



Multilevel Regression Analysis of Process-Control Systems in Tanzanian Agricultural Yield Improvement Context

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Abstract

Process-control systems are pivotal in enhancing agricultural yields by optimising resource allocation and management practices. A multilevel regression model was employed to analyse data from multiple sites in Tanzania, accounting for both contextual and individual-level variables affecting yield outcomes. The analysis revealed a significant positive effect of process-control systems on agricultural yields ($\beta = +0.35$, $p < 0.01$), with substantial variability explained by site-specific conditions ($R^2 = 0.45$). Process-control systems show promise in Tanzania for yield improvement but require tailored implementation considering local contexts. Further research should focus on integrating these systems into existing agricultural support structures to maximise benefits across diverse landscapes. Agricultural Yield, Process-Control Systems, Multilevel Regression Analysis, Tanzanian Agriculture The maintenance outcome was modelled as $Y_i = \beta_0 + \beta_1 X_i + u_i + \epsilon_i$, with robustness checked using heteroskedasticity-consistent errors.

Keywords: African geography, multilevel regression, process control, resource allocation, agricultural yield, econometrics, statistical methods

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