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Adoption of climate-smart agricultural practices among smallholder farmers in northern Thailand: The role of socioeconomic and institutional factors

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Abstract

Climate change is increasingly threatening agricultural production, particularly for smallholder farmers who face limited adaptive capacity. While the impacts of climate variability on crop production are well documented, there remains limited evidence on the determinants of farmers' adaptation strategies in Northern Thailand. This study aims to identify the key climate change adaptation practices adopted by smallholder farmers and to examine the socioeconomic and institutional factors influencing their adoption decisions.

A mixed-methods approach was employed, combining household survey data from 198 farmers with Key Informant Interviews and Focus Group Discussions. A descriptive analysis using the Weighted Average Index (WAI) ranked adaptation practices, while the Problem Confrontation Index (PCI) identified major constraints. A binary logistic regression model was used to analyse factors influencing the adoption of adaptation practices. The results show that multi-cropping (WAI=5.38), irrigation systems (WAI=4.88), changing cropping dates (WAI=3.69), and Alternate Wetting and Drying (WAI=2.98) are the most widely adopted strategies. The logistic regression results indicate that gender, age, education, land ownership, access to credit, and non-farm income significantly influence adoption decisions. The PCI results further reveal that high input costs, water scarcity, a lack of storage facilities, and labour shortages are the most critical barriers farmers face. The findings highlight the importance of strengthening institutional support systems to enhance farmers' adaptive capacity. Policy interventions should focus on improving access to credit, expanding extension and climate information services, subsidising agricultural inputs, and investing in water management infrastructure. These measures are essential for promoting climate-resilient and multifunctional agroecosystems. This study provides insights for policymakers, development practitioners, and stakeholders working toward sustainable agricultural adaptation in Southeast Asia.

Keywords: Adaptive capacity, binary logistic regression, climate change, climate-smart agriculture, Northern Thailand, smallholder farmers

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