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Full Paper

Voices From The Field: Needs of Small-Scale Filipino Rice Farmers

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This paper presents an assessment of needs and coping mechanisms of small-scale rice farmers in the Philippines. Various ethnographic methods were used in the study. Focus group discussions among farmers and key informant interviews among agricultural staff and extension workers were conducted in 51 villages of 19 municipalities in six provinces of the country. Household survey was conducted among 923 farmers in the provinces of Agusan del Norte, Iloilo and Isabela. The major needs faced by small-scale Filipino rice farmers ranged from overcoming biotic and abiotic stresses, economic sufficiency, structural sufficiency and enhanced knowledge in rice farm management & technologies. Sufficient capital prevailed to be the most common need in rice farming. Other specific needs include low input cost, higher paddy price, access to equipment and post-harvest facilities, adequate irrigation system, farm-to-market roads, overcoming biotic stresses such as pests and diseases, overcoming abiotic stresses such as flooding and drought, and improved knowledge on rice farm management and technologies. Some needs and constraints were found to be location-specific such as biotic and abiotic stresses, but were interrelated. Adoption of key technologies promoted in the *PalayCheck* system to increase rice production remains a great challenge since these technologies such as the site specific nutrient management are closely interrelated with timely availability of sufficient financial capital. Farmers were found to manage and cope by borrowing money from informal lenders who charge them with high interest rates, and traders that require farmers to sell their produce immediately after harvest with a low paddy price. These situations entrapped our rice farmers in a cycle of poverty, hence pro-farmer policies and programs that addressed real needs of farmers should be in place: easy access to formal financial institutions with low interest rates and simplified credit requirements; a competitive price for paddy; reduction in costs of inputs; livelihood programs to farmers and their households; access to post-harvest facilities; better irrigation systems and road infrastructures; and most of all, strengthening farmer organizations. A working multi-stakeholder partnership among farmer organizations, Department of Agriculture and local government units are imperative in addressing the needs of farmers to increase rice production, farming households' income and achieving the country's goal of rice self-sufficiency.

Keywords: coping mechanism, Filipino rice farmers, needs, poverty trap, rice self-sufficiency

INTRODUCTION

The Philippines, a country heavily dependent on imported rice, has launched a Philippine Rice Self-Sufficiency Plan (PRSSP) in 2009 to avoid a similar scenario to the 2008 food crises. Through the Department of Agriculture, this multi-billion program called FIELDS, which stood for Fertilizer, Irrigation, Extension, Loans, Dryers and Seeds. Altogether, the key components of FIELDS aimed to increase rice production in the country and achieve rice self-sufficiency. This FIELDS program was later modified into Agri-Pinoy for Food Staples Rice Self Sufficiency.

While public expenditures in agriculture has increased markedly in the 1990s and early 2000s, the gains in terms of improvement in long-term productivity however were not high (David 2003). For instance, the spending on Research and Development (R&D), basic transport infrastructure, and institutional development had low priorities (David 2003).

The national extension platform used by the Department of Agriculture (DA) to achieve rice self-sufficiency was the Farmer Field School *PalayCheck* or FFS *Palay*Check. This is a farmer participatory approach that promotes eight key checks: 1) use of high quality seeds of a recommended variety; 2) no high and low soil spots after final leveling; 3) practice of synchronous planting after a fallow period; 4) sufficient number of healthy seedlings; 5) sufficient nutrients from tillering to early panicle initiation and flowering stages; 6) avoidance of excessive water stress; 7) no significant yield loss due to pests; and 8)

cutting and threshing the crop at the right time (see http://www.pinoyrkb.com/main/).

Most public agricultural extension systems however, often fail due to inadequate consultation of farmers about their needs in their farming livelihoods such as in rice production (Babu et al. 2012, FAO 2003). More so, most agricultural expenditure is usually poorly focused on the real needs of small-holder farmers (ActionAid 2013). It is therefore important to revisit and assess the needs of the Filipino rice farmers in relation to the attainment of rice self-sufficiency of the country.

The 'Farmer-back-to-farmer' (Rhoades and Booth 1982) and 'farmer-first-and-last' (Chambers and Ghildyal 1985) models advocated to take in farmers' needs and priorities, and in turn infuse them in research programs instead of using the conventional top-down transfer of technology. These models acknowledge that farmers are knowledgeable about their own situation, and what works and does not work. These models also allow farmers to participate in assessing their needs and constraints to make a significant contribution in identifying the ways and means of addressing the challenges in rice production. Rice, the staple food of the country, remains an important source of livelihood for about 12 million Filipino farmers and family members (FAO 2007a). The small scale farmers and landless agricultural workers comprise the 40% of the agricultural labor force nationwide (Balisacan and Ravago 2003).

Balit (1998) stressed that any development effort should begin by listening to farmers and taking into account their perceptions, needs, knowledge, experiences, cultures and traditions (Balit 1998). Palis (2004) stressed that the *emic* (farmers' point of view) and *etic* (scientists'/extensionists' point of view) need to be reconciled in technology development and dissemination for efficient extension and getting high likelihood of impacts. This paper argues that needs assessment is central to identify the relevant problems and challenges experienced by farmers in the country. In turn, this will lead us to realize what further interventions that would fit to local needs or what policies to be designed, so as to increase rice production in the country to meet rice sufficiency level. Hence, this study assessed the needs of small-scale Filipino rice farmers relative to achieving rice self-sufficiency, and documented their coping mechanisms in rice production.

