



Methodological Foundations for Evaluating Manufacturing Yield Improvement in Ugandan Plants: A Multilevel Regression Perspective

Okello Kigozi¹, Tito Sserunku², Ezimba Nkerebwa^{3,4}, Kizza Wambora⁵

¹ Department of Research, Kampala International University (KIU)

² Uganda National Council for Science and Technology (UNCST)

³ Gulu University

⁴ Department of Advanced Studies, Uganda National Council for Science and Technology (UNCST)

⁵ Department of Advanced Studies, Kampala International University (KIU)

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Correspondence: okigozi@outlook.com

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Author notes

Okello Kigozi is affiliated with Department of Research, Kampala International University (KIU) and focuses on Environmental Science research in Africa.

Tito Sserunku is affiliated with Uganda National Council for Science and Technology (UNCST) and focuses on Environmental Science research in Africa.

Ezimba Nkerebwa is affiliated with Gulu University and focuses on Environmental Science research in Africa.

Kizza Wambora is affiliated with Department of Advanced Studies, Kampala International University (KIU) and focuses on Environmental Science research in Africa.

Abstract

This study addresses a current research gap in Environmental Science concerning Methodological evaluation of manufacturing plants systems in Uganda: multilevel regression analysis for measuring yield improvement in Uganda. 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 Uganda: multilevel regression analysis for measuring yield improvement, Uganda, Africa, Environmental Science, theoretical This work contributes a formal specification, transparent assumptions, and mathematically interpretable claims. The empirical specification follows $Y = \beta_{0+\beta}^{-1} p X + \text{varepsilon}$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Sub-Saharan, agglomeration economies, multilevel modelling, nested sampling, econometric methods, hierarchical analysis, regression diagnostics*

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