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Rapid Appraisal of the Postharvest Facilities Projects in the Philippines

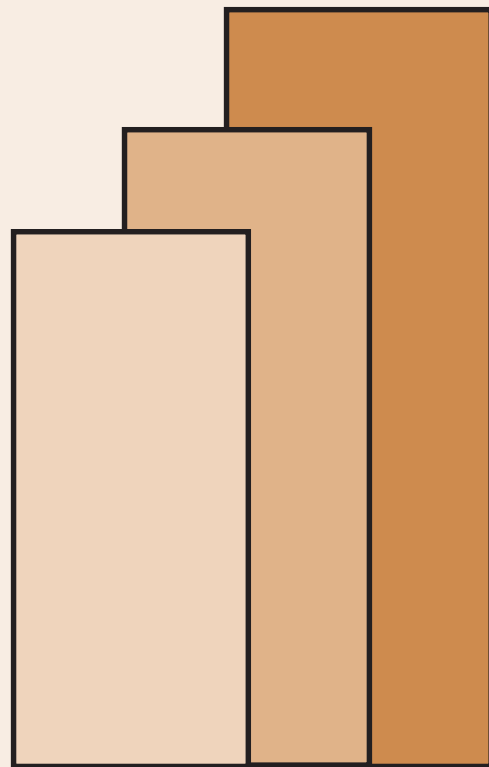
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Rapid Appraisal of the Post-Harvest Facilities Projects in the Philippines

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Abstract

The Philippine government's postharvest loss reduction programs entail significant investments (manpower, facilities and equipment) and their impacts need evaluating. Thus, the Philippine Institute for Development Studies of the National Economic and Development Authority commissioned NEXUS Agribusiness Solutions to undertake the "Rapid Appraisal of Selected Postharvest Facilities in the Philippines".

PHF Selection process considered at least one each for Luzon, Visayas and Mindanao and for the following PHF categories:

1. Equipment and facilities required immediately after harvest
2. Processing and storage facilities
3. Market infrastructure and transport facilities

Selected were four Rice Processing Centers (RPCs), established through a Korean International Cooperation Agency grant, in Pangasinan, Davao Del Sur, Bohol, and Iloilo. Using these sites as hub, other PHF nearby such as food terminals (FT), flatbed dryers (FBD) and threshers were included for evaluation.

In the context of upgrading value chains, reducing postharvest losses, and improving economic outcomes for smallholder farmers, selected PHF were characterized and assessed.

Evaluated PHFs were found responsive to farmers' needs (production, postharvest, processing and marketing), met pre-set objectives and posted positive impacts.

- RPCs' increase farmers' income, produce quality milled rice, reduce postharvest losses, improve distribution, and maximize utilization of byproducts, however, continued government support is needed, until a qualified beneficiary can take over operations.
- FBD/thresher distribution, reportedly preserve grain quality and reduce postharvest losses, but needs ensuring that benefits accrue to farmers.
- FTs provide agri-suppliers with access to markets, improve availability of commodities/basic goods, employment/entrepreneurial opportunities, and strengthened LGUs- private sector partnership. Proper management, comparable prices (to nearest market) and entrepreneurial skill of beneficiaries were key to successful FT operations in addition to appropriate location.

Recommendations centered on project management enhancement (timeliness of preparatory activities, participatory planning, etc.) and on operational improvements (capacity utilization, viability and sustainability).

Keywords: postharvest loss, postharvest facility, value chain, agricultural marketing, rapid appraisal

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List of Acronyms

PHFs	Postharvest Facilities
ACEF	Agricultural Competitive Enhancement Fund
AFMA	Agricultural & Fisheries Modernization Act
Agri-Pinoy	Agrikulturang Pinoy
AMAS	Agribusiness and Marketing Assistance Services
BAI	Bureau of Animal Industry
BFAR	Bureau of Fisheries and Aquatic Resources
BFT	Barangay Food Terminals
BOD	Board of Directors
BPRE	Bureau of Postharvest Research & Extension
CCP	Cold Chain Program
DA	Department of Agriculture
DSWD	Department of Social Welfare & Development
FBDs	Flatbed Dryers
FIELDS	Fertilizers, Irrigation, Extension, Loans, Dryers & Postharvest Facilities
FO	Farmer's Organization
GAA	General Appropriations Act
HVCDP	High Value Crops Development Program
KII	Key Informant Interviews
KOICA	Korean International Cooperation Agency
LGU	Local Government Units
MAO	Municipal Agricultural Officers
MC	Moisture Content
MFT	Municipal Food Terminals
NABCOR	National Agribusiness Corporation
NEDA	National Economic Development Authority
NIA	National Irrigation Administration
NHMP	National Hunger Mitigation Program
PAES	Philippine Agricultural Engineering Standard
PHILMECH	Philippine Center for Postharvest Development & Mechanization
RFU	Regional Field Unit
RPC	Rice Processing Centers
SPPAQFI	Sentrong Pamilihang Produktong Agricultural sa Quezon Foundation, Inc.

Executive Summary

Among global agricultural development woes are postharvest issues, specifically losses. This is a multifaceted concern as it impacts on the lives of the smallholder producers, the economy of the producing geographical unit, to a larger extent, the food security of the greater populace, the level of environmental challenges in meeting global food requirements. Aware of the pressing postharvest concerns, governments of countries in the Asia Pacific region agreed to prioritize the reduction of food losses, particularly post-harvest losses and food waste issues, in their country strategic plans for agricultural development, during the 2013 high level meeting on food loss and food waste in Bangkok, Thailand. Consequently, they agreed a) to work towards the creation of an enabling environment that is supportive of food loss reduction and will provide a better climate to stimulate private sector to investment in food loss reduction, and b) to integrate policy consideration for the development of basic and post-harvest specific infrastructure and food safety and quality regulations.

In the Philippines, while there are continuous government efforts to reduce postharvest losses, there is anecdotal evidence to indicate that government Post Harvest Facilities (PHF) investments may have been misallocated (as mentioned in this study's Terms of Reference). "*Are investments in PHFs truly responding to postharvest problems and issues in the agricultural value chain?*". This study, the "Rapid Appraisal of Postharvest Facilities", a component of a larger evaluation study of agricultural production support, shall evaluate the effectiveness of PHFs in the context of upgrading value chains and improving economic outcomes for small farmers.

The six-month study conducted from October 2014 to March 2015 centered on the four Rice Processing Centers (RPC) granted by KOICA since these have been in operation for at least two cropping seasons. The primary sites were Sta. Barbara (Pangasinan), Matanao (Davao del Sur), Pilar (Bohol), and Pototan (Iloilo). Using these sites as the hub, secondary sites with food terminals, flatbed dryers, and threshers were selected.

The study involved five major activities namely: (1) mobilization and workplan finalization, (2) detailed rapid appraisal planning, (3) rapid appraisal proper which is composed of two phases, initial assessment and in depth survey, (4) data processing and analysis and (5) report preparation. The rapid appraisal proper started with an initial assessment to determine operational status of the PHFs under consideration and for inclusion in the in- depth phase.

Capacity utilization and effect on reduction of postharvest losses were the main concerns evaluated regarding the KOICA-RPCs. Based on the procurement records provided by the four RPCs, the dryer and rice mill capacity utilization appeared to be inadequate. At full capacity assuming an eight-hour operation per day, the mechanical dryers can produce 25, 120 kg of dried paddy. The rice mills, on the other hand, can process 20,000 kg of milled rice per day. At least 30,000 kg/day of paddy must be procured to attain full capacity utilization. Procurement records showed that Pangasinan and Iloilo RPCs did not go beyond 12,000 kg/day of paddy procurement. Davao del Sur, however, reached an average of 141,043 kg/day of paddy procurement. (Bohol RPC procurement data is not yet available at the time that this initial report was written.) Lack of capital for paddy procurement was identified as a major constraint that led to low capacity utilization. Despite this limitation, the RPCs were still able to contribute to quality and quantitative postharvest losses in rice. A total of PhP 307 M worth of postharvest losses was estimated to be saved by utilizing the RPC facilities.

With regard to the flatbed dryers (FBDs) and rice threshers, the results of the impact evaluation revealed that the presence of the FBDs eliminates the risk of grain deterioration during the rainy season. Deterioration takes the form of stress cracking, mold development, grain fermentation and grain sprouting. This, however, is true among farmers who are able to avail of the services of the drying facilities. During the dry season, however, the impact of FBDs is less pronounced since farmers prefer the less costly method of sundrying (especially if grain volume to be dried is small). In the case of the threshers, farmer-respondents reported that they were able to thresh their paddy immediately with the additional unit of threshers provided by the Department of Agriculture. There is urgency to have the paddy threshed because farmers need cash as soon as their paddy is harvested to pay debts and to pay for household needs.

Barangay Food Terminals (BFTs) and Municipal Food Terminals (MFTs) were designed to function as food depots and distribution systems. Since each food terminal is located within a farming or fishing area, the Impact Evaluation Team concluded that the facilities can provide direct links between suppliers and consumers. BFTs are facilities that serve as a food distribution point at the barangay level, where farmers can bring their produce for sale as well as purchase food and non-food products at low prices. MFTs are designed to function as trading centers where growers can bring produce in large volumes for direct trading with wholesalers and “viajeros”. Thus, layers of middlemen are reduced leading to improved income for producers.

The government’s postharvest development program, based on selected assessment, were found to be strategically directed with its component mix addressing major postharvest concerns. The PHF identified and provided are those truly responsive to the needs of the marginalized farmers such as RPCs, food terminals, FBDs and threshers. This project mix covered key areas of agricultural development, namely: production, processing and marketing.

As to impact, the PHF facilities assessed were found to have met the objectives set for their establishment as well as have posted positive impacts. Given the state of the art equipment and well-trained personnel, RPCs are generally able to produce properly dried paddy and consequently good-quality milled rice. Likewise, RPCs also provide a safety net for farmers during periods of oversupply, when drying facilities are over utilized and private traders are not willing to accept wet paddy and/or offer very low buying prices.

MFTs and BFTs impacts are observable through the enhanced economic activities continually observe in areas where they were established, including expanded trade which afford suppliers and consumers alike greater product choices at lesser transaction costs. Flatbed dryers, are crucial and essential, especially during the rainy season, while threshers are instrumental in meeting farmers’ urgent need to immediately turn harvest into cash for household and loan repayment needs as well as timing of marketing produce while prices are still high (market not yet flooded with supply).

Having involved champions committed to the cause of PHF facilities program is a potent force in successful project implementations. Whether this is part of the strategy or just an incidental outcome is yet to be established.

Recommendations centered on the project management enhancement such as ensuring preparatory activities/consultation process are properly done and stakeholders involved the earliest possible time. This is in view of cited issues of nonawareness of counterpart requirements, unclear roles and responsibilities, among others. Operational enhancement to improve capacity utilization and enhance viability and sustainability were likewise recommended.

RAPID APPRAISAL OF POST-HARVEST FACILITIES PROJECTS IN THE PHILIPPINES

1. INTRODUCTION

Postharvest issues, specifically losses, are a multifaceted concern. The state of the postharvest sector's development in a given agricultural economy impacts not only on the lives of the smallholder producers, the economy of the producing geographical unit but to a larger extent, the food security of the greater populace, as well as the level of environmental challenges in meeting global food requirements. Food losses and food waste not only have adverse effects on the region's food security, but also negatively impact on the environment, labor, land, water and other resources used in food production (FAO 2013). Huge resources that could otherwise be spent on more productive activities go into producing and transporting goods that only go to waste (Manalili, et. al, 2014).

Cognizant of this pressing concern, governments in the Asia Pacific region, during the 2013 high level meeting on food loss and food waste in Bangkok, Thailand, agreed to prioritize the reduction of food losses, particularly post-harvest losses, and food waste issues in their country strategic plans for agricultural development; to work toward the creation of an enabling environment that is supportive of food loss reduction and provide a better climate to stimulate private sector to invest in the food industry for food loss reduction and for policy objectives to meet that end must integrate consideration for the development of basic and post-harvest specific infrastructure and food safety and quality regulations.

In the Philippines, while there are continuous government efforts to reduce postharvest losses, there is anecdotal evidence to indicate that government postharvest facilities (PHF) investments may have been misallocated (as mentioned in this study's Terms of Reference). Questions such as "*How much wastage is really going on in public PHF investments?*" or "*Are investments in PHFs truly responding to postharvest problems and issues in the agricultural value chain?*". These are just some of the many questions that need to be answered.

This study, "Rapid Appraisal of Postharvest Facilities", a component of a larger evaluation study of agricultural production support, is a modest attempt to address the concerns cited above. Evaluating the effectiveness of PHFs in the context of upgrading value chains and improving economic outcomes for small holder farmers is the major objective of the study. It will attempt to characterize PHF projects supported by public and donor funds, profile the types of post-harvest facilities provided to minimize postharvest losses, including expenditure patterns and trends (to identify the priority investments), as well as provide a field-based description of the decision process behind project identification, approval, and implementation.

Philippine Republic Act 8435, also known as the Agricultural & Fisheries Modernization Act (AFMA), defines postharvest activities as those involving threshing, drying, milling, grading, storage and handling of produce, and other activities such as stripping, winnowing, chipping and washing. Postharvest facilities for conducting these activities include, but are not limited to, drying and milling facilities, fish ports and landings, ice plants and refrigerated storage facilities,

processing plants, warehouses, buying stations, and market infrastructure and transportation (NAFC 2014).

Under the 2014 General Appropriations Act (GAA), the budget of the Philippine government is about PhP2.3 trillion with PhP 10.7 billion allocated to the Department of Agriculture (DA) (PCDSPO 2013). Of this agriculture budget allocation, 27 percent or about PhP 2.9 billion is provided for community postharvest development services and facilities. Table 1 provides a summary of ongoing and completed projects provided by the DA for postharvest facilities.

Table 1. Programs of the Department of Agriculture for establishment of postharvest facilities in the Philippines

Commodity	Program	DA Budget	Details
Rice	Rice Mechanization Program: Postharvest Facilities Component	Php 2.1-B (2014)	Provision of combined harvesters, threshers, flat bed dryers, multi-purpose drying pavements, rice mills, warehouse construction and expansion, rice processing centers, palay sheds
	Rice Mechanization Program: Rice Processing Center - KOWCA	Php865-M	4 RPC's established in Sta. Barbara, Pangasinan (Region 1); Pototan, Iloilo (Region 6); Bohol (Region 7); Davao del Sur (Region 11). Each RPC contains batch recirculating dryers (50 tons per day), warehouse for bag storage, rubber roll multi-pass rice mill (2.5 tons per hour)
Corn	Agri-Pinoy Corn Agri-Pinoy Corn Program: Postharvest Facilities Component	Php618-M	Corn postharvest processing & trading centers in Sta. Maria, Ilocos Sur (Region 1); Reina Mercedes, Isabela (Region 2); Tigaon, Camarines Sur (Region 5); Claveria, Misamis Oriental (Region 10); Digos, Davao del Sur (Region 11)
Highland vegetables	Tramline		Concentrated mostly in Benguet, with other systems installed in Abra, Ifugao, Kalinga, and Mt. Province
Fish	BFAR Cold Storage Facilities	Php89-M	Sardine cold storage in Dagupan, Zamboanga del Norte; fish cold storage in Maconacon, Isabela; fish port & cold storage in Sulu
Poultry		Php60-M	Liquid egg processing plant - San Jose, Batangas
High-value crop	Agri-Pinoy Trading Center Program	Php1.04-B	Establishment of regional trading centers for fruit, vegetables, other high-value crops. Benguet (Php655-M, soft launching in Oct 2014), Pangasinan (Php26-M, soft launching in July 2014), Nueva Ecija (Php77-M, target date for launching is May 2015); there are 19 other sites in the early stages of construction, business planning, feasibility studies
High-value crops, meat and fish	National Cold Chain Program	Php20-M	Provision of refrigerated transport and storage facilities, refrigerated displays. Ongoing since 2005 with first system established in La Trinidad, Benguet

2. SITUATIONER

2.1. Production Areas

In terms of value and volume of rice produced, the top five rice producing regions in the Philippines are Central Luzon, Cagayan Valley, Ilocos, Western Visayas, and SOCCSKSARGEN (Table 2 and Table 3, respectively). The average annual value and volume of production of Central Luzon was highest at PhP37.1 Billion and 2.02 Million metric tons for the period 2005-2009.

