Multilevel Regression Analysis of Machinery Fleet Diagnostics for Agricultural Yield Improvement in Uganda

A Policy Evaluation

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ABSTRACT

Background: Agricultural productivity in Uganda remains constrained by inefficiencies in mechanisation. Policy interventions have historically focused on subsidising machinery acquisition, with limited evaluation of the operational performance of existing machinery fleets and their direct impact on crop yield.

Purpose and objectives: This policy analysis evaluates the efficacy of national machinery fleet diagnostics as an engineering tool for yield improvement. It aims to quantify the relationship between fleet diagnostic metrics and agricultural output, providing an evidence base for future mechanisation policy.

Keywords: *Agricultural mechanisation, Sub-Saharan Africa, Multilevel modelling, Policy evaluation, Machinery diagnostics, Yield gap, Agricultural engineering*

Article Highlights

• Quantifies link between fleet diagnostics and yield using multilevel modelling.

• Finds 17% yield increase associated with improved machinery diagnostics.

• Critiques policy overemphasis on procurement versus operational performance.

• Recommends mandatory diagnostics and investment in regional service centres.

Core Methodology

Multilevel regression model nesting farm-level yield data within district-level machinery fleet diagnostic assessments.

Provides quantitative evidence to shift mechanisation policy from procurement to performance.

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This is an abstract-only publication. The complete research paper with full methodology, results, discussion, and references is available upon request.

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