Impact Evaluation, Policy Research and Advocacy Program

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IMPACT EVALUATION, POLICY RESEARCH AND ADVOCACY PROGRAM

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Executive Summary

The Impact Evaluation, Policy Research and Advocacy Program conducts socio-economic and policy research on issues involving the rice industry, and proactively advocates the results in order to help rice policymakers and stakeholders make informed decisions and actions. The program aims to aid achieve rice self-sufficiency, reduce poverty and malnutrition, and enhance the competitiveness of rice science and technology. The program also generates socio-economic information and provides feedback to increase the effectiveness of rice R&D, and hasten the course of technology adoption and adaptation. In 2012, the program implemented 16 studies in 4 projects, namely: (1) Social dimensions of rice-based farming systems; (2) Impact evaluation of rice R&D and related production services; (3) Understanding markets and prices of rice, value-added rice products, and farm inputs; and (4) Policy research and advocacy.

I.Social Dimensions of Rice-Based Farming Systems

Irene R. Tanzo

This project analyzes the social dimensions of rice-based farming systems to understand the course of technology adoption and adaptation. Specifically, this project identifies the technology needs of the farmers; determines the level of adoption of different rice technologies; characterizes the adopters; and examines various stakeholders involved in technology transfer. The information that this project generates can serve as the basis for setting rice R&D priorities, formulate recommendations for fine-tuning rice R&D activities, and the results lead to policy recommendations to hasten technology adoption and adaptation. For 2012, this project implemented three studies, two of which were completed.

Patterns and constraints to adoption of component technologies in PalayCheck® field schools

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To contribute in achieving rice self-sufficiency, the Philippine Rice Research Institute (PhilRice) implemented the Location Specific Technology Development (LSTD) Program in 2010 dry and wet seasons. It used Farmers' Field School and varietal trial as an extension method to promote the PalayCheck® system. PalayCheck® is an integrated system of managing the rice crop using 8 key checks or best practices in rice farming that lead to high yield. However, PalayCheck® can only affect yield to the extent that its component key checks are adopted. This study identified the patterns of and measured the rate of key check adoption in LSTD program sites. It also determined the factors affecting the number of key checks adopted.

Findings:

- Farmers who adopted 6, 7 and 8 key checks during the second season of LSTD implementation (2010 Wet Season or WS) rose to 25, 28, and 20% of respondents compared to 21, 23, and 17% during the first season (2010 Dry Season or DS) respectively. In contrast, the share to total of farmers who adopted five or less key checks reduced in 2010 WS (Table 1).

- The key checks on field leveling (Key Check 2 or KC 2), synchronous planting (KC 3), and harvesting and threshing of the rice crop at the right time (KC 8) were already practiced by farmers even before the introduction of PalayCheck® as more than 80% of farmers attained it during the baseline period in 2009 DS and WS (Table 2).

- The key check on use of high quality seed of recommended variety (KC 1) was the least followed by farmers before and during the conduct of the LSTD program. Nevertheless, it showed the largest increment in adoption rate from 41 to 53% in 2009 to 2010 DS and from 44 to 64% in 2009 to 2010 WS (Table 2).

- Due to the occurrence of El Niño in 2010, the adoption of key check on avoiding excessive water or drought stress (KC 6) dropped from 73% in 2009 DS and WS to 60 and 68% in 2010 DS and WS, respectively. The decline was also observed for KC 2 but to a lesser magnitude (Table 2).

- The factors affecting the number of key checks adopted during the LSTD program implementation was determined using Poisson regression. On average, highly educated and more experienced farmers adopted more key checks. Farmer innovators or those whose farms were used as demonstration plots, were inclined to adopt more key checks than other farmers who participated in the field school. In addition, the higher the rating of Rice Self-sufficiency Officers (researcher-extension worker who established the trials and conducted the training), the more number of key checks adopted by farmers. In contrast, age and ratio of rice income to total household income were negatively related to the number of key checks adopted (Table 3).

Table 1. Number of key check adopted, 2010 DS and 2010 WS

No. of key checks adopted	2010 DS		2010 WS	
	Freq	%	Freq	%
1 key check	3	0	1	0
2 key checks	23	3	8	1
3 key checks	47	5	25	3
4 key checks	109	12	71	8
5 key checks	161	18	132	15
6 key checks	185	21	220	25
7 key checks	199	23	250	28
8 key checks	153	17	173	20

Table 2. Key check achieved by season.

Key checks	Baseline DS		2010 DS		Baseline WS		2010 WS	
	Freq	%	Freq	%	Freq	%	Freq	%
key check 1	362	41	468	53	385	44	560	64
key check 2	798	91	737	84	802	91	779	89
key check 3	714	81	729	83	716	81	749	85
key check 4*	-	-	751	85	-	-	780	89
key check 5*	-	-	619	70	-	-	653	74
key check 6	644	73	525	60	646	73	602	68
key check 7*	-	-	555	63	-	-	600	68
key check 8	763	87	774	88	765	87	767	87

**Note: Key checks not measured during the baseline survey.*

Table 3. Factors determining number of key checks adopted, 2010.

Explanatory Variable	Coefficient	Std. Error	Test of Significance
Constant	1.74	0.06	0.00
Farmer category			
farmer innovator	0.05	0.01	0.00
Sex			
Male	0.02	0.01	0.11
Educational attainment			
high education	0.04	0.01	0.00
Training			
with training	0.02	0.01	0.13
Organizational membership			
with organization	(0.02)	0.02	0.28
Tenure			
with own land	(0.01)	0.01	0.64
Age	(0.00)	0.00	0.09
Number of household members workin in the farm	0.00	0.01	0.56
Farming experience	0.00	0.00	0.00
Farm size	0.00	0.00	0.74
RSO rating	0.01	0.01	0.01
Ratio of rice income to household income	(0.00)	0.00	0.00
(Scale)	.371[b]		

Dependent Variable: number of key cehcks achieved.

*all key checks.

Rice Self-Sufficiency Officers' Role Perception and Job Satisfaction in the LSTD-PalayCheck® Field School Areas

IR Tanzo and CG Yusongco

The Rice Self-sufficiency Officers (RSOs) are the primary movers of the Location Specific Technology Development (LSTD) program. They have undergone intensive, season-long, trainings and were deployed in various areas of the country since 2008. They had set up farmer groups and technology demonstrations in their assigned areas, serving as the research and extension arm of PhilRice in its LSTD program. Considering the critical role the RSOs played, it is important to determine how they perceived their role and their level of job satisfaction as these are good measures of their work performance. Such information will also be important in addressing issues concerning programs of the Institute.

Findings:

- Seventy-seven RSOs responded to the e-survey: majority was female (58%), single (82%) and where all college graduates. The mean age of respondents was 27 years.

- A 15-item role index was developed, describing each role the RSO was expected to perform. The RSO rated each role based on importance using a three-point Likert scale. Majority of the RSOs perceived all the roles as very important as the lowest mean score was 2.57. The roles that received the highest scores were focused on extension responsibilities namely, teaching/demonstrating rice technologies to farmers (3.0), guiding farmers to adopt improved farm practices (2.97), and setting up and developing location-specific technologies (2.96). Almost half (40%) of the RSOs perceived the role of teaching or demonstrating rice technologies to other stakeholders as somewhat important only.

- The RSOs' roles were grouped into six categories and were assessed by the RSOs based on clarity using a three-point Likert scale. All six categories were rated high as the lowest mean score was 2.62. Technology promotion role proved to be very clear to the RSOs as it has a mean score of 2.99. The RSOs role with local institutions and partners were perceived by a quarter of the respondents as somewhat clear only (25%). The research role of the RSOs, which was based on their TOR, should be 50% of their work, was perceived by 29% of the respondents as somewhat clear only.

- A Job Satisfaction Index (JSI) was developed which included 27 items and were categorized into five: 1) general working conditions, 2) pay and promotional potential, 3) work activities, 4) work relationship, and 5) use of skills and abilities. The RSOs rated each item based on their satisfaction using a five-point Likert scale. The item which gave the RSOs the highest satisfaction for their job was their working relationship with farmers (4.44 mean score). The items which gave the RSOs the lowest job satisfaction were status of employment (2.76) and opportunity to advance education (2.78). It is recommended that these factors be considered in similar programs to achieve high job satisfaction and possibly, mitigate personnel turn-over and enhance loyalty.

- The results suggest that the RSOs considered themselves more as extension workers.. It is recommended that in similar research and development programs of the institute, a thorough role discussion of the personnel be done to avoid confusion. It is also suggested that capacity enhancement be more focused on the major role/s of the personnel to hone the needed skills for the work.

- On forging partnerships, the survey and FGD results showed that not all local partners fulfilled the tasks expected of them. This brought disappointment and added work to the RSOs. It is recommended that a memorandum of agreement be made, clearly stating the roles of each stakeholder, when partnerships are expected in similar programs.

II. Impact evaluation of rice R&D and related production services
Alice B. Mataia

This project examines the potential, and actual impacts, of PhilRice research products such as varieties, crop management practices, and farm machineries and equipment on rice yield, farm income, and nutrition and poverty status of rice farming households. The impacts of related production-enhancing services such as irrigation and training were also assessed, with information about impacts communicated to policymakers for appropriate policies and actions. Evidence of impacts was also conveyed to donors to gain more support for rice R&D. The project also provides feedback to researchers for further improvement of rice R&D services and implementation of related production-enhancing projects.

For 2012, four of the studies are completed with concluded terminal reports, organized survey data sets and database systems. Five papers from the four completed studies were presented during 24th PhilRice Rice R&D conference. However, the targeted policy briefs for the completed studies are only partially accomplished and are still at the draft stage.

Baseline assessment of the socioeconomic indicators in the Location-Specific Technology Development-PalayCheck field school areas

RG Manalili, AB Mataia, AC Castañeda, RB Malasa, GORedondo, RZ Relado, RO Olivares, SJC Paran, CMA Tolentino, CP Austria, RV Bermudez, MAM Baltazar, MG Bulanhagui and RF Tabalno

A.Socioeconomic and technological profile of rice farmers in the Location-Specific Technology Development - PalayCheck Field School areas

RG Manalili, AB Mataia, AC Litonjua, RB Malasa, GO Redondo, RZ Relado, RO Olivares, SJC Paran, CMA Tolentino, CP Austria, CG Yusongco, RV Bermudez, MAM Baltazar, MG Bulanhagui and RF Tabalno

This study assessed the baseline socioeconomic characteristics and technological status of rice farmers in the 24 low-yielding irrigated provinces where the Location-Specific Technology Development - PalayCheck® Field School (LSTD-PFS) were conducted. The study covered 3,525 farmer-participants who participated in the weekly conduct of LSTD-PFS. Initial information on the socioeconomic and technological characteristics will be used as basis in the subsequent monitoring and evaluation activities of the project.

Findings:

- Farmer-participants spent almost half of their lives on rice farming. Most of the farmers have formal education, 77% were members of farmers' organization and 74% have attended rice-related training/seminar for the past three years. Sixty-five percent obtained irrigation water from National/Communal Irrigation System (NIS/CIS) and 24% from small scale irrigation systems such as Shallow Tube well (STW), Small Farm Reservoir (SFR) and Small Water Impoundments (SWI). Only 11% depended entirely on rainfall. Only 66% experienced sufficient supply irrigation water for the whole crop year. More than half of the farmers reported access to earthen farm-to-market roads.

- Rice farmers have an average annual total gross household income of P108,170, 45% of which are obtained through rice farming, 37% from non-agricultural and 17% from non-rice agricultural farming.

- Use of high quality seeds (hybrid, registered and certified) and low quality seeds (good and farmer's seeds) had an equal adoption rates (50% each) in both wet and dry seasons. Transplanting was still popular in all sites although direct seeding was common in Panay island, Zamboanga del Norte, Zamboanga Sibugay, South Cotabato and Sultan Kudarat (Figure 1).

- Seeding rate was still high at an average of 92.5kg ha-1, and was higher in provinces where direct seeding was practiced. These include

Aurora, Aklan, Antique, Capiz, Iloilo, Negros Occidental, Zamboanga del Norte, South Cotabato and Sultan Kudarat. High seeding rate was recorded in Bulacan during WS only. Capiz recorded the highest seeding rate of 190.35kg ha-1 for DS and 192.83kg ha-1 for WS or equivalent to 4.75-4.82 bags of 40-kilogram per bag of seeds. Cagayan recorded the lowest seeding rate at an average of 43.04kg ha-1 during DS and 48.25 kg ha-1 during WS. Other provinces with low seed usage include Apayao and Davao del Norte (Figure 2).

- Farmers used 60-40-10kg NPK ha-1 during DS and 56-13-9kg NPK ha-1 for WS and were still way below the recommended rates. A good observation is the minimal usage of pesticides among farmers. Labor use was 50 man-days ha-1 during DS and 49 man-days ha-1 during WS, provided by hired (42-47%), permanent (4-5%) and non-hired (49-53%) labor.

- Technologies on nutrient management that were least adopted by farmers which include the use of LCC and MOET, and fertilizer application based on the results of soil analysis. Other technologies with low rates of adoption include 400sq.m. seedbed size, and straight row planting with 20cm x 20cm planting distance.

