

## **Climate change adaptation and technical efficiency: Insights from rice farmers in Nepal**

### **Abstract**

Agriculture is highly exposed and vulnerable to extreme weather events and the impacts of climate change. Farmers have been adopting adaptation practices to minimize these adverse impacts. This paper assesses the impact of adaptation practices on technical efficiency (TE) in rice growing farms. To this end we first classified a sample of 150 rice farms in the Tanahun district of Nepal based on whether the farm has adopted adaptation practices or not. We then estimated separate stochastic production frontier models for each group of farms to calculate their TEs. Survey data reveals that 77.3% of the farmers have adopted at least one practice to mitigate the adverse impacts of climate change. The adaptation practices that farmers have adopted include adjusting the timing of farm operations, selection of rice varieties, crop rotation, improved irrigation and fertilizer management.

The empirical results showed that average TE for the sample was 0.66 which indicates that rice farmers in the study site could further improve production by 34% utilising existing technologies. The average TE of farms adopting adaptation practices (0.74) was found significantly higher ( $t$  value = 4.18,  $P$  value < 0.01) than non-adopting farms (0.64). More than 75% of the farms adopting adaptation practices had attained efficiency level between 70-100%, while it was approximately 45% for non-adopting farms. This further indicates that rice production can be further improved by adopting farm level climate change adaptation practices.

The results reveal that adaptation is an important factor in explaining efficiency differentials among rice growing farms. Furthermore, participation of family members in agricultural organizations, livestock holding and the education level of household head have a positive effect on technical efficiency. On the other hand family members moving out of farming for more than 6 months and age of the household head have a negative effect on technical efficiency.

It is evident from the results that further identification, improvement and promotion of adaptation strategies are of paramount importance in dealing with the negative impacts of climate change.

**Key words:** Climate change; adaptation; technical efficiency; stochastic production frontier approach; rice; Nepal