Table 2. Annual value of production of palay (Php x 10) at current prices

Region	Year of Production					Annual average
	2005	2006	2007	2008	2009	
National Capital Region	-	-	-	-	-	-
Cagayan Autonomous Region	3,661	4,085	4,708	6,330	6,548	5,066
Ilocos Region (R-1)	15,419	18,256	19,133	25,628	21,127	19,913
Cagayan Valley Region (R-2)	19,949	20,905	22,642	30,080	31,093	24,934
Central Luzon Region (R-3)	28,361	30,712	35,805	46,210	44,439	37,105
CALABARZON Region (R-4a)	3,962	3,684	4,290	5,903	5,347	4,637
MIMAROPA Region (R-4b)	7,994	8,274	9,509	11,429	13,979	10,237
Bicol Region (R-5)	9,102	8,097	9,756	12,270	13,550	10,555
Western Visayas Region (R-6)	18,638	19,475	22,196	28,545	30,342	23,839
Central Visayas Region (R-7)	2,466	2,785	3,170	4,665	4,047	3,427
Eastern Visayas Region (R-8)	7,794	8,212	9,678	13,831	13,322	10,567
Zamboanga Peninsula (R-9)	5,918	5,584	6,584	8,011	8,430	6,905
Northern Mindanao (R-10)	4,783	5,037	5,767	7,800	8,732	6,424
Davao Region (R-11)	4,485	4,716	4,601	5,564	6,154	5,104
SOCCSKSARGEN Region (R-12)	11,424	12,253	13,813	17,077	18,399	14,593
CARAGA Region (R-13)	3,779	4,116	5,078	5,820	5,919	4,942
Autonomous Region of Muslim Mindanao	5,518	5,775	6,903	8,951	7,630	6,955
Total	153,254	161,966	183,632	238,114	239,057	195,205

*Source: <http://countrystat.bas.gov.ph/selection.asp>; highlighted areas represent the top five producing regions of palay in terms of value

Table 3. Annual Volume of production of palay (metric tons)

Region	Year of Production					Annual average
	2005	2006	2007	2008	2009	
National Capital Region	-	-	-	-	-	-
Cagayan Autonomous Region	354,429	397,340	436,311	445,156	431,656	412,978
Ilocos Region (R-1)	1,382,877	1,597,168	1,642,301	1,691,629	1,351,715	1,533,138
Cagayan Valley Region (R-2)	1,848,849	1,953,755	2,025,245	2,080,240	2,077,036	1,997,025
Central Luzon Region (R-3)	2,545,853	2,677,633	2,942,113	3,014,347	2,805,467	2,797,083
CALABARZON Region (R-4a)	392,323	358,364	391,418	428,085	383,035	390,645
MIMAROPA Region (R-4b)	785,309	829,867	877,180	863,215	930,674	857,249
Bicol Region (R-5)	981,918	888,772	991,430	997,581	1,045,501	981,040
Western Visayas Region (R-6)	1,800,820	1,987,224	1,992,426	2,117,598	2,205,071	2,020,628
Central Visayas Region (R-7)	208,838	245,131	251,802	311,801	276,818	258,878
Eastern Visayas Region (R-8)	788,857	830,287	948,827	1,030,621	952,220	910,162
Zamboanga Peninsula (R-9)	562,557	514,201	553,759	551,310	565,764	549,518
Northern Mindanao (R-10)	459,010	461,289	501,892	551,246	583,297	511,347
Davao Region (R-11)	470,086	476,411	427,184	418,954	423,825	443,292
SOCCSKSARGEN Region (R-12)	1,090,105	1,146,220	1,186,688	1,234,757	1,229,040	1,177,362
CARAGA Region (R-13)	385,963	408,774	455,838	447,317	425,551	424,689
Autonomous Region of Muslim Mindanao	545,211	554,270	615,780	631,691	579,747	585,340
Total	14,603,005	15,326,706	16,240,194	16,815,548	16,266,417	15,850,374

*Source: <http://countrystat.bas.gov.ph/selection.asp>; highlighted areas represent the top five producing regions of palay in terms of volume

High-value crops are classified mainly into fruits and vegetables. For fruits, production volume is highest in Mindanao (58%) (Table 4). The top five fruit-producing regions by volume are Northern Mindanao, SOCCSKSARGEN, Davao, Western Visayas, and Cagayan Valley. For vegetables, 68% of production comes from Luzon. The top five vegetable-producing regions are Cagayan Autonomous Region, Ilocos, CALABARZON, Central Luzon, and Cagayan Valley.

Table 4. Average annual production volume of selected high value crops by region

Region	Production volume (metric tons) ²		
	Fruits ^y	Vegetables ^x	Total
National Capital Region	-	-	-
1 Cagayan Autonomous Region	20,235	231,088	251,324
2 Ilocos Region (R-1)	293,762	204,172	497,934
3 Cagayan Valley Region (R-2)	369,714	122,029	491,743
4 Central Luzon Region (R-3)	114,073	152,125	266,198
5 CALABARZON Region (R-4a)	233,191	162,558	395,749
6 MIMAROPA Region (R-4b)	279,324	8,723	288,047
7 Bicol Region (R-5)	179,224	77,273	256,498
8 Western Visayas Region (R-6)	348,636	58,265	406,901
9 Central Visayas Region (R-7)	221,087	57,105	278,192
10 Eastern Visayas Region (R-8)	209,762	13,926	223,688
11 Zamboanga Peninsula (R-9)	265,662	23,009	288,671
12 Northern Mindanao (R-10)	1,698,036	94,092	1,792,128
13 Davao Region (R-11)	909,322	43,299	952,621
14 SOCCSKSARGEN Region (R-12)	1,502,554	26,521	1,529,075
15 CARAGA Region (R-13)	157,047	11,221	168,269
16 Autonomous Region of Muslim Mindanao	258,149	5,047	263,196
Total	7,059,779	1,290,455	8,350,234

²Source: <http://countrystat.bas.gov.ph/selection.asp>; in a column, highlighted areas represent the top five producers in terms of volume. Based on data for the period 2009-2013.

^yRegional figures represent the sum of data for banana ('Lacatan', 'Saba'), calamansi, durian, lanzones, mango ('Carabao'), mangosteen, papaya, pineapple, rambutan, tamarind, watermelon

^xRegional figures represent the sum of data for ampalaya, asparagus, broccoli, cabbage, carrots, cauliflower, eggplant, gourd, lettuce, okra, pechay (Chinese, native), squash fruit, string beans, tomato

In terms of aggregate value of production of high-value crops, the top five regions are Davao, Northern Mindanao, SOCCSKSARGEN, Ilocos, and Western Visayas (Table 5).

Table 5. Average annual value of production (PhP x 1,000,000) of selected high value crops by region

Region	Year of production					Regional average
	2009	2010	2011	2012	2013	
National Capital Region	-	-	-	-	-	-
1 Cagayan Autonomous Region	1,803	1,115	2,073	1,919	2,399	1,862
2 Ilocos Region (R-1)	12,619	11,711	11,088	11,716	10,820	11,591
3 Cagayan Valley Region (R-2)	5,156	4,910	4,405	5,026	5,648	5,029
4 Central Luzon Region (R-3)	3,369	2,979	3,877	3,450	3,781	3,491
5 CALABARZON Region (R-4a)	3,743	4,094	4,940	5,369	5,172	4,664
6 MIMAROPA Region (R-4b)	4,094	3,232	4,389	3,761	2,679	3,631
7 Bicol Region (R-5)	2,337	2,381	2,666	2,954	3,183	2,704
8 Western Visayas Region (R-6)	5,378	5,753	5,985	6,033	6,411	5,912
9 Central Visayas Region (R-7)	3,871	4,097	4,145	4,111	4,737	4,192
10 Eastern Visayas Region (R-8)	2,210	2,203	2,402	2,490	2,423	2,346
11 Zamboanga Peninsula (R-9)	3,287	3,849	4,119	4,118	4,846	4,044
12 Northern Mindanao (R-10)	28,812	33,905	35,323	35,533	35,685	33,852
13 Davao Region (R-11)	42,585	47,369	50,716	49,931	47,779	47,676
14 SOCCSKSARGEN Region (R-12)	14,892	16,396	16,381	17,130	21,872	17,334
15 CARAGA Region (R-13)	<i>no data available</i>					
16 Autonomous Region of Muslim Mindanao	<i>no data available</i>					
Total	134,156	143,992	152,510	153,541	157,433	148,326

²Source: <http://countrystat.bas.gov.ph/selection.asp>. Highlighted areas represent the top five producing regions in terms of value. Yearly figures for each region represent the sum of data for banana, pineapple, mango, tomato, cabbage, eggplant and calamansi.

Annual value of production of fisheries products (total of commercial and municipal fisheries and aquaculture) is highest in the Central Luzon provinces (PhP8.6 Billion), followed by Western Visayas, CALABARZON, Zamboanga Peninsula and SOCCSKSARGEN regions (Table 6). In terms of volume, the highest producer is the ARMM, followed by MIMAROPA, Zamboanga Peninsula, Western Visayas and CALABARZON (Table 7).

Table 6. Average annual value of production of fisheries products by region

Table 6. Average annual value of production (Php x 1,000) of fisheries products by region

Region	Year of production					Regional average
	2008	2009	2010	2011	2012	
National Capital Region	4,116,875	5,652,738	5,595,585	6,290,153	8,005,601	5,926,190
Cagayan Autonomous Region	363,846	311,636	337,059	360,892	376,362	349,959
Ilocos Region (R-1)	11,073,620	11,002,358	12,830,334	14,224,492	14,327,926	12,691,746
Cagayan Valley Region (R-2)	4,191,205	4,333,222	4,652,689	4,595,540	4,866,948	4,525,921
Central Luzon Region (R-3)	29,361,331	27,080,803	27,390,401	28,685,547	30,445,104	28,592,637
CALABARZON Region (R-4a)	20,964,216	20,321,051	20,289,438	22,843,637	22,364,093	21,356,487
MIMAROPA Region (R-4b)	16,049,774	16,141,346	16,069,928	16,114,640	14,583,202	15,791,778
Bicol Region (R-5)	11,796,464	13,622,536	14,229,867	14,457,130	15,521,511	13,925,501
Western Visayas Region (R-6)	25,733,583	25,713,738	27,606,064	27,964,609	28,473,057	27,098,210
Central Visayas Region (R-7)	8,364,044	8,239,862	7,685,657	8,241,064	8,076,550	8,121,435
Eastern Visayas Region (R-8)	12,262,254	13,009,439	13,534,266	13,244,319	11,791,895	12,768,434
Zamboanga Peninsula (R-9)	22,139,846	22,768,294	21,002,655	19,299,945	19,641,543	20,970,456
Northern Mindanao (R-10)	10,759,020	11,288,332	11,956,096	12,683,695	13,739,907	12,085,410
Davao Region (R-11)	4,579,701	5,109,922	4,961,073	5,764,442	6,075,201	5,298,068
SOCCSKSARGEN Region (R-12)	15,648,719	16,569,723	16,398,014	23,512,721	25,605,519	19,546,939
CARAGA Region (R-13)	5,532,560	5,567,254	5,576,780	5,393,397	5,515,410	5,517,080
Autonomous Region of Muslim Mindanao	12,645,011	14,328,596	14,579,173	14,065,253	15,141,846	14,151,976
Total	197,404,498	201,155,000	204,539,126	218,252,824	223,894,419	209,049,173

^aSource: <http://countrystat.bas.gov.ph/selection.asp>. Highlighted areas represent the top five producing regions in terms of value. Yearly figures for each region represent the sum of data for commercial fisheries, municipal fisheries and aquaculture.

Table 7. Average annual volume of production (metric tons) of fisheries by region

Region	Year of production					Regional average
	2008	2009	2010	2011	2012	
National Capital Region	84,828	68,724	93,565	80,015	83,069	82,040
Cagayan Autonomous Region	4,130	4,229	3,534	3,660	3,778	3,866
Ilocos Region (R-1)	149,371	137,692	137,509	150,265	145,544	144,076
Cagayan Valley Region (R-2)	61,320	63,482	62,353	64,876	60,063	62,419
Central Luzon Region (R-3)	274,926	272,114	264,679	258,967	259,399	266,017
CALABARZON Region (R-4a)	408,150	415,580	413,395	402,895	408,142	409,632
MIMAROPA Region (R-4b)	740,239	720,735	726,498	728,972	685,648	720,418
Bicol Region (R-5)	263,100	273,537	290,385	289,007	295,312	282,268
Western Visayas Region (R-6)	400,742	433,231	441,558	450,886	439,707	433,225
Central Visayas Region (R-7)	225,421	233,765	240,648	240,073	236,360	235,254
Eastern Visayas Region (R-8)	199,576	206,831	211,184	209,778	200,418	205,557
Zamboanga Peninsula (R-9)	644,386	731,841	757,216	619,557	598,670	670,334
Northern Mindanao (R-10)	149,815	155,525	160,601	156,386	153,644	155,194
Davao Region (R-11)	69,866	66,539	68,938	64,250	67,468	67,412
SOCCSKSARGEN Region (R-12)	326,912	304,821	281,934	248,529	281,877	288,815
CARAGA Region (R-13)	111,162	103,657	101,190	96,152	93,766	101,185
Autonomous Region of Muslim Mindanao	852,944	887,676	904,271	909,320	845,232	879,889
Total	4,002,783	4,088,644	4,153,998	3,968,115	3,919,099	4,026,528

^aSource: <http://countrystat.bas.gov.ph/selection.asp>. Highlighted areas represent the top five producing regions in terms of volume. Yearly figures for each region represent the sum of data for commercial fisheries, municipal fisheries and aquaculture.

2.2. Postharvest Losses

The Philippine government aims for inclusive growth in agriculture. Such a goal, however, requires investment in infrastructure like transport and logistical systems that afford production areas access to resources, markets and social services (Manalili, et.al. 2014). At present, agricultural production and postharvest industry is fragmented and small-scale in nature with numerous producers, as well as multiple layers for marketing and distribution between growers and buyers. This results in inefficiencies in the supply chain which increases costs, causes losses both in terms of quantity and quality, and leads to higher prices of products. The large losses from farm to plate are attributed to poor handling, distribution, storage, and purchase/consumption behavior involving huge resources that could otherwise be spent on more productive activities go into producing and transporting goods that are wasted (Manalili, et. al., 2014).

2.2.1. Loss Assessment of Grains

Loss assessment has been conducted to quantify the magnitude of postharvest losses for several crops. For grain, postharvest losses may be classified into two categories: quality deterioration and quantitative losses. Grain quality deterioration is manifested by grain discoloration (yellowing) and decreases in head rice recovery after the milling process (Mendoza and Quitco, 1985). Other quality measures are the presence of foreign matter (eg., stone grits, grass seeds, rice straw, rice chaff) and unmilled rice. Quality deterioration, particularly yellowing, occurs when harvested paddy (unmilled rice) remains unthreshed and stored or piled in field stacks at a grain moisture content of 20% or even higher (wet paddy)(Trigo-Stockli and Pedersen, 1994). A five-day delay in threshing could result in a 38% to 67% yellowing per volume of harvest while a five day delay in drying could cause a 17% incidence of yellowing (Mendoza and Quitco, 1985). Delays in drying also render the grain to become brittle thereby increasing the amount of broken grains after milling (Trigo-Stockli and Pedersen 1994). Sundrying by spreading paddy on pavements causes grain fissures that leads to low head rice recovery after milling. Inefficient milling machines can also be the cause of low levels of milling and head rice yields. Since Filipino consumers, regardless of social status, prefer to eat good quality rice, the deterioration of grain quality is manifested (but not significantly) in the market price of *palay* and milled rice. (Manilay and Frio, eds, 1985).