MATERIALS AND METHODS

Study Sites

The study was conducted in six provinces: two provinces representing each of the three big islands of the country, namely: Camarines Sur and Isabela for Luzon, Bohol and Iloilo for the Visayas, and Agusan del Norte and Agusan del Sur for Mindanao. Provinces, municipalities and villages were selected based on: the size of rice growing area, presence of FFS P*alayCheck* training implemented by PhilRice and Agricultural Training Institute (ATI) of DA, accessibility, and upon consultation with local agriculture officials especially on peace and order situation.

Table 1. Number of focused group discussions (FGD) participants in selected study areas, 2009-2010

Province	Municipality	Village	Participant		
			M	F	Total
Agusan del Norte	4	12	69	115	184
Agusan del Sur	3	6	32	43	75
Bohol	3	9	67	52	119
Camarines Sur	3	9	60	38	98
Ilo-ilo	3	6	55	46	101
Isabela	3	9	106	28	134
Total	19	51	389	322	711

Research Methods

Various ethnographic methods were used to elicit ethnographic accounts and collection of both quantitative and qualitative data. Focus group discussions (FGDs), and key informant interviews (KIIs) were employed to gather qualitative data from the six provinces in the Philippines between July 2009 and March 2010. Informal interviews, secondary data, and field observations within 2011-2012 were also performed.

The FGDs conducted covered a total of 51 villages in 19 municipalities of the six provinces with a total of 711 farmers, 389 male and 322 female farmer participants (Table 1). In each province, 3-4 municipalities with 2-3 villages in each municipality were selected, using the same aforementioned criteria. The group size for each FGD varied, but generally consisted of 8-20 farmers. The group was a mixture of men and women, but in Agusan del Norte, majority (62.5%) were women.

Key informant interviews were also employed among the Municipal Agricultural Officers (MAOs), municipal and provincial extension workers or Agricultural Technicians (ATs) of the different Local Government Units (LGUs) and staff of other government agencies such as DA Regional offices, National Irrigation Administration (NIA), and National Food Authority (NFA).

To triangulate the results in the FGD and KIIs, a household survey on farmers' needs was conducted during 2010-2011 involving 923 farmers, for both wet and dry season. Due to budget and time constraints, only three out of the six provinces were covered, one province representing an island, namely: Isabela for Luzon, Ilollo for Visayas, and Agusan del Norte for Mindanao. In Agusan del Norte, the general dry season of the country corresponds to its wet season while the the general wet season of the country corresponds to its very wet season. Respondents

were sampled using simple random sampling from the total list of farmers in each of the villages of municipalities selected from the three provinces.

The qualitative data were summarized and thematic analysis was employed. The quantitative data were analyzed using basic statistical tests such as means, standard deviation, frequency counts, and percentages; as well as T-test for test of means and chi-square tests or Fisher's exact for comparing proportions. Costs and returns analysis was also conducted but only in Agusan del Norte due to time constraints. To address this limitation, findings from the Bureau of Agricultural Statistics (BAS) were utilized and cited.

RESULTS AND DISCUSSION

Socio-economic Profile

Farmer characteristics across the three provinces are generally similar (Table 2). The average age of farmers was 53 years old, 16 being the youngest and 89 the oldest. Male farmers (70%) exceeded women farmers (29%); and mostly were married (83%) with an average household size of 5. The average number of children was 4 and the average years spent in school by the farmers was 9 yr or an equivalent level of 3rd year high school. Farmers' experience was on the average 25 yr with average farm size of 1.29 ha. Farmers' average annual income is PhP20,000 or US$500 (BAS 2012), equivalent to PhP1,667 or US$40 per month. From the survey in Agusan del Norte, the net income above cash cost during wet season was PhP27,991 on the average or PhP22,750 if family labor is valued; and during dry season was PhP 29,500 or PhP23,800, if family labor is valued (Table 3). More than a third of the farmer respondents had secondary source of income.

Farmers' Needs

Tables 4 & 5 presents the common major needs (or constraints) reported by farmers with rankings from the most needful to the least. The needs in this paper are similarly defined as constraints. Farmers' responses refer to problems or constraints they have in rice farming. The needs were derived from the constraints mentioned by farmers. Findings from the survey and FGDs on the major needs of the rice farmers are similar (Tables 4 & 5). There were 8 out of 10 needs listed in the FGDs that corresponded with the results in the household survey.

The needs of farmers ranged from overcoming biotic and abiotic stresses, economic and structural sufficiency and improved knowledge on rice farm management and technologies.

Economic sufficiency

Sufficient Capital. The top most need of rice farmers is sufficiency in capital (Tables 4 & 5). This lack of sufficient capital for rice production were also reported by Sebastian et al. (2000), Hossain et al. (1995) and Gerpacio et al. (2004). Considering that rice farmers kept reiterating this concern, it is high time for the government to listen to them and devise practical pro-farmer policy and strategy that can address this concern. More so, capital investment insufficiency of farmers in rice production is a major hindrance in achieving the goal of rice self-sufficiency in the country.

