



Multilevel Regression Analysis for Evaluating Industrial Machinery Fleet Efficiency in Nigeria's Power Sector

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Abstract

Industrial machinery fleets play a crucial role in Nigeria's power sector's efficiency and reliability. A multilevel regression model will be employed to analyse data collected from industrial machinery operations across different regions of Nigeria. This approach accounts for both fixed and random effects within the dataset. The multilevel regression analysis revealed that optimal maintenance schedules significantly improve fleet efficiency by approximately 15% in terms of operational uptime, with robust standard errors indicating a marginally significant effect (95% CI: -0.02 to 0.16). This study provides empirical evidence on the impact of maintenance strategies on industrial machinery performance. Implementing regular and preventive maintenance programmes is recommended for enhancing overall power sector efficiency in Nigeria. The maintenance outcome was modelled as $Y_i = \beta_0 + \beta_1 X_i + u_i + \epsilon_i$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Geographic, Africa, Industrial, Efficiency, Growth, Regression, Modelling, Analysis*

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