2015 National Rice R&D Highlights

Socio-Economic Division

Department of Agriculture
PHILRICE
PHILIPPINE RICE RESEARCH INSTITUTE

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SOCIOECONOMICS DIVISION

Division Head: Rhemilyn Z. Relado

Executive Summary

The Socioeconomics Division 1) conducts discipline-based studies, 2) supports PhilRice's function of providing timely information to rice stakeholders, 3) develops and tests socioeconomic methodologies and theories, 4) conducts impact assessments of rice technologies, and 5) implements policy research and advocacy activities of the Institute. The division has 3 core projects for 2015. In addition, SED does various projects and studies that are both internally- and externally-funded.

I. Statistical Series on the Rice Economy

Project Leader: RZ Relado

The project addresses the need to gather, process, and update rice statistics and make available the information to primary rice stakeholders. Three studies are under the project. These are 1) monitoring of the rice-based farm households in major rice producing provinces in the Philippines, 2) revisiting the rice-based socioeconomic information system, and 3) updating rice and rice-related statistics. The first study is concerned with primary data gathering that would form the sequence of the quinquennial survey of the Socioeconomic Division. The second is on producing socioeconomic profiles that would be comprehensible to target stakeholders and is available as web-based applications. The last study is on continued updating of rice statistics from available secondary data in handbook and web format.

Rice Yield and Cost In Relation to Factors of Production: Results from 2011 WS – 2012 DS of RBFHS

Socioeconomics Division

In 2015, processing of data from the 2011 WS-2012 DS Regular Monitoring of Rice-Based Farm Households Survey (RBFHS) was done to determine possible factors that influence the yield and production cost of rice farming. The data covered information on July to December 2011 rice cropping (2011 WS) of 2,399 sample farmers, and January to June 2012 rice cropping (2012 DS) of 2,051 farmers from 33 major rice producing provinces in the country.

Highlights:

- Yield in 2012 DS is 0.46t/ha (or 9.2cav/ha) higher than in 2011 WS (Table 1). This is attributed to production losses wherein 46% of farmers reported production loss in 2011 WS. Among them, 65% reported loss due to typhoons, heavy rains or flood; 26% due to pests and diseases; 8% due to drought or insufficient water; and 2% was not able to apply fertilizer. In 2012 DS, one in every four farmers reported production loss. Among them, 43% reason out pests/diseases as cause; 20% due to heavy rains/flood; 7% due to drought; and 7% due to other weather-related reasons, among other reasons.

- More provinces attained more than 4 t/ha yield in dry season than in wet season (Figure 1 and 2). Davao Oriental (5.4t/ha) and Nueva Ecija (6.3t/ha) were the provinces with the highest yield in 2011 WS and 2012 DS, respectively.

- Irrigated rice fields produced 1.26t/ha (or 25.2cav/ha) higher than rainfed fields (Table 2). In irrigated areas, Davao Oriental had the highest yield of 5.43t/ha, while in rainfed areas, Compostela Valley had the highest with 5.32t/ha.

- Mean yield of farmers whose sources of irrigation are NIS/ CIS (4.1t/ha for 2011 WS; 4.8t/ha for 2012 DS) is significantly higher than the mean yields of those who rely on small scale irrigation systems (SSIS), natural source, and rain.

- The use of high quality seeds is still a significant factor (across seasons) that can further improve the yield.

- For both seasons, transplanted rice produced significantly higher yield than direct-seeded rice.

- Higher quantity of nitrogen applied during wet or dry season showed higher yield. Although in wet season, incremental yield is becoming smaller.

- Average amount of N-P-K applied during dry season is 73-16-12kg/ha respectively. In 2011WS, the average amount of N-P-K is 72-15-11kg/ha.

- Farmers who managed weeds by applying herbicides have significantly higher yield than those who did not apply. On the other hand, insecticide application does not significantly increase the yield of farmers. Farmers who observed diseases and applied fungicides have significantly higher mean yield. Further, yield of farmers who applied molluscicides, rodenticides and other pesticides (given that they observed such pests) showed higher yield.

- Farmers who attended rice-related training (2009-2011) produced significantly higher yield (4.1t/ha) than those farmers who did not attend any rice-related training (3.7 t/ha).
- Farmers who attained at least high school level have significantly greater yield than farmers who attained at most elementary level.

- For both seasons, majority of sample provinces produced palay at around Php10 to 12 per kg. Zamboanga del Sur produced the lowest cost of Php 9.05 and 8.22 per kg for wet season and dry season respectively.

- In irrigated areas, majority of sample provinces produced rice at around Php10 to 12 per kg. But in rainfed areas, cost/kg varies across provinces.

- Reducing labor cost, particularly harvesting and threshing, can lead to lower unit cost.

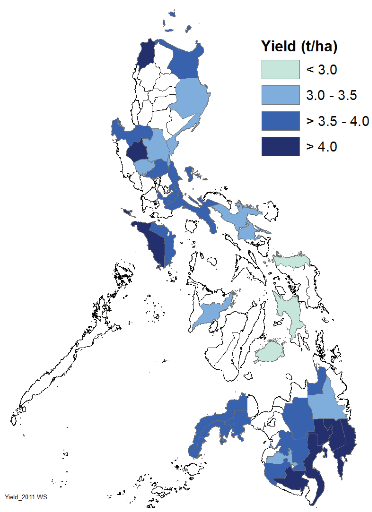
- Given that farmers are spending more or less PhP40, 000 per hectare per season for rice farming, increasing their yield is still a good strategy to lower cost/kg.

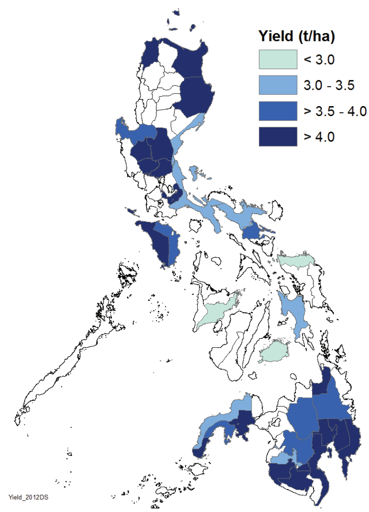
Table 1. Rice production for 2011WS and 2012 DS, Philippines.

ITEMS	**2011 WS (n=2,399)**	**2012 DS (n=2,051)**
Yield (kg/ha)	3,673	4,129
Paddy price (PhP/kg)	13.23	14.23
Gross Revenue (PhP/ha)	48,582	58,777
Total Production Cost (PhP/ha)	42,201	44,908
Cost/kg	11.49	10.88
Net profit		
from Rice Farming (PhP/ha)	6,381	13,868
from Rice Farming + Returns to Own Labor, Land, and Capital (PhP/ha)	20,788	29,116

Table 2. Rice production for irrigated and rainfed ecosystems, Philippines, 2011 to 2012.

ITEMS	Irrigated (n=3487)	Rainfed (n=963)
Yield (kg/ha)	4,152	2,896
Paddy price (PhP/kg)	13.78	13.38
Gross Revenue (PhP/ha)	57,206	38,740
Total Production Cost (PhP/ha)	46,029	33,978
Cost/kg	11.09	11.73
Net profit		
from Rice Farming (PhP/ha)	11,177	4,762
from Rice Farming + Returns to Own Labor, Land, and Capital (PhP/ha)	26,576	17,339





Revisiting the Rice-Based Socioeconomic Information System

RB Malasa, RM Almario, RF Ibarra, RF Tabalno, AC Arocena, FH Bordey, AB Mataia

There is a growing demand of rice-based socioeconomic information, thus, it is necessary to bring together general information about rice in the Philippines. To gather extensive primary data on rice, the Socioeconomics Division (SED) conduct a quinquennial survey to collect information about the technology, social and economic status of rice-based farm households in 30 major rice-producing provinces in the Philippines. Hence, it is important to organize these databases to make them accessible, available, and user-friendly for potential users. The Rice-Based Socioeconomic Information System was conceptualized and developed to construct a process/system for local retrieval of RBFHS datasets and create a web-based system on selected RBFHS data items for easy access and processing by data users.

Highlights:

- Validated and edited farmer names, farmer IDs (single ID system), and geocodes from 1996 to 2012 to ensure consistency of data for potential longitudinal studies;

- Edited and prepared pesticide and fertilizer matrices from 1996 to 2012 survey rounds for consistency and database structure for both material inputs;

- Relocated 2006-2007 and 2011-2012 data matrices in the BSEIS database;

- Established directory structure for other SED electronic data and information (e.g. maps, books, and proceedings) and uploaded selected electronic information materials;

- Edited RBSEIS design to be consistent with the PhilRice website (Figure 1);

- Added security features to enhance overall strength of security of the system;

- Optimized RBSEIS performance and improved load times (includes caching, HTTP requests, HTTP status codes);

- Edited titles, format of output tables, and data presentation of RBSEIS (Figure 2 and 3);

- Demonstrated RBSEIS to at least 80 staffers of PhilRice and administered usability survey to at least 25 staff;

- Presented RBSEIS as an information dissemination system of SED-PhilRice in FCSSP and National Rice R&D;
- Included RBSEIS in PhilRice local and production server (currently production server is unavailable due to continuous attempt to hack the PhilRice network);
- Finalized beta version of RBSEIS (refer to Table 1 for list of 2006-2007 and 2011-2012 data available for processing in the system); and
- Enhanced RBSEIS to have a responsive design (the system can be accessed through smartphones or tablets).

