Impact of sustainable agricultural practices on household welfare and labor demand: A case study in the Mekong Delta of Vietnam

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1. Introduction

Vietnam has achieved high productivity in rice production through rapid intensification over recent decades, but this has resulted in environmental degradation and adverse economic and health effects. To address these issues and ensure farmers' economic benefits, Sustainable Agricultural Practices (SAPs) have been promoted. However, the adoption rate of these practices remains low, and their impacts on household welfare are limited. This study aims to investigate the key factors influencing farmers' adoption of specific SAPs based on the criteria of the national program for rice production "1 Must Do, 5 Reductions" (Connor et al., 2021), and to provide empirical insights into its impact level on different outcomes. The study also extends previous studies that have focused only on economic outcomes by being the first attempt to estimate the impact of SAPs on labor allocation in rice production in Vietnam, by source of labor and labor gender.

2. Methodology and Data

Considering the self-selection bias may exist due to farmers' decision to adopt SAPs, the paper applies the multinomial endogenous treatment effect model to reduce bias from both observed and unobserved heterogeneity (Manda et al., 2016). The survey data collected from 152 rice farmers in the Mekong Delta, Vietnam in November 2022 through in-depth interviews based on a structured questionnaire was used to estimate the impacts of SAPs on rice production in Vietnam. The expected outcome equation is formulated as follows:

$$E(Y_i|d_i, z_i, l_i) = z_i'\beta_1 + \sum_{j=1}^{J}\gamma_j d_{ij} + \sum_{j=1}^{J}\lambda_j l_{ij}$$

Where Y_i denotes the outcome for the household i; z_i is exogenous covariates with parameter vectors β. The vector γ_j is the treatment effects relative to base category.

3. Results

The results showed that farmers' adoption decision is positively influenced by geographical location near the Mekong River, farmer's perception of higher prices for sustainable rice, and

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information from formal sources, but negatively correlated with income from non-farm activities. Farmers adopting a combination of all four SAPs achieve the greatest benefits with a higher yield of 13% compared to non-adopters. Conversely, adopting only one or two SAPs does not have a significant impact on rice yield and adopting a combination of three practices even significantly decreases yield by 11%. Regarding labor impact, adopting all four SAPs significantly contributed to a reduction in hired labor by 18% and male family labor by 8% while one or two practices adoption leads to an increase in both hired and family labor. Notably, the adoption of SAPs does not have impact on female family labor, suggesting that they are less engaged in rice farming.

Table – Effect of SAPs adoption on household welfare and labor demand.

Outcome / Practice No.	Ln Yield	Ln Profitability	Ln Hired labor	Ln Total family labor	Ln Male family labor	Ln Female family labor
Combination of any one	-0.008	-0.138	0.045***	0.725***	0.456***	0.158
or two practices	(0.006)	(0.297)	(-0.010)	(0.033)	(0.015)	(0.133)
Combination of any	-0.110***	0.142	-0.370***	0.468***	0.535***	0.058
three practices	(0.006)	(0.386)	(0.005)	(0.019)	(0.032)	(0.084)
Combination of all four	0.134***	0.521	-0.187***	-0.074	-0.082***	-0.031
practices	(0.006)	(0.587)	(0.009)	(0.048)	(0.022)	(0.110)

4. Conclusion

This study attempts to analyze the effects of multiple SAPs on the economic performance and labor allocation of rice farms, using the farm-level data collected from the Mekong Delta of Vietnam. The empirical results suggest the important role of access to formal information sources in promoting sustainable agriculture. It also indicates that an adoption of all four SAPs significantly improves rice yield, and reduces labor demand, while incomplete adoption leads to yield reduction and higher labor input. However, SAPs adoption may not guarantee higher profitability than traditional farmers. Notably, female family labor in the study site does not play important role in rice production, reflecting the traditional labor intra-allocation in Vietnam, where rice production is traditionally a male's job. These findings suggest several policy implications to improve production performance and household welfare.

References

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