In addition to quality deterioration, physical (quantitative) losses can be experienced when rice is improperly stored. Storing rice above its equilibrium moisture content (14%) at an extended period of time could result in mold growth thereby rendering the stockpile unfit for human consumption. Furthermore, rice storage facilities that lack proper protection from rats contribute to physical losses. Storage losses due to rats are mostly due to feces and urine contamination rather than from the actual amount of grain consumed (Halid, 1993). An average size Norway rat (*Rattus norvegicus*) only eats an equivalent of 7 to 9 kilograms of grain in a year (Brooks and Rowe, 1979). Studies on rice indicate an average total loss of 15% from harvesting until the crop is milled. The largest loss is encountered during drying, due mainly to poorly-designed drying equipment, improper use of drying technology, or poor drying conditions. Provision of well-managed drying and milling facilities and trading plants is considered a sustainable solution compared to farmer coop-operated postharvest facilities (de Padua 1999; PHILMECH 2012).

2.2.2. Loss Assessment of Fruit and Vegetables

For calamansi fruit produced in Zamboanga Sibugay and shipped to Manila, the marketable fruit is more than 95% at the farm but has decreased to 68% by the time it reaches the destination market. This is due to improper handling, lack of proper packaging, and poor transport and shipping conditions. Postharvest interventions such as curing and modified atmosphere packaging increased the proportion of marketable fruit to 95% (Agravante et al 2013). These interventions require only a simple postharvest facility equipped with curing racks and packing tables.

Loss assessment of banana shipped from Nasipit port (Agusan Del Norte) to Manila showed that fruit may be handled up to 10 times prior to shipment, and as many as 20 times before the final consumer is reached. There are 5-8 layers in the supply chain and involving up to 10 stakeholders. Shippers and consignees are the key players in the chain based on volume handled. The greatest risk occurs during inter-island shipment due to the practice of bulk loading in unrefrigerated container vans (Artes et al 2013).

Losses in cabbage are similarly significant. A loss assessment study conducted by Serrano et al (2009) showed that system losses are dependent on the distance to be traversed and the number of transfers along the handling chain. Farther destinations or greater number of transfer points (e.g. farmer to trader, trader to wholesaler) resulted in increased losses. Depending on the handling chain used, these system losses could reach 19-29%.

2.3. Government Interventions for Postharvest Loss Reduction

Government intervention in postharvest loss reduction becomes necessary when market forces are unable to provide enough incentives to encourage private investment in postharvest facilities (Cabanilla, et. al., 2002; Villaroel & Cardino, 1985). The Department of Agriculture (DA) has spearheaded various postharvest facility projects aimed at minimizing postharvest losses. The number and type of postharvest facilities are identified jointly by the units of the DA that will be involved in the implementation of the department's banner programs. The Regional Field Unit (RFU) overseeing the area where the projects will be located validates the appropriateness of the number and/or type of the identified facilities based on the postharvest needs specific to the location. In the current administration, project funds are directly released to the RFUs by the DA. The RFUs are responsible for the procurement of the postharvest facilities required by the projects.

Upon implementation of the projects, monitoring and technical support are provided by the Philippine Center for Postharvest Development & Mechanization (PHILMECH) for grains and high value crops while fisheries and livestock/poultry projects are monitored by the Bureau of Fisheries and Aquatic Resources (BFAR) and the Bureau of Animal Industry (BAI), respectively. Projects related to the provision of marketing facilities (e.g., food terminals and cold storages) are handled by the Agribusiness and Marketing Assistance Services (AMAS). Monitoring entails comparing the number of functional or completed postharvest facilities with the targeted number and type of units as well as determining whether the units are being utilized by the beneficiaries.

2.3.1. Rice and Corn Processing

Four modern rice processing centers (RPC) from the Republic of South Korea have been established in Pangasinan (Sta. Barbara), Iloilo (Pototan), Bohol (Pilar), and Davao del Sur (Matanao) (Figure 1). These RPCs are intended to duplicate the loss reduction achieved by the Korea-Philippines Integrated RPC established in Baler, Aurora in 2006; postharvest losses were reduced from 15% to 8% using the modern facility. The four facilities were established with PhP649-M provided by the Korean International Cooperation Agency (KOICA), while the Philippine government provided PhP136-M in counterpart funding (PHILMECH 2012).

Smaller RPCs are to be established (a number already completed and functional) nationwide for qualified beneficiaries. The government will shoulder about 85% of the project cost while the recipient provides 15% of the cost (Manila Bulletin 2013; Bingabing 2014). In addition to the RPCs, several units of rice threshers and FBDs have been provided by the DA in various locations within the rice-producing provinces. At present, PHILMECH reported that there are 1,744 units of threshers and 1,071 units of FBDs provided for farmers' use nationwide (Table 8).

Table 8. Regional distribution of barangay and municipal food terminals

Region	Barangay Food Terminal		Municipal Food Terminal	
	Number	%	Number	%
NCR	66	5.2	16	8.6
CAR	167	13.3	9	4.8
Region I	18	1.4	10	5.4
Region II	75	6	9	4.8
Region III	132	10.5	48	25.8
Region IVa	45	3.6	14	7.5
Region IVb	25	2	20	10.8
Region V	126	10	2	1.1
Region VI	11	0.9	14	7.5
Region VII	52	4.1	5	2.7
Region VIII	70	5.6	11	5.9
Region IX	75	6	6	3.2
Region X	71	5.6	5	2.7
Region XI	88	7	7	3.8
Region XII	105	8.3	4	2.2
CARAGA	60	4.8	4	2.2
ARMM	72	5.7	2	1.1
Total	1,258	100	186	100

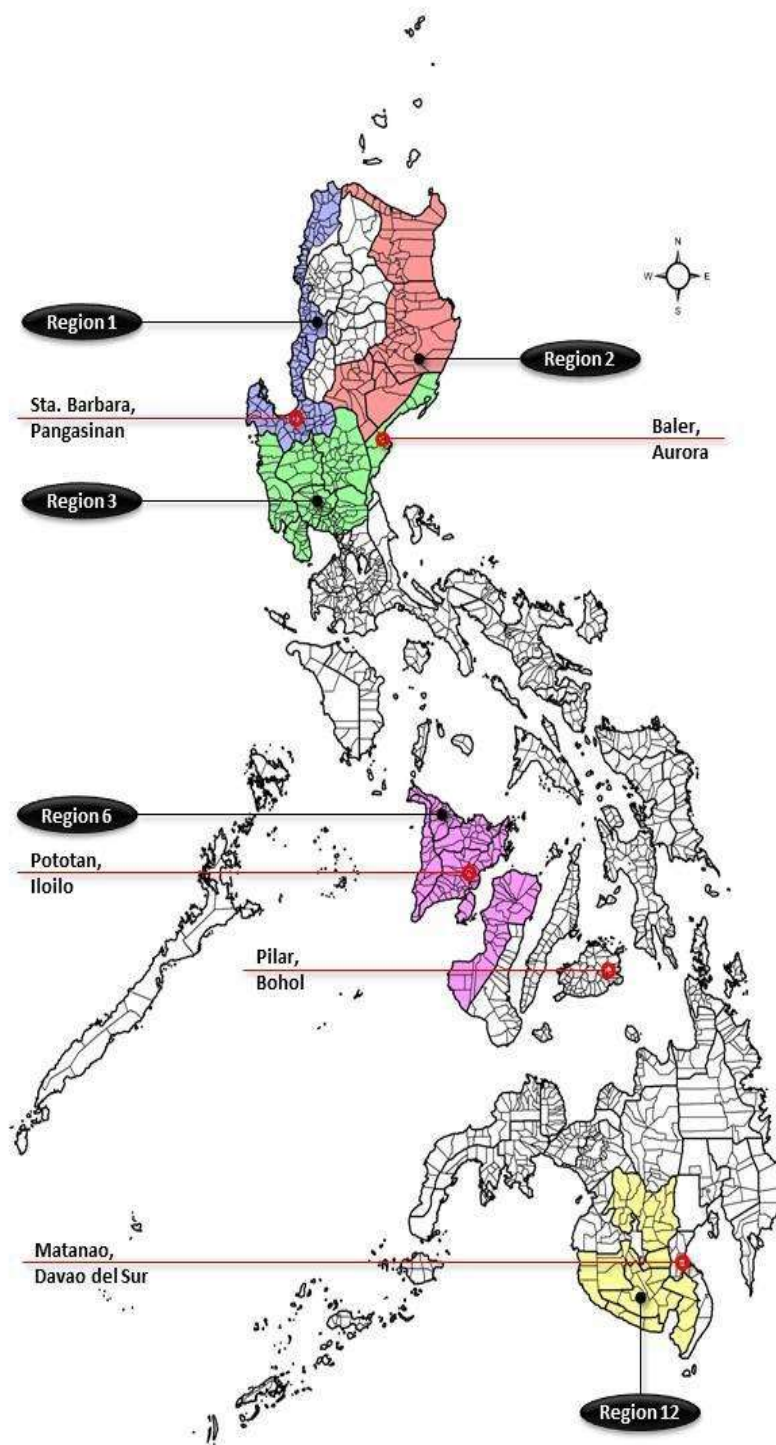


Figure 1. Location of KOICA-supported rice processing facilities in the Philippines. Shaded areas show the top five rice production areas (with respect to value or volume).

Corn farmers encounter significant difficulties in marketing their crop due to their failure to dry their harvest down to the required level of 14% moisture content. The lack of drying facilities is one reason for this failure. PHILMECH provided technical assistance in establishing a processing facility in Ilocos Sur that is equipped with dryers and biomass furnaces. The processing center purchases corn from farmers, dries the grain, and sells the dried product to feed millers in Pangasinan and Bulacan (Jose 2012). A second processing and drying facility was established in Claveria, Misamis Oriental with a milling capacity of 10 tons. The cost of the facility was borne by the Mindanao Rural Development Program of the DA (PhP8-M) while the provincial government provided PhP2-M as counterpart.

2.3.2. *Marketing of High-Value Crops*

For trading and loss reduction for high-value crops, the successful establishment and operation of the *Sentrong Pamilyan ng Produktong Agricultural sa Quezon Foundation, Inc* (SPPAQFI) in 2006 was considered a model for farmer empowerment. The facility is presently managed by a farmers' cooperative, where members can bring their produce to the facility and the association assists with marketing. Payments are quick and can be collected the next day by the farmer. An automated teller machine is being installed within the facility for more convenient payments. Farmers are also represented in the Board of Trustees, ensuring that issues are quickly and properly addressed.

To duplicate this model, the Agrikulturang Pinoy (Agri-Pinoy) Trading Center program of the DA plans to construct a total of 12 regional trading centers, 111 MFTs and BFTs in 2013 and 2014 (Figure 2 and Figure 3).

Municipal Food Terminal (2013)

1. Pidigan, Abra
2. Aspulo, Ifugao
3. Tanudan, Kalinga
4. Natonin, Mt. Province
5. Bekun, Benguet
6. Betac, Ilocos Norte
7. Caba, La Union
8. Igung, Cagayan Valley
9. Gamu, Isabela
10. Turmesini, Isabela
11. Urbiztondo, Pangasinan
12. Kasibu, Nueva Viscaya
13. Barmbang, Nueva Viscaya
14. Bagabag, Nueva Viscaya
15. Kayapa, Nueva Viscaya
16. Aglipay, Quirino
17. Lucab, Nueva Ecija
18. Sasmiun, Pampanga

19. San Juan, Batangas
20. Santo Tomas, Batangas
21. Nasugbu, Batangas
22. Calaca, Batangas
23. Union, Quezon
24. Infanta, Quezon
25. Caramoan, Camarines Sur

26. Celinog, Iloilo
27. Carles, Iloilo
28. Murcia, Negros Occidental
29. Bago City, Negros Occidental
30. Argao, Cebu
31. Cangaera, Biliran
32. Cebalogan, Samar
33. Aurora, Zamboanga del Sur
34. Talusan, Zamboanga Sibugay
35. Igigi, Zamboanga Sibugay
36. Manolo Fortich, Bukidnon
37. Impusugong, Bukidnon
38. Queson, Bukidnon
39. Linamon, Lanao del Norte
40. Muna, Lanao del Norte
41. Iligan City, Lanao del Norte
42. Jimenez, Misamis Occidental
43. Sinacaban, Misamis Occidental
44. Calamba, Misamis Occidental
45. Panson, Misamis Occidental
46. Talisayan, Misamis Oriental
47. Jessan, Misamis Oriental
48. Antongalan, Butuan City
49. Nesipit, Agusan del Norte
50. Beyugan City, Agusan del Sur
51. Prosperidad, Agusan del Sur
52. Trento, Agusan del Sur
53. San Jose, Davao del Norte
54. Placer, Surigao del Norte
55. Socorro, Surigao del Norte
56. Tandag, Surigao del Norte
57. Bislig City, Surigao del Sur
58. Balaogan, Lanao del Sur
59. Kapatagan, Lanao del Sur
60. Ramin, Lanao del Sur
61. Poona Bayabao, Lanao del Sur
62. Detu Odin Sinsuat, Maguindanao
63. Matanog, Maguindanao
64. Barira, Maguindanao
65. Petikul, Sulu
66. Bongeo, Tawi-Tawi
67. Languyan, Tawi-Tawi
68. Panglima Sugala, Tawi-Tawi
69. Simunul, Tawi-Tawi

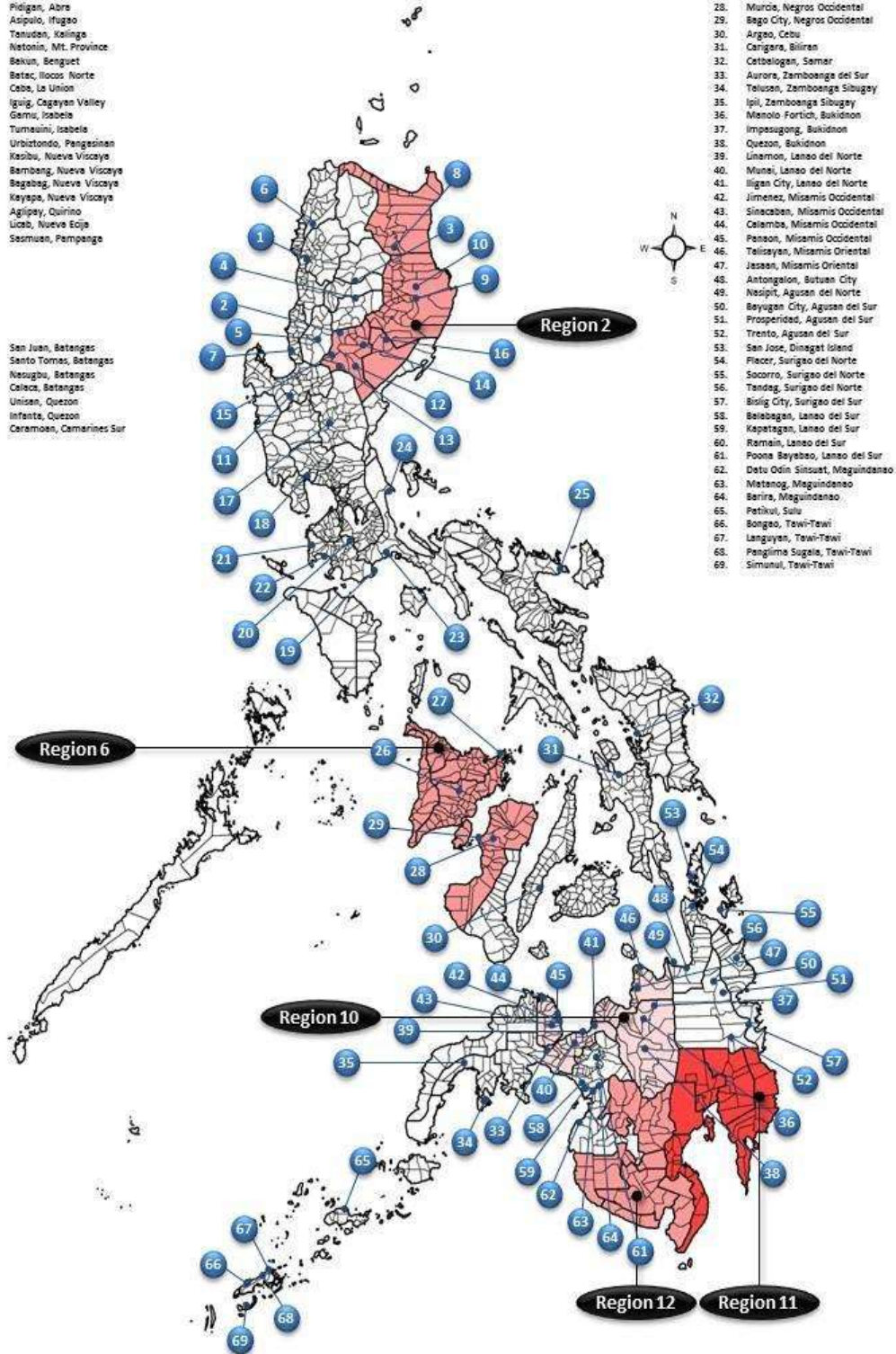


Figure 2. Location of municipal food terminals in the Philippines; shaded areas show the top five fruit production areas (with respect to volume).

