

Explaining SRI (System of Rice Intensification) adoption among smallholder farmers in Timor Leste



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1. Introduction

- A recent slowdown in yield gains and considerable ecological footprints call for innovative strategies in intensive rice production.
 - SRI promises productivity growth and sustainable management of water resources and soils.
 - However, adoption remains limited among smallholder farmers and there are knowledge gaps on what determines SRI adoption.
- This study aims to detect determinants of SRI adoption analysing household and plot level data from Timor Leste.

2. SRI in Timor Leste

- Since 2007, SRI is a national extension strategy, implemented by the Ministry of Agriculture and Fisheries (MAF).
- SRI components and households adoption rates of survey sample

Components	Description	Adopted by (%)	
i	Nursery	carefully managed mat or tray nurseries	39.8
ii	Compost	application of compost on plots	12.3
iii	Transplanting	planting young seedlings < 15 days	57.9
iv	Row planting	square pattern row planting on plot	65.7
v	Single seedlings	only one seedling per hill	54.2
vi	Distance	distance of seedlings from 20x20 to 50x50cm	63.5
vii	Re-irrigation	alternate wetting and drying on plots	54.2
viii	Weeding	multiple weedings (with hand weeders)	91.9

Source: Own survey data.



Weeding with hand weeder
Pictures: Noltze 2009.

Portable mat nurseries



Compost preparation

3. Methods

Data

- In 2009, a comprehensive farm survey covered 397 randomly selected small-scale rice producers (participants & non-participants of SRI training), including 475 rice plots.

Challenge

- Estimation of the influence of household and plot characteristics on a multiple-stage adoption decision-making process:

1. Status - adoption decision (0-1),

2. Depth - number of components on plot decision (0-8) and

3. Intensity – area under SRI decision.

Regression analysis

- The so-called double hurdle (DH) model, developed by Cragg (1971), allows to estimate (1.) status and (3.) intensity simultaneously based on two independent decisions.
- The (2.) depth of adoption is estimated by a count data model using poisson regression (Wooldridge 2002).

References

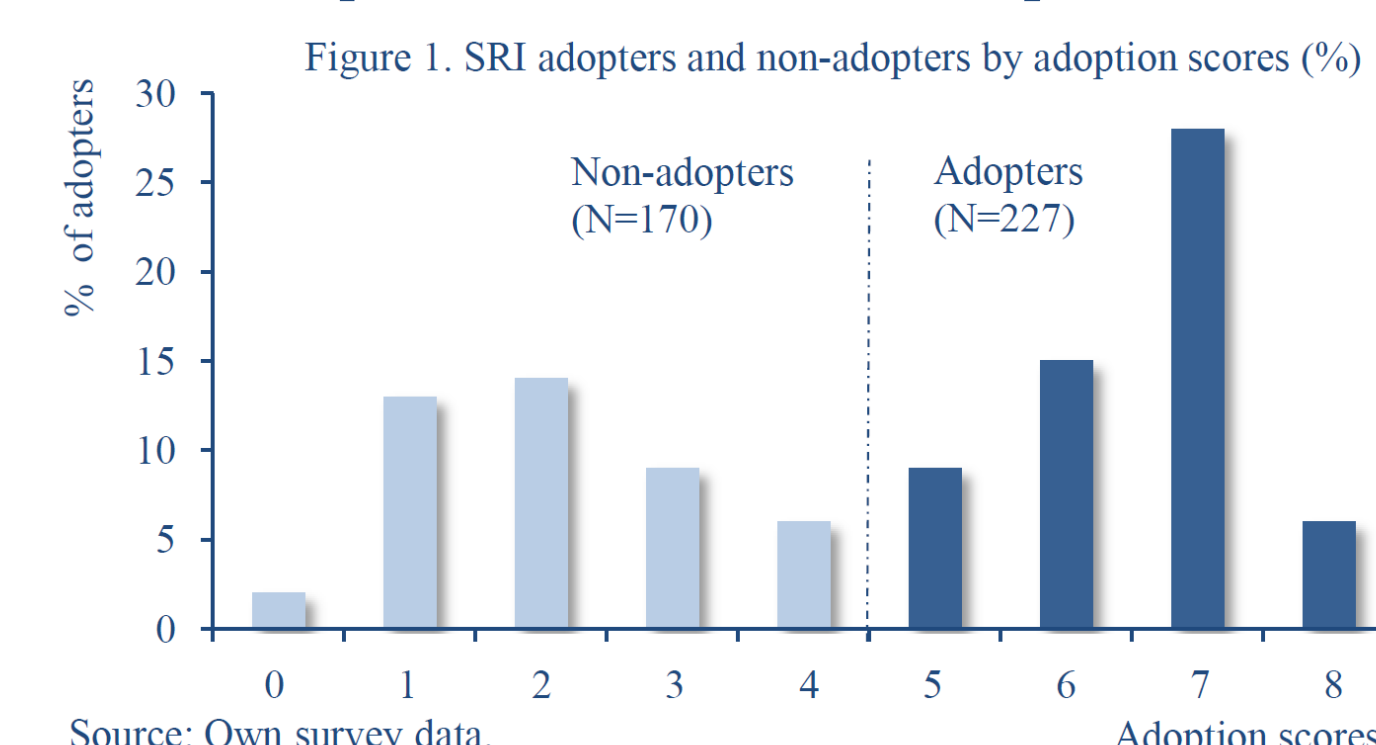
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Wooldridge, J., 2002. *Econometric analysis of cross section and panel data*. The MIT press.

4. Results

Determinants of adoption status, depth and intensity

Defining adoption

- Based on group clustering, adopter households have ≥ 5 components adopted (min. 0, max. 8) (Figure 1).



1. Adoption status

DH model (1st hurdle)

Variable	Sign	Sig.
Dependent variable: Adoption status of household (0-1)		
Years of schooling household head	-	*
Total land area (ha)	+	***
Share of rice area / total farm size	+	*
Participation in SRI training (dummy)	+	***
Participation in Hybrid Rice programme (dummy)	+	***

2. Adoption depth

Poisson model

Variable	Sign	Sig.
Dependent variable: Number of SRI components adopted on plot (0-8)		
Time from house to plot (min)	-	**
Plot level (1=flat, ..., 4=slight slope)	+	**
Irrigation system on plot (dummy)	+	***
Farmer has full control over water management (dummy)	+	*
Share of loam in soil (%)	+	***

3. Adoption intensity

DH model (2nd hurdle)

Variable	Sign	Sig.
Dependent variable: Area under SRI technology per household (hectare)		
Adult household members 18-65 years (dummy)	+	*
Total land area (ha)	+	***
Share of rice area / total farm size	+	***
Participation in Hybrid Rice programme (dummy)	+	*

The full models contain a number of additional plot, household and location variables. The tables provide some selected significant variables only. Source: own survey data. *, **, *** mean statistically significant at 10%, 5% and 1% level, respectively.

Key message

- ✓ **Status** - extension training participation and farm size are determining the initial adoption decision.
- ✓ **Depth** - SRI components are adopted on plots nearby the main farm, with functioning irrigation systems that can be individually managed and have quality soils.
- ✓ **Intensity** depends on factors like labour availability. At this stage, SRI training does not influence the decision.

5. Conclusion

- Various farm and farmer characteristics are determining the adoption of the novel technology.
- Intra-farm adoption follows a multiple-stage decision making process, considering differing factors on each stage.
- A successful introduction of SRI has to refer to various determinants within the multiple-stage decision-making process to enhance and sustain SRI adoption by small-scale producers.