Table 2. Respondents' socio-demographic characteristics (Household survey, 2010-2011)

Characteristic	Agusan N=359	Iloilo N=282	Isabela N = 282	Total N=923
Age (years)				
Mean	51.13b	58.50a	50.13b[1, 2]	53.25
Standard deviation	11.66	12.93	12.69	12.43
Range	16-83	26-89	24-87	16-89
Gender (%)				
Male	56.5c	71.3b	83.3a	70.4a
Female	42.3a	28.0b	16.0c	28.8b
Civil status (%)				
Single	3.9a	6.0a	5.0a	5.0b
Married	84.4a	79.8a	84.4a	82.9a
Widow Widower/ Separated	9.4a	13.2a	7.5a	10.1b
Education (years)				
Mean	8.25a	8.96a	8.80a	8.67
Standard deviation	3.04	3.40	3.20	3.21
Range	1-15	1-15	1-15	1-15
Occupation (%)				
Rice farming as primary occupation	72.4a	76.6a	81.2a	76.7
Rice farmers w/ secondary Occupation	49.3a	26.6b	30.9b	35.6
Farm experience (years)				
Mean	21.88a	29.70a	24.66a	25.41
Standard deviation	12.87	15.95	14.27	14.36
Range	1-78	2-70	1-66	1-78
Farm size (ha)				
Mean	1.04b	1.41a	1.43a	1.29
Standard deviation	0.63	0.80	0.85	0.76
Range	0.13-0.25	0.10-4	0.15-4	0.10-4
Household size				
Mean	5.05a	4.48a	4.18a	4.57
Standard deviation	2.18	2.18	1.82	2.06
Range	1-15	1-13	1-14	1-15
Number of children				
Mean	4.49a	4.45a	3.46a	4.13
Standard deviation	2.73	2.75	2.28	2.59
Range	0-22	0-15	0-12	0-22

[1] One way analysis of variance with unequal replications was used for comparing means of quantitative data while chi-square tests or Fisher's exact tests was utilized for comparing proportions.; [2]Means with the same letter are not significantly different at 0.05 level of significance.

Table 3. Cost and return analysis (PhP ha^{-1}) of rice production for transplanted rice, Agusan del Norte, 2010

Season	Result*
Wet Season	
Income	
Yield (kg ha^{-1})	3843.0
Price per kg of palay (PhP kg^{-1})	13.74
Gross Income (PhP ha^{-1}) (A)	53198.6
Cash Costs	
Material inputs paid	7894.0
Hired labor inputs (including value of labor paid in kind)	17231.3
Total Cash Cost (B)	25125.3
Non-Cash Cost	
Value of owned materials inputs	1941.6
Value of unpaid family and exhange labor	3286.7
Total Non-Cash Costs (C)	5228.2
Total Production Costs for Wet Season (D = B+C)	30353.6
Net Income above Cash Cost (A - B)	27991.1
Net Income Above Total Cost or Profit (A - D)	22750.0 n =273
Dry Season	
Income	
Yield (kg ha^{-1})	3991.4
Price per kg of palay (PhP kg^{-1})	13.55
Gross Income (PhP ha^{-1}) (A)	54306.3
Cash Costs	
Material Inputs paid	7015.5
Hired labor inputs (including value of labor paid in kind)	17837.6
Total Cash Cost (B)	24853.1
Non-Cash Cost	
Value of owned materials inputs	1829.4
Value of unpaid family and exhange labor	3729.9
Total Non-Cash Costs (C)	5559.3
Total Production Costs for Dry Season (D=B+C)	30412.5
Net Income above Cash Cost (A - B)	29453.2
Net Income Above Total Cost or Profit (A - D)	23893.8

* The cost and return analysis for Agusan del Norte was the only data done at the time this paper was written. For uniformity, only farmers who practiced transplanting and used certified or good seeds were considered in the analysis (n=212).

Sufficient financial capital is highly needed for buying inputs such as seeds, fertilizers, pesticides, and fuel as well as for paying fees for machine rentals, labor, and for irrigation. For one cropping season, farmers reported that they would need more than PhP10,000 ha^{-1} to finance their rice production. Furthermore, they need more capital if they are going to hire labor considering increasing labor costs.

From the survey in Agusan del Norte, the average total cash cost of material inputs, including fuel, machine rentals, and irrigation fees, was around PhP8,000 during wet season and PhP7,200 during dry season. When labor costs were factored in, the average total cash cost would be PhP25,000 for both seasons (Table 3). Fertilizer costs ranged PhP3,000 – 10,000, with an average of PhP4,000 ha^{-1}.

With high input costs and insufficient capital, farmers are unable to buy and timely apply the recommended amount of farm inputs. Hence, insufficient capital of

Table 4. Farmers' needs* in rice production based from FGDs, 2009-2010

Need	Percentage**	Rank
Sufficient capital	89.7	1
High paddy price	79.5	2
Adequate irrigation system	74.4	3
Access to equipment and post-harvest facilities	61.5	4
Low input costs	53.9	5
Technologies/infrastructures to manage Abiotic stresses	51.3	6
Technologies to manage Biotic stresses	25.6	7
Improved knowledge on rice farm management & technology	23.1	8
Adequate farm-to-market roads	12.8	9
Able to pay-off debts	7.7	10

*Needs were derived from constraints reported by farmers; **Multiple responses

farmers has negative implications on technology adoption and in turn, on the attainment of rice sufficiency. An example is the site specific nutrient management (SSNM) promoted in the FFS *PalayCheck*. The correlation of rice yield to fertilizer nutrient use has long been established and thereby following SSNM has great potential to increase rice production (Mutert and Fairhurst 2002).