Figure 1. RBSEIS homepage.

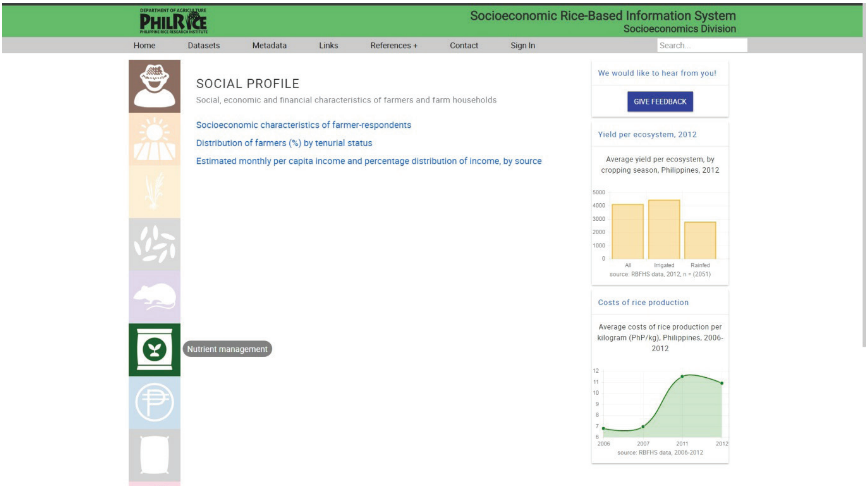
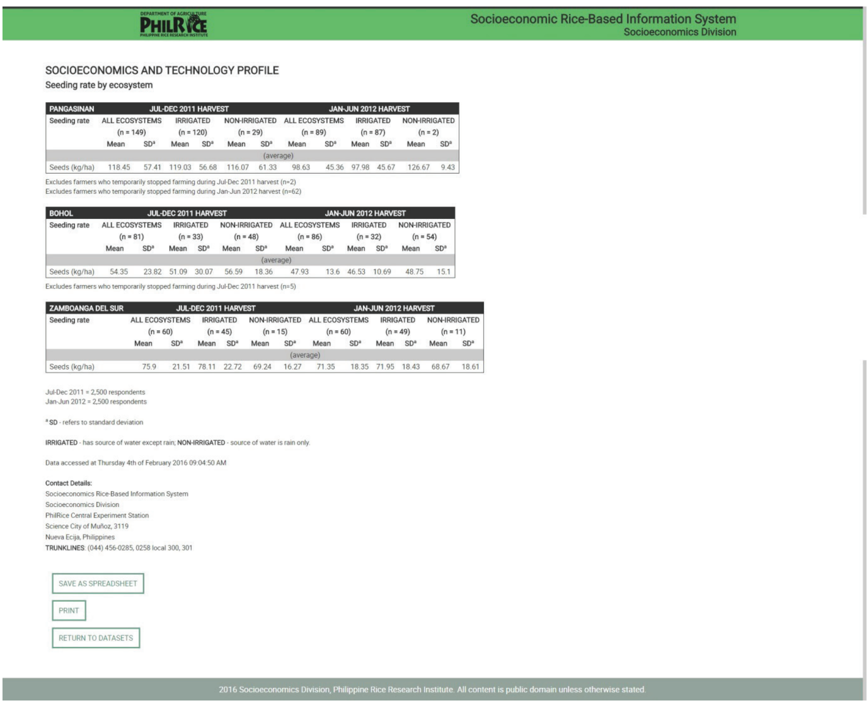


Figure 2. Image of data sets available in RBSEIS.



Socioeconomic Rice-Based Information System
Socioeconomics Division

SOCIOECONOMICS AND TECHNOLOGY PROFILE

Seeding rate by ecosystem

PANGASINAN	JUL-DEC 2011 HARVEST						JAN-JUN 2012 HARVEST					
Seeding rate	ALL ECOSYSTEMS (n = 149)		IRRIGATED (n = 120)		NON-IRRIGATED (n = 29)		ALL ECOSYSTEMS (n = 89)		IRRIGATED (n = 87)		NON-IRRIGATED (n = 2)	
	Mean	SD[a]	Mean	SD[a]	Mean	SD[a]	Mean	SD[a]	Mean	SD[a]	Mean	SD[a]
	(average)											
Seeds (kg/ha)	118.45	57.41	119.03	56.68	116.07	61.33	98.63	45.36	97.98	45.67	126.67	9.43

Excludes farmers who temporarily stopped farming during Jul-Dec 2011 harvest (n=2)
Excludes farmers who temporarily stopped farming during Jan-Jun 2012 harvest (n=62)

BOHOL	JUL-DEC 2011 HARVEST						JAN-JUN 2012 HARVEST					
Seeding rate	ALL ECOSYSTEMS (n = 81)		IRRIGATED (n = 33)		NON-IRRIGATED (n = 48)		ALL ECOSYSTEMS (n = 86)		IRRIGATED (n = 32)		NON-IRRIGATED (n = 54)	
	Mean	SD[a]	Mean	SD[a]	Mean	SD[a]	Mean	SD[a]	Mean	SD[a]	Mean	SD[a]
	(average)											
Seeds (kg/ha)	54.35	23.82	51.09	30.07	56.59	18.36	47.93	13.6	46.53	10.69	48.75	15.1

Excludes farmers who temporarily stopped farming during Jul-Dec 2011 harvest (n=5)

ZAMBOANGA DEL SUR	JUL-DEC 2011 HARVEST						JAN-JUN 2012 HARVEST					
Seeding rate	ALL ECOSYSTEMS (n = 60)		IRRIGATED (n = 45)		NON-IRRIGATED (n = 15)		ALL ECOSYSTEMS (n = 60)		IRRIGATED (n = 49)		NON-IRRIGATED (n = 11)	
	Mean	SD[a]	Mean	SD[a]	Mean	SD[a]	Mean	SD[a]	Mean	SD[a]	Mean	SD[a]
	(average)											
Seeds (kg/ha)	75.9	21.51	78.11	22.72	69.24	16.27	71.35	18.35	71.95	18.43	68.67	18.61

Jul-Dec 2011 = 2,500 respondents
Jan-Jun 2012 = 2,500 respondents

[a] **SD** - refers to standard deviation

IRRIGATED - has source of water except rain; **NON-IRRIGATED** - source of water is rain only.

Data accessed at Thursday 4th of February 2016 09:04:50 AM

Contact Details:
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Socioeconomics Division
PhilRice Central Experiment Station
Science City of Muñoz, 3119
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TRUNKLINES: (044) 456-0285, 0258 local 300, 301

SAVE AS SPREADSHEET

PRINT

RETURN TO DATASETS

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Figure 3. Sample of RBSEIS output table ready for downloading.

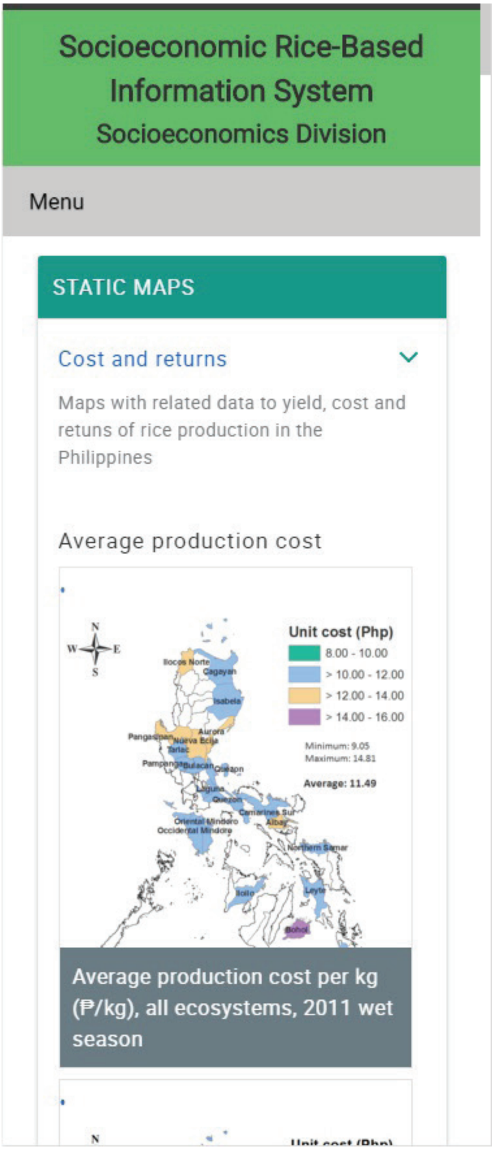

Figure 4. Sample of RBSEIS in mobile view.

Updating Rice and Rice-Related Statistics
RZ Relado, GO Redondo, CC Launio and RF Tabalno

Considering the fast-changing technological landscape and policy environment of the rice industry, the need for up to date data and a rice database is indispensable. Although the national level figures are regularly updated by the Bureau of Agricultural Statistics (now included in the fold of the Philippine Statistics Authority), the provincial figures, which are relevant data for location-specific policy intervention and rice program implementation, are not packaged to be available and easily accessible to policy makers and RD&E workers. In view of this, it becomes a responsibility of PhilRice to present a more simple and straight forward provincial rice statistics. Thus, this study aims to annually update selected and relevant rice statistics and upload it in the PhilRice website.

