African Transportation Engineering

Methodological Evaluation of Process-Control Systems in Kenyan Agricultural Yield Improvement

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Abstract

This study investigates the application of process-control systems in improving agricultural yields in Kenya, focusing on methodologies for multilevel regression analysis. A multilevel regression analysis was employed, considering multiple levels of data including farm-level inputs, farmer characteristics, and environmental conditions. The study utilised a mixed-effects model to account for both fixed and random effects in the dataset, ensuring robust estimates across different scales. The analysis revealed that incorporating process-control systems at the field level significantly improved yields by an average of 15% compared to traditional farming methods (95% confidence interval: 13-17%). This study supports the adoption of advanced process-control systems for enhancing agricultural productivity in Kenya, particularly at the farm-level. Farmers and policy makers are encouraged to invest in and implement these systems as a means to achieve sustainable yield improvements and boost overall food security. Agricultural Yield Improvement, Process-Control Systems, Multilevel Regression Analysis, Field-Level Effectiveness The maintenance outcome was modelled as $Y\{\} = beta0 + beta1\,X\{\} + ui + varepsilon\{\}$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: *Kenya, Multilevel Regression Analysis, Process-Control Systems, Agricultural Yield Improvement, Quantitative Research Methodologies, Geographic Information Systems, Data Analytics*

ABSTRACT-ONLY PUBLICATION

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