- Major pest and disease problems encountered by farmers include stemborer, rice bug, black bug, rodents,Golden Apple Snails (GAS) and tungro. Typhoons had affected rice farms as reported by 6% during DS and 25% during WS, while drought was experienced by 13% during DS and 7% during WS.

- Technologies and practices on seed quality, crop establishment and nutrient management should be given more emphasis during the conduct of PFS in the low-yielding irrigated provinces, as these technologies were the least adopted by farmers. Investments on infrastructures such as the improvement and rehabilitation of irrigation facilities and the construction of good farm-to-market roads are also of considerable importance, which may pave the way for the higher adoption of PalayCheck® technologies and other new technologies in rice production.

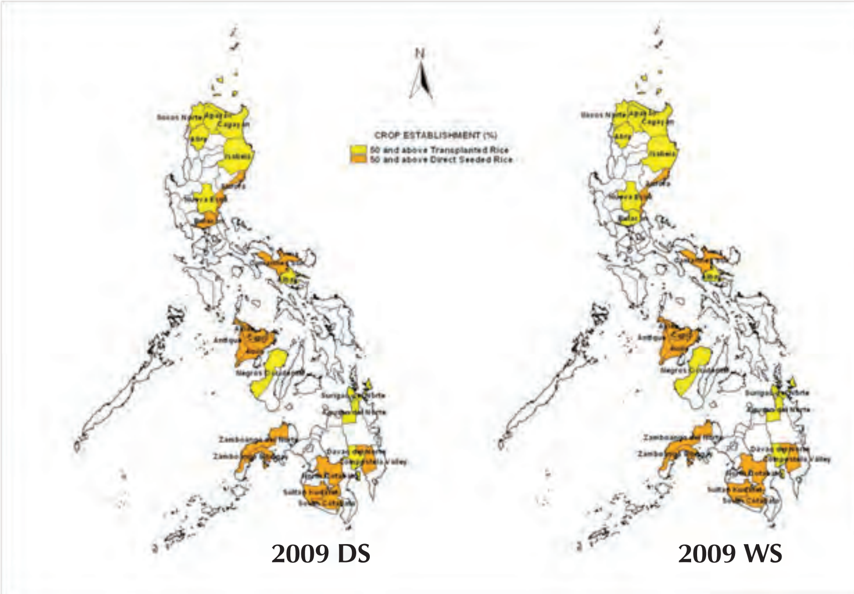

Figure 1. Geographical distribution of method of crop establishment used by farmers in the LSTD-PFS areas, 2009 DS and 2009 WS.

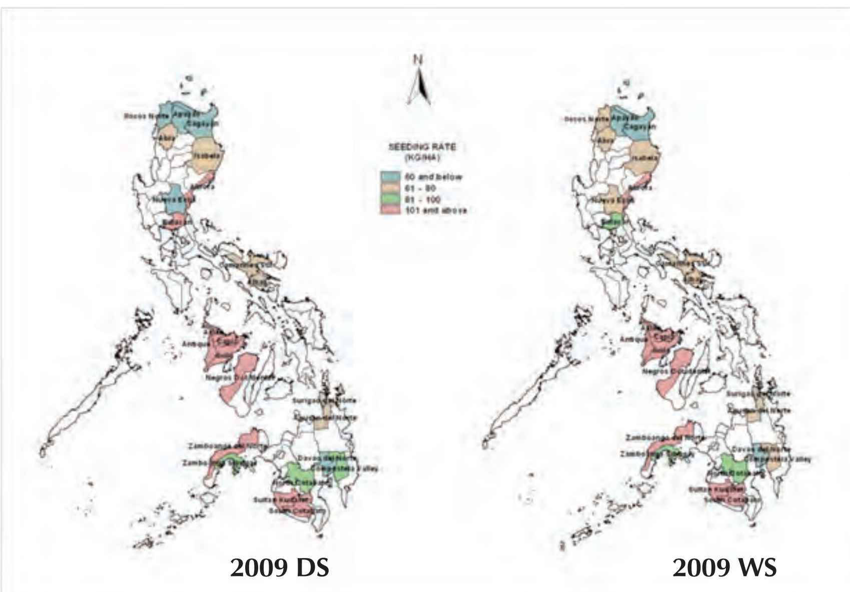

Figure 2. Distribution of average seeding rate by province, LSTD-PFS areas, 2009 DS and 2009 WS.

B. Productivity, profitability and technical efficiency of rice farming Location-Specific Technology Development-PalayCheck field school areas

RG Manalili, AC Litonjua, AB Mataia, RB Malasa, GO Redondo, RZ Relado, RO Olivares, SJC Paran, CMA Tolentino, CP Austria, CG Yusongco, RV Bermudez, MAM Baltazar, MG Bulanhagui and RF Tabalno

Productivity and profitability are the two most important indicators in assessing the success or failure of any crop production. Baseline assessment of rice productivity and profitability prior to the implementation of LSTD-PFS is important to establish if farmers have the incentive to expand rice production. It is also equally important to know if farmers used available resources to maximize their rice outputs. This study measured productivity, profitability, and technical efficiency of rice farmers in the LSTD-PFS areas during 2009 dry season (DS) and 2009 wet season (WS).

Findings:

- Baseline average yield of farmers was 3.86mt ha-1 and 3.63mt ha-1 during DS and WS, respectively. High average yield were observed in Nueva Ecija (6.57mt ha-1) and Davao del Norte (4.92mt ha-1) for DS and Davao del Norte (5.35 mt ha-1) and Compostella Valley (5.16mt ha-1) for WS. Around 19% attained yields greater than 5 mt ha-1 during DS and 17% during WS, and these farmers were mostly from Nueva Ecija, Davao del Norte and Compostella Valley. Farmer innovators yield were 7-8% higher (4.14mt ha-1 for DS and 3.89mt ha-1 for WS) than yield of participating farmers (3.82mt ha-1 for DS and 3.59mt ha-1 for WS). Average production was 4.42mt during DS and 4.15mt during WS. Marketed surplus was 2.16mt ha-1 for DS and 1.96mt ha-1 for WS. Higher marketed surplus were observed with farmer innovators and in provinces with higher yields in both seasons.

- The relatively low yield and production was attributed to major problems encountered by the farmers. Major pest and disease problems include stem borers, rice bugs, black bugs, rodents, Golden Apple Snails and tungro. Rice farms were also affected by typhoons during WS (6-25%) and drought during DS (7-13%).

- Baseline profitability in rice production in the LSTD-PFS areas was low with 0.50 and 0.46 net profit-cost ratios during DS and WS, respectively. This means a net return of P0.50 and P0.46 was received by the farmers for every peso invested in rice farming during DS and WS, respectively. Net income realized by farmers was higher during DS at P16, 558ha-1 compared to P13,943ha-1 during WS, due to higher yield and higher output price. Rice farming was more profitable for farmer innovators (P17,130ha-1 for DS and P14,381ha-1 WS) than the participating farmers (P10,802ha-1 for DS and P9,824ha-1 for WS) even if they had higher costs of production in both seasons. Across provinces, rice farming is less profitable in Abra, Ilocos Norte, Aklan, Capiz, and Negros Occidental due to low net income and net profit-cost ratios (Table 4).

- Profitability analysis across ecosystem showed that rice farming is still more profitable in the irrigated farms (P17,130ha-1 for DS and P14,381ha-1 for WS) than in rainfed farms (P10,802ha-1 for DS and P9,824ha-1 for WS) due to higher yield and higher farmgate price of palay.

- The mean baseline technical efficiency of farmer-participants ranged from 45% to 60%, which indicated great opportunity to raise productivity by improving farmers' management skills. Hence, an extension system, like LSTD-PFS, was useful in these areas. Rainfed farmers generally have lower technical efficiency or TE (45.6-48.0%) compared to irrigated farmers (58.5-56.5%) and therefore have a greater need for training. Farmer innovators also had higher TE levels than the participating farmers even before the LSTD-PFS was implemented. Irrigated farmers are more technically efficient during the dry season whereas rainfed farmers have better efficiency during the wet season (Table 5).

- Technical efficiency of irrigated farmers was positively affected by gender, membership to organization, training attendance, and season while negatively related to age. Education and attendance to training positively affects the TE of rainfed farmers (Table 6).

Table 4. Provincial summary of baseline costs and returns analysis in rice production in the LSTD-PFS areas, 2009 DS & 2009 WS.

Province	2009 DS							2009 WS						
	Yield ($t\ ha^{-1}$)	Price (P/kg)	Gross Returns (P/ha)	Total Costs (P/ha)	Cost/ kg	Net Income (P/ha)	Net Profit-Cost Ratio	Yield ($t\ ha^{-1}$)	Price (P/kg)	Gross Returns (P/ha)	Total Costs (P/ha)	Cost/ kg	Net Income (P/ha)	Net Profit-Cost Ratio
Philippines	3.86	12.37	49,437	32,878	12.37	16,558	0.50	3.63	11.92	44,452	30,509	11.92	13,943	0.46
Abra	3.42	12.58	41,957	36,763	11.16	5,194	0.14	2.59	12.16	28,962	32,252	13.67	(3,290)	(0.10)
Apayao	3.87	11.79	46,182	31,496	8.12	14,686	0.47	3.36	11.00	36,262	28,456	8.50	7,807	0.27
Ilocos Norte	4.24	13.74	54,046	50,083	12.96	3,963	0.08	2.61	11.91	28,592	37,625	15.69	(9,033)	(0.24)
Isabela	3.70	11.56	44,048	29,216	7.78	14,831	0.51	3.17	10.91	36,442	26,830	8.23	9,612	0.36
Cagayan	3.96	12.57	48,679	28,763	7.32	19,916	0.69	3.22	11.37	36,280	25,141	7.84	11,139	0.44
Aurora	4.14	12.74	56,035	33,546	7.80	22,490	0.67	3.88	12.64	50,393	32,008	8.02	18,385	0.57
Bulacan	4.27	13.20	56,395	40,333	9.56	16,062	0.40	3.24	12.21	37,989	32,704	10.62	5,285	0.16
Nueva Ecija	6.57	13.86	88,239	53,997	8.46	34,242	0.63	4.31	11.87	52,800	39,098	9.04	13,702	0.35
Albay	4.26	12.31	54,103	31,487	7.17	22,615	0.72	3.56	10.88	48,743	27,991	8.10	20,753	0.74
Camarines Sur	3.60	11.69	55,556	30,978	8.14	24,578	0.79	3.29	11.32	40,387	27,901	7.87	12,486	0.45
Aklan	3.00	12.30	36,427	39,031	12.82	(2,605)	(0.07)	3.34	12.87	38,517	37,065	11.59	1,452	0.04
Antique	4.01	11.30	46,330	32,868	8.06	13,462	0.41	3.76	11.20	41,033	29,960	8.26	11,072	0.37
Capiz	2.75	10.40	27,430	27,295	10.42	135	0.00	2.61	10.83	26,861	26,058	10.67	803	0.03
Iloilo	3.44	11.55	39,295	31,356	9.31	7,939	0.25	3.56	11.64	40,646	29,028	8.39	11,618	0.40
Negros Occidental	3.08	12.30	36,175	31,190	10.38	4,984	0.16	3.31	11.72	37,422	36,063	11.23	1,358	0.04
Zamboanga del Norte	3.73	12.09	43,230	27,848	7.73	15,382	0.55	4.00	11.52	44,724	30,087	7.73	14,637	0.49
Zamboanga Sibugay	3.07	12.47	37,648	19,916	6.72	17,733	0.89	2.80	12.40	32,407	19,338	7.55	13,069	0.68
Davao del Norte	4.92	13.52	67,810	39,909	8.09	27,901	0.70	5.35	13.01	68,598	38,257	7.32	30,341	0.79
Compostella Valley	4.06	13.65	54,954	34,940	8.66	20,014	0.57	5.16	12.66	63,121	35,408	7.09	27,712	0.78
North Cotabato	4.35	12.43	53,812	30,548	7.14	23,264	0.76	4.24	12.34	52,164	29,552	7.02	22,612	0.77
South Cotabato	4.34	13.55	55,545	33,909	8.33	21,636	0.64	4.75	13.51	61,429	33,671	7.54	27,758	0.82
Sultan Kudarat	3.90	12.85	49,925	31,656	8.24	18,269	0.58	4.17	12.74	52,137	32,094	7.89	20,043	0.62
Agusan del Norte	4.28	13.25	55,034	41,540	10.14	13,494	0.32	3.87	12.83	48,466	38,595	10.32	9,871	0.26
Surigao del Norte	3.95	13.06	50,285	40,651	10.58	9,635	0.24	3.30	12.20	39,441	37,237	11.89	2,204	0.06

Notes: DS - Dry Season, refers to January to June harvest WS - Wet Season, refers to July-December harvest

Table 5. Technical efficiency (%) by farmer classification and season, 2009.

Farmer Classification	Irrigated		Rainfed	
	2009 DS	2009 WS	2009 DS	2009 WS
Farmer Innovators	60.0	58.4	59.4	56.1
Participating Farmers	58.3	56.2	44.4	47.3
ALL FARMERS	58.5	56.5	45.6	48.0

DS - refers to January-June harvest WS - refers to July-December harvest

Table 6. Factors affecting technical efficiency of respondents, 2009 DS and WS.

