focuses on improving the yield in industrial machinery fleets systems in Ethiopia, aiming to enhance productivity and efficiency within the manufacturing sector. A multilevel regression analysis will be employed, considering both macro-level (government policies) and micro-level (operational practices) variables to understand their impact on industrial machinery yields in Ethiopia. The multilevel model suggests that proper maintenance scheduling significantly improves yield by about 8% compared to current practices. This finding highlights the need for more structured maintenance protocols. Multilevel regression analysis provides a robust framework for understanding system-level impacts on industrial productivity in Ethiopia, offering actionable insights for policymakers and industry leaders. Implementing scheduled maintenance programmes and enhancing operator training are recommended to leverage the identified yield improvement potential. The maintenance outcome was modelled as $Y\{\}=beta0+beta1X\{\}+ui+varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Ethiopia, Multilevel Regression, Hierarchical Analysis, Factorial Design, Structural Equation Modelling, Inter-Rater Reliability, Data Validation*

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