Municipal Food Terminal (2013)

1. Piliigan, Abra
2. Asipulo, Ifugao
3. Tanudan, Kalinga
4. Natonin, Mt. Province
5. Bekun, Benguet
6. Betac, Ilocos Norte
7. Caba, La Union
8. Igalig, Cagayan Valley
9. Garrin, Isabela
10. Turmevini, Isabela
11. Urbitondo, Pangasinan
12. Kasibu, Nueva Viscaya
13. Barmbang, Nueva Viscaya
14. Bagabag, Nueva Viscaya

CAR

Region 1

Region 3

Region 4a

15. Keyapa, Nueva Viscaya
16. Aglipay, Quirino
17. Licab, Nueva Ecija
18. Sasman, Pampanga
19. San Juan, Batangas
20. Santo Tomas, Batangas
21. Nasugbu, Batangas
22. Calaca, Batangas
23. Unisan, Quezon
24. Infanta, Quezon
25. Caramoran, Camarines Sur

26. Calinog, Iloilo
27. Carles, Iloilo
28. Murcia, Negros Occidental
29. Bago City, Negros Occidental
30. Argao, Cebu
31. Canigara, Biliran
32. Catbalogan, Samar
33. Aurora, Zamboanga del Sur
34. Talusan, Zamboanga del Sur
35. Iplil, Zamboanga Sibugay
36. Maroto Fortich, Bukidnon
37. Impugang, Bukidnon
38. Quezon, Bukidnon
39. Linamon, Lanao del Norte
40. Muna, Lanao del Norte
41. Iligan City, Lanao del Norte
42. Jimenez, Misamis Occidental
43. Sinacaban, Misamis Occidental
44. Calamba, Misamis Occidental
45. Panson, Misamis Occidental
46. Talicayan, Misamis Oriental
47. Jasaan, Misamis Oriental
48. Antongalon, Butuan City
49. Nasipit, Agusan del Norte
50. Bayugan City, Agusan del Sur
51. Prosperidad, Agusan del Sur
52. Trento, Agusan del Sur
53. San Jose, Dinagat Island
54. Placer, Surigao del Norte
55. Socorro, Surigao del Norte
56. Tandag, Surigao del Norte
57. Bislig City, Surigao del Sur
58. Barabagan, Lanao del Sur
59. Kapatagan, Lanao del Sur
60. Raman, Lanao del Sur
61. Poona Baybeo, Lanao del Sur
62. Datu Odin Sinsuat, Maguindanao
63. Matanog, Maguindanao
64. Benris, Maguindanao
65. Petikul, Sulu
66. Bongao, Tawi-Tawi
67. Languyan, Tawi-Tawi
68. Panglima Sugala, Tawi-Tawi
69. Simunul, Tawi-Tawi

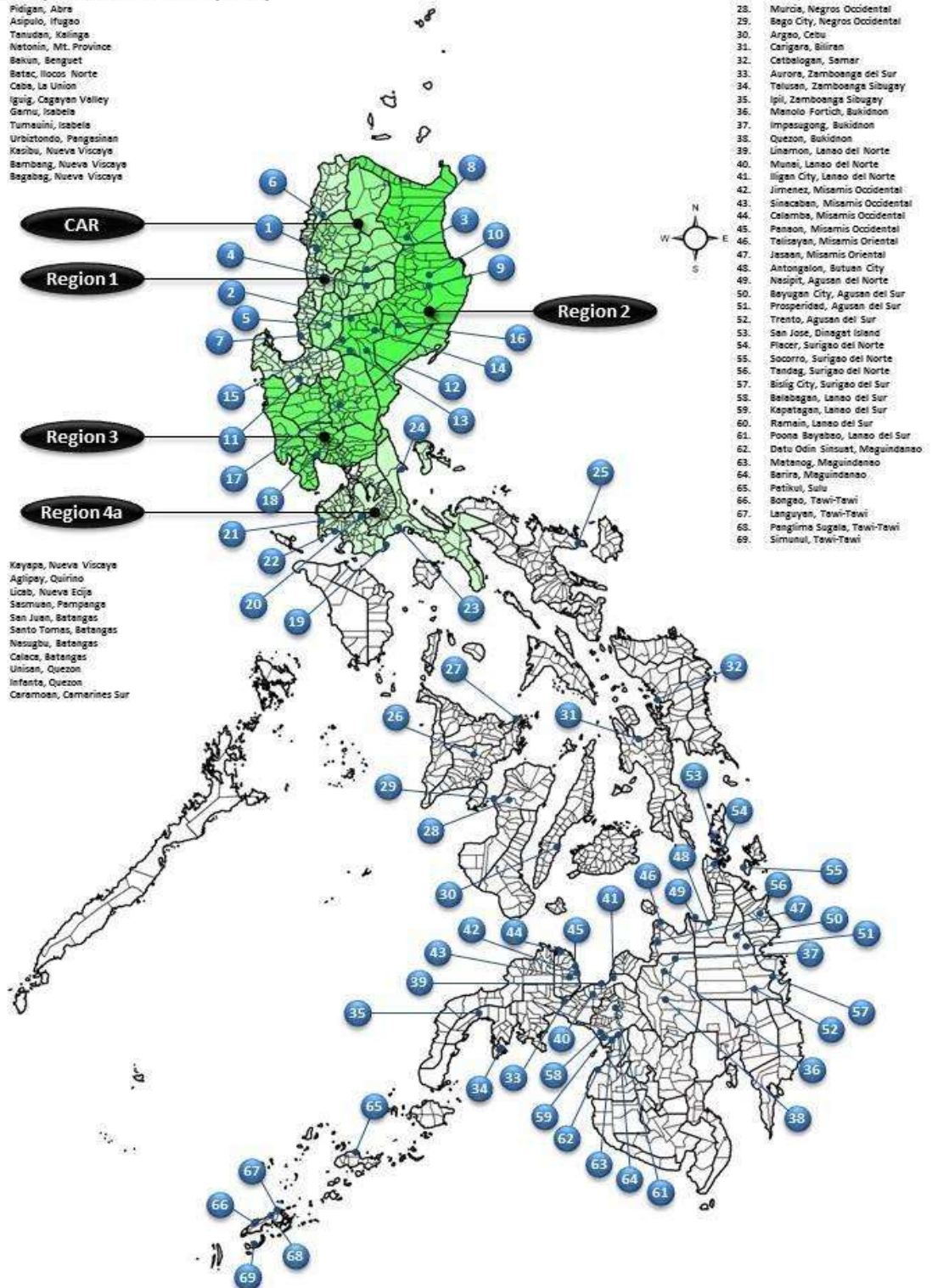


Figure 3. Location of municipal food terminals in the Philippines; shaded areas show the top five vegetable production areas (with respect to volume)

Previous government administrations have pursued similar programs, such as Pres. Gloria M. Arroyo's poverty- and hunger-reduction programs called "Gulayan ng Masa", "Food for School" and "Tindahan Natin" (The News Today 2007). For the period of 2007-2013, the project has been able to establish 186 MFTs and 1,258 BFTs. At present, there are varying levels of operational status of BFTs; 88%, 20%, and 9% of BFTs are regularly operating, on irregular status, or non-operational, respectively. For MFTs, 69%, 1%, and 30% are operating, on irregular status, or not operating, respectively. Net returns in high-value crops such as vegetables are 11 and 18 times higher than rice and corn (Briones and Galang 2013). However, the presence of functioning trading posts and packinghouses are essential to ensure that quality produce is brought to markets where farmers can realize these types of returns.

As of June 2014, the regional trading centers are all in various stages of planning and construction; the facility in Urdaneta, Pangasinan is the closest to completion, having conducted a soft launch in July 2014. The facility is mainly targeted for lowland vegetable farmers (Macam 2014).

Most of the BFTs are clustered in the CAR (13.3%) to cater to the large number of highland vegetable farms in the region. Regions III and V also received large numbers of BFTs with 10.5% and 10.0%, respectively.

In terms of MFTs received, the top three recipients were Regions III, IVb, and NCR with 25.5%, 10.8%, and 8.6%, respectively. or are not operating, respectively.

2.3.3. Cold Chain Systems for Storage and Transport

The use of refrigerated transport or storage facilities for maintaining quality and extending shelf life of commodities has met varying degrees of success. A 1986 survey of cold storage facilities and ice plants in the Philippines showed that high fuel and electricity costs, mechanical breakdowns, high cost of replacement parts, low water quality, inadequate water supply, intense competition, and lack of credit access contributed to non-expansion of operations and facilities, temporary closure, or bankruptcy (Lantican et al 1986). These constraints towards adoption of cold chain systems still exist at present.

The DA-PHILMECH is currently implementing its Cold Chain Program (CCP) at three major vegetable-producing areas in the Philippines by providing training to beneficiaries, as well as access to cold chain equipment such as precoolers, cold storage rooms, and refrigerated trucks (Estigoy 2006). Figure 4 and Figure 5 show the location of government projects where cold chain facilities such as cold storage facilities and refrigerated trucks have been deployed; location of private cold chain facilities such as cold storage facilities, ice plants and combined ice plant-cold storage facilities are also shown. Despite such government support, however, commercial adoption of the technology has been difficult to implement on a continuous and sustainable basis. However, the cold chain system established by DA in Benguet recorded its first year of positive results in 2009 with PhP1.5-M in total revenues, and utilization rates of 66%, 100% and 85% of its refrigerated trucks, cold storage units and plastic crates, respectively. This was achieved after four years of operation, culminating in the export of Benguet-grown beans and broccoli to Japan (Embuscado 2010).

Cold storage facilities for fish have also been established in Dapitan (Zamboanga del Norte), Maconacon (Isabela) and Sulu under the DA Bureau of Fisheries and Aquatic Resources (BFAR) (Figure 4 and Figure 5). The facility in Dapitan cost PhP40-M and was intended to stabilize supply of sardines for processing, a major product of this city. It was turned over to the government in 2011, but has since been unused due to equipment malfunctions and lack of proper project monitoring (Takumi 2013). The status of the facilities in Isabela and Sulu at present is unknown.

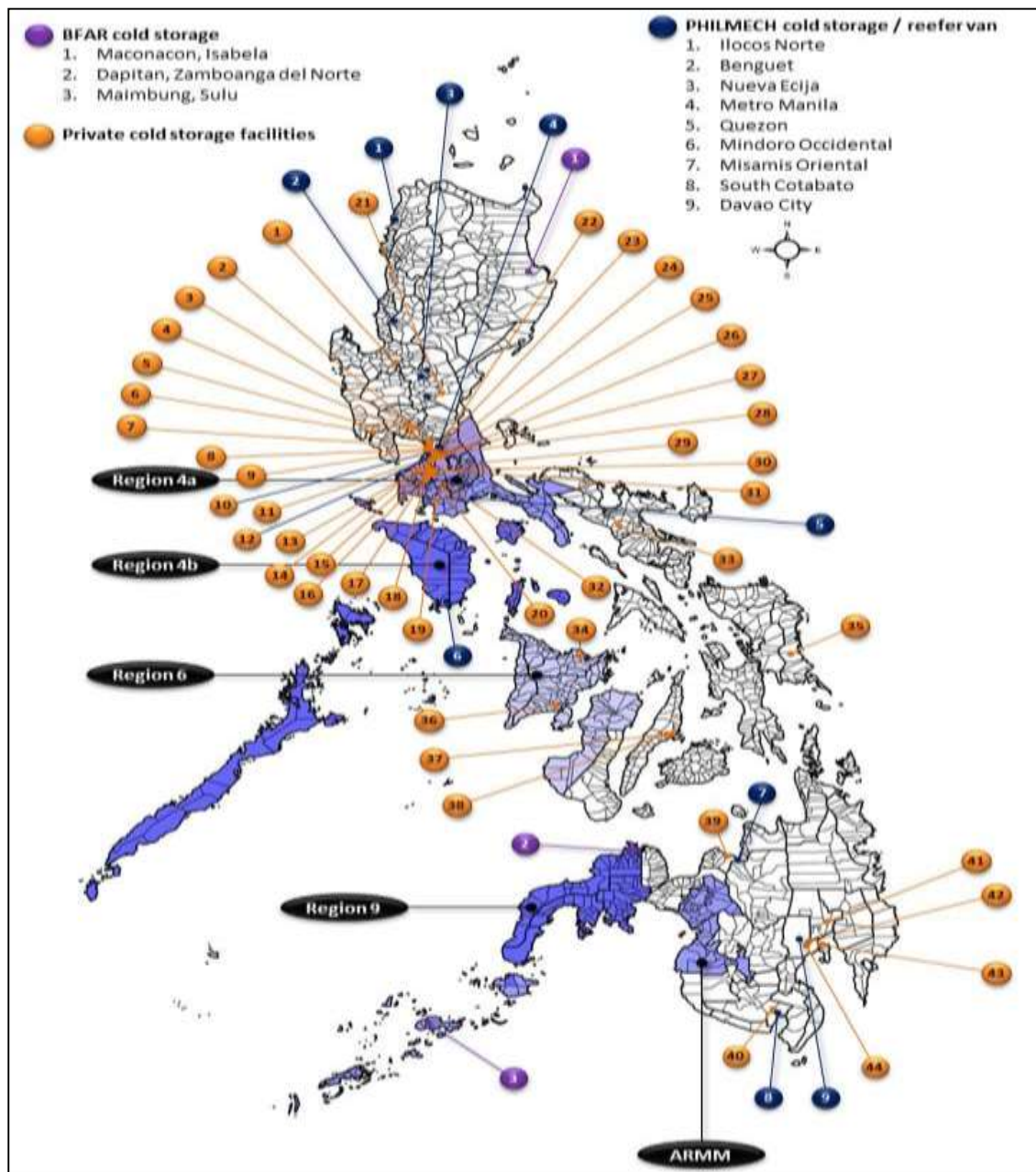


Figure 1 Location of private and government cold chain facilities in the Philippines with respect to top five production (by volume) areas of fisheries products (shaded regions); refer to Attachment 1 for listing of private facilities.