Explanatory Variables	Irrigated			Rainfed		
	Coefficient	Std. Error		Coefficient	Std. Error	
Gender[a]	0.0108	0.0053	*	0.0149	0.0146	
Age	-0.0005	0.0003	*	-0.0012	0.0007	
Farming experience (no. of years)	0.0003	0.0002		0.0010	0.0006	
Education (no. of years)	0.0013	0.0007		0.0049	0.0021	*
Membership to organization[b]	0.0120	0.0062	*	-0.0024	0.0139	
Attendance to training[c]	0.0173	0.0057	**	0.0481	0.0144	**
Season[d]	0.0235	0.0049	**	0.0013	0.0129	
contant term	0.5234	0.0154	**	0.4036	0.0423	**

*,** - means significant at 5% and 1% alpha.

[a] - dummy variable with value of 1 if male, 0 if female.

[b] - dummy variable with value of 1 if farmer is a member of organization, 0 if not a member.

[c] - dummy variable with value of 1 if farmer has attended a training in the last 3 years, 0 otherwise.

[d] - dummy variable with value of 1 if DS, 0 if WS.

C. Trends in adoption of rice varieties in the Philippines

CC Launio and RG Manalili

Seeds are one of the most important inputs in rice production. Improvement in rice variety is considered as one of the major strategies to increase productivity, improve farm profitability, and reduce malnutrition. Much of the funds for rice research and development in the Philippines had been devoted to development and diffusion of improved rice varieties. This study analyzed the trends in rice variety diffusion adoption in farmers' field in the Philippines. It used data from the rice-based farm household survey (RBFHS) conducted in 1992 WS, 1993 DS 1996 WS, 1997 DS, 2001 WS, 2002 DS, 2006 WS and 2007 DS. Information on variety planted from the location-specific technology development (LSTD) baseline survey of rice-based farmers among low-yielding rice areas covering 2009 WS and DS were also used.

Findings:

- Increasing trend in the use of recently-released rice varieties, and decreasing trend in the use of early generation modern varieties occurred from 1996 to 2007 (Table 7). PSB Rc18, PSB Rc82, PSB Rc10, NSIC Rc128, NSIC Rc122, and NSIC Rc146 were the top varieties planted in terms of varietal share.

- In 2009 DS, NSIC Rc128 occupied 8-10% of the total area planted in low-yielding irrigated rice areas (Table 8). NSIC Rc146, locally named PJ7 having moderate resistance to Stemborer deadheart, was planted by farmers as early as the 2006 WS survey. NSIC Rc146 was among the more widely-planted inbred in the 2009 survey in low-yielding irrigated areas. Other inbred varieties that have been increasingly popular during the survey period were: NSIC Rc130, NSIC Rc138, NSIC Rc150, NSIC Rc152, and NSIC Rc160.

- Hybrid rice area share was around 8% in 2006 WS, and 9% in 2007 DS. While IRRI-bred varieties were dominant in farmers' fields, the share of varieties bred by Philippine Rice Research Institute, Magsasaka at Siyentipiko para sa Pag-unlad ng Agrikultura, and private companies increased in the recent years.

- Farmers do not necessarily plant varieties recommended for their specific ecosystem. While the trend in the percentage of rainfed areas planted to irrigated-recommended varieties is decreasing, it is still significant at 71% in the 2007DS. Even in 2009 crop year, 10-12 rainfed-recommended varieties were planted to around 2-3% of irrigated areas.

- On aggregate variety replacement, the weighted average age of varieties planted was between 8-11 years, which varied widely among provinces that ranged 5-17 years.

- On spatial diversification, greater number of varieties comprising lesser proportion of area planted in the more recent surveys was observed. The diversity widely differed among provinces.

Table 7. Trend in variety group share in area planted, every 5 years, 1992-2007, Philippines.

Variety group*	1992 WS	1993 DS	1996 WS	1997 DS	2001 WS	2002 DS	2006 WS	2007 DS
Inbred								
1966 to 1975	2.8	1.5	1.8	1.9	0.5	0.1	0.4	0.7
1976 to 1985	59.8	54.2	32.9	27.4	21.4	19.8	5.9	5.6
1986 to 1995	25.2	30.9	53.1	55.4	52.5	39.2	41.2	35.3
1996 to 2005	0.0	0.0	0.7	1.3	8.7	19.5	24.5	28.8
2006 to 2011	0.0	0.0	0.0	0.0	0.0	0.0	2.1	3.7
Hybrid	0.0	0.0	0.0	0.0	0.3	0.1	7.9	8.7
Masipag	0.0	0.0	2.2	2.5	5.3	6.9	3.6	2.9
Traditional	7.1	7.7	0.4	0.5	5.4	4.6	0.2	0.9
Unclassified	5.2	5.7	9.0	10.9	6.0	9.9	14.2	13.4

*Variety group based on year of variety release;
DS-dry season; WS-wet season

Source of raw data: RBFHS survey

Table 8. Variety adoption in irrigated low yielding rice areas, 2009 CY, Philippines.

Variety	Year Released	Breeding Institution	DS 2009 (n=3498)			WS 2009 (n=3499)		
			Percent of Farmers	Area share	DS Rank	Percent of Farmers	Area Share	WS Rank
NSIC Rc128	2004	PhilRice	9.18	10.12	1	7.14	7.63	4
PSB RC18	1994	IRRI	11.81	10.10	2	11.83	11.67	1
PSB Rc10	1992	IRRI	9.55	9.99	3	6.94	6.71	5
PSB RC82	2000	IRRI	9.69	9.39	4	10.15	9.24	2
M3			9.38	9.26	5	7.83	7.65	3
NSIC RC146	2006	PhilRice	4.75	4.24	6	4.83	4.42	6
NSIC RC122	2003	IRRI	3.49	3.25	7	4.03	3.73	8
NSIC Rc132H	2004	SL Agritech	2.43	2.86	8	0.74	0.83	22
NSIC Rc138	2006	PhilRice	2.49	2.55	9	2.34	2.44	11
Blonde			2.54	2.10	10	2.31	2.13	12
NSIC Rc130	2004	PhilRice	1.80	2.06	11	1.29	1.21	20
PSB RC14	1992	UPLB	2.29	2.05	12	2.23	1.93	15
NSIC Rc152	2007	PhilRice	1.57	1.99	13	3.00	3.47	9
NSIC Rc160	2007	PhilRice	2.00	1.97	14	3.97	4.02	7
NSIC RC150	2007	PhilRice	1.46	1.90	15	1.60	2.10	13
NSIC RC158	2007	IRRI	0.97	1.14	19	2.17	2.51	10
NSIC RC120	2003	PhilRice	0.97	0.48	27	1.00	1.97	14

Source: LSTD Baseline survey, 2009

D.

D. Anthropometric assessment of malnutrition among 0-12 year old children in the rice farming areas in the Philippines
AB Mataia,RO Olivares and SJ Paran

Child malnutrition is a continuing challenge in the Philippines. This study assessed the rate of malnutrition and overall prevalence of undernutrition among 0-12 years old children in the rice farming areas in the Philippines. A total of 2472 children (1,189 boys and 1,283 girls) in 24 rice producing provinces were measured. Commonly used undernutrition indicators: underweight, stunting and wasting, as well overnutrition indicators: overweight and obese were used to evaluate the nutritional status of the studied children following the recommended cut-off points from Child Growth Standard (CGS) and WHO Reference 2007. Additionally, the Composite Index of Anthropometric Failure (CIAF) was used to determine the overall prevalence of undernutrition. To measure malnutrition, the Z-score or Standard Deviation (SD) system recommended by WHO was used. Svedbergs' model of six groups of children was used for assessing CIAF.

Findings:

- Among 0-12 years old children, malnutrition exists in the sample rice producing provinces. Many of these children were suffering from undernutrition or overnutrition, however undernutrition was more prevalent especially among less than 5 years old wherein in every 100, 26 are underweight, 46 were underheight, 16 were wasting and 16 were overweight. In age groups 6-10 and 11-12 years old, 6 in every 10 were stunted while underweight and overweight were of low magnitude. (Table 9).

- The CIAF showed a very high magnitude of children with anthropometric failures with 57%, 50% and 41% of aged 0-5, 6-10 and 11-12 years old were sufferring from undernutrition, respectively (Table 10).

- The provinces with the highest magnitude of total undernourished children relative to the national average in all age groups were North Cotabato, South Cotabato, Zamboanga Sibugay and Camarines Sur. Poverty was one one of the reasons of the high incidence of malnutrition in the rice farming areas with 63% and 51% of the rice farming households are earning below the annual per capita poverty and per capita food treshold, respectively. The educational level of household heads, where majorirty were elementary and high school levels, have significant positive association with malnutrition.

- To improve health and nutrition status of 0-12 years old children in the rice farming areas, adequate attention must be focused in areas that have high potential to reduce poverty and malnutrition or undernutrition in the rice farming communities, namely: (1) accelerate rice farm productivity and improve input use efficiencies; (2) identify promising livelihood alternatives to other household members; (3) encourage adoption of economically viable alternative farming systems that can provide guaranteed high income; (4) capacitate the household head on proper nutrition and (5) implement specific nutrition program. Differences in magnitude of malnutrition or undernutrition also exist across rice producing provinces, which suggest varying needs. Specific interventions is therefore required to deliver such need differences. For example, a very high magnitude of CIAF or total undernourished children were noted in the provinces in Bicol and Mindanao.

Table 9. Prevalence of malnutrition among 0-12 years old children, Philippines

Category of Malnutrition	AGE GROUP BY SEX								
	0-5 yrs old (%)			6-10 yrs old (%)			11-12 yrs old (%)		
	Boys	Girls	All	Boys	Girls	All	Boys	Girls	All
Underweight / Thin	14.0	11.9	25.9	4.9	3.6	8.5	5.4	4.8	10.2
Wasting / Severe Thinness	8.9	8.2	17.1	6.7	5.4	12.1	7.1	5.2	12.3
Stunting	23.7	22.7	46.4	33.2	28.3	61.5	30.9	26.5	57.4
Overweight	8.0	7.6	15.6	5.2	5.4	10.6	6.3	4.6	10.9
Obese	-	-	-	7.7	5.4	13.1	3.0	2.9	5.9

Table 10. Total children with anthropometric failures by age group, all provinces.

Group	Age Group (in no. of years)					
	0-5		6-10		11-12	
	(n)	(%)	(n)	(%)	(n)	(%)
No Anthropometric Failure	403	43.4	537	50.4	282	58.9
With Anthropometric Failures	525	56.6	528	49.6	197	41.1

Seasonal monitoring of socioeconomic indicators in Location-Specific Technology Development-PalayCheck field school areas

AC Castañeda, SJ Paran, CP Austria, RO Olivares, AB Mataia, RG Manalili, RB Malasa, CMA Tolentino, GO Redondo, RZ Relado, RVBermudez Jr., MAM Balatazar and MG Bulanhagui

A. Monitoring the yield, profit, input-use, and technical efficiency in LSTD-PFS farmers

AC Castañeda, SJ Paran, CP Austria, RO Olivares, AB Mataia, RG Manalili, RB Malasa, CMA Tolentino, GO Redondo, RZ Relado, RV Bermudez Jr, MAM Balatazar, MG Bulanhagui

This study documented and assessed the seasonal productivity and profitability indicators in LSTD-PFS areas. To monitor the socioeconomic indicators in the LSTD-PFS areas, three Farmer Innovators (FIs) and nine Participating Farmers (PFs) were interviewed for two seasons. All FIs were included in the survey while PFs were randomly selected using simple random sampling.

Findings:

- LSTD-PFS farmers had yields that are significantly higher in 2012 DS than in 2010 WS resulting in higher gross returns in the earlier season. In terms of input costs, farmers spent less on fertilizer, threshing, irrigation, food, and fuel in the WS than in the DS. Nevertheless, farmers still had slightly higher profit in the WS 2010, even though the difference is not statistically significant (Table 11).

- During the implementation of LSTD program, FIs exhibited efficiency levels of 67 and 65 percent in 2010 DS and WS (Table 12). Meanwhile, PFs displayed 65% technical efficiency in both seasons. In the first season of LSTD implementation, there was still a slight difference between the efficiency levels of PFs and FIs but this disappeared in the second season indicating that PFs' technical efficiency had already caught-up. This suggests that the LSTD program could have positive effect on the technical efficiency of PFs.

Table 11. Cost and Returns of LSTD-PFS Farmers, Dry Season and Wet Season 2010.

