Unlocking the Global Potential Competitiveness of Myanmar's Rice Sector: A Comparative Study of Production Costs and Efficiency

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1. Introduction

- ❖ Rice is crucial for the food security of over half of the world's population.
- ❖ Ensuring a consistent global rice supply to meet the growing future rice demand faces significant challenges due to factors such as adverse impacts of climate change, shocks in energy and fertilizer prices, and trade restrictions.

- ❖ Myanmar ranks as the seventh-largest contributor - both total rice production and sown area globally - 4.3 % (2.34 million tons) of the global rice export volume in 2022.
- ❖ Understanding the competitiveness of Myanmar's rice industry is vital for maximizing its global potential.

- ► A few studies consider the relationship between cost efficiency and the global competitiveness of rice farming at the household (micro) level – we address endogeneity concerns that prior research has not adequately dealt with.
- ► We consider seasonal variations across both the dry and wet seasons, an aspect often overlooked in previous research.

2. Objectives

This study aims to answer the following research question:

- ➢ To what extent is the production cost of Myanmar's rice industry competitive on the global market and what factors contribute to this competitiveness?

This study aims to evaluate the cost competitiveness of rice production in Myanmar.

(1) estimate and compare rice production costs across selected major rice-producing countries, especially in Asia;

(2) analyze the cost efficiency of rice production in Myanmar in both the monsoon and summer seasons, focusing solely on the domestic context;

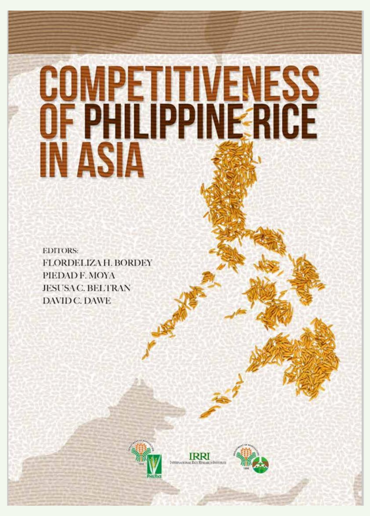
(3) examine the relationship between global competitiveness (export parity basis) and cost efficiency in Myanmar's rice production.

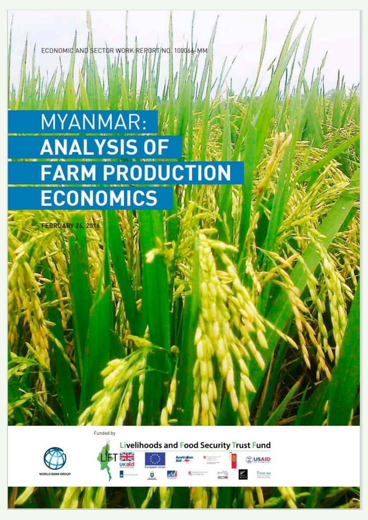
3. Data and Methodology

Data for this study are sourced from three main outlets.

- ✓ The primary dataset from the Area-Based Farm Household Survey - conducted in October 2014 under the Metrics and Indicators for Tracking in Global Rice Science Partnership project.
- ✓ 2,000 rice-farming households
  - **Collaborative survey-**

IRRI International Rice Research Institute & Yezin Agricultural University (YAU), Myanmar.





- ✓ For other major rice-producing countries, two secondary sources are utilized.

- The normalized Cobb-Douglas cost frontier model can be expressed as

$$ln\left(\frac{C_{totalcst}}{P_{seed}}\right) = \beta_0 + \beta_1 \ln\left(\frac{P_{fertilizer}}{P_{seed}}\right) + \beta_2 \ln\left(\frac{P_{landrent}}{P_{seed}}\right) + \beta_3 \ln\left(\frac{P_{fuel}}{P_{seed}}\right) + \beta_4 \ln\left(\frac{P_{power}}{P_{seed}}\right) + \beta_5 \ln\left(\frac{P_{chemical}}{P_{seed}}\right) + \beta_6 \ln\left(\frac{P_{wage}}{P_{seed}}\right) + \beta_7 lnY_{output} + (v_i + u_i) \;....(1)$$

$$u_i = \delta_0 + \sum_{k=1}^{n} \delta_k z_{ki} + \varepsilon_i........(2)$$

v_i: a stochastic error to capture the effect of noise, assumed to be v_i~i.i.d

u_i: a one-sided non-negative disturbance, captures the effect of inefficiency ($u_i \geq 0$), assumed to follow $u_i \sim i.i.d\ N^+(0, \sigma_u^2)$