Highlights:

- Updated and uploaded the following data sets: 1) Estimated palay production, area harvested and yield per hectare by semester, variety and ecosystem, 2013-2014, 2) Potential irrigable area and total service area- by type of irrigation system, 3) Annual and semestral average dealer's price of pesticides by type, province and region, 4) Average palay production costs and returns, 5) Fertilizer: annual average dealer's price- by grade, 6) Annual and semestral average farmgate, wholesale, and retail prices, special palay/rice, and 7) Annual and semestral average farmgate, wholesale, and retail prices, ordinary palay/rice.

- Provided various data 55 times since May 2015 such as: production, area and yield, cost and returns, production losses, and fertilizer use, among others.

- Rearranged the layout of the BAS data to suit the DBMP format of PhilRice.

II. Adoption and Impact Evaluation of Rice R&D Products and Related Support Services

Project Leader: JC Beltran

The project aims to contribute in the effective and efficient monitoring, evaluation and quantification of the performance of rice R&D products and development programs through ex-ante, monitoring and evaluation activities, and ex-post impact evaluation studies. It hopes to provide evidence of the usefulness of R&D, and production related services, while providing feedbacks to researchers and development workers to ensure more efficient R&D work, research prioritization, and better management of projects and programs.

Economics of using shallow tubewells and open surface pumps in rice-based farming

RG Manalili, CC Launio, RB Malasa, and JY Siddayao

While the population is inevitably increasing, the need to increase rice production in the Philippines is essential to support its ballooning demand. The rice production during dry season in the country provides opportunities to increase productivity through intensifying the utilization of irrigation systems. The use of shallow tubewell (STW) and open surface pumps (OSP) became more popular in the absence of surface irrigation in the farm in recent years. This study aims to assess the status and impacts of using shallow tubewell and open source pumps in rice-based farming in the country. The study used the 2011 wet season (WS) and 2012 dry season (DS) data from 10 provinces with greater number of STW and OSP users. Productivity and profitability were compared among STW and OSP owners and renters and farmers with no sources of irrigation other than rain.

Highlights:

- On average, farmers were 53 years old, mostly have gone into formal schooling, and have been into rice farming for about 25 years. More than half of the sample farmers have attended rice production training except for rainfed farmers where 55% of them were not able to attend any rice and rice-related trainings. Only one-fifth of them were aware of the PalayCheck and Palayamanan technologies. Most of them were non-members of any farm organizations.

- Seeding rate is still high among STW, OSP owners and renters, and rainfed farmers at an average of 102kg/ha for WS and 104kg/ha for DS. The average nitrogen (N) used by farmers were 90kg/ha for both WS and DS, with STW users having the highest N rates for both seasons at 96 to 100kg/ha. On average, usage of P2O5 was 20 to 21kg/ha while K2O was 14 to 15kg/ha for both WS and

DS. Use of organic fertilizer was very minimal. Pesticides use was higher during WS than DS, with higher usage of herbicides and molluscicides by all of the farmers. The use of fuel for irrigation was higher for DS ranging from 104 to 204 l ha-1 or at an average of 134 l ha-1. Rice farming is more labor intensive for STW renters with 85 man-days ha-1 during WS and 89 man-days ha-1 for DS due to higher man-days spent on irrigation and field monitoring activities (Table 3).

- STW users obtained higher yields than the OSP users and rainfed farmers both in WS and DS. Among the STW users, owners have higher yields at 4.18t/ha during WS and 4.49t/ha in DS compared to renters (4.15t/ha in WS and 4.24t/ha in DS). Among the OSP users, owners got higher yields during DS at 3.69t/ha compared with the renters at 3.50t/ha. Rainfed farmers had the lowest yield at 3.29t/ha.

- Average cost of production was higher among STW and OSP renters in both WS and DS due to rental payments of irrigation pumps. STW renters got the highest cost of production during DS at around P57,000 ha-1 compared to P49,500 ha-1 incurred by the STW owners, P44,600 ha-1 by OSP owners, and P46,400 ha-1 by OSP renters. The higher cost incurred during DS can be explained by the higher cost of fuel and oil due to the use of irrigation pumps (Table 4).

- Although yields obtained were higher, rice production among STW and OSP renters is less profitable during DS because of the higher cost on fuel and machine rentals. Net profit-cost ratios during DS for renters ranged from 0 to 0.01, while farmers in the rainfed farms incurred profit loss.

Table 3. Comparative mean input-use in rice production by source of irrigation, Philippines 2011 WS and 2012 DS.

Items	2011 WS						2012 DS					
	ALL	STW		OSP		Rainfed	ALL	STW		OSP		Rainfed
		owner	renter	owner	renter			owner	renter	owner	renter	
Seeding rate (kg/ha)	102.22	101.39	99.46	108.53	90.92	105.34	104.16	96.24	108.23	107.42	109.20	125.36
Seed price (Php/kg)	32.13	29.15	37.01	30.45	56.61	27.50	34.61	41.62	22.90	35.36	27.40	20.75
Inorganic fertilizer (kg/ha)												
Nitrogen (N)	90.37	99.68	98.93	77.98	70.22	83.05	89.59	96.38	100.80	87.37	73.41	66.28
Phosphorous (P_2O_5)	20.42	22.01	23.04	19.68	18.48	16.77	21.42	21.10	23.57	21.94	21.23	19.21
Potassium (K_2O)	14.40	16.06	15.84	14.40	12.77	10.52	15.57	16.83	14.90	16.76	14.90	7.85
Organic fertilizers (kg/ha)	7.02	7.13	7.79	14.08	8.06	0.30	8.56	8.57	2.12	10.83	16.67	0.89
Farm residues	2.55	0.59	4.55	11.35	-	0.17	2.64	0.51	-	7.01	7.02	0.56
Pesticides ai (kg/ha)												
Insecticides	0.14	0.14	0.12	0.15	0.10	0.14	0.13	0.13	0.10	0.16	0.10	0.15
Herbicides	0.37	0.38	0.30	0.49	0.29	0.32	0.44	0.39	0.47	0.54	0.38	0.48
Molluscicides	0.16	0.27	0.41	0.71	0.18	0.24	0.20	0.18	0.28	0.22	0.17	0.14
Fungicides	0.04	0.04	0.02	0.08	0.03	0.01	0.06	0.05	0.09	0.11	0.02	0.00
Rodenticides	0.05	0.09	0.00	0.03	0.01	0.01	0.13	0.24	0.01	0.04	0.01	0.03
Fuel (liters/ha)												
Land preparation etc	18.17	18.61	14.97	22.31	18.69	15.36	22.94	22.45	18.03	30.31	19.97	16.95
Irrigation	25.46	35.07	33.44	24.15	25.04	-	133.75	161.63	204.53	107.51	104.10	-
Others	0.33	0.27	-	0.26	-	0.82	0.58	0.22	2.18	0.32	0.70	0.82
Oil (liters/ha)	1.14	1.39	1.32	1.11	0.64	0.69	1.43	1.72	1.46	1.50	0.68	0.69
Total Labor use (md/ha)	78.14	82.30	84.99	63.31	67.63	81.02	76.55	79.00	88.82	71.50	68.15	71.15
Land Preparation	9.46	8.58	10.04	9.83	8.60	11.29	9.30	8.33	10.37	9.70	8.67	12.74
Crop Establishment	20.29	23.40	24.15	12.51	16.74	18.62	15.97	18.11	21.65	11.75	13.74	10.91
Crop Care and Maintenance	8.97	11.39	7.84	7.21	5.95	6.58	16.75	19.93	16.74	16.38	13.58	5.13
Harvesting and Threshing	19.85	20.44	19.13	17.69	17.30	21.66	17.87	17.76	17.35	18.27	16.20	20.22
Postharvest	6.23	6.46	7.88	4.50	5.22	6.60	4.85	4.95	6.43	4.57	4.66	3.21
Field Monitoring	13.35	12.03	15.94	11.57	13.82	16.28	11.81	9.92	16.29	10.82	11.29	18.94

Source: Own Survey, 2012

Table 4. Comparative costs and returns in rice production of STW, OSP owners and renters and rainfed farms, Philippines 2011 WS and 2012 DS.