PARTICULARS	DS 2010 n = 1,209	WS 2010 n = 1,209	
Yield (kg/ha)	4.05	4.30	**
Price	13.14	12.04	**
Gross Returns (PhP/ha)	52,966.44	51,851.39	
Production Costs (PhP/ha)			
Seeds	2,047.20	2,046.18	
Labor	11,183.02	11,087.71	
Fertilizer	4,383.33	4,032.94	**
Pesticides	1,695.48	1,720.25	
Irrigation	1,033.41	838.11	**
Food	1,227.65	1,101.15	*
Transportation	248.95	261.82	
Land rent	4,186.81	3,918.01	
Machine & animal rentals	244.08	268.88	
Interest	572.04	675.40	
Fuel	2,180.89	875.56	*
Others	60.31	50.37	
Total production cost**	35,841.15	33,400.81	**
Net profit (PhP/ha)	17,125.29	18,450.58	
Net profit-cost ratio	0.64	0.66	

*,** - means significant at 5% and 1% alpha, respectively.

Table 12. Technical efficiency of LSTD-PFS farmers, 2010 DS and WS.

Farmer Classification	DS 2010		WS 2010	
	No. of Farmers	Technical Efficiency	No. of Farmers	Technical Efficiency
Farmer Innovators	182	0.6695	181	0.6534
Participating Farmers	542	0.6480	524	0.6547
All Farmers	724	0.6534	705	0.6544

B. Comparative analysis of productivity and profitability of farmers: With and without LSTD-PFS

This study compared the performance of participating farmers in LSTD sites to a group of farmers in the same areas but who are not participants of the training. To do so, 178 non-participating farmers from Bulacan, Davao del Norte, and Iloilo were interviewed for the with-and-without comparison of productivity and profitability.

Findings:

- Comparison of yield, and costs and returns of participants and non-participants shows that the average WS-2010 yield of LSTD-PFS participants is higher than non-participants, resulting in better gross income (Table 13). However, these farmers incurred almost the same costs. Nevertheless, LSTD-PFS participants still received higher profits than their counterparts. This implies that the effect of LSTD-PFS was more on increasing farmers' yield than on substantial reduction of production costs to non-participants.

- Technical efficiency results for the with-and-without analysis (Table 14) shows that in the WS, farmers from Bulacan, Iloilo, and Davao del Norte had almost the same efficiency. Only 0.01% difference was recorded in TE scores. Since non-participants are from the same barangay with the participants, information on best farming practices could have also reached them. This could imply that there is good information sharing within the sampled barangays in these provinces.

Table 13. Costs and returns of rice production, LSTD-PFS participants and non-participants in selected provinces, 2010 WS.

Items	Participants (n=290)	Non-participants (n=178)	
Average Area	1.53	1.34	*
Returns			
Yield (mt ha^{-1})	4.46	4.13	*
Price (PhP kg^{-1})	11.93	11.95	
Gross Return (PhP ha^{-1})	53,394	49,515	*
Costs (PhP ha-1)			
Seed	2,068	2,152	
Fertilizer	4,333	4,121	
Pesticides	1,855	1,936	*
Labor (Hired and Imputed)	19,218	18,199	*
Machine Rental	195	234	
Land Rental	3,154	3,636	
Irrigation Fee	987	1,068	
Food	938	933	
Fuel and Oil	950	973	
Transportation	248	213	
Interest on Capital	662	986	*
Other Input Cost	80	41	
Total Production Cost (PhP ha^{-1})	34,687	34,493	
Cost per Kilogram (PhP kg^{-1})	7.85	8.40	
Net Profit	18,708	15,022	*

Source: Own survey

* - mean differences are statistically significant at 5% alpha.

Table 14. Technical efficiency of LSTD-PFS participants and non-participants in selected provinces, 2010 WS.

Farmer Classification	No. of Farmers	Technical Efficiency
Participants	290	0.5866
Non-participants	178	0.5970

Impact assessment of the Location-Specific Technology Development-PalayCheck Field School (LSTD-PFS)

AB Mataia, R Olivares, RG Manalili, RB Malasa, AC Litonjua, GO Redondo, RZ Relado, CP Austria, SJ Paran, CMA Tolentino and RF Tabalno

This study assessed the actual, and likely future impacts, of the LSTD-PFS project after two seasons of implementation in 24 rice producing provinces in the Philippines. This provided insights and important evidence of the project's impacts. The comparison of indicators "before and after" the project implementation was used as framework in assessing impacts. The "before and after" scenario used the baseline data, which measured the impact indicators before the project intervention, and the monitoring data that measured the same during the two-season implementation.

Findings:

Overall analysis showed that the LSTD program exhibited positive impacts in 2010 relative to prior its implementation in 2009.

- The conduct of a PalayCheck field school facilitated the adoption of key checks where 18% of the farmers completely adopted the 8 key checks while majority adopted different combinations of key checks. Adoption of the individual key checks also improved from 53% to 85% in the project first season implementation to 63% to 88% in its second season implementation.

- The adoption of the key checks resulted to a significant 8% increase in the technical efficiency level of farmers from 51.17% to 55.29%, which translated to a significant improvement on crop management practices, technology adoption,such as MOET,and efficient use of inputs particularly in application rates of NPK fertilizer and chemical active ingredient (Table 15). In addition, yield significantly increased by 9% (0.33 mt ha-1) while per unit cost reduced by 2.82% (P0.23kg-1), which translated to a growth in net income by a significant 25% (P3,907ha-1) and returns to investment of 18%. A significant reduction in costs was observed among material inputs such as seeds, fertilizer and pesticides (Table 16). Similarly, the total rice areas covered by the project generated an incremental palay output of 3,457mt with 0.022% share to total production in 2010.

- The significant impact of the project was observed among farmer innovators. Farmer innovators together with the RSOs were engaged in the field demonstration where they learned by doing the PalayCheck® system, which facilitated adoption. The field demonstration was also rated the most effective strategy of the project in imparting knowledge to farmers. The establishment of technology demonstration as technology showcase is an effective means of showing and telling farmers exactly what the key checks are and how these will fit under their local conditions.

Overall, the project has been effective in achieving its objectives but great impacts could be realized given the following the recommendations:

- The mean TE scores are still relatively low at 55.29%, which indicates that around 45% of palay output is lost due to inefficient use of resources. Farmers can save on cost by 57% if they are more technically efficient. The technical knowledge of farmers on the appropriate and efficient use of inputs particularly on the seeding rate could be enhanced more;

- The field demonstration was rated the most effective strategy in imparting knowledge to farmers as they can apply themselves the key practices. Based from the results, the significant impact of the project was more evident on farmer innovators as they engaged in the field demonstration. More demonstration fields showcasing the PalayCheck technology must be established in the major rice producing provinces in the Philippines to facilitate and increase its adoption. However, modules in the PFS must only focus on key checks with very low adoption such as key checks 1, 6 and 7;

- The project's contribution to domestic total palay output was estimated at an insignificant 0.022%. The contribution could be increased further if the PalayCheck® training module is adopted in farmers' field schools implemented by local government units.

Table 15. Technology adoption and inputs use, before and after project implementation, Philippines.

Item	Before Project: 2009			After Project: 2010			Estimated Impact		
	FI	PF	All	FI	PF	ALL	FI	PF	ALL
Mean TE score (%)	53.45	50.43	51.17	58.21	54.35	55.29	8.90	7.77	8.00
Adoption Rate by Seed Class									
Hybrid	9%	5%	6%	14%	7%	9%	5%	2%	3%
Registered	4%	4%	4%	9%	4%	5%	5%	0%	1%
Certified	58%	55%	55%	65%	64%	64%	7%	9%	9%*
Good Seed	24%	22%	23%	44%	41%	42%	20%	39%	19%*
Farmer's Seed	34%	42%	40%	31%	38%	36%	-3%	-4%	-4%
Ave. seeding rate (kg/ha)	83	91	88	75	89	85	-10%	-2%	-4%
Ave. Fertilizer Application Rate									
N application rate (kg/ha)	59	57	58	56	56	56	-5%	-1%	-3%*
P application rate (kg/ha)	14	13	14	16	14	15	12%	7%	8%*
K application rate (kg/ha)	12	9	10	13	10	11	9%	12%	10%*
Total NPK (kg/ha)	85	80	81	85	81	82	0%	1%	1%
Ave. Pesticide Application Rate									
Insecticide (ai kg/ha)	0.13	0.15	0.14	0.16	0.14	0.14	21%	-9%	-1%
Herbicide (ai kg/ha)	0.33	0.35	0.34	0.27	0.25	0.26	-18%	-27%	-24%
Molluscicide (ai kg/ha)	0.18	0.17	0.17	0.18	0.19	0.18	0%	10%	7%
Fungicide (ai kg/ha)	0.05	0.05	0.05	0.05	0.05	0.05	-8%	-12%	-11%
Rodenticide (ai kg/ha)	0.01	0.01	0.01	0.01	0.01	0.01	-49%	16%	-11%
Total Ai (kg/ha)	0.71	0.73	0.72	0.66	0.64	0.64	-6%	-13%	-11%*
Labor Use (md/ha)	49.46	51.18	50.66	45.76	47.03	46.67	-7%	-8%	-8%*
MOET Users	26%	12%	15%	92%	63%	70%	66%	51%	55%*

*significant at 1%

Table 16. Net income, before and after project implementation, Philippines.

Items	Before: 2009	After: 2010	Estimated Impact	% Change
Yield (kg ha^{-1})	3,812	4,138	326	8.56%
Price (PhP kg^{-1})	12.14	12.58	0.45	3.68%
Gross Returns (PhP ha^{-1})	47,188	52,818	5,630	11.93%*
Total Production Cost (PhP ha^{-1})	31,330	33,053	1,723	5.50%
Net Profit (PhP ha^{-1})	15,857	19,764	3,907	24.64%*
Net Profit-Cost Ratio	0.51	0.60	0.09	18.14%

* 1% level of significance

Table 17. Cost of production, before and after project implementation, Philippines.

Items	Before: 2009	After: 2010	Estimated Impact	% Change
Seeds	1,965.03	1,888.18	(76.86)	-3.91*
Fertilizer	4,516.17	3,997.76	(518.41)	-11.48*
Pesticides	1,765.98	1,623.86	(142.11)	-8.05*
Fuel and Oil	935.29	1,340.76	405.47	43.35
Labor Costs				
Hired Labor	11,588.85	12,590.44	1,001.59	8.64
Permanent labor	1,221.36	1,568.56	347.19	28.43
Imputed labor (O,F,E)	3,173.82	3,426.64	252.83	7.97
Other Costs				
Irrigation fee/cost	835.03	920.09	85.05	10.19
Interest payments	667.73	534.69	(133.03)	-19.92
Food expenses	909.26	960.61	51.35	5.65
Transportation costs	229.13	211.84	(17.29)	-7.55
Land tax / rental value	2,897.88	3,264.51	366.62	12.65
Machine & animal rental	230.77	203.24	(27.53)	-11.93
Other Costs	42.81	51.33	8.52	19.91
Total Costs	31,330.00	33,053.00	1,723.00	5.50
Cost per kg	**8.22**	**7.99**	**(0.23)**	**-2.82**

*1% level of significance

Impact Assessment of Small-Scale Irrigation Systems in Rice-Based Farming Areas in the Philippines

CC Launio, RG Manalili, AB Mataia, RB Malasa, GO Redondo, KB Avila, AF Belizario and RO Tabalno

This study consists of two major activities: 1) M&E of DA-FAO SSIS-FFS implementation in rainfed areas of Central Luzon and Pangasinan, Philippines; and 2) socioeconomic evaluation of deepwell pump irrigation system use in rice-based farming in Tarlac.

A.Monitoring and evaluation of DA-FAO SSIS-FFS implementation in rainfed areas of Central Luzon and Pangasinan, Philippines

CC Launio, RG Manalili, AB Mataia, RB Malasa, GO Redondo, KB Avila, AF Belizario and RO Tabalno

This component activity monitored the immediate impact of SSIS and the FFS implementation among farmer-beneficiaries in rainfed sites in Central Luzon and Pangasinan. Baseline surveys were conducted around the start of project implementation covering the 2009 WS and 2010 DS. Monitoring surveys covering the 2010 WS and 2011 DS were then conducted in January to February and August to September, 2011, respectively. A panel data of 519 farmers with 4-seasons data was used in the analysis. Preliminary findings on farm and farmers' profile were initially reported.

Preliminary findings:

- Figure 3 shows the comparative number of farm households falling in each income category. Based on nominal per capita income, more farmers are within the Php 50,000 and over income bracket after the implementation of the FAO/DA-SSIS-FFS implementation.

- Table 18 shows the comparative input-use between the 2 wet and 2 dry season cropping. Average amount of seeds use relatively decreased from 87kg ha-1 to 70kg ha-1 during the WS, and from 85 to 78kg ha-1 during the DS. Average NPK use did not differ much before and after the project implementation although average N usage slightly decreased, while P and K usage slightly increased. Average NPK use after the project implementation is 70-19-12kg/ha during WS and 88-25-18kg ha-1 during the dry season. Use of insecticides, while minimal at 100g or less ai ha-1, slightly increased during WS and slightly decreased in the DS.

- Table 19 shows the yield and profitability of farmers in rice production before and after the project implementation. Average yield during the WS did not differ much between the baseline 2009 WS and the 2010 WS but for the DS, the 2011 DS average yield is higher by around 0.88tons/ha. In terms of profitability, assuming similar price between seasons, net profit increased by 32% in the WS and more than doubled in the DS relative to baseline profits. Since production cost did not significantly change, net profit-cost ratio increased by around Php0.15 per peso invested during WS, and Php0.24 per peso invested during DS. Further analysis using regression and other statistical tests will be done to confirm these results.

