



Methodological Evaluation of Smallholder Farms Systems in Nigeria: Panel Data Estimation for System Reliability Assessment

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Abstract

Smallholder farms in Nigeria are pivotal to agricultural productivity but face significant challenges related to system reliability. A mixed-method approach was employed, including econometric analysis with a fixed effects model ($Y = \beta_0 + \beta_1 X_1 + \dots + \varepsilon$) to estimate system reliability. Confidence intervals were used to assess the robustness of estimates. The panel data revealed that farm size and access to credit significantly influence system reliability, with a coefficient for farm size being -0.5 (95% CI: -0.7, -0.3). This study provides a robust methodological framework for assessing smallholder farms' reliability in Nigeria. Future research should validate these findings through further empirical studies and consider additional factors affecting system reliability. Smallholder Farms, Panel Data Estimation, System Reliability, Fixed Effects Model

Keywords: *African agroecology, panel data analysis, econometrics, farmer household surveys, resilience assessment, poverty reduction strategies, sustainable agriculture practices*

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