Item	2011 WS						2012 DS					
	ALL	STW		OSP		Rainfed	ALL	STW		OSP		Rainfed
		owner	renter	owner	renter			owner	renter	owner	renter	
Average Area Harvested (ha)	1.33	1.52	0.88	1.45	1.01	1.16	1.44	1.75	0.92	1.45	1.01	1.01
Returns												
Yield (t/ha)	3.89	4.18	4.15	3.70	3.72	3.29	4.00	4.49	4.24	3.69	3.50	2.52
Price (P/kg)	12.98	13.19	12.89	12.67	12.66	12.92	13.54	13.79	13.48	13.40	13.36	12.92
Gross Returns (P/ha)	50,743.20	55,348.75	53,542.62	47,262.35	47,266.70	42,648.78	54,198.40	61,860.61	57,223.66	49,460.01	46,771.03	32,527.42
Costs (P/ha)												
Seed	2,443.79	2,520.72	2,472.36	2,448.25	2,275.50	2,316.30	2,658.79	2,737.79	2,370.79	2,765.57	2,497.48	2,559.40
Fertilizer	7,281.04	7,844.52	7,811.52	6,831.52	6,027.74	6,569.44	7,250.04	7,543.08	7,701.33	7,478.20	6,359.24	5,684.88
Pesticides	1,196.41	1,197.68	1,343.48	1,372.81	1,122.13	1,005.87	1,374.51	1,316.76	1,396.47	1,531.07	1,274.76	1,375.73
Fuel and Oil	2,148.44	2,618.38	2,417.25	2,315.61	2,002.36	833.66	7,758.14	8,869.92	10,481.13	7,207.47	6,892.50	934.04
Hired Labor	14650.128	16106.315	15030.253	13078.761	15055.377	16043.737	13309.14	14245.49	13999.42	12309.99	13864.99	9362.15
Payment for permanent hired labor							1,399.76	2,240.69	472.71	722.84	686.56	821.33
Imputed Labor (done by operator / exchange labor)	6,087.45	5,158.57	7,318.78	5,366.71	5,607.65	8,239.48	6503.34	6186.53	8406.09	6306.75	5956.38	6846.93
Machine Rental	344.84	255.25	704.68	198.45	912.25	237.30	665.11	165.46	2,334.26	300.74	2,127.73	193.49
Land Rental	2,690.22	2,190.15	3,700.16	2,590.83	3,980.07	2,853.80	2,359.38	1,768.33	4,030.80	2,419.49	2,983.80	2,348.55
Irrigation Fee	106.91	50.75	220.97	119.78	383.31	49.66	266.14	140.80	637.13	252.54	642.76	-
Food	1,382.12	1,455.15	1,544.05	1,269.92	1,061.34	1,351.04	1,239.06	1,250.74	1,547.33	1,138.58	1,061.76	1,259.91
Transportation	325.53	335.13	268.28	329.60	255.46	360.18	280.64	265.63	235.72	297.45	299.40	350.59
Interest on Loan Capital	1,392.46	1,391.75	2,585.84	948.80	1,115.94	1,230.52	1,617.82	1,778.46	2,907.63	1,056.49	1,293.64	949.17
Repair and maintenance cost	258.53	220.86	254.39	478.52	106.18	239.72	382.15	548.94	113.59	475.94	35.09	59.26
Other costs (twine, nylon etc.)	605.35	697.03	488.52	292.54	743.70	641.37	437.23	508.50	466.74	385.57	402.50	201.92
Total Production Cost	40,913.23	42,042.26	46,160.54	37,642.11	40,648.99	41,972.07	47,501.27	49,567.13	57,101.14	44,648.69	46,378.62	32,947.34
Cost per kilogram (P)	**10.52**	**10.06**	**11.13**	**10.17**	**10.92**	**12.77**	11.87	11.05	13.45	12.10	13.25	13.08
Net Profit (P/ha)	9,829.98	13,306.49	7,382.08	9,620.24	6,617.70	676.71	6,697.12	12,293.48	122.52	4,811.33	392.41	-419.92
Net Profit-Cost Ratio	0.24	0.32	0.16	0.26	0.16	0.02	0.14	0.25	0.00	0.11	0.01	-0.01

Source: Own Survey, 2012

Farm-level impact of deepwell pump irrigation system used in rice-based farming in Tarlac, Philippines
CC Launio and RG Manalili

Groundwater irrigation development is one focus area of irrigation development in the country. Thus from 2003 to 2005, a Tarlac Groundwater Irrigation Systems Reactivation Project (TGISRP) was implemented by the National Irrigation Administration (NIA) through a loan from the Japanese government. Based on the project's briefing paper, the TGISRP aimed among others to construct 72 deepwell pump irrigation systems (DPIS) for a total target service area of 3500 hectares in Tarlac Province; to increase cropping intensity from 100% to 200%; and to improve crop production and farm income.

This study aims to evaluate the farm-level impact of using deepwell pump irrigation systems (DPIS). The "with or without" evaluation framework was used in the study where we conducted a household survey comprising of 325 respondents--users of DPIS, shallow tubewells (STW), and rainfed farmers were interviewed. Based on the data, some DPIS beneficiaries were either using STW or were covered under the Casecnan Multi-Purpose Irrigation Project. Other sampled rainfed farmers also had other water sources like rivers or creek. In the analysis for profitability, we then used their actual source of water for that season. While there were respondents taking water from NIS canal and other irrigation sources, the primary control groups are the STW users and pure rainfed farms. The household survey covered the 2011 DS and 2011 WS.

Highlight:

- Based on the monitoring data gathered from the Tarlac NIA provincial operations center (NIA-POC), 69% of the pumps were fully operational in 2010 while 11% were operational but not in use, and 4% were partially operational (Table 3). In 2013, majority (44%) are still operational and being used while 19% were not operational. The reasons for the pumps non-operational include stolen parts of the DW (i.e. starter or radiator or alternator), broken engine, damaged injection pump, and minimal water discharge. The fully operational pumps which are not being used are those units that either have covered by the Casecnan Multipurpose Irrigation Project or those that are not being used because farmers preferred to use their private STWs or fuel requirement was perceived higher for deepwell pump.

- With regards to the payment of farmers' equity of 30% through their Irrigation Service Cooperatives, the NIA-PO status report shows that only 1 out of the 72 ISCs was fully paid as of 2010. In 2013, about 6% of the ISCs fully paid the equity requirement.

- Comparing deepwell and STW users' input-use, deepwell users in Tarlac used an average of 215 L/ha of fuel during DS and 56 L/ha during WS. This amount was not significantly different from the amount of fuel used by STW users (Table 5). Deepwell farmers used significantly higher herbicides compared with those using STW.

- Farms supported by the CMIPP during DS got the highest yield although not significantly different from the yield of deepwell pump users. Comparable yields of deepwell and STW users were also observed. The yield during DS for farms supported by rivers/creeks, however, was lowered by around 0.5t/ha relative to those farmers using deepwells or STWs.

Table 5. Comparative mean input-use in rice production by irrigation source, Tarlac, 2011.

Particulars	2011 Dry Season		DW-STW (diff)		2011 Wet Season			DW-RF (diff)		DW-STW (diff)	
	Deepwell	STW			Deepwell	Rainfed	STW				
n	*81*	*104*			*53*	*80*	*107*				
Area (ha)	1.57	1.71	-0.14		1.36	1.34	1.75	0.02		-0.39	
Seed (kg)	107.29	115.12	-7.83	*	111.38	98.14	100.45	13.24	*	10.93	*
Seed price (pesos/kg)	24.51	24.39	0.12		20.82	20.08	25.93	0.74		-5.10	
Inorganic fertilizer (kg/ha)											
Nitrogen (N)	122.34	110.13	12.21		70.42	68.62	79.36	1.80		-8.94	
Phosphorous (P)	17.71	19.53	-1.82		10.59	10.65	14.89	-0.06		-4.30	
Potassium (K)	15.25	15.30	-0.05		10.17	8.54	13.31	1.63		-3.13	
Organic fertilizers (kg/ha)											
Commercial organic	17.59	6.03	11.56		25.94	13.61	21.03	12.33		4.92	
Animal manure	0.00	19.23	-19.23		0.00	25.99	4.25	-25.99		-4.25	
Pesticides (kg A.I./ha)				**					**		
Insecticides	0.12	0.12	0.00		0.27	0.13	0.11	0.15		0.16	
Herbicides	0.45	0.26	0.19	***	0.41	0.19	0.20	0.21	***	0.20	
Molluscicides	1.55	0.30	1.25		0.14	0.17	0.25	-0.04		-0.11	
Fungicides	0.03	0.03	0.00		0.00	0.01	0.05	-0.01		-0.05	
Rodenticides	0.00	0.00	0.00		0.03	0.00	0.01	0.03		0.03	
Fuel (liters/ha)	214.73	221.44	-6.71		55.89	17.37	49.18	38.51	***	6.71	
Oil (liters/ha)	4.43	1.92	2.52		4.31	0.67	1.52	3.64	***	2.79	
Labor (md/ha)	70.23	75.76	-5.53		52.24	59.01	54.03	-6.77		-1.79	
Seedbed prep/sowing	7.26	1.81	5.44		2.38	2.64	1.73	-0.26		0.65	
Land preparation	12.42	8.77	3.65		9.30	10.04	8.88	-0.74		0.41	
Crop establishment	19.96	19.38	0.58		18.46	21.44	19.48	-2.98		-1.02	
Crop care/maintenance	16.69	29.21	-12.51		7.48	6.83	7.96	0.65		-0.48	
Harvesting/threshing	17.07	15.62	1.45		12.81	15.32	14.63	-2.51		-1.82	*
Postharvest	4.09	2.79	1.31		4.19	5.37	3.07	-1.18		1.12	
Field monitoring (md/ha)	12.95	12.85	0.10	*	17.23	11.53	9.94	5.70		7.29	*

Batch 4 baseline profile of rice-based farming households in PhilRice- JICA TCP5: Autonomous Region in Muslim Mindanao

FH Bordey, JC Beltran, and MAM Baltazar

In evaluating the progress of the TCP5, regular baseline and monitoring surveys were done in the sites covered by the project. In this study, Batch 4 baseline information will be reported which will assist the implementers in creating appropriate actions needed to achieve the project's objectives.

The objectives of TCP5 are: (1) train and update the knowledge base of ATs to enhance their capacity to provide training for farmers; (2) train Muslim farmers in rice-based farming technologies utilizing Farmers' Field School approaches; and (3) provide information and education materials to ATs and farmers. Specifically, the project targets that at least 70% of the trained farmers adopt 1 out of 10 rice technologies to be introduced (except in Tawi-tawi) and 70% of those who are trained in vegetable farming adopt at least 2 out of 10 of the introduced technologies.

Highlights:

Sociodemographic profile

- 282 farmer-beneficiaries (FB) and 50 non-participants (NP) were included in the survey.