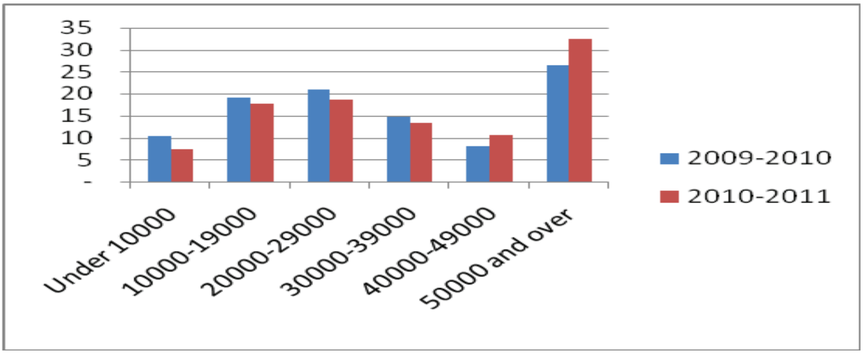

Figure 3. Frequency distribution of sample farm households, by per capita income bracket

Table 18. Comparative Average Input-Use, 2009 WS to 2011 DS.

Item	2009 WS	2010DS	2010 WS	2011 DS
N	493	185	493	185
Seed (kg)	86.81	85.31	70.46	77.88
Seed price (pesos/kg)	18.70	21.53	18.25	23.63
Inorganic fertilizer (kg/ha)				
Nitrogen (N)	71.25	92.09	69.61	88.38
Phosphorous (P)	20.69	21.57	19.43	24.88
Potassium (K)	12.33	13.78	12.49	17.98
Organic fertilizers (kg/ha)	49.28	5.22	40.06	0.96
Pesticides ai (kg/ha)				
Insecticides	0.01	0.10	0.10	0.08
Herbicides	0.34	0.36	0.24	0.33
Molluscicides	0.16	0.11	0.08	0.11
Fungicides	0.04	0.03	0.05	0.03
Rodenticides	0.00	0.01	0.00	0.02
Fuel (liters/ha)				
Land preparation, etc.	26.42	37.35	21.00	26.64
Irrigation	16.00	184.58	17.22	143.39
Oil (liters/ha)	1.44	2.65	1.36	2.10
Labor				
Seedbed	1.34	1.65	2.62	1.36
Land preparation	8.67	9.72	5.74	8.66
Crop establishment	16.04	16.81	16.67	17.06
Crop care and maintenance	19.02	40.34	15.35	32.64
Harvesting	12.71	12.75	12.26	14.13
Postharvest	9.66	8.98	8.85	10.22

Source: Own baseline and monitoring surveys

Table 19. Comparative Costs and Returns Analysis of Rice Production,2009 WS to 2011 DS

Item	2009 WS	2010DS	2010 WS	2011 DS
N	493	185	493	185
Average Area Planted (ha)	0.98	0.78	0.97	0.72
Average Area Harvested (ha)	0.96	0.76	0.95	0.71
Returns				
Yield (t/ha)	3.59	3.83	3.63	4.72
Price (P/kg)	10.80	13.49	11.22	13.44
Gross Returns (P/ha)	39,975	53,063	41,974	64,834
Costs (P/ha)				
Seed	1,640	1,852	1,286	1,842
Fertilizer	4,910	5,797	4,677	6,571
Pesticides	1,191	1,115	1,038	970
Fuel and oil	1,697	8,279	1,556	7,252
Hired Labor	8,750	12,731	11,551	14,595
Permanent Labor	592	1,008	574	921
Imputed Labor	4,445	7,684	2,019	7,802
Land Rental	2,194	1,539	2,139	1,646
Other costs	3,738	5,242	2,844	4,430
Total	29,158	45,247	27,685	46,029
Cost per kilogram (P)	8.11	11.81	7.62	9.76
Net Profit (P/ha)	10,817	7,815	14,289	18,805
Net Profit-Cost Ratio	0.37	0.17	0.52	0.41

Source: Own baseline and monitoring surveys

B. Socioeconomic evaluation of deepwell pump irrigation system use in rice-based farming in Tarlac

CC Launio, RG Manalili, KB Avila, AF Belizario, RF Tabalno and P Moya

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 of 3,500 hectares in Tarlac Province; to increase cropping intensity from 100% to 200%; and to improve crop production and farm income.
As an activity of the impact assessment study of small-scale irrigation systems, the study aimed to evaluate the use of DPIS in rice-based farming in Tarlac relative to shallow tubewell (STW) and pure rainfed farming. Project costs, number of operational deepwell pumps, status of the equity payment, number of actual pump-users from 2006 to 2011, actual irrigated area relative to service area, cropping intensity and cropping pattern were gathered.

To be able to gather more specific data that will enable to estimate the benefits, A household survey was conducted to cover the 2011 WS and 2012 DS. The number of DPIS that are operational and utilized, operational but not utilized operational and utilized (but farmers are not paying equity), and operational and utilized (with farmers paying or have already paid the equity) were identified based on the system-level information. For each of these strata, 10% of the pumps were randomly sampled, and the number of active ISC members for the sample pumps enumerated. For each of the sampled pumps, 75 STW-owners, 46 for STW-renters and 75 purely rainfed samples) for a total of 325 sample respondents were interviewed.

Preliminary findings:

- Monitoring data from the Tarlac provincial NIA as of June, 2010 shows that of the 72 deepwell pumps, 50 pumps or 69% are operational, 11% are operational but not utilized, 4% are partially operational and 15% are not operational. Of the 50% operational, 20% are now covered by the Casecnan Multipurpose Irrigation Project. The average equity repayment by irrigation service cooperatives (ISCs) is 16%. At least one deepwell pump has been fully paid the counterpart equity.

- Table 19 shows the initial results of our analysis of productivity and profitability by source of irrigation. In terms of yield during DS, the average yields for NIA/CIS systems appear to be the highest although not very different from the average of farmers using deepwell pumps. Average yield between deepwell and STW users also is not significantly different at around 0.2t/ha. Average yield during DS for other sources like rivers/creeks, however, is less by around 0.5t/ha relative to use of deepwells or STWs. Further analysis using regression and other statistical tests will be done to confirm these results.

Table 20. Comparative cost and returns analysis of rice production in Tarlac, by irrigation source, 2011 DS

Item	ALL	NIA/CIS	Deepwell	STW	Others
N	211	21	77	103	10
Average Area Planted (ha)	1.56	1.50	1.60	1.63	0.65
Average Area Harvested (ha)	1.56	1.48	1.60	1.63	0.63
Returns					
Yield (t/ha)	4.59	4.89	4.70	4.47	4.03
Price (P/kg)	14.24	14.01	14.42	14.27	13.00
Gross Returns (P/ha)	66,585.66	71,088.15	69,304.30	64,031.22	59,127.04
Costs (P/ha)					
Seed	2,581.54	2,606.18	2,592.03	2,579.63	2,310.08
Fertilizer	7,468.02	7,440.82	7,958.23	7,093.40	7,971.16
Pesticides	1,059.00	1,182.41	1,256.85	877.73	1,386.43
Fuel and Oil	8,474.46	4,737.16	9,886.68	8,295.56	4,414.37
Hired Labor	14,736.78	15,625.54	14,857.45	14,499.43	14,213.21
Permanent Labor	2,038.88	1,341.87	2,801.65	1,641.87	1,190.70
Imputed Labor	1,160.79	1,369.16	1,099.29	1,102.45	2,834.91
Land Rental	1,706.57	2,490.68	814.47	2,259.26	553.49
Other Costs	7,786.09	6,404.55	8,546.21	7,568.85	7,523.11
Total Production Cost	47,012.13	43,198.38	49,812.85	45,918.18	42,397.47
Cost per kilogram (P)	10.24	8.84	10.60	10.26	10.51
Net Profit (P/ha)	19,573.53	27,889.77	19,491.45	18,113.05	16,729.57
Net Profit-Cost Ratio	0.42	0.65	0.39	0.39	0.39

Source: Own survey

Impact assessment of PhilRice-JICA Technical Cooperation Project Phase 3 in Nueva Ecija

RB Malasa, MAM Baltazar, MG Bulanhagui, and SR Francisco

For more than a decade, the Japan International Cooperation Agency (JICA) and PhilRice collaborated in developing technologies that would benefit rice farmers in increasing rice production. The third phase of the collaboration, referred to as TCP3, aimed to extend appropriate rice and rice-based technologies to farmers. PhilRice researchers and a team of JICA experts have developed an extension program which identified technologies that suited specific pilot areas (Cabanatuan City, Rizal, and San Antonio) in Nueva Ecija. Trainings were conducted and demonstration farms were established so rice farmers can learn and experience the effects of the technologies. Core sites were managed by PhilRice-JICA team while expansion sites were managed by the respective local government units. This study evaluated the impacts of the TCP3 to farmer-beneficiaries in the target sites.

Findings:

- In 2010 WS, the yield level of farmers in all core sites decreased compared with the baseline WS data (Table 20). The highest decrease in yield was observed in Cabanatuan City at 1.20 mt ha-1. Farmer cooperators in San Antonio have the least decrease in yield (0.02 mt ha-1) relative to the baseline WS. Moreover, San Antonio had the highest yield level in both baseline and 2010 WS.

- The yield level in the core sites in 2011 DS increased compared with the baseline DS data. During this season, farmers in Cabanatuan City experienced the highest yield increase of 1.94mt ha-1 followed by San Antonio with 0.53mt ha-1. Although farmers in Rizal have the least yield increase, they attained the highest yield of more than 7mt ha-1.

- Except in San Antonio, farmer-cooperators in the expansion site achieved the highest average yield in 2010 WS compared to farmer-cooperators in core sites and non-participating farmers (Table 21). The same was observed in 2011 DS except in Cabanatuan City.

- Most of the farmers in the expansion sites were able to follow the technology recommendations for the two seasons except for proper harvest management particularly in Rizal (Table 22).

Table 21. Yield of farmers in core site, before and after TCP3.

Location/ Season	Yield (mt ha^{-1})			
	Baseline WS Cropping*	2010 WS	Baseline DS Cropping*	2011 DS
Cabanatuan City	4.87	3.67	4.79	6.73
Rizal	4.42	4.23	6.92	7.21
San Antonio	4.95	4.93	5.08	5.53

*Year of project implementation is different across sites.

Table 22. Yield (mt ha-1) by farmer classification and location, 2010 WS and 2011 DS.

Farmer classification/ Location	Season	
	2010 WS	2010 DS
Cabanatuan City		
core site	3.67	6.73
expansion site	3.95	6.02
non-cooperator	3.82	6.50
Rizal		
core site	4.23	7.21
expansion site	3.90	7.23
non-cooperator	3.77	6.33
San Antonio		
core site	4.93	5.53
expansion site	4.32	5.80
non-cooperator	4.36	5.56

Table 23. Farm practices in TCP3 expansion sites (%), 2010 WS and 2011 DS.

Farm practices	2010 WS				2011 DS			
	Cabanatuan	Rizal	San Antonio	All	Cabanatuan	Rizal	San Antonio	All
Seed class use								
hybrid	7	2	0	3	42	34	75	47
registered	3	3	8	4	3	2	5	3
certified	83	92	70	84	50	59	15	45
good seeds	0	3	5	3	0	2	0	1
farmer's seeds	7	0	16	6	5	3	5	4
Proper land leveling								
practice	93	100	90	95	95	98	98	97
otherwise	7	0	10	5	5	2	3	3
Synchronous plating								
practice	100	100	95	99	95	98	100	98
otherwise	0	0	5	1	5	2	0	2
Maintain 3-5 cm water level								
follow recommendatior	87	98	59	84	82	97	70	85
otherwise	13	2	41	16	18	3	30	15
Follow proper harvesting and threshing								
follow recommendatior	52	39	49	46	62	39	65	54
otherwise	52	39	49	46	62	39	65	54

Baseline Assessment and Seasonal Monitoring of PhilRice-JICA Technical Cooperation Project Phase 5
FH Bordey, JC Beltran, and RC Gulen

The Philippine Rice Research Institute in collaboration with the Japan International Cooperation Agency has started to implement the fifth phase of the technical cooperation project (TCP) on rice-based farming technology extension for the Autonomous Region in Muslim Mindanao (ARMM) in 2012. The TCP aims to train and update the knowledge of agricultural technicians to enhance their capacity to provide training for farmers; train farmers on rice-based farming technologies; provide information materials for farmers and agricultural technicians; and establish production and postproduction support system. At the end of the implementation period, the project expects that 70% of target farmers adopt at least 15 rice and 2 vegetable cultivation technologies/ practices to be extended. This study aimed to establish the baseline status and monitor the progress of farmers in the target site to properly attribute the gains in technology adoption and productivity to the TCP.