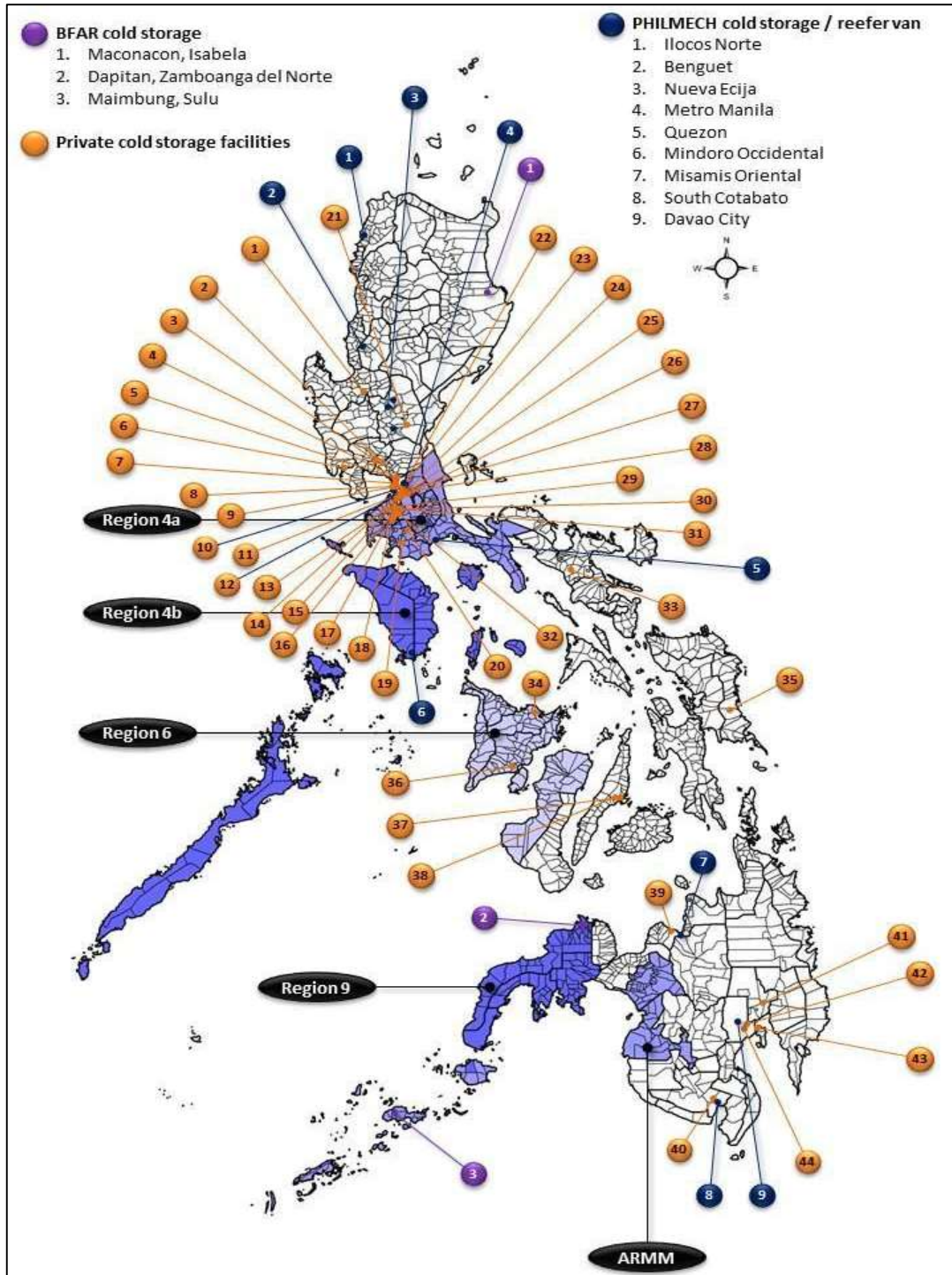


Figure 5. Location of private ice plants and combined facilities and government cold chain facilities in the Philippines with respect to top five production (by volume) areas of fisheries products (shaded regions)

2.3.4. *Tramline Program*

PHILMECH has been implementing a tramline program that aims to provide farmers with an alternative system for hauling perishable crops or farm inputs (fertilizer, chemicals, seeds) from areas that are isolated from farm roads. The system uses trams conveyed along steel cables that are suspended between two or more stations that can bridge ravines, rivers, and dense vegetation. Farmers bring their produce to strategically located consolidation points using the tramline in exchange for a user fee.

Two systems are being provided by PHILMECH according to the needs of the site to be serviced. The monocable tramline has a hauling capacity of 2.5-2.8 tons hr⁻¹, a cable length of 980 m, a service area of 10 ha, with up to 9 consolidation points that can be serviced. The bi-cable tramline system has a capacity of 0.5 – 2.0 tons hr⁻¹, a carrier capacity of 150-500 kg, is capable of servicing 2-5 consolidation points, and has an estimated cost of P100,000-1,000,000 per tramline. The benefits include faster and less costly delivery of produce and farm inputs, and less mechanical damage to the crop (PHILMECH 2013).

At present, the tramline project has established or is planning to set up 121 systems nationwide. Benguet province has 21.5% of all tramline projects, followed by Nueva Viscaya (7.4%) and Ifugao (6.6%) provinces.

The system has proven to be versatile, allowing farm inputs, produce, and people to be transported safely and cheaply across difficult terrain. It has even been used to replace washed-out bridges during periods of calamity when growing areas have been isolated (Magararu 2012).

2.4. Summary of Situationer

A recent study by Reardon et al (2012) in China, Bangladesh and India has shown that appropriate government policies and interventions can reduce postharvest losses without any major government role in the supply chain. Relaxing restrictions on foreign investment and deregulation of milling in the rice industry allowed private sector investments to come in and for modern technology to be introduced; provision of roads and other infrastructures further facilitated change. Direct transactions between farmers and rice mills or wholesale traders increased; and services to farmers were also improved. These findings align with recommendations by de Padua (1999).

The Philippine government continues to invest in programs to reduce commodity losses through the provision of postharvest facilities and technology interventions. However, many programs are unsustainable and survive only due to subsidies. Underutilization is also a common problem due to inappropriate technology, overcapacity, improper location, lack of understanding on postharvest technology, or added costs of interventions.

To cite one example, the National Agribusiness Corporation (NABCOR) was a government-owned and controlled corporation that aims to promote agribusiness through the development and multiplication of enterprises of small farmers and fisherfolk (NABCOR undated). However, the existing corn grain facilities by NABCOR across the country are underutilized and mismanaged, leading to their discontinued operation, to the detriment of corn farmers (Manalili et al 2014). In the early part of 2014, however, the privatization process of the said facilities was initiated.

In light of the significant investments on postharvest facilities for rice, high-value crops and fisheries, some effort must be exerted in determining the effectiveness of these interventions in loss reduction. Proper and sustained operation of these facilities is necessary for Philippine farmers, fishers and commodities to become competitive under an integrated ASEAN economic zone that is to be established in 2015. This assessment should not be taken in isolation and must be done within the value chain context and in consideration of markets, support services provision and more importantly, chain governance and coordination.

3. OBJECTIVES

The overall objective of this study is to evaluate the effectiveness of postharvest facilities (PHF) and assets in the context of upgrading value chains and improving economic outcomes for small holder farmers. The specific objectives are:

- (1) Survey existing literature and secondary data to characterize PHF project identification, selection, expenditures, assets, and impacts, within a framework of value chain upgrading, and identify a suitable selection of study sites and projects.
- (2) Assess a representative set of PHF covering projects in terms of quality, utilization, and operations, and maintenance, based on appropriate indicators, according to the following categories:
 - Threshers, dryers, and other facilities proximate to harvest;
 - Processing and storage facilities (e.g. milling equipment, ice plants, cold storage, warehouses)
 - Market infrastructure and transport facilities
- (3) Based on objectives (1) and (2), identify strengths and weaknesses/problem areas in the project cycle of PHF projects, in terms of identification, selection, implementation, and operation and maintenance.

4. GENERAL APPROACH AND METHODOLOGY

4.1. Identification of PHF for Impact Assessment

4.1.1. General Analytical Framework

The general analytical framework to assess the impact of PHF projects in the Philippines including program management is presented in Figure 6. The study collected primary and secondary data pertinent to the impact assessment. Engineering and economic efficiency indicators were used to measure the effectiveness of the PHF projects in upgrading value chains.

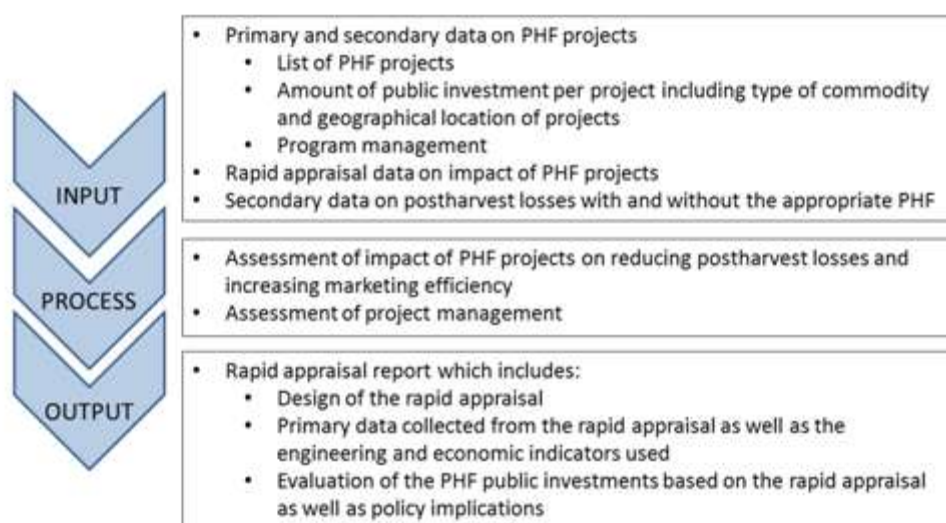


Figure 6. General Analytical Framework

4.1.2. *Characterization of Postharvest Facility Projects*

Requests for information on postharvest programs of the Department of Agriculture were sent to the concerned agencies such as the Agribusiness & Marketing Assistance Service (AMAS) and PHILMECH. The information requested covered the background of various postharvest programs (e.g. program rationale, budget requested, original proponent, and implementing agencies), as well as the current status of the program if available. Further information was obtained from websites of the government agencies concerned.

4.1.3. *Selection of PHF Projects, Commodities, Study Sites and Respondents*

Examples of PHFs established by the Philippine government include barangay and municipal food terminals, cold chain systems, rice processing plants, and marketing and distribution infrastructure (farm-to-market roads, port areas, nautical highways). Projects implemented to establish PHFs and target commodities were selected for evaluation based on amount of government investment, impact potential on beneficiaries, and relevance to current government programs and thrusts. Furthermore, the focus of the impact assessment was on projects that had been on-going for a number of years enough to ensure sufficient data.

Study Sites

In order to be representative nationwide, study sites were distributed between the Luzon, Visayas and Mindanao group of islands. Target commodities were rice, high-value crops (fruits and vegetables), and aquatic products. Information on PHF projects and priority commodities were obtained from the DA and its agencies and programs, including PHILMECH, Agribusiness and Marketing Assistance Service (AMAS), Bureau of Fisheries & Aquatic Resources (BFAR) and the High-Value Crops Development Program (HVCDP). Based on assessment of information gathered by the Impact Assessment team, study sites were centered on the four Rice Processing Centers (RPC) granted by KOICA since these have been in operation for at least two cropping seasons. These primary sites were Sta. Barbara (Pangasinan), Matanao (Davao del Sur), Pilar

(Bohol), and Pototan (Iloilo) (Table 9). Using these sites as the hub, secondary sites with food terminals, flatbed dryers, and threshers were selected

Table 9. Matrix of postharvest facilities for evaluation

Island (Province)	Rice Processing Centers	Municipal/Barangay Food Terminal	Cold Chain Facilities
Region 1 (Pangasinan)	☐	LUZON ☐	☐
Region 2 (Aurora)	☐	×	×
Region 6 (Iloilo)	☐	VISAYAS ☐	×
Region 7 (Bohol)	☐	☐	×
Region 11/12 (Davao del Sur)	☐	Mindanao ☐	☐ (South Cotabato)

Originally, fishports with cold storage were included in the list of facilities to be studied. These were eventually excluded because the facilities were found to be non-operational during the initial field assessment conducted by the Impact Assessment Team. These were the fishports in Sual, Pangasinan and in Estancia, Iloilo. Tramlines were also removed from the list of facilities since these services are located in areas outside the provinces that were earlier selected.

Rice Processing Centers

Rice remains to be a major crop of concern of the DA. Rice processing centers make up a significant portion of the budget of the DA allotted for the Rice Mechanization Program, the flagship program of the current administration. Evaluation of engineering aspects of rice processing centers was done using PAES 206:2000 as a guide.

Flatbed Dryers and Rice Threshers

Distribution of flatbed dryers and rice threshers is also a component of the Rice Mechanization Program. Flatbed dryers and threshers within the province where the KOICA-RPCs are located were included in the evaluation.

Food Terminals for High-Value Crops

For impact assessment of BFTs and MFTs, study sites were selected based on identification of a BFT-MFT pair that allows tracing the movement of produce from the barangay to the municipality. At present, only BFTs and MFTs have had sufficient time to operate, while regional trading centers were only established in 2014. In addition, BFT-MFT pairs were chosen in sites with RPCs to maximize the time of team members; specific sites were identified in collaboration with the DA-AMAD and MAOs. Within the areas of RPCs

Since some primary processing operations (e.g. trimming, washing, sorting) are performed in municipal food terminals, the Philippine Agricultural Engineering Standard (PAES) 418: 2002 was used as a guide for evaluating these types of facilities.

The specific sites of the study by region and by PHF are given in Table 10.

Table 10. Study sites per province

PROVINCE	RPC	MFT	BFT	Flatbed Dryer	THRESHER
Pangasinan	Pangasinan Rice Processing Center—Sta. Barbara, Pangasinan		BFT-Mona,-- Brgy. Mona, Alaminos City	Alaminos Alaminos City FAF Amandiego FO Timpuyong Ulog Danggit Pamililya Amanalon Amagbangan FA	Alaminos Purok Sto. Rosario Association Hundred Islands FO Alaminos City FAF, Alcala Pindangan Coop
			BFT-Kiba-0-- Brgy. Kiba-O Matano , BFT Kinuskusan,-- Brgy. Kinuskusan, Bansalan, BFT – Malawanit-- Brgy. Malawanit, Magsaysay,	Magsyasay Badagoy Irrigation Association Balaka Na Pulo Communal Irrigation Association Albatana Malabis Communal Association	Digos City SARBIDA Bansalan Lower Marber IC United FO
Davao del Sur	Davao Rice Processing Complex- Matanao, Davao del Sur			Digos City Sarbida	Magsaysay Magsaysay FO Badagoy IA Albatama Malabis Communal Assoc
				Leon Talacuan FO Isian Norte Umambong FO Anoca IA's	Leon Talacuan FO Lanang FO
Iloilo	Iloilo Rice Processing Complex- Pototan, Iloilo	MFT- Leon MFT- Tubungan	BFT Jolason— Tubungan , Iloilo	Tubungan Tubungan Federation FO	Tubungan Tabat FO Tenyente Benito F Tubungan Zone 3 Tubungan FO Bikil FO Bankal FO
				San Miguel Federated FO of San Miguel	Tigbauan Nagba Farmers MPC
Bohol	Bohol Rice Processing Complex— Pilar, Bohol	MFT- Guindulman	BFT-Rizal— Brgy. Rizal,Pilar BFT-Libaong, Brgy. Libaong, Panglao	Dagohoy LACASANDA IA Pilar EA, Irrigators Association BOFAMCO San Isidro IA	Dagohoy Sab-D-Mil IA Ballidance IA LACASANDA IA Pilar BOFAMCO San Isidro IA

4.1.4. Respondents and Respondent selection

A total of 529 respondents were interviewed for the study. Table 11 presents the number of respondents on a per type of PHF and on a per area basis.

Table 11. Number of respondents by PHF type per province

Province	RPC		MFT				BFT		FBD	T	KI	
	User	Non User	RPC Manager	Supplier	Costumer	Manager	Supplier	Costumer				Manager
Pangasinan	35	35	1	0	0	0	0	5	1	4	4	27
Davao del Sur	31	32	1	0	0	0	30	33	3	4	6	34
Iloilo	32	30	1	21	13	2	4	8	1	6	10	23
Bohol	31	30	1	11	11	1	20	20	2	6	5	22
Total	129	127	4	32	24	3	54	66	7	20	25	106

In terms of respondent selection, in the case of the PRPCs, the lists of farmers who availed of the services of the rice processing centers were secured from the RPC management. Thirty farmers were randomly selected for each RPC. Another set of thirty farmers who do not avail of the services of the processing complex were identified through the assistance of the Municipal Agricultural Officers (MAO) of the town where the RPCs are located as well as from the MAOs of the towns surrounding the RPCs. Respondents for the evaluation of barangay and municipal food terminals were identified through the Barangay Captains (for the BFTs) and the Municipal Agricultural Officer (for the MFTs). The respondents are farmers/fishermen supplying agricultural/fishery products to the food terminals and customers of the food terminals (ie., vegetable/fruit traders (for MFTs) and members of households who buy from BFTs. Similarly, respondents for the evaluation of the projects on flatbed dryers and threshers (farmers who availed of the services of the facilities) were identified through the assistance of the respective Municipal Agricultural Officers.

