African Food Chemistry (Food Science)

Methodological Evaluation of Smallholder Farms Systems in South Africa Using Difference-in-Differences Models for Risk Reduction Assessment

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Abstract

Smallholder farms in South Africa face significant operational risks that hinder their productivity and sustainability. A DiD model was applied to analyse the impact of specific interventions on reducing farm-level risks. The study utilised a pre-post design with control and treatment groups. The DiD analysis revealed a statistically significant reduction in crop failure rates by 25% among treated farms compared to controls, indicating effective risk mitigation strategies. DiD models are robust for measuring the efficacy of interventions aimed at reducing operational risks in smallholder farming systems. Future research should validate these findings across different geographic regions and contexts to enhance their generalizability. The empirical specification follows $Y = \beta_{0+\beta}^{\rightarrow} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *Sub-Saharan, Agricultural, Risk, Modelling, Policy, Economic, Sustainability*

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