Preliminary findings:

- A total of 248 farmer-participants in 2012 as well as 64 non-participants in the target sites were interviewed in 2012 before the training commenced. Among the participants, 32% did not finish elementary level education, 17% have graduated from elementary, 15% have reached some secondary level while only 10% have finished high school. Eighty-five percent of the farmer-participants are male. More than 80% of them are between 21 to 60 years old with farming experience less than 25 years. Majority of them are Maranaos (28%), Tausug (27%), and Maguindanaoan (24%). In addition, 80% of the participants have no training on rice and/or vegetable production prior to TCP5.

- Non-participating farmers are also predominantly male (75%). About 14% of them did not complete elementary school, 25% were elementary graduates, 19% have reached secondary level while 8% have finished high school. Seventy-five percent of non-participants are male. More than 90% are between 21 to 60 years old with less than 25 years of farming experience. Thirty percent of non-participants have Tausug ethnicity, 25% are Maranaos while 20% are Maguindanaoan. A lesser share of non-participating farmers, at 75%, were not trained on rice and/or vegetable farming.

- The average household income of participants was distributed to rice farming (34%), non-rice agriculture (27%), and non-agriculture activities (39%). Meanwhile 36% of household income of non-participants was sourced from rice farming, 31% from non-rice agriculture, and 33% from non-agriculture endeavors.

- Table 24 shows the technologies adopted by participants and non-participants prior to TCP5 implementation. In general, a larger share of participants is adopting recommended rice production technologies compared to non-participants. Nevertheless, the adoption level is below 40% except for the right time of harvesting, which was adopted by 45% of participants.

- Among the technologies that have 30-40% adoption level are: (1) use of recommended varieties; (2) land preparation for at least 21 days; (3) synchronous planting; (4) threshing paddy rice not later than a day after harvesting; and (5) not burning rice straws in the field. The technologies with least adoption or those below 10% adoption are: (1) leaf color chart; (2) minus-one element technique; (3) agroecosystem analysis (AESA); (4) community trap barrier system; and (5) alternate wetting and drying of field based on observation well.

Table 24. Technology adoptions of sample farmers in PhilRice-JICA TCP5 sites.

	Technology	% Adoption	
		Participants	Non-participants
1)	Used certified seeds	17	7
2)	Used a recommended variety in the area	40	45
3)	Stale seedbed and one month fallow period	25	18
4)	At least 21 days land preparation	34	39
5)	No high and low soil spot after final leveling	23	18
6)	Synchronous planting	32	23
7)	400 sqm seedbed size	17	7
8)	Used 15-20kg/ha for hybrid or 20-40kg/ha for inbred for transplanted rice and 40 - 80kg/ha for direct seeded	29	11
9)	Proper plant spacing (20 cm x 20 cm)	15	7
10)	Used leaf color chart (LCC)	5	0
11)	Used minus-one element technique (MOET)	4	0
12)	No spraying within 30 DAT or 40 DAS for defoliators	13	5
13)	Practice AESA	9	9
14)	Community trap barrier system	5	2
15)	Intermittent irrigation	10	2
16)	Alternate wetting and drying based on the observation well	8	2
17)	Harvested when 80-85% of the grains are ripe	45	34
18)	Thresh palay not later than 1 day after harvest	31	20
19)	Scatter rice straw in the field after threshing or rice straw composting	21	23
20)	Not burning rice straw in the field	43	30

III. Understanding Markets and Prices of Rice, Value-Added Rice Products and Farm Inputs
Project Leader: Jesusa C. Beltran

This project intends to contribute to the attainment of IEPRA program objectives by looking beyond production and production technologies, and understanding markets, prices and marketing and distribution systems, not only of rice, but also of value-added rice products and relevant farm inputs. Specifically, the project aims to: (1) develop a model for predicting paddy prices for production decision-making; (2) conduct market analysis of selected value-added rice products; (3) analyze the value chain of rice in the Philippines; (4) analyze the supply chain or structure, conduct and performance of selected input markets; and (5) develop agribusiness modalities for rice. The project conducted three studies for 2012. The major findings of this project are outlined as follows:

Forecasting palay prices in the Philippines
JC Beltran, FH Bordey and SJC Paran

The price of paddy is the most important variable affecting the planting decisions of rice farmers and the driving mechanism of the rice agribusiness sector's marketing decisions. It strongly influences the profitability of rice farming and marketing. In addition, the price of paddy influences the price of milled rice that affects the demand decision of consumers. Thus, it would be beneficial for the whole rice production industry if price uncertainty can be transformed into calculable risk through a better way of forming price expectation. A scientific way of forecasting paddy price is important to develop, and therefore the main focus of this study.

Preliminary findings:

Econometric model

- Table 25 shows the results of ordinary least squares (OLS) estimation of wholesale price of rice. Four models were used in the estimation, namely: Model 1 which includes ending stock to use ratio, trend, period and monthly dummy variables; Model 2 which excludes monthly dummy variables in Model 1; Model 3 which includes a one-month lag of wholesale price, trend, period and monthly dummy variables; and Model 4 which excludes monthly dummy variables in Model 3. In Models 1 and 2, results show that the ending stock to use ratio negatively influences the wholesale price, while all other variables positively affect the wholesale price. On the other hand, in Models 3 and 4 significant positive coefficients were found for a one-month lag wholesale price of rice and for all other variables, which indicates a positive relationship with the wholesale price. Generally, all regressions models are found reasonably accurate as they perform well in explaining the wholesale price formation. Thus, all of the estimated wholesale prices of rice in all econometric models were used in forecasting the farmgate price of palay.

- Table 26 shows the results of farm price estimates using monthly prices from 1980 to 2010. Based on estimates, a one-month lag of farm price significantly affects the current farm price. A one percent increase in one-month lag price will increase the current farm price by 85 percent. This means that price remains important in the formation of farm price. Furthermore, trend and period dummy variables were also found significantly influencing the farm price, which indicates the effect of the changes in the market structure over the years in farm price formation. To validate these results, the predicted farm prices were compared to the actual farm prices in 2011 and 2012. The result of the paired t-test shows no significant difference between the means of the two farm prices, and therefore the model is fit in explaining the current farm price.

Maximum bid price model

- A supplementary survey of five rice millers in Nueva Ecija was conducted to gather additional rice marketing cost information. This information was used to prepare and finalize the cost structure of rice mill that was used for the analysis of the cost and return of rice marketing system.

- Table 27 shows the estimated rice marketing cost in the Philippines. Preliminary results show that the transportation cost shared almost 50% of the total marketing cost, which reflects a considerable impact of increasing fuel cost in the country. This is followed by the storage and milling costs with 29% and 14% shares in the total marketing cost, respectively.

- For the farm price forecasting approach, a maximum bid price model was developed. The constructed rice marketing cost structure presented above was used in the maximum bid price model. Figure 4 shows a sample screen shot of the maximum bid price model. The model can easily calculate the predicted farm price for any given wholesale price of rice in the market.

- The estimated wholesale prices from the four models presented above were used in the maximum bid price model to forecast the current farm prices.

Table 25. Results of OLS estimation of the wholesale price.

Explanatory variables	Dependent variable: Wholesale price of rice			
	Model 1	Model 2	Model 3	Model 4
Ending stock to use ratio	-0.138***	-0.124***		
	[0.000]	[0.000]		
1996-2007 dummy	0.331***	0.328***	0.026**	0.037***
	[0.000]	[0.000]	[0.040]	[0.003]
2008-2010 dummy	0.644***	0.636***	0.053**	0.075***
	[0.000]	[0.000]	[0.021]	[0.001]
trend	0.002***	0.002***	0.000**	0.000**
	[0.000]	[0.000]	[0.044]	[0.023]
wholesale price (t-1)			0.919***	0.891***
			[0.000]	[0.000]
February	0.024		0.004	
	[0.205]		[0.756]	
March	0.013		-0.012	
	[0.505]		[0.148]	
April	-0.027		-0.002	
	[0.242]		[0.812]	
May	-0.021		0.002	
	[0.357]		[0.823]	
June	0.034*		0.009	
	[0.088]		[0.290]	
July	0.027		0.003	
	[0.194]		[0.757]	
August	-0.03		-0.005	
	[0.160]		[0.613]	
September	0.023		-0.001	
	[0.238]		[0.909]	
October	0		-0.030***	
	[0.981]		[0.000]	
November	-0.025		-0.044***	
	[0.203]		[0.000]	
December	-0.007		-0.022**	
	[0.742]		[0.032]	
Constant	1.927***	1.952***	0.190***	0.242***
	[0.000]	[0.000]	[0.008]	[0.000]
Observations	252	252	251	251
R-squared	0.968	0.965	0.995	0.993

Note: *** significant at 1%, ** significant at 5% and * significant at 10%

Table 26. Results of OLS estimation of the farm price.

Explanatory variables	Dependent variable: farm price
Farmgate price (t-1)	0.851***
	[0.000]
1996-2007 dummy	0.039**
	[0.017]
2008-2010 dummy	0.076***
	[0.007]
trend	0.000**
	[0.017]
February	-0.034**
	[0.017]
March	-0.001
	[0.896]
April	0.006
	[0.546]
May	0.003
	[0.773]
June	-0.017
	[0.214]
July	0.014
	[0.153]
August	-0.001
	[0.945]
September	0.006
	[0.550]
October	-0.027***
	[0.005]
November	-0.046***
	[0.000]
December	-0.085***
	[0.000]
Constant	0.249***
	[0.004]
Observations	251
R-squared	0.989

Note: *** significant at 1%, ** significant at 5% and * significant at 10%

Table 27. Marketing cost by function (Php mt-1 dry paddy equivalent), 2012.

Item	Cost (Php/mt)
Transportation cost	1,100
Drying cost	155
Storage cost	640
Milling cost	320
Total Cost	2,215

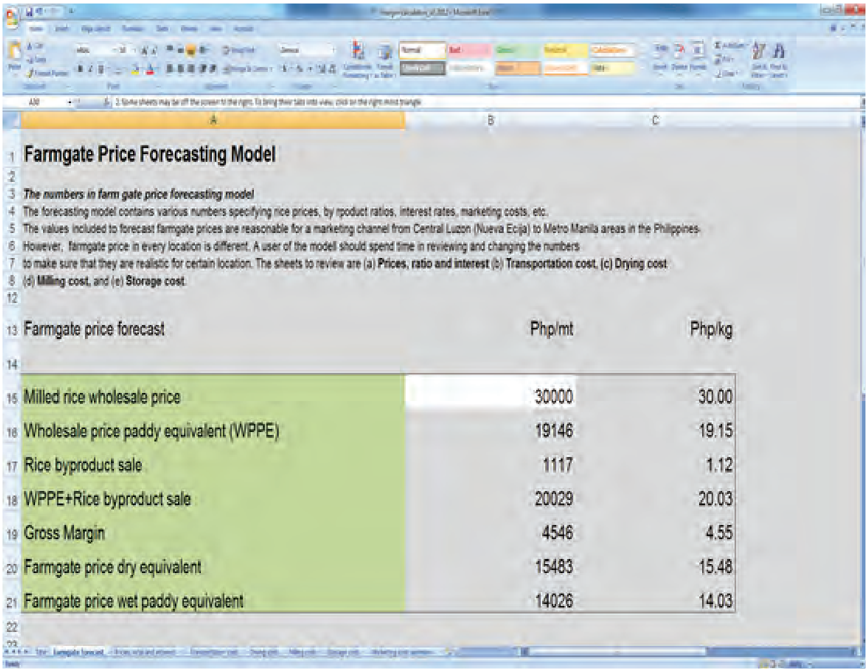

Figure 4. A sample screen shot of maximum bid price model.

Model validation

- The calculated farm prices using the maximum bid price model were compared to the actual monthly farm prices in 2011 and 2012. Using paired t-test, results show that the mean difference between the predicted farm prices and current farm prices was statistically insignificant. This implies that the econometric and maximum bid price models can predict farm prices accurately. Nevertheless, further refinements are still necessary in the model specifications. Also, validation using longer time period for farm prices is important to ensure accuracy of model estimates.

Assessing the value of rice seed variety attributes

CC Launio, RG Manalili and FB Lamson

The study explored the use of seed sales data from 2006-2010 in determining preferred seed variety attributes of seed growers and farmers. Following the hedonic analysis framework which answers how different qualities or attributes affect price variability or how observed prices are formed given quality attributes, the study explored the use of the variation in quantity sold as dependent variable instead of price (constant in the case of rice seeds). The effect of variety characteristics on the variation of sales was analyzed also considering regions and years.

Preliminary findings:

- Aggregate estimation showed that the characteristics that significantly explained the volume of sales for foundation seeds are: dummy variable for regions, average yield, and chalkiness rating. The significant negative coefficients of the dummy variables for Northern Luzon, Southern Luzon, Visayas and Mindanao indicate that the volume of sales in these regions are relatively lower compared with the base Central Luzon. The higher the average yield, the greater the volume of foundation seed sales and the greater the higher the chalkiness rating, the lower the volume of sales (Table 28). In the case of registered seeds, significant qualities affecting the volume of sales include dummy variable for regions, average yield, milling recovery and chalkiness rating. Height and GT score are also significant at 10% level of significance.

- Considering the analysis over time periods, while regional dummies and yield appeared to be a consistent important variable explaining variation in sales, there are some differences in significant variables in different years. Moreover, the analysis considering the regions also showed relatively inconsistent significant variables.