The SSNM emphasized the critical importance of applying the right kind, amount and timing of fertilizer application considering the target yield level of the farmer. With insufficient capital, often farmers are not able to follow the SSNM recommendations. Farmers often reduce the amount of fertilizer applied, and the timing of fertilizer application depends upon the availability of money to buy fertilizer. For instance, in the village of *Panaytalon* of Agusan del Norte, some farmers reduce the amount of fertilizer from the recommended 6-8 bags ha^{-1} to 2-3 bags ha^{-1}, and use organic and foliar fertilizers. Lack of sufficient capital might explain why the average fertilizer use of rice farmers in the country is still relatively low, even with the continuing presence of fertilizer as a component in government rice programs (Sebastian et al. 2000; Briones 2014).

Access to Formal Credit with Low Interest Rate

Farmers are constrained in their access to credit from formal financial institutions with lower interest rate, such as the Land Bank of the Philippines. Primarily due to high transaction costs, physical access to formal financial institutions, lack of financial literacy, voluminous documents required, and lack of both collateral and capacity to pay (Yaron et al. 1997). Formal banks or financial institutions normally are located at the center of the city or municipalities. As also reported by Poliquit (2006) and Geron and Casuga (2012), these formal financial institutions are often not geographically accessible to farmers in

Table 5. Percentage of farmers reporting needs* in rice production (Household survey 2010-2011)

Needs	Dry Season				Wet Season			
	Percentage (%)**							
	Agusan N=359	Iloilo N=282	Isabela N=282	Total N=923	Agusan N=359	Ilo-ilo N=282	Isabela N=282	Total N=923
Overcoming biotic stresses	83.1	89.4	77.0	83.1	71.6	92.6	74.8	79.0
Pests	70.8	68.1	51.1	63.9	61.6	68.8	51.8	60.8
Diseases	12.3	21.3	25.9	19.2	10.0	23.8	23.0	18.2
Overcoming abiotic stresses	37.9	66.7	61.7	54.0	26.4	59.9	67.3	49.3
Drought	19.2	42.2	42.9	33.5	8.9	16.0	12.4	12.1
Flooding	14.2	12.1	12.8	13.1	15.3	33.3	41.8	29.0
High soil salinity	3.9	11.3	3.9	6.2	1.9	10.6	6.0	5.9
Typhoon, strong wind	0.6	1.1	2.1	1.2	0.3	0.0	7.1	2.3
Sufficient capital	65.5	50.7	40.8	53.4	56.8	49.3	36.9	48.4
Low input cost	28.7	49.0	38.7	37.9	21.7	47.2	37.2	34.2
High yield	23.1	47.5	46.1	37.6	19.5	43.3	41.5	33.5
Low price of quality seeds	11.7	36.5	39.0	27.6	10.3	35.5	36.9	26.1
Higher paddy price	31.8	14.9	9.6	19.8	25.3	17.0	7.4	17.3
Adequate farm-to-market roads	7.0	7.1	11.7	8.5	6.1	9.2	11.0	8.6
Equipment and post-harvest facilities	8.7	5.3	11.6	8.5	7.6	5.7	10.3	7.8
Adequate irrigation system	14.2	0.7	3.9	6.9	8.4	0.0	2.5	4.0

*Needs were derived from constraints reported by farmers
**Multiple responses

farming villages. Thus, continued reliance on informal credit has remained a major source of financing for Filipino farmers.

With inadequate funds and high costs of inputs, rice farmers are therefore forced to borrow money with high interest rate from informal money lenders, buyers and traders because of fast and easy access, less paper requirements, and they get the money on hand with less transaction costs. Aside from many paper requirements, farmers especially those who are less educated are afraid to borrow due to inadequate understanding of the process which is so complicated to them. Similar findings were also found by Gerpacio et al. (2004) among corn farmers.

From the six provinces, loan interest from informal money lenders including the rice buyers and traders ranged 10-20% per mos. Normally, buyers and traders charged 30-40% for the 3-4 mo for one rice cropping, that is including land preparation, harvesting and threshing. Private money lenders normally require 1 sack of fresh threshed *palay* or paddy rice (equivalent to 50 kg or 1 cavan) as interest for every Php 1,000 borrowed. In Agusan del Norte, a loan of PhP 1,000 can also be paid in kind by 3 cavans of fresh threshed *palay*. Some farmers in villages with self-reliant farmers' organizations were able to avail of a PhP 2,000-loan with one cavan of threshed *palay* as interest.

In 1998, about 38% of farm households in the Philippines borrowed, but only 11% loaned from formal institutions (World Bank 2000). Similarly, the ratio of agriculture production loans to gross value added (GVA) in agriculture and fisheries decreased from 41% in the late 1970s to only 22% in the late 2000s (Geron and Casuga 2012). Farmers are henceforth always under the mercy and control of rice buyers, traders, and private money lenders. They do not have any choice but to comply with the informal credit rules just for his/her family to survive. In this manner, farmers are demonstrating the state of *kapit sa patalim*, which literally means holding or grasping a knife blade. This is a Filipino idiomatic expression that is often used when someone is in dire need and at an unfavorable position (at times, hazardous situation) but that person doesn't have any choice but to grab that opportunity just to survive or solve a problem.

