Mechanization and Appropriate Technologies for Small Farms in Mali: An Assessment

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Abstract

Mechanization and appropriate technologies are essential for improving agricultural productivity in Mali's small farms, particularly in rural areas where climate resilience is a significant challenge. A mixed-methods approach was employed, including surveys with 150 randomly selected farmers and qualitative interviews with extension service providers. Data were analysed using descriptive statistics and thematic analysis. Tractor usage increased yields by approximately 25% in the surveyed farms, while crop diversification led to a 15% reduction in pest damage across different crops studied. The results indicate that mechanization through tractor use and diversified cropping are effective strategies for enhancing small farm productivity in Mali's agricultural sector. Farmers should be encouraged to adopt both mechanized tools and crop diversification techniques. Extension services need to provide more training and support for these technologies. The empirical specification follows $Y = \beta_{0+\beta}^{\rightarrow} p\, X + varepsilon$, and inference is reported with uncertainty-aware statistical criteria.

Keywords: *African geography, Smallholder farming, Agro-ecology, Soil conservation, Precision agriculture, Sustainable intensification, Participatory research*

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