- Further refinements are necessary in the model specifications, but the preliminary findings imply that average yield is the one overwhelming factor determining seed demand among Philippine seed growers and farmers. The top varieties demanded by seed growers and farmers have average yield of around 6mt ha-1 and maximum yield of around 10-12mt ha-1. Further estimations using the Tobit model that would allow the full sample considering zero observations need also to be explored to confirm results.

Table 28. Results of Tobit estimation of sales volume of Foundation and Registered Seed Sales, Philippines, 2007-2010.

Variable	Foundation Seeds			Registered Seeds		
	Parameter Estimate	t-Value		Parameter Estimate	t-Value	
Intercept	365.713	0.77		-135.137	-0.13	
dNLuzon	-875.812	-17.6	***	-1409.804	-14.59	***
dSLuzon	-925.760	-17.57	***	-1700.199	-15.97	***
dvis	-1019.957	-17.03	***	-1777.558	-11.84	***
dmin	-1038.939	-16.75	***	-1807.692	-10.56	***
d2008	-61.183	-1.33		207.634	2.01	**
d2009	-19.546	-0.43		171.004	1.62	
d2010	23.277	0.5		209.775	1.96	**
yrs_rel	-63.032	-1.01		-96.754	-0.82	
dphilrice	-18.195	-0.32		131.516	1.15	
duplb	-29.252	-0.41		99.357	0.67	
aveyld	102.759	4.08	***	201.057	3.74	***
maturity	0.249	0.06		0.078	0.01	
height	3.815	1.23		10.289	1.66	*
tillerno	0.153	0.41		-1.043	-1.26	
blast_r	-6.427	-0.13		102.992	0.97	
tungro_r	-4.643	-0.08		-15.176	-0.13	
millrec_r	17.614	0.81		117.367	2.86	***
amlose_r	-15.058	-0.43		6.613	0.1	
glength_r	55.390	0.98		95.064	0.73	
gshape_r	-28.148	-0.62		-21.210	-0.22	
chalk_r	-52.782	-3.43	***	-135.050	-4.34	***
gtscore_r	-30.904	-1.55		-70.951	-1.66	*
no. of observations		1378			1059	
F-value		22.43	***		17.79	***
Adj. r-squared		0.26			0.26	

Inventory of value-added products from rice in the Philippines

GO Redondo, CC Launio, AC Castañeda, and RF Tabalno

This study intended to: (a) assemble information on existing and potential uses of rice. rice bran, rice husk and rice straw based on publication review; (b) conduct an inventory of the existing use/s of rice, rice bran, rice husk and rice straw by industries/manufacturers in the Philippines; (c) determine location of manufacturers and major production areas for value-added products using rice, rice by-products, and rice straw; and (d) draw implications for policy and research based on generated information. Secondary and primary data for the inventory of current and potential uses of and value-added products from rice were used. For the secondary data, a list of import and export products, and list of manufacturers/producers of value-added products and their location were obtained from the Department of Trade and Industry (DTI), Department of Agriculture (DA), and through the Internet.

Key informant interviews were done to cover traditional and other potential products in the Philippines, get list of other key/major players in the specific industries and derive other information not available from published documents. Based on the list obtained from the concerned agencies and key informants, primary data were obtained through mailed and telephone surveys, and actual product survey in wet markets, supermarkets and malls. Data gathered from each firm includes the product name, use of rice, rice bran, rice hull or rice straw in the product, average volume used per unit of product, and product outlets. A total of 194 samples were surveyed for the three types of outlets. Majority of the samples came from Nueva Ecija, Northern Mindanao, Cagayan Valley, and Ilocos (Table 29). For the mailed survey, the top three provinces were Nueva Ecija, Pangasinan, and Tarlac. In the actual survey, the top regions surveyed for wet market were Cagayan Valley, Northern Mindanao, and Davao Region, and Northern Mindanao, Caraga, Central Luzon, and Davao Region for the supermarket and malls. For provinces visited, number of samples ranged from 1-4.

Table 29. Number of samples by major outlets by source of information of rice value-added products in the Philippines, 2012.

Region/Province		Wet market survey		Mailed survey		Actual survey (Supermarket/mall)		TOTAL	
		Number of wet market surveyed	%	Number of mailed survey	%	Number of mall/ supermarket surveyed	%	N	%
CAR	Cordillera Administrative Region	5	5.75	1	1.72	-	-	6	3.09
1	Ilocos	3	3.45	13	22.41	3	6.12	19	9.79
2	Cagayan Valley	21	24.14					21	10.82
3	Central Luzon	1	1.15	34	58.62	5	10.20	40	20.62
4	Pasig City, MM			1	1.72			1	0.52
4a	CALABARZON	6	6.90	5	8.62	4	8.16	15	7.73
4b	MIMAROPA	4	4.60			5	10.20	9	4.64
5	Bicol	9	10.34	3	5.17	6	12.24	18	9.28
6	Western Visayas	4	4.60			4	8.16	8	4.12
7	Central Visayas	1	1.15	1	1.72	1	2.04	3	1.55
10	Northern Mindanao	14	16.09	-	-	8	16.33	22	11.34
11	Davao Region	11	12.64	-	-	5	10.20	16	8.25
12	SOCCSKSARGEN					2	100.00	2	1.03
	Caraga	8	9.20	-	-	8	16.33	16	8.25
	Total for Regions	87	100.00	58	100.00	49	100.00	194	100.00

Preliminary findings:

- Table 30 and 31 presents the list of value-adding products from rice in the Philippines by major outlets. The top 5 value-adding food products based on the three types of outlets were snacks, meals and snacks, snacks/appetizer, seasoning and meals for infants. The most commonly sold value-added products in wet markets are different kinds of meals and snacks such as variations of suman, bibingka, and pancit. For the manufactured products based on mailed survey, majority were snacks followed by meals and snacks, and beverages and drinks (coffee and wine). Snacks, appetizer and meal products were also the most common based on actual survey of products in famous supermarket or malls.

- Based on the three surveys, the most common value-added products from table rice are food and snack products. These are the white rice or glutinous rice which are cooked as whole (i.e biko, bibingka suman and tamalis); grinded (i.e. bibingka galapong, espasol, suman muryekos, puto and cutchinta); or pounded (i.e bibingka pinipig, suman pinipig, pinipig espasol). Rice is also grinded and made to rice coffee, rice tea, and packaged mixes such as adobo mix, caldereta mix, kare-kare mix, rice mate, and rice flour. Also, rice is an important ingredient for baby foods and cereal drink.

- Rice hull and rice straw are very important especially to those who are raising animals as feed additives and as bedding for chicken to act as moisture absorbent. These are also used for mulching vegetables and mushroom.

- Rice straw and rice hull are also used as fuel in cement industry, clay pots making, and in making iodized salt.

- Rice straw is used in making organic fertilizer and as bedding material for growing mushrooms.

- The burned rice hull or rice ash is also used as organic fertilizer for plants.

- Rice bran is used as food supplement, pet food and animal feeds.

Table 30. List of value-adding products (foods) from rice in the Philippines by major outlets.

Value-adding products	Mailed survey		Actual survey				TOTAL	
			Wet market survey		Supermarket/Mall			
	N	%	N	%	N	%	N	%
Baby food	1	1.14					1	0.05
Beverages and drinks	10	11.36	10	2.59	2	0.14	22	1.14
Cereal drinks					107	7.31	107	5.52
Condiments	1	1.14	2	0.52	4	0.27	7	0.36
Cooking/baking	1	1.14	4	1.04	14	0.96	19	0.98
Energy drink					21	1.44	21	1.08
Food	3	3.41	41	10.62	34	2.32	78	4.03
Food supplement					1	0.07	1	0.05
Meals and snacks	15	17.05	53	13.73	202	13.81	270	13.94
Meals for infants					141	9.64	141	7.28
Rice conditioner					18	1.23	18	0.93
Seasoning					167	11.41	167	8.62
Side dishes	1	1.14	3	0.78			4	0.21
Snacks	56	63.64	273	70.73	534	36.50	863	44.55
Snacks/appetizer					218	14.90	218	11.25
Total	88	100.00	386	100.00	1463	100.00	1937	100.00

Table 31. List of value-added products from rice by-products in the Philippines, by major outlets.

Value-adding products	Mailed survey		Actual survey: Wet market survey		Actual survey: Supermarket/Mall		TOTAL	
	N	%	N	%	N	%	N	%
Rice bran and rice straw								
Feed additives	9	27.27	12	80.00			21	23.33
Rice bran								
Food supplement					1	2.38	1	1.11
Pet food	1	3.03	2	13.33	36	85.71	39	43.33
Rice hull								
Cooking					1	2.38	1	1.11
For bedding (chicken, mushroom, plants)	5	15.15					5	5.56
For easier drying of clay pots	1	3.03					1	1.11
For firing (clay stoves, cement industry, making iodized salt)	5	15.15					5	5.56
Preservative (Ice)	3	9.09	1	6.67			4	4.44
Premixes	1	3.03					1	1.11
Rice straw								
Mulching (okra, onion)	3	9.09					3	3.33
Paper box	1	3.03					1	1.11
Special paper sheet	1	3.03					1	1.11
Food wrapper					4	9.52	4	4.44
Burned rice hull/rice hull ash								
Used in the preparation of organic fertilizer	3	9.09					3	3.33
Total	33	100.00	15	100.00	42	100.00	90	100.00

IV. Policy Research and Advocacy

Flordeliza H. Bordey

This project generally aims to provide relevant information to various stakeholders about the rice industry and the issues surrounding it. In particular: (1) it attempts to assist in crafting a rice self-sufficiency program in the country; (2) aid in priority setting for allocation of funds to the rice industry at the national and regional level; (3) create favorable policy environment for harnessing the applications of rice R&D; and (4) understand various issues about the rice industry and formulate policy recommendations to address it. The project conducted four studies in 2012 of which one is completed.

Understanding rice self-sufficiency in the Philippines

FH Bordey

This study reviewed the advantages and disadvantages of pursuing rice self-sufficiency as a means to achieve food security. It also examined the strategies used by past and current rice programs to affect self-sufficiency. Finally it projected the supply and demand conditions in which self-sufficiency in rice could be feasible by 2013.

Findings:

- The main arguments used to support self-sufficiency are: (1) the thin volume of internationally traded rice; (2) concentration of 80% of world's exports to only five countries making importing countries vulnerable to export controls imposed by these countries; (3) little substitutability of rice with other cereals; (4) highly segmented world market because of little substitutability between types of rice; and (5) scarce foreign exchange reserves that could be used for other purposes if saved from importing rice.

- Self-sufficiency is not desired due to: (1) high cost of supporting inefficient producers who are in turn discouraged to shift to more economically rewarding activities; (2) preclusion to regular participation in international rice trade prevented negotiation for lower prices; (3) prevention of influx of cheaper rice is undesirable for net rice consumers; (4) government resources used in achieving self-sufficiency can be used in supporting other commodities that may have higher returns to society.

- The Rice Production Programs implemented by the government are: Masagana 99 (1973-1985); Rice Productivity Enhancement (1988-1990); Rice Action (1990-1991); Grains Production Enhancement (1993-1995); Gintong Ani (1996-1998); Agrikulturang Makamasa (1998-2000); Ginintuang Masaganang Ani/FIELDS (2001-2010); and Food Staples Sufficiency (2011-present). Of these programs, only Masagana 99, Ginintuang Masaganang Ani/FIELDS, and Food Staples Sufficiency Programs have categorically supported the attainment of self-sufficiency. All rice programs used different combinations of strategies such as distribution of high quality seed, subsidy on fertilizers, pest control, irrigation development, provision of credit guarantee and crop insurance, dispersal of postharvest facilities, research and development, extension and education, and price support. The frequent changes in DA leadership after Masagana 99 resulted in steep learning curve on the administration of each program, which in turn led into implementation setbacks. The Philippines has been rice self-sufficient for only 12 years since 1961.

- Estimation of supply and demand conditions wherein the promised rice self-sufficiency by 2013 could be achieved indicated that self-sufficiency at the current level of prices would be feasible under a demand scenario of 110 kg per capita rice consumption. Under this scenario, the total demand for 2013 was estimated at 15.45 million mt. Assuming a beginning stock of 3.0 million mt, this scenario requires 12.45 million mt of milled rice from domestic production, which is equivalent to 19.15 million mt of paddy. This implies that production only needs to increase by 6% over the 2012 production level. If the target harvest area of 4.74 million ha is achieved, this production warrants a yield level of 4.04mt/ha, which is only 5% higher than the yield in 2012 (Table 32).

- The analysis of medium scenario, which assumed 115kg per capita consumption, indicated a total demand of 16.07 million mt of milled rice for 2013. Given a beginning stock of 3.12 million mt, this suggests that domestic production of milled rice should be 12.95 million mt, which is equivalent to 19.92 million mt of paddy. This means that paddy production needs to increase by 10% higher than the 2012 production level. Given the target harvest area of 4.74 million ha, the medium scenario necessitates a yield of 4.20mt/ha, which is 9% higher than the 2012 yield level. Achieving self-sufficiency under this scenario might be difficult but not be entirely implausible if the strong production growth from 2011 to 2012, which was 8%, is surpassed.