- The formula of the Domestic Resource Cost ratio is

$$DRC = \frac{(Value\ of\ non-traded\ inputs)}{(Output\ value) - (Value\ of\ traded\ inputs)}$$

- The relationship between cost efficiency and global competitiveness (Domestic Resource Cost) is assessed as follows:

$$LnDRC_i = \beta_0 + \beta_1 LnCE_i + \alpha D_i + \partial F_i + \theta H_i + \delta O_i + \gamma G_i + e_i.......(3)$$

Where, DRC_i is the DRC ratio, CE_i is the cost efficiency indices, D_i are the demographic characteristics, F_i are the farm characteristics, H_i is the livelihood and diversification, O_i is the financial and training support, G_i is the geographic location, e_i is the error term, and β, α, ∂, θ, δ, γ, are the corresponding vectors of intercept and slope coefficients.

4. Results

➢ Myanmar ranks as the second-least expensive rice producer after Vietnam

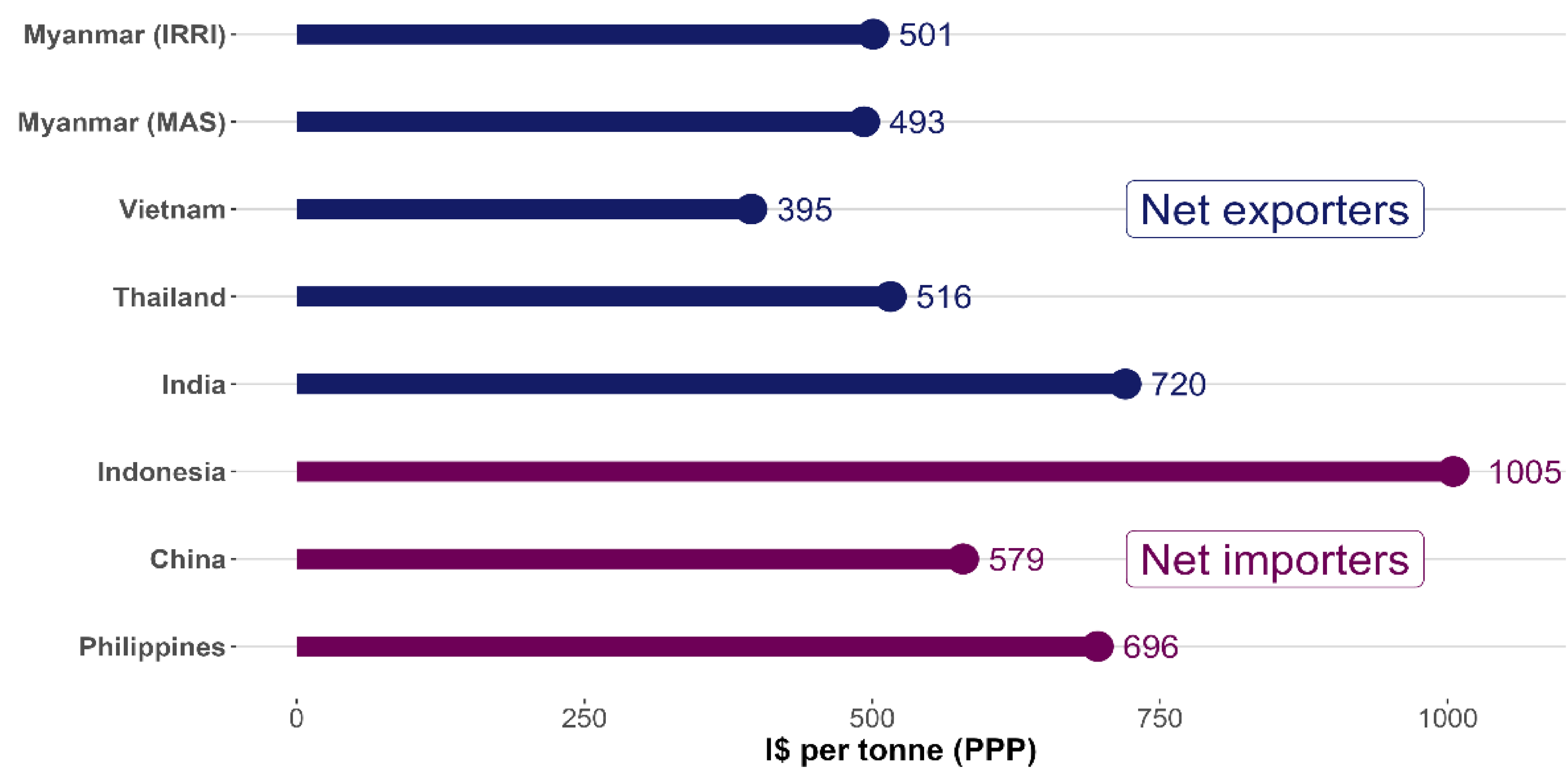


Figure 1. Annual average paddy production cost per tonne across selected Asian countries

Table 1 Summary statistics of cost efficiency and Domestic Resource Cost ratio value in Myanmar's rice production

	Cost efficiency		DRC score	
	Dry season	Wet season	Dry season	Wet season
Mean	0.89	0.86	0.31	0.54
SD	0.08	0.09	0.16	0.34
Minimum	0.39	0.32	0.03	0.08
Maximum	0.99	0.98	1.90	8.76
Difference (Dry-Wet)	0.0372***		-0.2276***	
	(0.0032)		(0.0099)	

Note: Standard errors (SE) in parentheses. *** p < 0.01, ** p < 0.05, and * p < 0.1.

- The mean cost efficiencies are 89% and 86% for the dry and wet seasons.
- 0<DRC<1 suggests that domestic rice production is internationally competitive, with DRC values of 0.31 (dry season) and 0.54 (wet season).

Table 2 Estimated IV regression results of cost efficiency on Domestic Resource Cost in Myanmar's rice production (dependent variable: log [DRC ratio value])

Variables	Dry Season		Wet Season	
	IV-GMM Model		IV-GMM Model	
	Coefficient	SE	Coefficient	SE
Ln(Cost efficiency)[1]	-1.2259***	(0.2676)	-1.3282***	(0.2381)