- Batch 4 TCP5 farmers can be described as mostly middle-aged male (21-40 years old) who lives with an average household size of 6, who have spent 11-25 years in farming, but have not attended formal schooling and any farm-related trainings.

Farm Characteristics

- The average farm size planted with rice was 0.75 hectares during dry season and 0.97 hectares during wet season. Vegetable crops are planted in small areas, usually for their own consumption.

- Majority of the farmers who planted rice were considered upland, though in larger areas like Maguindanao, majority have access to irrigation canals of NIA.

Technology adoption and farm practices

- No rice technology has been adopted by at least 70% of the farmers. For rice technologies/recommendations with almost 50% adoption are recommended varieties, synchronous planting, harvest timing, and rice straw management.

- Vegetables technologies which were easily adopted include recommended vegetable variety (69%), the use of trellises (72%), and pesticides as their last resort (44%). Least followed vegetable technologies were permanent raised plot bed (14%), mulching (8%), and compost (5%).

- Direct-seeding rice was the most common practice of crop establishment. Since most of them used direct-seeding that naturally requires more seeds, NP use around 88 kg of seeds while FB use 79kg.

- When it comes to varieties planted, the most common were SS, Kamahalan, and Tanguiling. These are traditional farmer-named varieties. Farmer-named varieties may have gotten their names from the plant's physical characteristic, yield potential, source, etc. They name their rice because they simply want to remember it.

- NP use slightly less herbicide and insecticide than FB.

- Majority in Tawi-tawi and some in Sulu merely planted vegetables and cassava. Cassava is considered a staple food in Tawi-tawi, though there are also some in Basilan and Sulu that includes cassava as their staple.

Monitoring and evaluation of the PhilRice-JICA TCP5: Autonomous Region in Muslim Mindanao
FH Bordey, JC Beltran, and MAM Baltazar

The 5-year PhilRice-JICA Technical Cooperation (TCP 5) is in its 4th year of implementation. This study aims to capture the effect of TCP 5 in the (1) adoption level of rice and vegetable technologies among farmer-beneficiaries; (2) impact on the rice yield of farmers; and (3) impact on farmers' rice income. Adoption level pertains to the achievement of at least 10 rice technologies being used by at least 70% of the Farmer Beneficiaries (FB). While for vegetable technologies, at least 2 were targeted to be used by at least 70% of the FBs.

The project has reached out remote areas in several municipalities of the 5 provinces of the Autonomous Region in Muslim Mindanao (ARMM). Around 1000 vegetable and rice farmers were trained and provided with farming knowledge, technologies, and tools to improve their farming practices and eventually win over poverty and become food secure.

There were 3 batches of samples considered since 2011.The first year of each batch was the baseline and succeeding years until the project ends will be their monitoring survey round. In addition to FBs, non-participants (NP) were included as control group.

Results of this study point to decreasing adoption of introduced rice and vegetable technologies. There are also indications of minimal changes on yield and rice income of FB. However, the project is in its final stages, where the events can affect the farmers' behavior and decisions in adopting certain technologies. Hence, additional refinements in this stage of implementation are needed to further sustain the project's impacts.

Highlights:

Events that affects farmers' behavior and decisions in adopting technologies

- Batch 1 on its first year, increased its adoption of technologies from 0 to 11 technologies, which surpassed the project's target. This can be attributed to the presence, visibility, and accessibility of the ADOs and other project implementers.

- In year 2 (Batch 1), when the farmer to farmer (FTF) approach was implemented, technology adoption further increased to 13 technologies. The influence of the farmer leader may have possibly contributed in the increase of technology adoption.

- However, on its 3rd year (Batch 1), adoption level of FBs decreased to only 4 technologies. During this stage of implementation, the ADOs' presence was starting to wane from the community and the farmers were expected to become stewards of the group.

- The same patterns occurred among Batch 2 and Batch 3 FBs on its first two years. The presence of the implementers and ADOs and the FTF approach contributed to the increase of adoption of technologies.

- The weaning of the project activities and decreasing number of visits of the ADOs greatly influenced the sustainability of the project's impact.

Decreased adoption of the introduced rice and vegetable technologies among FB

- The least adopted rice and vegetable technologies or recommendations were those that use tools, procedural, and bought.

- In contrast, those with the most number of adopters were simple, free or can earn savings, and are related to accustomed practices.

Minimal changes on yield and rice income

- The trend of the adoption level of the three batches was parallel to their yield. Like in the case of Batch 1 FB, yield increased gradually from 2,466 kg/ha in 2011 to 2,802 kg/ha in 2012, 2,931 kg/ha in 2013 and dropped to 2,470 kg/ha in 2014.

- While Batch 2 and 3 is still on its 2nd and 3rd year, respectively. The trend on their yield and income is still increasing. The supposedly expected drop like from the case of Batch 1 could not yet be verified until the next monitoring round.

Socioeconomic impact of adopting rice combine harvester in the Philippines
IAArida, FHBordey, JCBeltran, IRTanzo, RZRelado, RBMalasa, and MJTAntivo

This study generally aims to provide insights that would lead to sustainable use of rice combine harvester in the Philippines. Specifically, this study aims to assess the perception and level of awareness on combine and the impact of adopting the machine on the productivity and profitability of farmers. Similarly, this study also aims to identify the determinants of combine adoption and determine its social effects.

Highlights:

- Focus Group Discussions (FGDs) were conducted to collect information and insights on the current condition of RCH adoption, issues and problems encountered, as well as its social effects. FGDs on each province consisted of four (4) groups of participants that include farmers who availed combine services (Renters), farmers who have never used combine (Non-user), Agricultural Technologists (ATs), and farm laborers (landless farmers). Participants came from Nueva Ecija (Talavera, Bongabon, Cabiao, Jaen), and Isabela (San Mateo, Cordon, Echague, and Luna).

- Key Informant Interviews (KII) were also conducted to cabecillas, combine service providers, paddy traders, and rice millers in Nueva Ecija and Isabela to determine the perception on social and economic effects in each stakeholders.

- Dry season survey was also conducted to 450 farmers from Nueva Ecija, Isabela, Cagayan, Tarlac, and Pangasinan. Initial calculation showed that total cost of harvesting and threshing was significantly lower by 51% with the use of combine.

- Results from FGDs and KIIs:

a) Awareness of combine:
Most farmers and Agricultural Technologists have known the combine through promotions, field demonstrations, and trade fairs and exhibit sponsored by the Department of Agriculture (DA) and its attached agencies, Philippine Center for Postharvest Development and Mechanization (PhilMech) and Philippine Rice

Research Institute (PhilRice). Manual harvesters who worked in Isabela learned about combine as an alternative machine used for harvesting. This contributed to the increased awareness on combine in Nueva Ecija.

b) Social reasons for adoption/non-adoption:
Farmers used combine due to labor shortage especially during peak harvesting season. However, though it is more convenient to harvest rice using combine, farmers are hesitant to adopt due to labor displacement issue. Majority of manual harvesters are relatives, neighbors, or close friends of the rice farmers. Thus, combine adoption will not only affect laborers' source of income but also their positive relationship with rice farmers. Other farm owners fear that after using combine, farm laborers will no longer make themselves available during land preparation and crop establishment.

c) Economic reasons for RCH adoption/non-adoption:
According to Renters, combine can harvest a hectare of rice field in four hours as compared to use of manual harvesters that takes three days to harvest. Production cost decreased which can be attributed to reduced costs of food and labor. Lodged paddy areas can also be harvested using combine.

Combine service providers offer free bagging and hauling of the paddy, particularly in Isabela and in some parts of Nueva Ecija. Hence, farmers find it more economical, time-saving, and hassle-free.

Non-users claim that this technology greatly affects soil condition of the rice field. Based from their previous observations, farmers experienced difficulty during land preparation of the succeeding season, due to the field's uneven level, particularly when farmers practice rice-other crops or rice-rice-other crops.

d) Social impact of combine adoption:
More than 50 percent of landless farmers were greatly affected due to widespread adoption of combine. Farm laborers are forced to find new jobs in other to sustain the needs of their family. Before, income of manual harvesters was enough to last until the next harvesting season. According to farmer leaders, there were actually no displaced laborers, but their earnings significantly decreased due to fewer farm owners who hire manual harvester. Surprisingly, landless farmers did not hold a grudge to farm owners who opted to rent combine. They understood rice farmers need to immediately harvest especially

during rainy seasons. They are also aware that farmers saved a lot from reduced production costs.

Another observation on combine adoption was decreased production losses. Landless farmers used to collect at least 10 kilograms of paddies that are left in the field after harvesting and threshing activities. At present, collected paddies significantly reduced to 3 kilograms. Now, rice farmers observed that some of farm laborers became more serious and attentive to their work, unlike in the past, when they are usually more relaxed because of no other harvesting alternative.

Overall, rice farmers and farm laborers believe that it is time for the government to promote the technology. This was recommended not only because of the combine's advantages to rice farmers and rice production, but as well as for the government to take action on providing alternative means of livelihood to the affected landless farmers.

III. Policy Research and Advocacy

Project Leader: AC Litonjua

Issues concerning the rice sector can affect the operations and decisions of its major players, i.e., consumers, producers, traders, and input dealers. As a support to these players, the government, then, has to ensure that sound rice-related policies are created and implemented. Crucial to policy-making is the relevant information that serves as the government's guide in addressing issues confronting the sector.