As to respondents for Key informant interviews (KII) representatives of key institutions involved in the planning and or operation of PHF were targeted. These included local government officials, heads of local units of the Department of Agriculture, plant managers and representatives of the Board of Directors (BOD) of the RPCs and managers of BFTs and Appendix 1 presents the names of the key informants from each of the provinces visited by the Impact Assessment Team. Farmers using the services of flatbed dryers and threshers were treated as key informants since only a limited number (10 respondents per province) were interviewed due to time constraint.

4.1.5. Data Collection

Questionnaires were used for data collection (Appendix 2). For suppliers of RPCs and food terminals, questionnaires were structured to obtain information on before-and-after scenarios, e.g., volume of paddy sold to the RPC or food terminal, price received for the product(s) sold, selling price of the product when sold to other market outlets. Steps to minimize bias due to recall were implemented, such as **Benchmarking** (recalling data for specific time periods, e.g., recent wet season harvest or price paid by rice traders for the same wet season) and **Triangulation** (recalling data about two or more time periods or sources of information, e.g., wet and dry season paddy prices and paddy prices paid by rice traders versus RPC).

4.2. Impact Assessment of PHF

4.2.1. Appraisal Process

The study involved five major activities as shown in, namely: (1) mobilization and work plan finalization, (2) detailed rapid appraisal planning, (3) rapid appraisal proper (which is composed of two phases, initial assessment and in depth survey), data processing and analysis, report preparation and financial management. The rapid appraisal proper started with an initial assessment to enable the team to determine the operational status of the facilities under consideration for inclusion in the study.

These were conducted in October 2014. The purpose was to observe the current state of postharvest facilities and to hone in on the final mix of facilities that would serve the purpose of the rapid appraisal while staying within the constraints of limited time and project funds. The initial assessment served to ensure appropriateness of the facility, determine extent of data generation that will be required, develop questionnaires for key informants, as well as determine sample size of respondents. This was in preparation for the in-depth activity that followed upon identification of the type PHF and selection of the area to be covered.

Table 12. Initial and In-depth field assessment dates

Assessment	Date	Province	Location	Facility / Government Agency Visited	
Initial Field Assessment	8-10 Oct 2014	Pangasinan	Brgy. Tebag East, Sta. Barbara Urdaneta City	DA-KOICA Rice Processing Center Municipal office, organic trading center	
			Binalonan	Barangay food terminal	
			Alaminos	Municipal agriculture office, barangay food terminal	
			Sual	Philippine Fisheries Development Authority, Fishport, ice plant	
	16-18 Oct 2014	Davao City	Davao del Sur	Brgy. Matanao, Digos City	DA-KOICA Rice Processing Center
			Brgy. Catigan	Barangay food terminal	
			Brgy. Tamugan, Marilog	Barangay food terminal	
			Brgy. Tamugan, Marilog	Banana Packinghouse	
	28 Oct 2014	Bohol	Toril	Philippine Fisheries Development Authority fishport	
			Pilar	DA-KOICA Rice processing center	
			Brgy. Libaong	Barangay food terminal	
	29 Oct 2014	Iloilo	Brgy. Rizal	Barangay food terminal	
			Brgy. Amamoros, Pototan	DA-KOICA Rice processing center	
			Leon	Municipal food terminal	
			Tubungan	Municipal food terminal	
Brgy. Jolason			Barangay food terminal		
In Depth Field Assessment	25-28 Nov. 2014	Pangasinan	Iloilo City	Philippine Fisheries Development Authority fishport	
			Brgy. Tebag East, Sta. Barbara	DA-KOICA Rice Processing Center-	
			Alcala	Municipal Agriculture Office	
			Sta. Maria	Municipal Agriculture Office	
	8-12 Jan 2015	Davao del Sur	Alaminos	Municipal Agriculture Office	
			Davao City	DA RFU 11 Office	
			Matanao	DA-KOICA Rice Processing Center	
		Magsaysay	Municipal Agriculture Office		

14-17 Jan 2015	Iloilo	Digos City	Office of the Provincial Agriculturist
		Iloilo City	DA RFU 6 Office
		Iloilo City	Office of the Provincial Agriculturist
		Pototan	DA-KOICA Rice Processing Center
		Pototan	Municipal Agriculture Office
		Leon	Municipal Food Terminal
		Tubungan	Municipal Food Terminal
5-7 Feb 2015	Bohol	Brgy. Jolason, Tubungan	Barangay Food Terminal
		Tagbilaran	Office of the Provincial Agriculturist
		Guindulman	Municipal Food Terminal
		Pilar	Barangay Food Terminal
		Pilar	DA-KOICA Rice Processing Center
Panglao	Barangay Food Terminal		

4.2.2. Assessment of PHF Projects and Project Management

Assessing the impact of PHF projects involves a four-stage process. Figure 6 is a graphical representation of the process.

Outputs are the “immediate results generated by a program or project upon its completion” (Davis, et. al. 2008 in PCAARRD, 2013). The types of outputs can be determined from the statement of objectives of the PHF projects. The information to be generated under the Outputs Stage are:

1. The postharvest process(es) that is(are) being improved;
2. Types and number of postharvest facilities installed or awarded to the beneficiaries; and Number of persons utilizing the facilities. At the Outputs Stage, the impact indicators that will be used are:
 - a. Appropriateness of PHF installed/awarded to location-specific needs;
 - b. Degree of utilization of the PHF;
 - c. PHF capacity versus volume being handled;
 - d. State of PHF/ maintenance program;
 - e. Technology adoption strategy(ies) employed; and,
 - f. Degree of equity in PHF utilization among members of the community.

The proper design and use of Good Manufacturing Practices in postharvest facilities to ensure safe and good quality products were also assessed (Yaptenco 2014; Yaptenco and Esguerra 2012). For cold chain projects, proper operation of facilities and use of appropriate temperature management practices will be assessed (Yaptenco 2009).

Outcomes are changes in postharvest practices, product quality and/or quantity, increase in income or general household welfare as a result of the adoption of project outputs by the final users (Davis, et. al., 2008). Analysis of outcomes of the PHF programs/projects included the following:

1. Determination of postharvest losses reduced due to the adoption of the PHF;
2. Savings gained by intended beneficiaries of the PHF; and

3. Number of jobs created by the PHF programs/projects.

Determination of reduced postharvest losses

Quantitative losses in drying and milling

Postharvest losses were classified as quantitative and quality losses. Quantitative losses in rice after harvest are manifested by the decrease in milling and head rice recovery. Studies conducted by PhilMech estimated that the practice of the traditional method of paddy drying (sundrying) leads to quantitative losses reaching about 5.8% of total volume of dry paddy ready to be milled. This is brought about by grain fissuring due to overheating the grain during the drying process (i.e., when grain temperature exceeds 40 degrees Centigrade) as well as rewetting which happens when there is a sudden downpour during sundrying. Losses due to grain fissuring become evident only after the paddy is milled. Fissured grains come out as brokens after milling. Small brokens are separated from the larger brokens and head rice and are sold as animal feeds. Grain germination is another cause of grain loss when sundrying is delayed for more than a day.

The amount of reduced quantitative losses due to sundrying was estimated using the monthly paddy procurement by the RPCs for 2013 (available data was for Pangasinan and Davao Del Sur only) and 2014. Applying the 5.8% loss due to drying, the magnitude of losses was determined by assuming that this volume of procured paddy were instead dried using the traditional method.

Losses in the milling process are caused by technically inefficient milling machines resulting in low milling recovery. Private millers commonly operate single-pass village mills which have a rated milling recovery of 60%. Smaller mills use the Engleberg steel mill which has a lower (50-55%) milling recovery. These mills produce more brokens that are mixed with the rice hull and bran and are sold as animal feeds. In contrast, a multi-pass modern rice mill produces a milling recovery of 65-70% (or an average of 68%) (IRRI, 2014)¹. All KOICA-RPCs are equipped with a multi-pass rice mill. The amount of milled rice that would have been lost was determined by computing for the difference in the milled rice yield obtained from the KOICA-RPC rice mills and from the traditional single-pass rice mills of most private millers. This was done using the total procurement of the RPCS for 2013 and 2014 as basis for the computation.

Quality Losses

Paddy harvested during the wet season commonly has a high moisture content which ranges from 21 to 28 %. When left in this condition, grain discoloration (grain yellowing) gradually occurs at a rate that is directly proportional to the number of days that drying is delayed. The market price of milled rice with a considerable amount of discolored grains is lower than the price of the same commodity with no yellow grains. Thus, an economic loss (which is termed, Value Loss) is incurred when paddy is improperly dried. Value loss can be estimated using the formula (Teter, 1987)²:

$$\% \text{ paddy value} = 100 - 3.51 D^{0.35} \times (M-15)^{0.69}$$

¹ International Rice Research Institute. Rice Milling. www.knowledgebank.irri.org (accessed 2/9/15)

²Teter, Norman. 1987. Paddy Drying Manual, Agricultural Services Bulletin 70, FAO, Rome.

Where: D = number of days the wet paddy was held without drying starting at 20:00 hrs on the day of harvest

M= moisture content, % wet basis

100 = 100% of the value of the paddy after milling if it were dried immediately

Table 13 provides the percent value of paddy with delayed drying compared to 100% value of paddy that was properly dried. If paddy at 22% moisture content (MC) is held 10 days without drying, “the rice obtained from it will be worth 70% of the value of rice that could have been milled from the same paddy if it had been dried immediately” (Teter).

Table 13. Percent value of paddy with delayed drying compared to 100% value of paddy dried on the day of harvest

Days	Moisture Content, %				
	24	22	20	18	16
1	84.0	86.6	89.3	92.5	96.5
2	79.6	82.4	86.4	90.4	95.5
3	76.5	80.3	84.4	89.0	94.8
4	74.0	78.2	82.7	87.8	94.3
5	72.0	76.4	81.3	86.8	93.8
6	70.1	74.8	80.1	86.0	93.4
7	68.4	73.4	78.9	85.2	93.1
10	64.2	70.0	76.1	83.2	92.1
13	60.8	67.0	73.9	81.6	91.4
16	57.8	64.5	71.9	80.2	90.7
19	55.2	62.3	70.1	79.0	90.2
21	53.6	61.0	69.1	78.3	89.8
Source: Teter (1987), FAO					

Quality deterioration due to delay in threshing was computed following the results of the study conducted by Mendoza and Quitco, former researchers of the National Postharvest Research Institute (now PhilMech). The percent of yellow kernels obtained from the number of days threshing is delayed is summarized in Table 14. The percentage of yellow kernels was dovetailed with the buying price of the National Food Authority (NFA) for paddy. However, the price matrix was based on 1985 paddy buying prices. This was adjusted to the equivalent current prices.

Table 1. Percent of yellow kernels by day of threshing delay

No. of days of threshing delay	Yellow kernels %
0	0
1	11.7
2	20.7
3	28.3
4	34
5	39
6	40.7
7	43.3

Source: Mendoza and Quitco, 1985

Qualitative data based on key informant interview were used in the impact evaluation of flatbed dryers. This included utilization rate and perceived benefits generated from the facilities.

Savings gained by intended beneficiaries of the BFTs and MFTs

Farmers/fisherfolks benefited from the presence of BFTs in terms of having an assured market outlet for their harvests. The economic indicators used in measuring benefits derived were 1) savings in transport cost and 2) added income. Savings in transport cost represents the difference in transport cost that producers would otherwise incur to bring their product to the town market in the absence of the BFTs. Added income, on the other hand, is the increase in income from selling the products to the BFTs based on the buying price of the BFTs versus the price paid by other market outlets.

Net Benefit Derived from the Projects

The Impact Evaluation was able to estimate the returns to public investment of the KOICA-RPCs. However, since the facilities have only been operating for three harvest seasons at the most, the usual financial measures (e.g., Internal Rate of Return, Net Present Value) would not provide a realistic analysis. In lieu of these measures, the study employed the Capital Recovery Approach. This approach measured the extent by which the project investment has been recovered based on the monetary value of the benefits generated by the project.

Only qualitative data were generated for the other PHF projects. In this case, quantitative measures of returns to investment was not possible.

Employment Generated

Creation of opportunities for employment is considered a component of the benefits that can be derived from the PHF projects. The jobs created by the projects were determined by asking the RPC managers and the Municipal Agricultural Officers of the respective MFTs/BFTs and threshers/flatbed dryer projects to identify the various personnel hired by the projects including the salaries and wages that they receive.

4.2.3. *Evaluation of Project Management*

Evaluation of project management included the (1) assessment of decision-making process to identify the type and capacities of PHF, as well as the location and beneficiaries of the project, (2) criteria used for choosing PHF suppliers/manufacturers, and (3) presence or absence of a project monitoring system.

Operational evaluation was undertaken to determine if implementation of identified PHF programs was carried out as planned. The evaluation was based on initial project objectives, indicators, and targets. Interviews with program beneficiaries and implementers/proponents were used to gather information. The objective was to compare planned outputs with actual outcomes, and to determine if there were gaps between expected and actual outputs. Lessons for future project proposals and implementation were also identified (Khandker 2010).

4.2.4. *Identification of Strengths and Weaknesses in Identified PHF Programs and Projects*

Parameters that could affect the performance of a PHF will include proximity to production areas and markets, access to transport and storage infrastructure, availability of technical support (repair, maintenance, and operation), presence of a reliable and adequate water and power supply, labor availability, and local weather conditions and geography. Inaccessibility of markets and inadequate support for farmers may be seen as manifestations of coordination failure, where despite profit opportunities for service providers, farmers, and buyers, coordination failure prevents the supply chain from assuring timely flow of supply from farmers (Briones and Galang, 2013).

Other factors examined include presence/absence of political interference, qualifications of personnel of implementing agencies. Similarly, coping mechanisms and modalities of emerging responses to challenges and potentials are worth documenting as well.

4.3. **Study Timeline**

The study duration was for 6 months from October 7, 2015 to March 30, 2015. Rapid appraisal proper was done for the first four months of the study, from October to February while the remaining months were devoted to analysis report writing. A brown bag seminar where preliminary results of the study was conducted in February 10, 2015. The idea was to generate feedback and have enough time to incorporate them in the study's final report.

5. **RAPID ASSESSMENT RESULTS**

5.1. **Postharvest Facility Description and Technical Assessment**

5.1.1. *KOICA Rice Processing Centers*

Project Background

Four modern rice processing centers (RPC) from South Korea were established in Pangasinan (Sta. Barbara), Iloilo (Pototan), Bohol (Pilar), and Davao del Sur (Matanao) (Figure 1) under a project entitled "Establishment of Modern and Integrated Rice Processing Complexes in the

Philippines". The project proposal was developed by the Bureau of Postharvest Research & Extension (BPRE) under DA in Aug 2008. A project evaluation team was sent by South Korea in Dec 2008; after evaluation, the Korean government approved the project for funding through the Korean International Cooperation Agency (KOICA); hence, the project was also known as the KOICA RPC Project. On the Philippine side, the project was approved by the National Economic Development Authority (NEDA) in April 2009. These RPCs are intended to duplicate the loss reduction achieved by the Korea-Philippines Integrated RPC established in Baler, Aurora in 2006; postharvest losses were reduced from 15% to 8% using the modern facility.

The main objective of the KOICA RPC Project was "to increase the income of farmer-beneficiaries by improving the efficiency of their rice post production system thru the provision of integrated and modern rice processing facilities and equipment". With these facilities, the project was expected to (1) produce good-quality milled rice, (2) reduce postharvest losses, (3) improve the distribution system of rice, and (4) maximize the utilization of rice byproducts.

Implementation of the project started in 2009. The first facility to be established was in Pangasinan in 2010, followed by the RPCs in Iloilo, Bohol and Davao del Sur. All RPCs were projected to be fully functioning and managed by farmers' organizations (FO) by 2014.

The project was implemented in four phases. Phase I (pre-project phase) included development of the project proposal, site selection, coordination activities with local government units (LGU), and presentation and modification of the proposal to the Philippine and South Korean governments for final approval. The lead agency in charge of this phase was the Project Development Services division of the Department of Agriculture. Phase II (construction phase) involved site preparation and development through LGUs, facility construction and installation of equipment by KOICA, testing and commissioning, and turnover of the facility to the Philippine government (represented by the DA and its regional office, as well as the concerned LGU). Phase III (pre-operation phase) involved preparations for business operations of each facility. Activities for this phase included consultations with farmers, establishment of the RPC Professional Management Team, business planning and trial operations. Phase IV (operations phase) focused mainly on operations needed to run each RPC as a full business by a FO.