Manager's age	0.0002	(0.0009)	-0.0010	(0.0010)
Manager's education	0.0018	(0.0041)	-0.0062	(0.0045)
Family size	0.0159**	(0.0063)	0.0086	(0.0066)
Dependency ratio	-0.0260	(0.0198)	0.0140	(0.0206)
Largest plot size	-0.0159**	(0.0064)	-0.0066	(0.0064)
Labor productivity	-0.0013***	(0.0002)	-0.0006***	(0.0001)
Farm implement index	-0.0265***	(0.0088)	-0.0322***	(0.0093)
Livestock†	-0.0871***	(0.0216)	-0.0412*	(0.0218)
Non-farm activities†	-0.0620***	(0.0220)	-0.0648***	(0.0238)
Formal loan†	-0.0257	(0.0325)	-0.0228	(0.0480)
Training access†	-0.0218	(0.0221)	0.0172	(0.0258)
Kangyidaunt†	-0.0560*	(0.0332)	-0.3832***	(0.0476)
Kyaiklat†	-0.5463***	(0.0355)	-0.3570***	(0.0493)
Myaungmya†	-0.1355***	(0.0381)	-0.2601***	(0.0514)
Constant	-0.9253***	(0.0793)	-0.3880***	(0.0951)
Observations	1,451		1,320	
R-squared	0.3981		0.2370	
Diagnostic statistic: Endogeneity test: Durbin-Wu-Hausman χ^2	13.56***		6.06**	
Instrument relevance test: Cragg-Donald Wald F statistic	494.02***		216.15***	
Instrument exogeneity test:Hansen J statistic (Overid. Test χ^2)	1.63		0.85	

Note: Robust standard errors (SE) in parentheses. *** p < 0.01, ** p < 0.05, and * p < 0.1. † Denotes a dummy variable, ln is natural logarithm. [1]Two instrumental variables (IVs) are used: the standard deviation of the cost efficiency difference and the experience of crop damage.

➢ Higher CE corresponds to lower DRCs, thereby enhancing global competitiveness.

5. Conclusions

- These findings highlight the importance of continued efforts to improve cost efficiency at the household level in rice production, as it directly affects Myanmar's ability to compete in the global rice market.
- Both dry and wet-season rice production demonstrate a comparative advantage, emphasizing the need to optimize rice production strategies for each season.
- Our study offers scalable insights that can be applied to promote the competitiveness, sustainability, and efficiency of rice production.

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