This project investigates the effectiveness as well as the loopholes of the existing rice-related policies. It also studies the existing issues surrounding the industry and proposes policy solutions for these issues. Furthermore, to create policy change, this project delivers and advocates results of policy researches to its intended users through policy briefs, rice industry briefers, policy seminars, media releases, and policy memos. The proponents of this project also actively participate in policy forums and consultations hosted by other government agencies and private institutions. The project also regularly updates the electronic archive of socioeconomic and policy research results, which serves as reference of stakeholders.

Linking Rice Research to Policy and Action
ACLitonjua, FHBordey, JYSiddayao, AGGregorio, and MGNidoy

Information from socioeconomic and policy researches is already available in papers. To create greater impact, information derived from it has to be actively delivered and promoted to rice stakeholders, especially the policymakers. This information can serve as their guide in creating relevant policies, programs, and projects for the rice sector. This study, then, serves to strengthen the link between socioeconomic and policy researches and policymaking.

Highlights:

- Two issues of the policy briefs Rice Science for Decision-makers (RS4DM) were published and distributed to stakeholders. These materials focus on the issues of the Philippines' rice competitiveness vis-à-vis selected Southeast Asian (SEA) countries. These are:

  a) GAME CHANGER: Is PH rice ready to compete at least regionally? This article discusses the existing rice trade, estimates the Philippines (PH) the level of competitiveness in the event of a more relaxed trade policy, and proposes solutions to increase competitiveness of the farmers.

  b) GAME CHANGER: How can the Philippines improve its rice competitiveness? This discusses in details the options that can be adopted to resiliency.

- Co-sponsored a two-day policy roundtable meeting on Improving the agricultural insurance program to enhance resilience to climate change in Southeast Asia. This was held on 29-30 July 2015 in Makati City. The activity aimed at promoting the practice of agricultural insurance in the SEA region and in improving the insurance program to cushion the effect of climate change.

- Prepared and published the proceedings of the policy seminar Is rice research and development worth investing in? This material compiles and documents the paper presentations and discussions during the seminar. This can serves as a reference material to those interested in knowing the role of rice research and development in attaining rice security, and R&D investment issues.

- Completed application of ISBN and property rights to two other seminar proceedings (a) Philippine rice trade policies and rice security: future directions, and (b) Palay, bigas, kanin: managing demand towards sufficiency.

- Updated the rice industry briefer to include 2013/2014 data and information. This serves as a briefing material about the status, performance, and current issues surrounding the rice industry.

- Continued updating of the electronic archive of rice-related reference materials of researchers and other stakeholders. In 2015, the study team uploaded 26 laws, 25 working papers, and 63 news articles in the electronic archive.

Analysis of the Rice Value Chain in the Philippines
AB Mataia, JC Beltran, RG Manalili, BM Catudan, MEJ Fermin and SJ Paran

Despite interventions by the National Food Authority (NFA) to stabilize the rice supply and prices, the rice market has been characterized by “high” prices for the consumers and “low” paddy prices for farmers (Tolentino and Peña DL, 2011). Some analysts attributed the wide price spread to inefficiencies along the rice value chain characterized by high production and marketing costs. In preparation for a liberalized and more competitive rice market in the ASEAN integration, farmers and other market players need to overcome the impediments such as inefficiencies along the rice value chain. This study generally aims to analyze the rice value chain in top 20 major rice producing provinces in the Philippines and identify specific policy directions and strategies needed to improve the rice industry in general, and the specific segments in the value chain in particular. Personal interview with market players (farmers, palay traders, rice millers, rice traders) and service providers was conducted to gather data and information on production and marketing practices and costs, and input and output prices. Information on business enabling environment affecting the performance of the rice value chain was also collected. However, survey data are still to be processed and analyzed.

Highlights:

- Figure 5 shows the several value chains that exist per province however, the most common is shown in Figure 6. Market players are connected along a chain producing, assembling, processing, and marketing or distributing rice to end consumers through a sequenced set of activities. The market actors include providers of material inputs, farmers and cooperatives, agents/assemblers, palay traders, rice millers, rice wholesalers, rice wholesalers-retailers and rice retailers. Each actor performs different activities in the value chain.

- A diversity of rice marketing channels exists for farmers’ palay harvest. They market their palay to market players of the value chain such as agents, palay traders, rice millers, cooperatives, and National Food Authority (NFA). However, only a small percentage of farmers in the sample provinces sell to NFA except in Occidental Mindoro where participation of NFA in the palay procurement is from 50 to 55% of the total palay production in the province. Most of the time palay changes hands immediately or shortly after harvest, which can be explained by the immediate needs of cash of farmers.

- Many farmers choose their marketing channel or outlet freely based on the highest palay price offered. The usual practice is that buyers require a sample of the harvested palay first, before specifying the equivalent price, thus making most farmers price-takers. Palay buying prices however vary based on the percent of moisture content (MC) of grain, that is, the higher the MC, the lower the price. In some cases, buyers downgrade the price by reducing or "reseko" the weight from 3 to 12 kg per sack of palay depending on the MC level. Aside from the quality, the prevailing market price and volume of palay sold are taken into consideration when prices are set.

- Assembling describes the step in the value chain where palay is only assembled, but not yet processed. Most of it takes place immediately after harvest. A relatively common assembling value chain exists between agents who have acquired palay from several farmers for their clients (palay traders, rice millers and sometimes rice traders). Agents usually get a commission fee of PhP0.20/kg. Palay traders are also engaging in assembling in order to sell the assembled palay to rice millers or rice traders. There are also farmer cooperatives that are into assembling where they sell the procured palay to NFA and to some rice millers.

- Milling describes the processing of palay into milled rice and selling it to wholesalers/retailers. This segment in the value chain involves processing players such as rice millers (big and small), cooperatives and traders. Millers and cooperatives, and traders sell the milled rice and custom milled rice, respectively to different wholesalers and retailers either directly or through agents. Majority of the millers and cooperatives sell in the same or adjacent municipality and in most cases, they have business contacts or they hired agents in other provinces and in major cities such as Manila, Cebu, Cagayan de Oro and Davao.

- Marketing/Distribution describes the step in the value chain where milled rice is sold to the end consumer. Wholesalers and retailers are the main players involves in the distribution of milled rice however, rice millers and traders who are mainly engaged in other segments in the value chain, also manage retail outlets in the public market and sell milled rice to consumers.

- Major challenges exist with regard to market prices fluctuation. Peak harvest season decreases prices to low levels. In addition, imported and smuggled rice contribute to falling market prices especially palay prices, thus affecting value chain actors engaged particularly in the distribution and production.

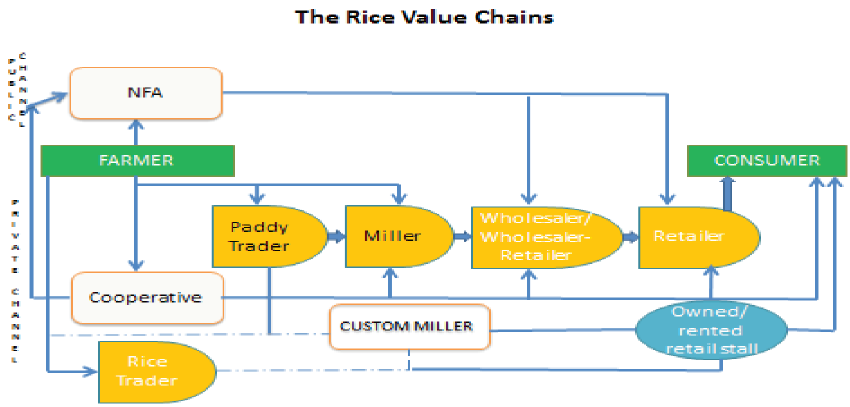

Figure 5. Several value chains in the rice sector, Philippines.

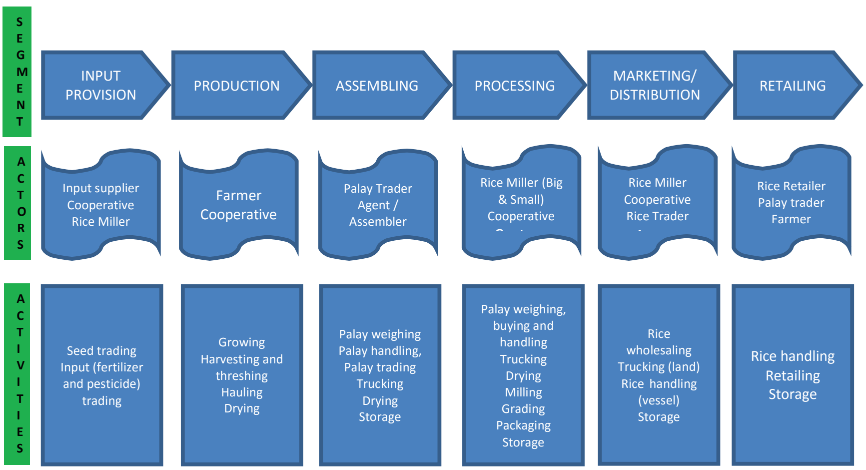

Figure 6. Mapping of specific activities/functions carried out by market players from segments in the rice value chain.