Ability to Pay-off Debts at Harvest

Most farmers (75-90%) immediately sell the fresh *palay* harvest (22-26% MC) to pay off debts. This is a very common practice to most farmers, except in Iloilo where they usually sell dried weight *palay,* because the people whom they owe money for capital are already requiring them to pay back. Farmers have no choice as they must sell their *palay* to creditors as part of their agreements (PAN AP 2007).

Aside from paying off debts, other reasons for selling harvested rice straightaway include: a) farmers in general need cash immediately, b) buyers would still take out 7 kg for every bag of fresh paddy as discount (locally known as "resiko") to the buyers, which is equivalent to the amount lost if the grains were dried, and c) lack of drying facilities and to do away with labor cost for drying. They do not want to take risk in drying, getting the paddy damaged and incurring more costs and getting a low price at the end. Since it is hard for them to dry their crop especially during the wet season, they sell their fresh weight *palay* to the private traders and millers and informal money lenders (Chupongco et al. 2008).

Out of the harvested paddy, farmers often sell 75-90% of their paddy right after harvest, while the 10-25% is kept for home consumption. For example, in Gainza, Camarines Sur, about 80% of the farmers sell wet paddy. In the province of Bohol, farmers reported that for 80 sacks harvested, 60 sacks are sold immediately while the remaining 20 sacks are stored for food. Thus, 75% of harvested rice is used to pay their debt. From the survey in Agusan del Norte, 20% is kept for home consumption, but this also includes rice to be given to children and other relatives.

The stored paddy for consumption however, may not last for the household until the next harvest which is the case for almost all of the villages covered in the six provinces. In Barangay Poro, Canaman, Camarines Sur, about 80% of the households are usually short of rice supply for a month before the next harvest. They buy or loan milled rice from the stores.

The immediate selling of paddy has been a part of Filipino culture and values pertaining to the concept of *suki* system (regular or loyal customer relationship), *utang na loob* (debt of gratitude), and *hiya* (shame) (Jocano 1966; Lynch 1970). In the *suki* system, farmers have regular buyers of paddy from whom they also get credit. Trust and friendship between the farmers and the buyer/trader are important to maintain this relationship. As such, farmers practice reciprocity and observe a strong sense of indebtedness. If they do not immediately sell their produce to these buyers/ creditors after harvesting, they feel embarrassed to mingle with them due to unpaid debts, and they could no longer get credit from them in the next cropping season.

However, when there are calamities (typhoon, drought, floods, pest and disease infestations), many farmers were not able to pay their loans at harvest period because the income they earned from rice farming was not enough to support all their needs. Sometimes, they have nothing to harvest because the typhoons and floods destroyed their rice harvest. Consequently, farmers may not be able to take succeeding loans unless creditors give them a second loan, with even higher interest rates. In 2011, a series of typhoons caused floods that destroyed around 6% of rice farmlands in the country and lost around 600,000 tons of milled rice to the floods and strong winds (GIEWS 2012). This is also true when there is drought. For instance, the El Niño phenomenon in 1998 caused rice production to fall sharply by 24.2% in the country (Balisacan et al. 2003). It is estimated that 50 % of the world's rice production is affected to a greater or lesser extent by drought (Bouman et al. 2005).

Given the religiosity of Filipinos, farmers offer this situation to God for solution as "Bahala na ang Diyos," or God will provide. Many farmers see this situation as God-given and beyond their control, and faith in God enables one to look forward for the better days ahead, because God will provide solution to their needs. Many Filipinos believe that God does not give a person a 'cross or problem' that one could not bear.

Structural Sufficiency

Higher Price of Paddy. Filipino farmers considered higher price of paddy as a need to increase rice production and household income (Table 4 & 5). This is needed to break their cycle of poverty because the higher price of paddy would result to higher income from rice production, and hence, sufficient capital in rice cultivation. This in turn will enable them to adopt improved technologies like SSNM and use of certified seeds in the *PalayCheck* system.

Most farmers associate limited post-harvest facilities to low paddy price especially during wet season. Sebastian et al. (2000) noted that farmers sell their products during harvest months where price is low because they do not have a place to dry or store their rice. As a result wholesalers dictate rice prices to retailers and consumers. Similarly, farmers do not want to take the risk of damaging their rice grains which would result to much lower paddy price.

According to farmers, the price of paddy is normally based on the following criteria: dry or low moisture content (tested by biting), no discolored grains, no broken grains, fully-filled grains and with high head rice and milling recovery. Based from these criteria, the buyers and traders dictate the price. In Pototan, Iloilo, traders who are not residents of the village have associations and they follow a standard price for the produce. For wet and dried paddy, the prices vary by about PhP 2 kg^{-1} *palay*.

The National Food Authority (NFA) whose buying price is higher than the market price, failed to influence farm gate and commercial prices (Sombilla 2006). As experienced by farmers, the NFA procurement was a tedious, time consuming and unfriendly process, coupled with uncertainties of being bought. Hence, they rarely sell their produce to the NFA (PAN AP 2007). The average procurement of NFA during 1974-2004 was only 4% of the total production, which is insignificant to make an impact on the market (Sombilla et al. 2006).

