



Methodological Evaluation of Manufacturing Systems Yield Improvement in Nigerian Plants Using Multilevel Regression Analysis

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Published: 19 July 2010 | **Received:** 18 March 2010 | **Accepted:** 31 May 2010

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DOI: [10.5281/zenodo.18905688](https://doi.org/10.5281/zenodo.18905688)

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Abstract

This study addresses a current research gap in Energy concerning Methodological evaluation of manufacturing plants systems in Nigeria: multilevel regression analysis for measuring yield improvement in Nigeria. The objective is to formulate a rigorous model, state verifiable assumptions, and derive results with direct analytical or practical implications. A structured analytical approach was used, integrating formal modelling with domain evidence. The results establish bounded error under perturbation, a convergent estimation process under stated assumptions, and a stable link between the proposed metric and observed outcomes. The findings provide a reproducible analytical basis for subsequent theoretical and applied extensions. Stakeholders should prioritise inclusive, locally grounded strategies and improve data transparency. Methodological evaluation of manufacturing plants systems in Nigeria: multilevel regression analysis for measuring yield improvement, Nigeria, Africa, Energy, comparative study This work contributes a formal specification, transparent assumptions, and mathematically interpretable claims. The empirical specification follows $Y = \beta_{0+\beta}^{\rightarrow} p X + \text{varepsilon}$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: Nigerian, multilevel, regression, productivity, performance, supply, logistics

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