Implementing Agencies

The three main agencies involved in implementing the KOICA RPC Project were the KOICA, the Department of Agriculture, and LGUs. The four facilities were established with a PhP 649-M grant provided by the KOICA which covered facilities and equipment, training of operators, and travel of Korean experts to project sites. The Philippine government provided PhP136.45-M in counterpart funding to cover freight and taxes, purchase of a 1-ha lot, site development, and expenses incurred by government implementing agencies. The FO designated as recipient of the RPC is required to provide a PhP2-M counterpart fund as additional operating capital.

Agencies of the Department of Agriculture were actively involved in the implementation of the KOICA RPC Project. The functions of each agency are shown in Table 15.

Table 15. Implementing agencies of the Department of Agriculture under the KOICA RPC Project

Name of Agency	Function	Remarks
Office of the DA Undersecretary for Special Concerns	Monitoring of the project to ensure proper implementation	A steering committee to oversee the project was formed, with USEC Bernadette R. Puyat as chairman.
DA Project Development Services	Developed and packaged the KOICA RPC Project proposal	
Philippine Center for Postharvest Development & Mechanization (PHILMECH)		Main proponent of the project and is the lead agency in the National Project Management Office (NPMO)
DA Special Project Coordination & Management Assistance Division	Management and monitoring of all administrative and financial concerns of the project.	
DA Rice Program	Tasked to ensure that the project stayed within the scope and coverage of the DA Rice Development Program. Provided funds for Maintenance & Operating Expenses of the KOICA-RPC Project, as well as Php20-M for each RPC as startup operating capital	
National Agri-Business Corporation (NABCOR)	Provided business expertise to operationalize each RPC (including business planning); was tasked as the initial operator of each facility before turnover to a qualified farmers' organization.	Government-owned and controlled corporation tasked to promote agribusinesses for small farmers and fisherfolk. Abolished due to poor performance of its functions, minimal social impact, and non-viability.
DA Regional Field Units (RFU)	Assigned as lead implementors at the provincial level; RFUs involved included RFU I (San Fernando, La Union), RFU VI (Iloilo City, Iloilo), RFU VII (Tagbilaran City, Bohol), RFU XI (Davao City)	Provided an RFU officer to lead a Provincial Project Management Office (PPMO) for each RPC

Sources: DA-NPMO (2014); Gutierrez (2014)

Technical Assessment

Technical aspects of the various RPCs around the Philippines are shown in Table 16; the information shown was gathered from interviews with key informants within each RPC and government agencies implementing the project.

Degree of Utilization

As a modern rice milling facility, each RPC is provided with a multi-pass milling system composed of rice hullers, aspirators, color sorter and length grader (Figure 7). The rice mill can produce 2.5 tons of milled rice per hour; for an 8-hour shift per day, this translates to 20,000 kg of milled rice per day. Assuming an average milling recovery of 65%, the estimated dried paddy requirement is 30,769 kg per day. An estimated volume of 10,769 kg per day of byproducts (rice hull, bran) is produced.

Table 16. Technical aspects of the various RPCs

Aspect	Project Sites				
	Baler (Aurora)	Sta. Barbara (Pangasinan)	Pototan (Iloilo)	Pilar (Bohol)	Matanao (Davao del Sur)
Start of operations / pre-operations	Custom milling in 2007; procurement of paddy in 2008	September 2011	April 2012	Jan 2013	July 2013
Cost of facility and equipment	KDICA subsidy of Php130-M plus Php41.8-M	KDICA grant of Php649-M, Philippine government counterpart of Php136.45-M			
Area of facility	1 hectare	Minimum of 1 ha			
Equipment		5 units, drying capacity of 6 tons (1,000 bags) paddy per day; with combined kerosene-biomass furnace			
Batch recirculating dryer		Capacity of 2.5 tons of milled rice per hour; includes aspirator, rubber roll huller, paddy separator, length grader, color sorter, friction whitener, sewing machine			
Multipass rice mill		Forklift (1 unit)			
Forklift		Forklift (1 unit)			
Trucks		1 ten-wheeler, 1 two-tonner truck provided by DA	2 trucks	2 trucks, 2 multicab vehicles and 2 motorcycles	2 trucks
Service fees					
Drying		Php3 per kg paddy	Php2 per kg paddy to discourage custom drying		Php55 or Php35 per sack of paddy using kerosene or rice hull, respectively
Milling		Php90 per cavan of milled rice (Php1.80 per kg); Php100 per cavan (Php2 per kg) of classified milled rice	Php 90 per cavan of milled rice (Php1.80 per kg); minimum volume of 200 bags for repeat customers, 300-bag minimum for other clients	Offers a custom milling service, but management discouraged it, thus it is expensive	Php 2 per kg of milled rice
Milling recovery		64%	65%	66%	65%
Warehouse capacity		1 storage warehouse, canhold 22,000 bags of milled rice			
Service area		Minimum of 1,000 ha			
Issues and concerns	Programmable logic controllers need to be replaced, are only available from Korea; cut wires	Problems with maintenance, due to the absence of locally available spare parts that are compatible with equipment		Low paddy supply in the second harvest	RPC capacity not fully utilized, lack of supply of palay, unregistered vehicle

Note: 1 cavan of milled rice = 50 kg

KOICA RPCs

- Equipped with mechanical dryers (5 units, 6 t/day per unit), multi-pass rice mill (2.5 tons/hr), cargo trucks
- Storage warehouse (can hold 22,000 bags milled rice)
- 65% milling recovery
- Pickup / delivery service
- Custom milling / drying (some RPC's only)



Figure 7. Facility and equipment provided by the Korean International Cooperation Agency for each Rice Processing Center.

To produce dried paddy, each RPC is equipped with five batch recirculating dryers with a drying capacity of 6 tons per day per dryer; total capacity of each facility is 30 tons per day. For an average moisture content (MC) of 28% wet basis and a target MC of 14%, about 25,120 kg per day of dried paddy can be produced per 8-hour shift. During periods of oversupply, RPCs can operate beyond this period to dry larger amounts of grain. Based on information from the RPC manager in Pototan, the number of days of operation is 23 (30 days – 4 weekends – 3 days maintenance); if paddy is procured daily for 23 days, the RPC should purchase 690 tons per month to fully utilize the dryers. Once dried, the paddy is stored to allow moisture in the grain to equalize in a process known as tempering. This is said to increase the head rice yield.

Based on procurement data provided by RPCs, availability of paddy for drying and milling seems to be inadequate to fully utilize the capacities of the facility. Figure 8 shows the volume of procurement for RPCs in Sta. Barbara (Jan – Dec 2013), Matanao (Jan – Sept 2014) and Pototan (Jan – Dec 2014). Paddy procurement in Sta. Barbara shows a distinct peak during September and October, reaching approximately 600 tons for these months. Procurement during the rest of the year is markedly lower. Procured volume in Matanao is more evenly distributed and larger compared to the Sta. Barbara RPC, with peaks in March and September. The paddy volume procured by the Pototan RPC is much lower compared to Matanao and Sta. Barbara, with the peak procurement occurring in September. No data was available from the Pilar RPC.

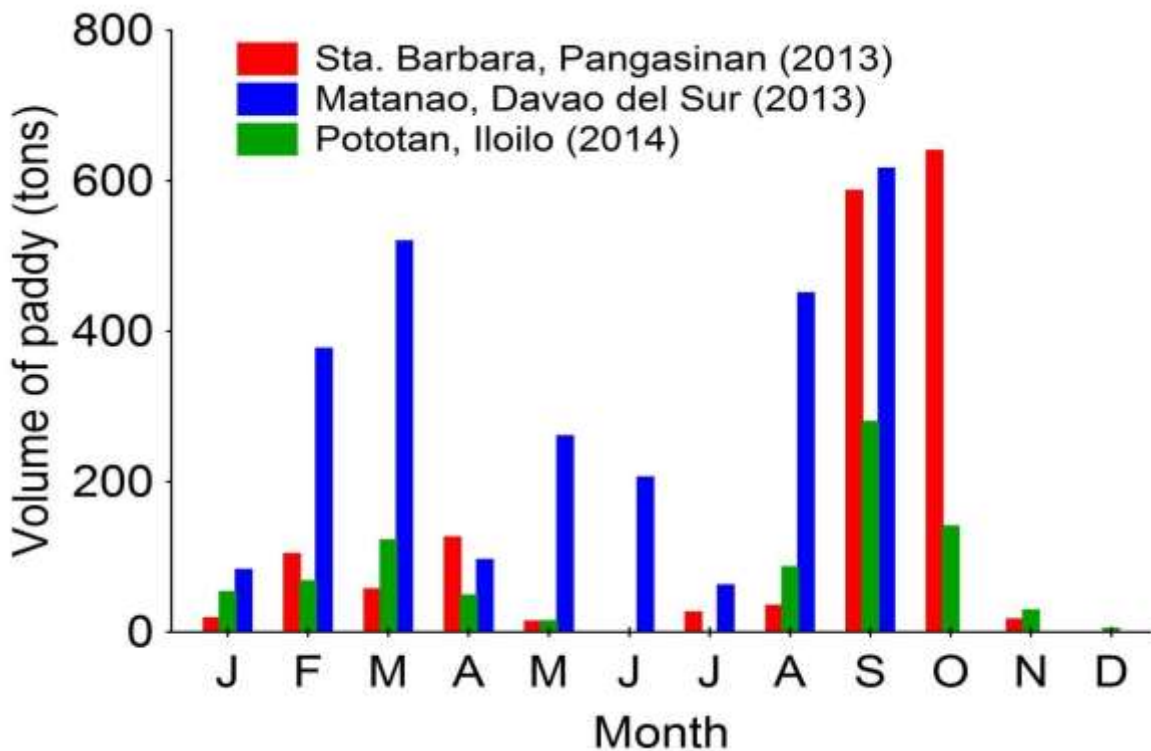


Figure 8. Monthly volume of procured paddy for KOICA RPCs (except Pilar)

Area Serviced by RPCs

Each RPC was designed to service a production area of 1,000 ha; to ensure the full utilization of the capabilities of an RPC, most sites are located on or close to major rice production areas (Figure 1). For example, the top five growing areas in terms of value and production volume are Central Luzon, Cagayan Valley, Ilocos, Western Visayas, and SOCCSKSARGEN (Table 2 and Table 3, respectively). All the RPCs currently established are located in one of these regions except for the Pilar (Bohol) facility. For most rice-growing areas, a service area of 1,000 ha is considered small and this requirement should be easily satisfied. However, all the RPCs under the KOICA program currently procure paddy from distant areas (Figure 9 to 12); an extreme case is the Matanao RPC which has procured paddy from Agusan del Sur (250+ km away) during periods of low supply.

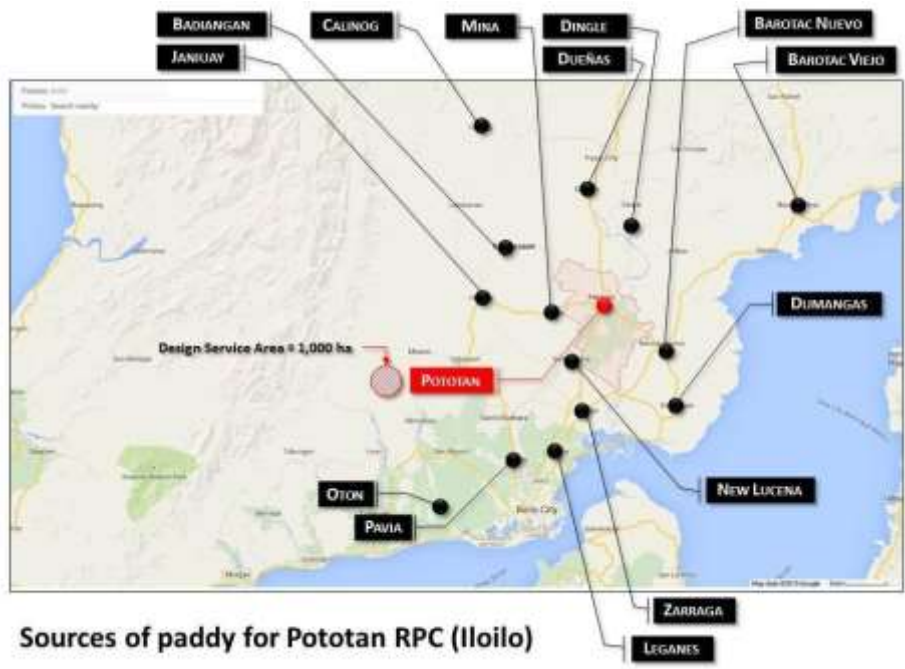
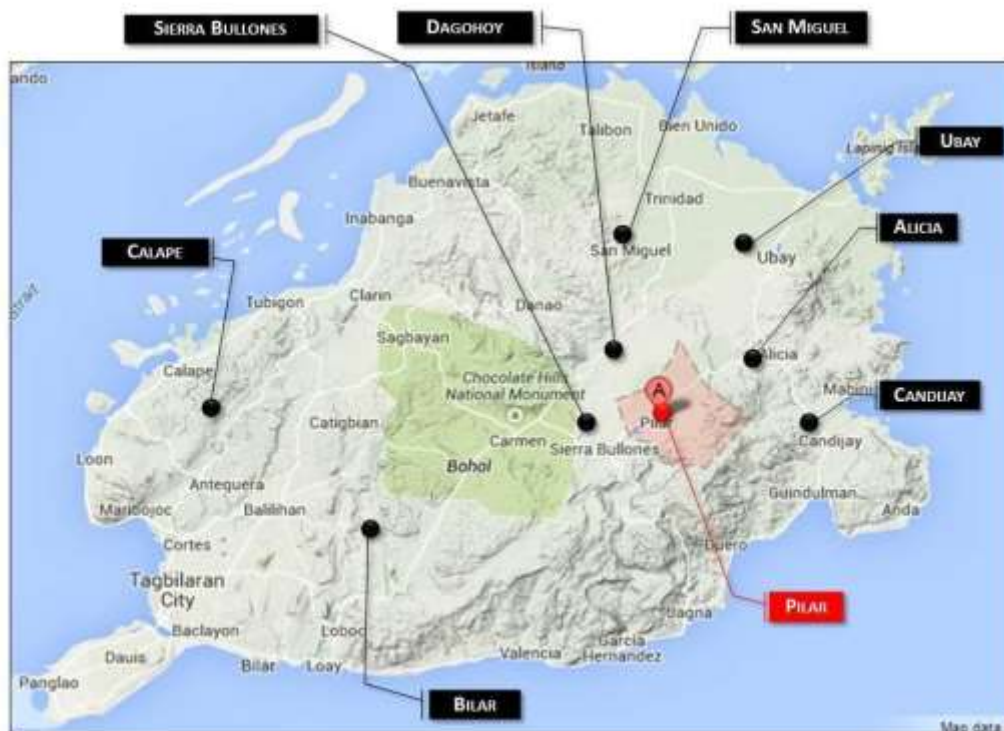


Figure 9. Sources of paddy for Pototan RPC (Iloilo)



Figure 10. Sources of paddy for the Sta. Barbara RPC (Pangasinan)



Sources of paddy for Pilar RPC (Bohol)

Figure 11. Sources of paddy for the Pilar RPC (Bohol)



Sources of paddy for Matanao RPC (Davao)

Figure 12. Sources of paddy for the Matanao RPC (Davao)

Based on a national average yield of 3.47 tons of wet paddy per hectare, the estimated service area for a single year was 469 ha, 771 ha and 245 ha for the Sta. Barbara, Matanao and Pototan RPCs, respectively (Figure 13).

