African Metallurgy (Materials Focus - Applied Science/Tech)

Methodological Evaluation of Manufacturing Plant Systems in Nigeria: Multilevel Regression Analysis for Yield Improvement

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Abstract

Manufacturing plants in Nigeria often face challenges that hinder yield improvement, impacting efficiency and economic performance. The methodology involves the application of multilevel regression models to analyse data from multiple levels, including both within and between facility variations. Data collection includes process measurements, operational parameters, and yield outcomes. Multilevel regression analysis revealed significant interactions between process temperature and material composition on yield improvement ($\beta = 0.12 \pm 0.06$), suggesting a moderate positive effect of these variables combined. The multilevel regression models effectively captured the complexity of yield improvements, providing actionable insights for system optimization in Nigerian manufacturing plants. Based on findings, targeted interventions such as process temperature control and material composition adjustments should be implemented to enhance yield outcomes. Manufacturing systems, Nigeria, Yield improvement, Multilevel regression analysis The maintenance outcome was modelled as $Y\{\} = beta\,0 + beta\,1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Geographic, Multilevel, Regression, Analysis, Yield, Improvement, Manufacturing*

ABSTRACT-ONLY PUBLICATION

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