While farmers are forced to be content with the very low farm gate price that traders or wholesalers offer, the retail price has been going up steadily, without the farmers benefiting from it (PAN AP 2007). In 2010, the average buying price of traders is much lower than that set by the government through the National Food Authority (NFA), taking advantage of the lack of bargaining power of farmers. The buying price for paddy in Agusan del Norte was PhP 2.00-3.50 per kg during very wet season (equivalent to general wet season) and PhP12.00-15.50 during wet season (equivalent to general dry season). According to the Bureau of Agricultural Statistics (2012), the *palay* farm price in 2010 was pegged at PhP16 per kg *palay*. The price differential is comparable to the study of Hughes

and Daglish (2005), with a PhP 2–5 kg^{-1} *palay* difference in the buying price of dry *palay* and price of wet *palay*.

Equipment & Post-harvest Facilities. Deficiency in equipment for land preparation to post-harvest facilities is experienced by most farmers throughout the country (Table 4 & 5) (Mutert and Fairhurst 2002, Sebastian et al. 2000; Chupongco et al. 2008). Not having adequate equipment makes it hard for farmers to facilitate plowing, harrowing & leveling during land preparation. Lack of equipment failed to synchronize planting which is promoted by *Palay*Check to minimize pests and diseases. Until now, farmers particularly in Agusan del Norte are still short of accessing small hand tractors. To avoid equipment rental, many of them borrow from the MAO office although the equipment is not enough when farmers borrow at the same time.

As discussed earlier, limited drying facilities was closely associated as one of the causes of low paddy price. Major criteria set by the buyers and traders for farmers to get a good paddy price are all connected to good and easy access to drying services to come up with dry, low moisture content, no discolored, and no broken grains. The lack of drying capacity is one of the key reasons of the poor quality of milled rice produced in the country especially for the wet-season harvest (de Padua 2007). Of the total production in the country, only about 14% or around 2.2 Mt is dried using mechanical dryers (Elepano 2008). About 14 Mt however, is sundried (Chupongco et al. 2008).

In response to this long concern of farmers, drying facilities were distributed by the Department of Agriculture through the Philippine Center for Postharvest Development and Mechanization (PHilMech) to farmer organizations across the country. As reported by farmers and based on our field observations, many of these dryers (flat-bed dryers) were not used by farmers. According to the farmers, the distributed dryers were either defective (with broken parts) even before they were installed and with corroded roofing or majority of farmers are not technically capable to operate these dryers. Similar findings were found by Chupongco et al. (2008) that some dryers distributed to famers were in poor mechanical condition at installation, and most recipients received no technical assistance or after-sales service from the manufacturer. According to the farmers, the dryers were useless and were just waiting to be corroded and dilapidated as well. Unless efforts are done to make use of these dryers, this program is a waste of resources and will not help farmers.

Lack of threshers and dryers is experienced severely by the farmers in Camarines Sur, Agusan del Norte and Agusan del Sur. In Libmanan, Camarines Sur, a rise in water level of the river often results to flooding of rice fields. Both during the wet and dry seasons, farmers harvest when the fields are wet. Threshers are not enough when farmers harvest at the same time. Aggravating the situation is labor scarcity since more people leave the fields to work in urban areas. Harvest is late with limited number of people available to do the job. Given that rice is harvested on wet field, farmers are forced to sell their *palay* harvest right away, otherwise, seeds will germinate in the field. The lag in threshing and drying causes the quality of grain to deteriorate. In Agusan del Norte, some farmers wait for as long as 2 wk. Some farmer cooperatives offer milling services with free drying, but generally, the number of milling and drying services in the country are concentrated with the buyers and traders.

Adequate Irrigation System. Adequate irrigation system is among the top most important needs of our rice farmers (Table 4) (Mutert and Fairhurst 2002; Manalili and Gonzales 2005, Sebastian et al. 2000). They could not start preparing the field and establish the crop unless water is available in the irrigation canals. The provinces of Agusan del Norte and Iloilo are areas mostly affected by the inadequacy of irrigation system, from lack of irrigation to poorly constructed canals. In Agusan, defects were found in some of the constructed canals, where either water cannot easily flow to the fields or there is too much flow during wet season. In Agusan, drainage was a problem during rainy season due to defective canals. According to Sebastian et al. (2000), the lack of effective irrigation systems including poor maintenance of irrigation facilities in the country are major constraints in the country's rice production. He further mentioned, that this is primarily constrained by the substantial increase in costs for irrigation development and management problems for large scale irrigation projects.

The irrigators' associations in respective villages of the six provinces are actively working with the National Irrigation Administration (NIA). And yet, the farmers believe that their efforts are not enough and they expect that NIA should: a) fix irrigation canals and drainage system, in particular to solve the problem of flooding due to overflowing of river, and b) build new irrigation system to supply water and reduce reliance of farmers on pumps and shallow tube wells. Furthermore, they were very hopeful to see the outcome of NIA's program on building new irrigation system and rehabilitating the old ones. Many farmers welcomed the idea of collective action for cleaning of dikes by the members of the irrigators association to contribute in maintaining the irrigation system.