Benchmarking the Philippine Rice Economy Relative to Major Rice Producing Countries in Asia

FH Bordey, PF Moya, JC Beltran, CC Launio, AC Litonjua, RG Manalili, AB Mataia, RZ Relado, RB Malasa, IR Tanzo, CG Yusongco, SJC Paran, MSD Valencia, MRL San Valentin, EB Marciano, and DC Dawe

The Philippines quantitative restriction on rice will expire by 2017 and given the implementation of ASEAN Economic Integration in 2015, the country's rice industry is now facing greater competition. The Department of Agriculture through Philippine Rice Research partnered with the International Rice Research Institute to determine how the Philippines fare relative to its Asian neighbors. This project examines the competitiveness of the Philippine rice economy relative to selected rice-producing countries in Asia: China, Indonesia, India, Thailand, and Vietnam. The specific objectives are as follows: (1) determine various government policies in each selected country that affect the country's competitiveness in rice production and marketing; (2) examine and compare rice yield, input use, and marketing practices in selected Asian countries; (3) examine the cost of producing and marketing commercial rice in the Philippines and in selected Asian countries; (4) examine the cost of producing hybrid rice seed in the Philippines and compare it with those of China and India; and (5) determine the comparative and competitive advantages of the Philippines in the production and marketing of commercial rice and in the production of hybrid seeds with respect to selected Asian countries.

To attain these objectives, a survey in irrigated and intensively cultivated rice areas was conducted in crop year 2013 to 2014. About100 rice farming households were purposively selected in each country and personally interviewed every season using an electronic questionnaire. To assess the marketing system, face-to-face interview with 10 paddy traders, 10 rice millers, and 10 wholesalers in select rice marketing channels in Southeast Asia were conducted. To examine the hybrid seed production, 30 contract growers in major hybrid seed production state or province in China, India, and Philippines were interviewed.

Highlights:

- Profile of an Asian Rice Farmer: Irrigated rice farmers in PH were generally the oldest (58) among those in the different sites. Coupled with having medium-sized farms (about 2 ha) and an average household size of five, the age factor could affect the Filipino farmer's choice of hiring farm workers and his ability to supervise them effectively. PH farmers are not far behind their neighbors in terms of education and training, but this can still be improved. Although more than 60% own the land that they cultivate, still less than half of them own farm machinery. However, PH farmers can learn from their counterparts in other countries who rely more on active rental market for machinery rather than on ownership to ensure wide use.

- Variety, Seeds, and Crop Establishment: Results show that majority of farmers in all study areas planted high-yielding varieties. This implies that yield is a major consideration of farmers in choosing a variety to plant. Aside from yield, farmers considered other factors such length of maturity, resistance to pests and diseases, and higher milling recovery in choosing the variety to be planted. In addition to yield, these are rice qualities that can be considered in breeding.

  Unlike in the Philippines, farmers in comparator countries collectively plant significantly fewer varieties. For Vietnam and India, two exporting countries, this choice was possibly affected by their need to maintain a consistent level of quality. Thailand though used more varieties than these two countries but still relatively fewer compared to Philippines. There are notions that too many varieties have been bred and released in the Philippines, which led farmers to plant plenty of varieties to the disadvantage of millers in terms of achieving optimal milling rates. But this could be their practice in managing pests and diseases through increased diversity. Hence, the option to breed more varieties in the future should carefully balance the needs of different stakeholders across the value chain.

- Fertilizer and Nutrient Management: A Comparison across Asian Rice Producers: Filipino farmers ranked third in the six countries in terms of N application in both seasons. Nevertheless it has the lowest P application; it is second to the least in K application. On average, farmers in the Philippines only apply fertilizer thrice during HYS and twice during LYS, which is less frequent compared with Vietnamese farmers who consistently apply around four times every season. A greater frequency of application could improve the efficiency of nutrient uptake of the rice plant, which could be part of the reason for the higher yield in Vietnam compared with that in the Philippines (see chapter on Rice yield and its determinants).

- Pesticide Use and Practices: Most of the farmers relied heavily on pesticides for rice crop protection. Insecticides and herbicides were the most common types of pesticides used by the farmers in all countries in all cropping seasons. Fungicides were popularly used in Vietnam, Thailand, and Indonesia. Majority of the farmers in the Philippines and Vietnam were users of molluscicides. Rats seem to be a less common problem among rice farmers during the survey as shown by a relatively low percentage of rodenticide users.

Besides India, rice farmers in the Philippines were the least users of pesticides among farmers in other countries. Reasons for its low usage include relatively high prices, strong educational campaigns on dangers associated with pesticides use, and adoption of integrated pest management. On the other hand, farmers in Vietnam, who attained the highest yield, applied more pesticides for crop protection. This should be carefully studied. If Filipino farmers wanted to improve its yield, pest and disease management should be revisited. Are Filipino farmers adequately protecting the rice crop or are they too conservative on their pesticides use? It is certainly a misconception that higher use of pesticides always leads to higher output. However, inappropriate pest and disease management could lead to yield loss in some circumstances. Inapt weed management could lead to 10-15% yield penalty. High weed populations are commonly observed on most Philippine rice farms. Weeds should be prevented or controlled earlier as its injury is more at the early stage of rice crop.

- Labor and Mechanization: Reducing labor costs is one of the main ways to improve competitiveness and increase labor productivity so that rural incomes can increase over the long-run. It is possible to be highly competitive based on labor-intensive production that has low levels of labor productivity. But in such a situation, people will not be wealthy. Thus, there are two key problems with the low level of mechanization in the Philippines. First, it results in higher overall costs, which is what makes the Philippines less competitive. Second, and in many ways fundamentally different, low mechanization keeps labor productivity low and results in low rural incomes.

  Thailand, Vietnam, and China are among the countries with high productivity of labor due to less use of labor input and highly mechanized farming operations. The use of combine harvester required only minimal labor input thus saved time, labor, cost, and potentially reduced losses on harvesting and threshing activities. The common practice of direct seeding method also reduced the labor requirement in crop establishment. As a result, Thailand and Vietnam were able to produce rice more economically than their counterparts due to the adoption of these labor saving technologies.

- Rice Yield and Its Determinants: The analysis of rice yield determinants in irrigated farms in Asia shows various yield-enhancing factors that can be explored particularly in the Philippines. Among inputs, the proper use of herbicide is one area with great potential. The use of hybrid rice particularly during HYS is another option to increase yield. However, the performance of hybrid rice is location specific, hence, careful consideration should be made in its promotion. The efficiency of fertilizer use is another area for improvement. These should be coupled with enhancement in farmers' knowledge through education and training. While there are things that can be done to improve yield in the Philippines relative to its neighbors, it must be noted that a significant cause of yield difference is inherent in the resources available in the countries. These are soil fertility, water availability, and general climate pattern that cannot be replicated. Hence, strategies for increasing yield should also be guided by limitation in resources.

- Costs of Rice Production: Cost analysis shows that producing a kilogram of paddy is more expensive in intensively cultivated and irrigated areas in importing countries like Philippines, Indonesia, and China than in exporting countries like Thailand, Vietnam, and India. This indicates that exporting countries have advantage in terms of cost competitiveness at the farm level compared to importing countries.

- Profitability of Rice Farming: This study demonstrates that rice production in intensively irrigated areas in the major rice producing areas in Asia is profitable considering the positive values of the net returns per hectare. It was also shown that the annual household income from rice farming is more than enough to meet the poverty threshold income for all locations. It is clear from the analysis that profitability of rice farming is greatly influenced by first, the interplay of paddy prices and yield and second, the magnitude of costs of production. Thailand appears to be the most profitable because of its relatively low cost of production, moderate gross revenue, and bigger area cultivated.

- Rice Prices and Marketing Margins: Rice prices in the Philippines were high because of expensive cost of paddy and high GMM. High marketing cost, and high returns to management are the two main factors responsible for high GMM in the country. Marketing cost in the Philippines is high due to lower economies of scale and underutilized rice mills. This twin factors are primarily due to a lower volume of paddy supply. During the survey, the group found that Thailand and Vietnam can also buy paddy from their neighboring countries. Traders in Thailand have additional sources of paddy from Laos while Vietnam can directly buy from

Cambodia. These are possible because of their geographical locations relative to each other.

To sum up, this paper highlights that differences in rice prices come not only from production cost, but also from marketing factors. Hence, Philippines cannot be competitive by enhancing the rice production system alone. Efforts should be parallel in improving its marketing system to be able to compete globally.

- Can Philippine Rice Compete Globally?
  This study shows that Philippines' ordinary white rice (regular milled) is still more expensive than imported rice with similar quality (25% broken rice) even at 35% tariff rate when QR is eliminated. In this respect, Philippine rice can be said as less competitive. Only at FOB prices of about US$450 can Philippine rice start to become competitive given the 35% tariff. Hence, the removal of QR can lead to decline in domestic price of milled rice and eventually to lower price of paddy since the farmers are price takers. To maintain their farm income at pre-liberalization level, their cost of production must be reduced to about PhP 6.97kg-1.

  This could be done by promoting the use of hybrid rice in suitable areas, focusing R&D in producing breakthrough technologies, and considering improvements in management practices, which could increase the yield and reduce the production cost per kilogram. To further reduce the cost, labor-saving technologies such as direct seeding and use of combine harvester can also help. Reducing the production cost will also result to reduced overall marketing cost. Improving the milling recovery through use of varieties with similar grain length and shape and better head rice recovery can contribute further in reducing the processing cost.