Table 32. Demand projection and production requirement, low consumption scenario

Particulars	2013	2014	2015	2016
TOTAL DEMAND (Million mt)	15.45	15.72	15.99	16.26
Food	10.93	11.13	11.33	11.52
Export	0.00	0.00	0.00	0.00
Seed use	0.28	0.29	0.30	0.30
Industrial use	0.46	0.48	0.49	0.51
Feeds and wastes	0.71	0.71	0.71	0.71
Ending stock	3.06	3.11	3.16	3.22
REQUIRED SUPPLY (Million mt)	15.45	15.72	15.99	16.26
Beginning stock	3.00	3.06	3.11	3.16
Import	0.00	0.00	0.00	0.00
Domestic production (Milled Rice)	12.45	12.66	12.88	13.09
Paddy equivalent	*19.15*	*19.48*	*19.81*	*20.15*
Target harvest area (Million ha)	*4.74*	*4.85*	*4.94*	*5.02*
Target yield(mt/ha)	*4.04*	*4.02*	*4.01*	*4.02*
Related Indicators				
Per capita rice consumption	110	110	110	110
Population	99.40	101.19	102.97	104.74
Daily requirement	0.034	0.035	0.035	0.036
Projected self-sufficiency ratio	1	1	1	1
Ending stock to use ratio	0.198	0.198	0.198	0.198

Source: Author's calculation
Source of target area: Department of Agriculture 2012

Assessment of the regional rice industry for policy formulation

BM Catudan, FH Bordey, SJC Paran, NI Martin and FB Lamson

This study aimed to consolidate all available information related to the rice industry of the 16 rice-producing regions in the country to serve as a reference for DA-RFU rice program planners and implementers when crafting appropriate policies. The study has two sets of outputs: (1) a primer of the rice industry in each region, including individual analysis for the top two rice-producing provinces within each region; and (2) internet-accessible database system of municipal-level rice industry data of the top two rice-producing provinces in each region.

Data sets used for the regional primers were collected from various agencies and integrated to have a comprehensive analysis of the situation in each region. Percentages, averages, growth rates and ratios were used to measure the trends and status of rice production in each region. The analyzed data and information were presented in tables, graphs and maps.

Data sets for the municipal-level database system were obtained from the Municipal Agriculture Offices in coordination with the DA-RFUs. Data sets received in hardcopy were encoded in the computer while. The e-copies of the data sets were proof-read, edited and transferred to spreadsheets in the standard format ready for uploading in the database system.

Highlights:

Each regional rice industry primer contained the trend analysis of the following data sets:

1. Regional Level Analysis

- Trends in rice harvest area, 1990-2011
- Growth in rice harvest area, 1990-2011
- Trends in rice yield, 1990-2011
- Growth in rice yield, 1990-2011
- Trends in rice production, 1990-2011
- Growth in rice production, 1990-2011
- Area and yield contribution to production, 2001-2011
- Rice harvest area by semester, 2000-2011
- Rice production by semester, 2000-2011
- Rice harvest area by province, 2000-2011
- Rice production by province, 2000-2011
- Rice yield by semester by province, 2000-2011
- Share of hybrid seeds to area and production, 2008 and 2009
- Share of certified inbred seeds to area and production, 2008 and 2009
- Average yield of hybrid and certified seeds, 2008 and 2009
- Fertilizer use by semester and ecosystem, 2009
- Service area of irrigation facilities, 2010
- Cost of paddy rice production, 2010
- Returns to paddy rice production, 2010
- Average monthly farmgate price, 2009-2011
- Trends in prices of paddy and regular milled rice, 2006-2011
- Postharvest facilities: threshers, 2009
- Postharvest facilities: dryers, 2009
- Postharvest facilities: mills, 2009
- Postharvest facilities: storage, 2009
- Postharvest facilities: NFA facilities, 2010
- Per capita consumption, 1999-2000 and 2008-2009
- Per capita consumption by barangay type, 1999-2000 and 2008-

2009

- Ratio of per capita availability and per capita consumption, 2008-2009

2. Provincial Level Analysis (top 2 rice-producing provinces)

- Trends in rice harvest area, 1990-2011
- Growth in rice harvest area, 1990-2011
- Rice harvest area by semester, 2000-2011
- Trends in rice yield, 1990-2011
- Growth in rice yield, 1990-2011
- Trends in rice production, 1990-2011
- Growth in rice production, 1990-2011
- Rice production by semester, 2000-2011
- Decadal monthly rainfall in nearest PAGASA station, 1961-2009

The municipal-level rice database includes the following data sets:

- Rice harvest area and yield by season and by ecosystem, 2006-2011
- Major rice production problems by season and by ecosystem, 2006-2011
- Master list of farmers, latest available
- Rice postharvest facilities and machinery
- Non-NIA managed irrigation facilities

The data sets submitted by the municipal LGUs, however, included only 28 provinces from 14 regions consisting of 565 municipalities. No data sets were received from Region 7 (Bohol & Negros Oriental) and Region 12 (North Cotabato & Sultan Kudarat).

Linking rice research to policy and action

AC Castañeda, FH Bordey, SR Francisco, AMJ Eligio, SJC Paran, FB Lamson, and SP Razon

PhilRice's socioeconomic and policy researches contain rich information that can be used in formulating sound rice policies, and in enhancing technology adoption and adaptation. Research results have to reach its intended readers to translate it into informed decisions and actions. This study mainly intends to strengthen the link between socioeconomic/ policy researches and policymaking.

Highlights:

Policy Briefs

Two issues of the Rice Science for Decision-makers (RS4DM) were prepared for policy-makers, PhilRice management and selected staff, DA officials, students, and other rice stakeholders. The material synthesized findings of researches and provided recommendations for policymaking. The issues published in 2012 are:

a. Why is Per Capita Rice Consumption Increasing?

This topic is based on a PhilRice study that determined the reasons behind increasing Per Capita Rice Consumption (PCRC). It examined the Supply and Utilization Accounts (SUA), which is being used in estimating the PCRC. Parameters of SUA were found to be obsolete, thus, need updating.

PCRC is crucial in estimating rice imports and in setting rice self-sufficiency targets.

b. Combining Organic and Inorganic Fertilizers: Recommended Practice for Sustaining Rice Yield

This topic touches on fertilizer management, especially on the proper use of organic and inorganic fertilizers. This is based on the results of a study that determined the fertilizers' effects on growth and yield of irrigated lowland rice. It showed that the combination of organic and inorganic fertilizers can result in good yield. This policy brief called for ways to correct farmers' misconceptions on the application organic and inorganic fertilizers.

Policy forum/seminar

The study annually hosts a policy forum to create discussion venue for rice policy issues. This is being held every September as part of the Development Policy Research Month (DPRM) celebration.

In 2012, the topic "Philippine Rice Trade policies and Rice Security: Future Directions" was chosen in response to the current issue on government's adherence to Quantitative Restrictions (QRs) on rice.

This forum was organized to review and assess QR's impact, so far, on the rice sector. Several studies had already been conducted on rice trade liberalization but these need updating. In this forum, updates on and insights on future directions of rice trade policies were gathered.

The objectives of the forum were: (a) to review history and the current status of the rice trade policies in the Philippines; (b) to assess implications of 2005 QR extension to the rice industry, particularly on rice sufficiency and price stability; (c) to assess the competitiveness of Philippine rice industry; (d) to determine the advantages and disadvantages of rice tariffication; and (e) to identify future directions of the rice industry under a tariff regime.

Seminar/Forum Proceedings

In 2012, the proceeding of the Policy Seminar-workshop on Mainstreaming Brown Rice to Low- and Middle-income Families was prepared. It is mainly composed of submitted papers of speakers, transcribed discussions and group interactions, and a resolution on increasing the market supply, acceptability, and public awareness of brown rice. This proceeding will be distributed in first quarter of 2013.

Online sharing of socioeconomic and policy papers, and related documents

The team has collaborated with the Information Systems Division (ISD) in creating and maintaining an online storage of SED's research papers (discussion and terminal reports), policy news articles, and legal issuances related to rice. As of December 2012, 18 working papers, 25 news articles, and 7 rice-related laws are now accessible through this online storage.

Revisiting the economics of hybrid rice seed production in the Philippines
FH Bordey, JC Beltran, CC Launio, RZ Relado, FB Lamson

This study determined the cost of producing seed of three-line hybrid varieties in the Philippines at the farm level. Seed growers of both public and private hybrid rice varieties in Davao Oriental, the hybrid seed capital in the country, were interviewed using a structured questionnaire. Data on seed yield, input uses, and prices were collected and used in constructing the cost structure of hybrid rice seed production.

Preliminary findings:

- Seed growers of public and private hybrid rice varieties have both an average area of 6ha indicating that these groups were not significantly different in terms of land endowment.

- The average seed yield of public hybrids is 1,226kg ha-1, which is significantly lower than the mean seed yield of private hybrids at 1,917kg ha-1. No significant difference between the yields of R-lines was observed.

- Typically, seed cooperatives buy public hybrids from seed growers while big seed companies procure private hybrids using contract growing schemes. Seed cooperatives and companies market hybrid rice seed in various retailers in the country. The output price of public hybrids is generally higher at PhP113kg-1 compared to Php76kg-1 of private hybrids. However, because of the higher seed yield, no significant difference in the gross revenues of both public and private hybrids was observed. On average, a typical seed grower of public and private hybrids would grossed at PhP158,000ha-1 and PhP165,000ha-1, respectively.

- The average cost per hectare of producing public hybrids is PhP107,000 while that of private hybrids is PhP102,000. Although the total costs per hectare in both groups were not statistically different, the material costs of producing public hybrids were significantly higher than those producing private hybrids. This is because the cost of parental seed of private seed growers was technically shouldered by the seed companies whereas parental seed of public hybrids were procured by public seed growers. This could be one of the reasons for the lower procurement price of private hybrids compared to public hybrids.

- For public hybrids, the share of material inputs to total production cost is 31% while labor cost constitutes 37%. On the other hand. Material and labor costs composed 24% and 41% of the total production cost of private hybrids. Cost of renting land comprised a hefty 28% of the production cost of both public and private hybrids. Hybrid seed production have generally raised the cost of renting rice land in Davao del Norte to around PhP30,000ha-1 per season.

- The net profit for producing private hybrids is PhP63,000ha-1 while that of public hybrids is PhP51,000ha-1. The difference was not statistically significant because of the wide variation. However, the unit cost of producing private hybrid is lower at Php26kg-1 compared to PhP89kg-1 of public hybrids. While these unit costs are statistically significant, the real difference is unclear unless parental seed of private hybrid was valued accordingly.

Table 33. Costs and returns of producinghybrid rice seed in the Philippines, 2012.

Particulars	Public Hybrid		Private Hybrid		T-test
	Mean	Standard Deviation	Mean	Standard Deviation	(P-Value)
Area (ha)	6	4	6	4	0.826
Yield					
Processed F1 Seeds (kg ha^{-1})	1,226	407	1,917	723	0.001
Processed R Line (kg ha^{-1})	1,257	601	1,454	714	0.454
Price of Output					
Price of F1 (PhP kg^{-1})	113	33	76	21	0.000
Price of R line (PhP kg^{-1})	15	2	15	2	0.657
Gross return (PhP ha^{-1})	158,048	56,927	164,630	58,638	0.678
Costs (PhP ha^{-1})					
Material Costs					
Seed	7,569	2,640	0	0	0.000
Fertilizer	11,911	4,781	15,245	5,945	0.070
Pesticides	7,462	2,844	7,747	3,359	0.787
GA3	4,072	1,968	174	360	0.000
Others (Bags/Sacks/Rope/Fuel)	2,395	2,469	1,244	1,252	0.258
Hired Labor					
Seed and Seedling Management	1,044	1,485	96	169	0.119
Land Preparation	3,591	2,051	4,125	1,818	0.508
Crop Establishment	6,793	2,240	7,505	2,458	0.148
Crop Care and Maintenance	2,924	1,827	1,559	960	0.062
Rouging	1,203	922	1,737	1,110	0.256
Supplementary Pollination	1,568	704	1,488	829	0.796
Harvesting and threshing	10,776	3,794	11,515	3,874	0.439
Postharvest	428	332	413	389	0.929
Permanent Hired Labor	10,926	5,541	13,576	7,298	0.325
Other Costs					
Food	981	483	1,073	1,046	0.805
Depreciation	1,670	1,724	935	835	0.295
Repair and Maintenance	1,331	1,602	1,055	1,397	0.712
Transportation	453	413	589	542	0.552
Land Lease/Rental	29,889	9,014	29,800	8,991	0.615
Machine Rental	0	0	2,000	4,051	0.168
Animal Rental	167	214	150	233	0.885
Total Production Costs (PhP ha^{-1})	107,134	33,792	102,024	32,193	0.309
Net Profit (PhP ha^{-1})	50,914	30,861	62,606	35,513	0.420
Unit Cost (PhP kg^{-1})	89	29	58	26	0.002

Source: Own survey

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

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