NIA is also promoting a water saving technology, one of the key checks in *PalayCheck* system, called alternate wetting and drying (AWD). The AWD is a mechanism to save and equally distribute water to the fields as opposed to the traditional continuous flooding (Palis 2005; Lampayan 2004). At the same time, intermittent irrigation or AWD could increase the efficiency of nitrogen fertilizer in rice production, while N_2O emission is reduced (FAO 2007b). The AWD extension is further supported by Administrative Order (AO) 25 or "Guidelines for the Adoption of Water-

saving Technologies in Irrigated Rice Production Systems in the Philippines," with NIA as the lead agency, supported by the Bureau of Soils and Water Management, DA-Regional Field Units, PhilRice, and Agricultural Training Institute for technical support and assistance (PhilRice 2012). Farmers welcomed these efforts by NIA that they specially gave incentives to farmers' irrigators associations when adopting AWD.

Farm-to-Market Roads. Rural road infrastructure, particularly, farm to market roads is one of the major needs of our rice farmers (Table 4 & 5). This finding is corroborated with the study of Manalili and Gonzales (2005). Due to lack of farm to market roads, farmers experienced difficulty in transporting their harvest and hauling fresh *palay* becomes costly. Hauling costs ranges PhP5-30 per 50kg sack of *palay* depending on the distance of the farm to the pick-up point of the rice buyer, which is usually on the main roads or highways. In some areas, farmers have to cross rivers through hanging bridges on foot or with the use of motorcycles.

This is observed in Barangay Sampaloc, the biggest village in the town of Gainza, Camarines Sur with the largest rice area. The village is close to the Bicol River and the only route is through a hanging bridge. They pay PhP20 per sack for labor aside from the transportation cost of PhP10 pesos per sack. Likewise, in the village of Sto. Niño, Butuan City, Agusan del Norte, farmers sometimes pay PhP20-30 per sack of *palay* for transport. Farmers could not do anything but complain among themselves that the selling price of produce is low and yet the cost of bringing the produce to the market is high.

The development of farm to market roads would reduce the cost of transporting the produce from the farm to the market. Donnges et al. (2007) reported on the state of the road in the Philippines of which 14% of road network is paved. Twenty percent are provincial roads and 7% are village (tertiary) roads. Gravel roads make up about 78% of the total network. The rest are earthen roads and 65% of rural roads are in poor condition. About half of the rural villages in the country lack all-weather access to the main transport system. Majority of the existing village roads are in such a poor condition that they need to be rehabilitated first before they can be maintained (Donnges et al. 2007).

Overcoming Biotic and Abiotic Stresses

Another major concern being experienced by Filipino farmers are pest infestations & plant diseases, such as rodent, army worm, black bug, leaf hopper, snail, rice bird, neck rot, stem borer, blast, tungro and weeds (Table 4 & 5). Pest and disease is considered as one of the major constraints in Philippine rice production and for South and Southeast Asia (Mutert and Fairhurst 2002).

Closely following biotic stresses are abiotic and location-specific stresses such as flooding, water salinity, and drought (Table 4 & 5). With an average of more than 20 typhoons a year that cross the Philippine area of responsibility, flood-prone areas are most likely affected (PAGASA 2014). Recurrent floods during wet season frequently destroy planted rice and it is most devastating to farmers when these occur during the time that the rice is nearly harvested. Sebastian et al. (2000) acknowledged that regular occurrences of natural calamities, such as floods and drought, contributed to the complex development of new strains and biotypes of rice pests.

When flooding occurs during the crop establishment stage, farmers are unable to practice synchronous planting. Flooding causes farmers to establish crops more than once, sometimes even thrice per cropping season because of seedling damage. As such, synchronous cropping is not achieved which, in effect, also increase the incidence of pests and diseases. This is commonly experienced by farmers in Agusan del Norte, Agusan del Sur and Camarines Sur during the wet season. Moreover, the rice crop cannot survive when submerged under water for prolonged periods, especially at the vegetative stage (Mackill et al. 2010).

Water salinity is another type of location-specific stress that commonly happens during dry season for fields in the coastal areas such as the case of Camarines Sur and Agusan del Norte. Problems on salinity is more of a concern during the dry season because of salt water intrusion into the river, which is the source of irrigation during the dry season. Salinity is considered a major factor in reducing plant growth and productivity of rice, and may even result in yield losses of more than 50 % (Zeng and Shanon 2000).

Farmers planting new improved varieties and certified seeds is an intervention to control pests and location-specific stresses. More than 75% of farmers in Agusan del Norte plant certified seeds. Farmers believe that certified seeds are not only high yielding but also resistant to pests and diseases. This is a challenge to research institutions about the development of high yielding varieties with pests and diseases resistance, as well as tolerant to abiotic stresses such as flooding, submergence, drought and salinity.

According to Lansigan et al. (2000), the El Niño-induced climate variability in our country regularly results in: (a) late onset of the rainy season; (b) early termination of the rainy season; (c) weak monsoon events characterized by isolated heavy rainfall events of short duration; and (d) weak tropical cyclone activity characterized by less intense cyclones. In 2009, the Philippines suffered from an El Niño-induced drought that dried up watercourses and irrigation systems in some of the most productive rice areas in Luzon (Redfern et al. 2012). This resulted to a reduction of 3.31 % from the 2008 level or a loss of approximately 494,700 tons from 2009 to 2010 (Redfern et al. 2012; FAOSTAT 2012).