Rice Yield Gap and Economic Efficiency in the Philippines

FH Bordey, MGC Lapurga, JC Beltran, IA Arida, WB Collado, and AC Litonjua

This study aims to assess the causes of yield variation across rice producing provinces in the Philippines using the data on PhilRice-PSA (formerly BAS) project on Regular Monitoring of Rice-Based Farm Households Survey (RBFHS). The RBFHS data consist of sample respondents from 33 major rice producing provinces in the Philippines. The reference cropping period is from July to December 2011 (wet season) and January to June 2012 (dry season). There are 4,050 observations included in the data; 2,399 farmers for wet season (WS) and 2,051 farmers for dry season (DS).

Highlights:

- Irrigated farmers produce rice paddy that is 1.26 ton higher than that of rainfed farmers. In addition, yield during dry season (4.1t/ha) is significantly higher compared to that of wet season (3.7t/ha). This could be due to the weather condition wherein typhoons usually traverse the country during the second half of the year.

- Ilocos Norte, Tarlac, Occidental Mindoro, South Cotabato, Compostela Valley and Davao provinces were the consistent top rice yielders for wet and dry season (Figure 7). Nueva Ecija had an average yield of 6.3t/ha in 2012DS while Davao Oriental had the highest rice yield during 2011WS.

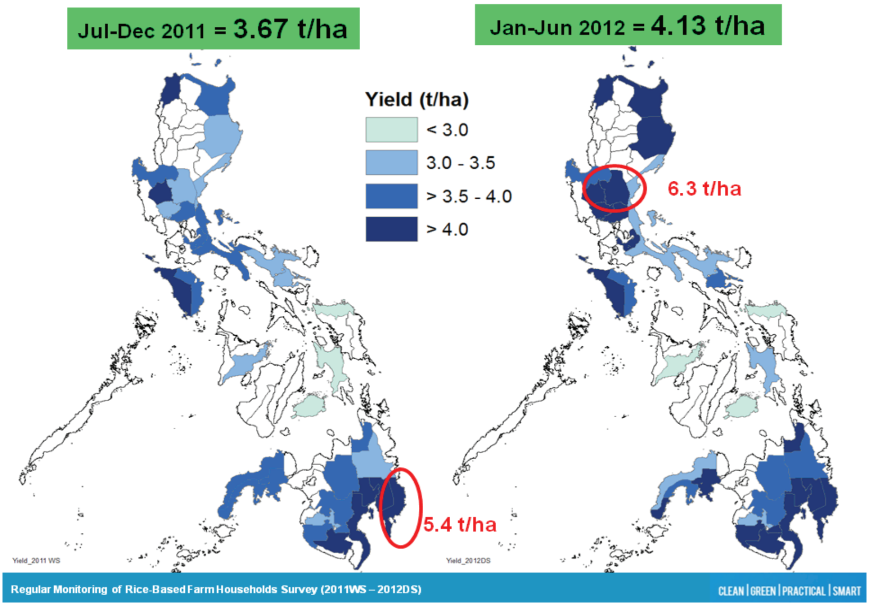

Figure 7. Average rice yield in 33 provinces covered in the RBFHS, by season, 2011 to 2012.

- Initial Cobb-Douglas production function estimates indicate that increase in the use of nitrogen, potassium oxide, herbicide, labor man-day, machine-day, and seed quantity can contribute to the increase of yield. In addition, the use of irrigation sources (other than rain), adoption of high quality seeds, training participation and dry season cropping are significant factors to improve the yield. Holding other factors constant, yield is 30% higher for NIS/CIS users relative to non-users. It is also 48% higher for hybrid seed users relative to non-users.

Abbreviations and acronymns

ABA – Abscicic acid
Ac – anther culture
AC – amylose content
AESA – Agro-ecosystems Analysis
AEW – agricultural extension workers
AG – anaerobic germination
AIS – Agricultural Information System
ANOVA – analysis of variance
AON – advance observation nursery
AT – agricultural technologist
AYT – advanced yield trial
BCA – biological control agent
BLB – bacterial leaf blight
BLS – bacterial leaf streak
BPH – brown planthopper
Bo - boron
BR – brown rice
BSWM – Bureau of Soils and Water Management
Ca - Calcium
CARP – Comprehensive Agrarian Reform Program
cav – cavan, usually 50 kg
CBFM – community-based forestry management
CLSU – Central Luzon State University
cm – centimeter
CMS – cystoplasmic male sterile
CP – protein content
CRH – carbonized rice hull
CTRHC – continuous-type rice hull carbonizer
CT – conventional tillage
Cu – copper
DA – Department of Agriculture
DA-RFU – Department of Agriculture-Regional Field Units
DAE – days after emergence
DAS – days after seeding
DAT – days after transplanting
DBMS – database management system
DDTK – disease diagnostic tool kit
DENR – Department of Environment and Natural Resources
DH L– double haploid lines
DRR – drought recovery rate
DS – dry season
DSA - diversity and stress adaptation
DSR – direct seeded rice
DUST – distinctness, uniformity and stability trial
DWSR – direct wet-seeded rice
EGS – early generation screening
EH – early heading
EMBI – effective microorganism-based inoculant
EPI – early panicle initiation
ET – early tillering
FAO – Food and Agriculture Organization
Fe – Iron
FFA – free fatty acid
FFP – farmer's fertilizer practice
FFS – farmers' field school
FGD – focus group discussion
FI – farmer innovator
FSSP – Food Staples Self-sufficiency Plan
g – gram
GAS – golden apple snail
GC – gel consistency
GIS – geographic information system
GHG – greenhouse gas
GLH – green leafhopper
GPS – global positioning system
GQ – grain quality
GUI – graphical user interface
GWS – genomwide selection
GYT – general yield trial
h – hour
ha – hectare
HIP - high inorganic phosphate
HPL – hybrid parental line
I - intermediate
ICIS – International Crop Information System
ICT – information and communication technology
IMO – indigenous microorganism
IF – inorganic fertilizer
INGER - International Network for Genetic Evaluation of Rice
IP – insect pest
IPDTK – insect pest diagnostic tool kit
IPM – Integrated Pest Management
IRRI – International Rice Research Institute
IVC – in vitro culture
IVM – in vitro mutagenesis
IWM – integrated weed management
JICA – Japan International Cooperation Agency
K – potassium
kg – kilogram
KP – knowledge product
KSL – knowledge sharing and learning
LCC – leaf color chart
LDIS – low-cost drip irrigation system
LeD – leaf drying
LeR – leaf rolling
lpa – low phytic acid
LGU – local government unit

LSTD – location specific technology development
m – meter
MAS – marker-assisted selection
MAT – Multi-Adaption Trial
MC – moisture content
MDDST – modified dry direct seeding technique
MET – multi-environment trial
MFE – male fertile environment
MLM – mixed-effects linear model
Mg – magnesium
Mn – Manganese
MDDST – Modified Dry Direct Seeding Technique
MOET – minus one element technique
MR – moderately resistant
MRT – Mobile Rice TeknoKlinik
MSE – male-sterile environment
MT – minimum tillage
$mtha^{-1}$ - metric ton per hectare
MYT – multi-location yield trials
N – nitrogen
NAFC – National Agricultural and Fishery Council
NBS – narrow brown spot
NCT – National Cooperative Testing
NFA – National Food Authority
NGO – non-government organization
NE – natural enemies
NIL – near isogenic line
NM – Nutrient Manager
NOPT – Nutrient Omission Plot Technique
NR – new reagent
NSIC – National Seed Industry Council
NSQCS – National Seed Quality Control Services
OF – organic fertilizer
OFT – on-farm trial
OM – organic matter
ON – observational nursery
OPAg – Office of Provincial Agriculturist
OpAPA – Open Academy for Philippine Agriculture
P – phosphorus
PA – phytic acid
PCR – Polymerase chain reaction
PDW – plant dry weight
PF – participating farmer
PFS – PalayCheck field school
PhilRice – Philippine Rice Research Institute
PhilSCAT – Philippine-Sino Center for Agricultural Technology
PHilMech – Philippine Center for Postharvest Development and Mechanization
PCA – principal component analysis
PI – panicle initiation
PN – pedigree nursery
PRKB – Pinoy Rice Knowledge Bank
PTD – participatory technology development
PYT – preliminary yield trial
QTL – quantitative trait loci
R - resistant
RBB – rice black bug
RCBD – randomized complete block design
RDI – regulated deficit irrigation
RF – rainfed
RP – resource person
RPM – revolution per minute
RQCS – Rice Quality Classification Software
RS4D – Rice Science for Development
RSO – rice sufficiency officer
RFL – Rainfed lowland
RTV – rice tungro virus
RTWG – Rice Technical Working Group
S – sulfur
SACLOB – Sealed Storage Enclosure for Rice Seeds
SALT – Sloping Agricultural Land Technology
SB – sheath blight
SFR – small farm reservoir
SME – small-medium enterprise
SMS – short message service
SN – source nursery
SSNM – site-specific nutrient management
SSR – simple sequence repeat
STK – soil test kit
STR – sequence tandem repeat
SV – seedling vigor
t – ton
TCN – testcross nursery
TCP – technical cooperation project
TGMS – thermo-sensitive genetic male sterile
TN – testcross nursery
TOT – training of trainers
TPR – transplanted rice
TRV – traditional variety
TSS – total soluble solid
UEM – ultra-early maturing
UPLB – University of the Philippines Los Baños
VSU – Visayas State University
WBPH – white-backed planthopper
WEPP – water erosion prediction project
WHC – water holding capacity
WHO – World Health Organization
WS – wet season
WT – weed tolerance
YA – yield advantage
Zn – zinc
ZT – zero tillage

List of Tables

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