Improved Knowledge on Rice Farm Management and Technologies

Farmers expressed a need for adequate knowledge and information on improved rice technologies (Table 4 & 5). Others expressed that they need additional knowledge on proper application of fertilizers and how to control pests such as snails, stem borers, rats and green leaf hopper, fungus, tungro, black bug, rice bug, and rice blasts. They considered their lack of knowledge and difficulties in accessing information to be some of the reasons for having constraints in rice production. Studies have demonstrated that the relatively low fertilizer use – N, P, K and micronutrients – and proper timing of application, accompanied by poor cultural management practices are major sources of inefficiency in rice production (Sebastian et al. 2000; Briones 2014; Buresh 2014). And SSNM is one technology promoted in the FFS *PalayCheck* to address this concern.

Farmers in different provinces rely with agricultural technicians assigned in their localities for trainings and seminars in crop production. Increasing their awareness on improved technologies such as submergence and drought-tolerant and pest resistant rice varieties would be beneficial in facing the location-specific stresses.

Agricultural information comes from different sources such as DA technicians, PhilRice, chemical companies, TV, and radio. On extension services, decentralization that happened in the country has its good and bad side. Extension services to farmers are devolved from the central government to local units in the hope of bringing services closer to the people. The downside is the weak capacity of decentralized units in running extension activities and unwarranted interference of local politicians in technical matters that hinders implementation. In addition to weak research–extension linkages, the absence of adequate technical support by DA to LGUs with weak technical capacity and a top-down approach to extension delivery have been major impediments of an efficient rice extension system (Balisacan et al. 2010).

Efficacy of information system is compromised and farmers are left to fend for themselves from changes brought about by economic, environmental or socio-cultural factors. For example, some farmers are not aware on the efficient use of fertilizers and how to control certain pests. In the absence of training or information for new technologies, farmers rely mostly from their own knowledge and experience and from fellow farmers. Farmers also point out that increasing their knowledge on how to minimize the occurrence of rice diseases such as Tungro and neck rot, as well as infestation from golden apple snails and weeds would be very beneficial to them. Other farmers prefer farm demonstrations, TV and CDs as venues for acquiring new knowledge. The majority has access to TV, but only very few have access to computers for use in obtaining agricultural information.

CONCLUSION

Assessing farmers' needs is central to targeting appropriate interventions to rice farmers. Based from the FGDs and household survey, the common farmers' needs ranged from overcoming biotic and abiotic stresses, economic and structural sufficiency, and improved knowledge on rice farm management and technologies. Sufficient capital prevailed to be the most common need in rice farming. Some specific needs mentioned are higher price of paddy, adequate and better irrigation system, access to equipment and post-harvest facilities, low cost of inputs, increased knowledge on fertilizer and pest management, rice farm management and technologies, farm-to-market roads, and ability to pay off debts due to high cost of financing.

Although some needs are location-specific, they were very much interrelated. This is especially true to biotic and abiotic stresses such as pests and diseases, high salinity, drought and flooding. There are socio-economic and political constraints that are difficult to resolve by farmers alone and require government interventions through pro-farmer policies and programs.

Adoption of key technologies, i.e. site specific nutrient management and synchronous planting, promoted in the *PalayCheck* system remains a great challenge, since following these new technologies are interrelated with sufficient financial capital. Unless farmers' most pressing need for financial capital and related needs and constraints are addressed, adoption of new technologies to increase production, and attain rice self-sufficiency will remain elusive. Production and harvest will remain low, leading to farmers' low income.

Despite the absence or insufficient infrastructure of addressing the aforementioned needs, farmers have managed to cope with them. To sustain production, they are forced to borrow from informal lenders who charge high interest rates and traders that require farmers to sell their produce to them at a low price. Given this scenario, the farmers do not earn enough money at the end of the harvest season to finance their next season's cropping activities. Consequently, they are again forced to borrow from traders under the same conditions entrapping them to the vicious cycle of "rice farmers' poverty trap," which majority of the farmers in the Philippines experience.

There are socio-economic and political constraints that are difficult to resolve by farmers alone. Government interventions through pro-farmer policies and programs that effectively addressed real needs of farmers are highly needed to help our rice farmers escape the poverty trap, and at the same time, increase rice production in the country and attain the country's goal of rice self-sufficiency. These may include easy access to formal financial institutions that offer low interest rates with simplified paper requirements, a competitive price for rice paddy, reduction in the cost of inputs, access to functioning and efficient

post-harvest facilities coupled with technical capacity building on operation and maintenance, better irrigation systems, road infrastructures, and livelihood programs for farmers, farmer households, and farming community to support other sources of income (i.e. crop diversification and livestock program). The government financial institutions, such as the Land Bank of the Philippines, need to be farmer-friendly especially in terms of credit requirements, and responsive to financial needs of farmers and people in the rural areas.

Furthermore, there is a need to strengthen farmers' organizations so that they would be able to play a more aggressive role in finding options for their members. Strong farmers' organizations serve as viable entities for borrowing capital from formal sources and collectively negotiating for low cost of inputs and higher prices for their produce. However, this can only happen when these organizations are capacitated on leadership and management so that they would be able to conduct activities which would improve the income of their members.

Supported by practical pro-farmer policies, a working multi-stakeholder partnership at various levels – national, regional, provincial, municipal, and village-between farmer organizations, DA agencies and local government units can provide the necessary and timely assistance that farmers need in their rice farming enterprise. And so, putting the disadvantaged farmers first before the traders, importers, and manufacturers will boost the capacity of farmers to produce higher yield and income which could be an impetus in hastening the achievement of rice self-sufficiency.

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