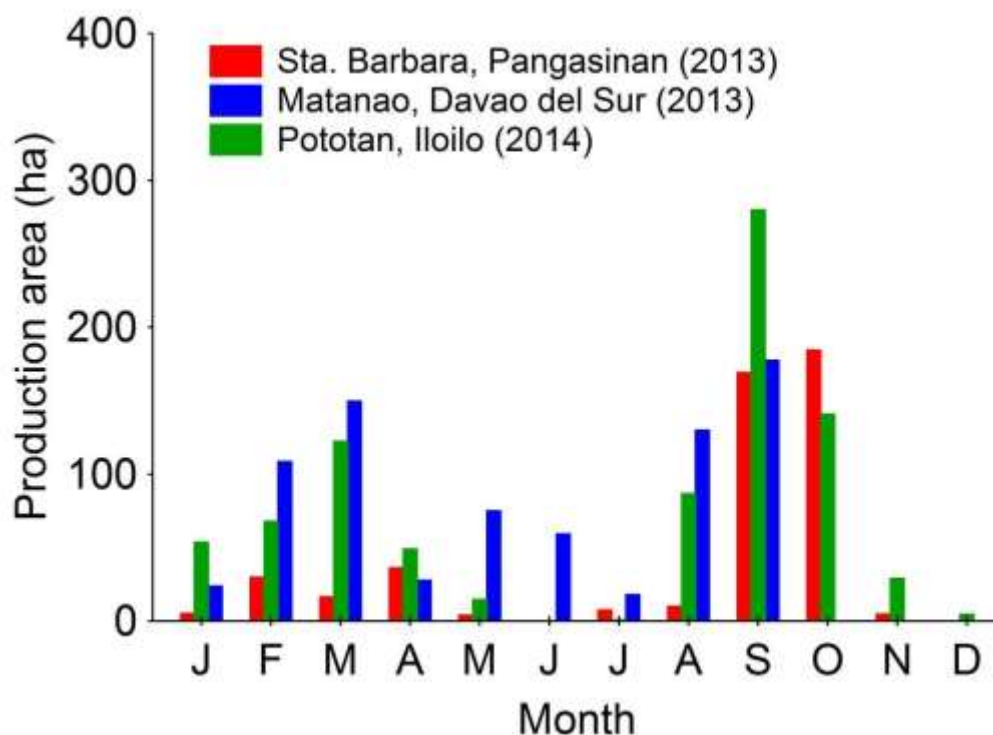


Figure 13. Estimated growing area serviced by RPCs (except Pilar)

The limited utilization of each RPC may be due to:

1. Existing agreements between farmers and private traders which limit the volume of paddy that can be procured by each RPC;
2. Limited operating capital which restricts the volume of paddy that can be procured by RPCs;
3. Lack of awareness of farmers on the services of RPCs;
4. Unprogrammed planting leading to oversupply of paddy during certain months of the year and shortages during the rest of the year.

Operation & Maintenance

The majority of equipments in all RPCs are mostly sourced from South Korean manufacturers. Interviews with key informants indicate that replacement of parts is difficult due to the lack of an accredited Philippine distributor. Locally available parts are not compatible with the machines installed in RPCs.

During the rapid assessment, RPCs were generally observed to be operating under hygienic conditions in stark contrast to village-level rice mills where dust is an ever present health hazard. Cleanliness can still be improved since scattered grain in floor areas and cobwebs in ceilings were observed, indicating a need to implement a more thorough cleaning program. Working areas are well-lighted, safe and danger zones are clearly delineated, and equipment are labeled.

Impact Assessment

Table 17 shows a matrix of the actual impact that the KOICA RPC Project has had on the rice industry within the locale of each RPC. Initial and in-depth assessments show that the overall impact of the project has been positive. With its modern equipment and well-trained personnel, RPCs are generally able to produce properly dried paddy, which in turn ensures good-quality milled rice.

Table 17. Impact of the RPCs on the domestic rice industry

Expected Impact	Output	Actual Impact	Remarks
Produce good-quality milled rice	Premium rice, graded and sorted for length and color; each sack is accurately filled with 50 kg of milled rice	Suppliers of paddy are encouraged to provide only good-quality grain since RPCs do not accept overdried, fermented, or insect-damaged paddy; private mills are forced to upgrade equipment to produce better quality milled rice	Analysis of premium milled rice sample from Iloilo RPC: head rice = 74%, brewer's rice = 0%, damaged / discoloured grain = 0.4%, chalky / immature grain = 4.1%, red grain = 0%, MC = 13%
Reduce postharvest losses	Wet paddy properly dried to 14% MC	Farmers are able to sell directly to the RPC (guaranteed market) immediately after harvesting and threshing; drying costs are reduced or eliminated	Farmers who are able to sell wet paddy directly to RPCs prefer this arrangement; services of RPC should be advertised more since some farmers are not aware of the RPC
Improve distribution system of rice	Timely pickup of paddy from growing areas	Transport costs are reduced or eliminated	Limited number of trucks of RPC, multiple usage (pickup of paddy, delivery of milled rice) translates to long waiting times for farmers; some RPCs offer a transport incentive (Php0.20 per kg) to deliver paddy to the RPC
	Free delivery of milled rice to clients	Freshly milled rice with long shelf life can be delivered to clients	
Maximize utilization of rice byproducts	Availability of byproducts for sale	Broken grains sold as animal feed	
		Rice bran sold as raw material for cosmetics	
	Rice hull used as fuel for biomass furnace of RPC	Reduced cost of drying; ash is used as soil additive	

Since RPCs are equipped with mini-rice mills that can be used for predicting milled rice quality, the RPC can decide quickly whether to accept or reject procured paddy. The presence of RPCs also provides a safety net for farmers during periods of oversupply, when drying facilities are overwhelmed and private traders are not willing to accept wet paddy and/or offer very low buying prices.

The Pilar RPC follows a pricing scheme based on MC of procured paddy and prevailing market price of dried paddy (14% MC); this scheme is shown in Figure 14 based on data provided by the RPC. The practice of the RPC is to offer a buying price for paddy at 14% MC that is higher than the market price by PHP 0.50 per kg; this is then adjusted according to the actual MC of the procured paddy. The RPC also does not go below the NFA-dictated price of PHP17 per kg, even if market price is below this level. This gives an objective means of pricing paddy while giving an incentive to growers to sell their paddy to the RPC. For example, if the prevailing buying price for dried paddy is PHP19.50 per kg, the RPC will offer to buy at PHP20 per kg. If a farmer has wet paddy at 21% MC, then the adjusted buying price based on Figure 14 is PHP18 per kg.

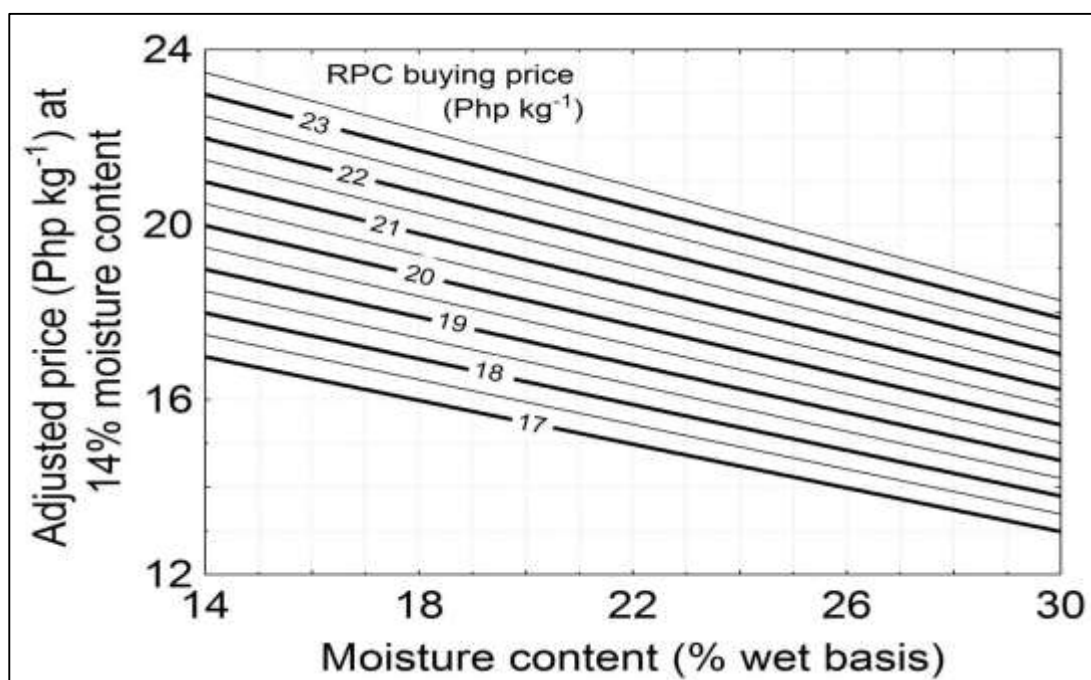


Figure 2 Pricing scheme for procurement of paddy from RPC suppliers. The buying price is a function of moisture content of paddy and the prevailing market price for well-dried paddy (14% MC).

Food Terminals

Project Background

The Agrikulturang Pinoy (or Agri-Pinoy) Trading Center program of the Department of Agriculture (DA) has a total investment target of PhP3.5-B (NEDA 2014). Previous government administrations have pursued similar programs, such as Pres. Gloria M. Arroyo's poverty- and hunger-reduction programs called "Gulayan ng Masa", "Food for School" and "Tindahan Natin" (The News Today 2007). For the period of 2007-2013, the project has been able to establish 186 MFTs and 1,258 BFTs.

High-value crops are classified mainly into fruits or vegetables. For fruits, production in terms of volume is centered in the main island group of Mindanao (58%) (Table 4). The top five fruit-producing regions by volume are Northern Mindanao, SOCCSKSARGEN, Davao, Western Visayas, and Cagayan Valley regions. For vegetables, however, 68% of production in terms of volume comes from the Luzon island group. The top five vegetable-producing regions are Cagayan Autonomous, Ilocos, CALABARZON, Central Luzon, and Cagayan Valley regions. In terms of aggregate value of production of high-value crops, the top five producing regions are Davao, Northern Mindanao, SOCCSKSARGEN, Ilocos and Western Visayas regions (Table 5). Most of the BFTs are clustered in the CAR (13.3%) to cater to the large number of highland vegetable farms in the region (Table 8). Regions III and V also received large numbers of BFTs with 10.5% and 10.0%, respectively. In terms of MFTs received, the top three recipients were Regions III, IVb, and NCR with 26%, 11%, and 9%, respectively (MADECOR 2013). The location on MFTs to be established in 2013 relative to fruit and vegetable production areas are shown in Figure 3 and Figure 4, respectively.

As earlier cited in the report, the regional trading centers are in various stages of planning and construction with only the facility in Urdaneta, Pangasinan the closest to completion. In fact, the facility which is mainly targeted for lowland vegetable farmers (Macam 2014) had a soft launch in July 2014. Since only BFTs and MFTs have been operating for several years, only these facilities were expected to have sufficient data for impact assessment.

Barangay & Municipal Food Terminals

BFTs and MFTs were designed to function as food depots and distribution systems that could offer safe and quality food products such as meat, poultry, fish, vegetables and fruits. Since each food terminal is located within farming or fishing area, it can provide direct links between suppliers and consumers. BFTs are facilities that serve as a food distribution point at the barangay level, where farmers can bring their produce for sale as well as purchase food and non-food products at low prices. MFTs are designed to function as trading centers where growers can bring produce in large volumes for direct trading with wholesalers. Thus, trading layers or middlemen are reduced leading to improved income for producers. The objectives of the program are to:

1. "To provide farmers and fisherfolk immediate access to markets;
2. To make available and accessible agri-fishery commodities and basic necessities at affordable prices;

3. To create employment opportunities through the project's livelihood component and its forward and backward linkages;
4. To capacitate the operators to become entrepreneurs by providing trainings on enterprise development and other technical support;
5. To strengthen the partnership between LGUs and private sectors and other stakeholders in the delivery of basic goods and services in the community" (AMAS 2013).

Expected impact of the program includes:

1. Increased income of agri-fishery producers
2. Availability of safe, nutritious and affordable food
3. Creation of employment opportunities for food repacking, processing and delivery
4. Income generation for local government units

Eligible barangays or municipalities were considered as recipients of a food terminal according to the following criteria:

1. Areas identified by the Department of Social Welfare & Development (DSWD) as depressed areas
2. Located in areas with high population density
3. High demand for low-priced wage commodities
4. Located in provinces with Priority 1, 2 or 3 ratings in the National Hunger Mitigation Program (NHMP).

Implementing Agencies

The Agri-Pinoy Food Terminal Program is implemented mainly by the DA Agribusiness & Marketing Assistance Service (AMAS) in collaboration with LGUs and registered farmer or fishers' organizations as project recipients.

Funding up to PhP150,000 for trading capital, building improvement and training is provided for each BFT. Equipment such as freezers, chillers, meat processing equipment, package sealers and weighing scales are also provided based on the requirements of the site. Funding for construction of MFTs is provided by the DA in the PhP500,000 to PhP1.5-M range.

As a basic policy of the program, beneficiaries must be able to provide counterpart inputs such as land for the facility, an existing building or structure, initial operating capital, and a management team to operate the facility.

Technical Assessment

Table 18 gives the technical description of BFTs visited during the impact assessment. Since these facilities are intended as retail outlets at the community level, they are generally single-story structures without air conditioning (Figure 15). These are generally equipped with simple

equipment for food processing and storage, weighing and packaging, as well as display stands for fresh produce.

Table 19 gives the technical description of MFTs that were evaluated. The structure generally resembles a gymnasium, open on all sides with a high roof line to promote air circulation. The floor area is kept free of obstructions to allow the free movement of goods and people; concrete is used for durability, ease of cleaning and to promote mobility of goods and equipment. Figure 16 shows some typical structures for MFTs.

Table 18. Technical description of barangay food terminals visited during the impact assessment

Start of operations	March 2009	July 2008	July 2010	September 2008	September 2010	August 2010
Location	Brgy. Mona Alaminos City (Pangasinan)	Brgy. Kinuskusan, Bamsalan (Davao Del Sur)	Brgy. Kiba-o, Matanao (Davao Del Sur)	Brgy. Malawant, Magsaysay (Davao del Sur)	Brgy. Jolason, Tubungan (Iloilo)	Brgy. Libaong, Panglao, Bohol
Land ownership	Owned by cooperative member	Owned by barangay	Owned by barangay	Owned by barangay	Owned by barangay	Owned by barangay
Lot dimensions		30 m x 40 m		20 m x 27 m	12 m x 12 m	
Building description	Single story concrete structure	Single story concrete structure	Single story concrete structure	Single story concrete structure	Constructed of light materials (Damboko frame, GI sheet walls)	
Equipment	Two freezer (chest type) storage unit, meat grinder	Weighting scale, rice cooker		Rice processor for <i>Kakanin</i> , weighing scale, meat grinder, freezer	Chest-type freezer, upright chiller, plastic crates and drums	Chest freezer (2-door), digital weighing scale, meat grinder, plastic crates, chopping knives, cooler box, water container
Issues and concerns						
	1.1	1.3	1.3	1.3	1.3	1.3
						259.08

Table 19. Technical description of municipal food terminals visited during the impact assessment

Aspects	MFT Leon	MFT Tubungan	MFT Guindulman
Start of operations	Started operation from 1994, was 2002 called a supermarket. Changed status to a MFT in 2002.		
Cost of facility	Php 1 million for establishment of the facility	Php2-M (Php1-M for establishment in 2002, Php1-M for added amenities in 2013)	
Area of facility	1000 square meter. 18 meters by 36meters	375 square meters	
Location	Brgy. Anonang, Leon (Iloilo), adjacent to the Municipal Hall compound	Tubungan, Iloilo	Brgy. Poblacion, Guindulman (Bohol)
Land Ownership	Municipal Land	Municipal land	
Building description	Gymnasium-type building, concrete flooring, steel truss and posts	Gymnasium type building concrete structures	
Equipments		weighing scale, freezer, chiller, plastic crates and some other equipment for the MFT	
	1.15	1.78	1.78
			164.846



Figure 15. Barangay food terminals in Bohol (top) and Davao City (bottom) serve as retail outlets for the community.



Figure 16. Municipal food terminals in Alaminos, Pangasinan (top) and Guindulman, Bohol (bottom)

Operational Status

At present, there are varying levels of operational status of BFTs; 88%, 20%, and 9% of BFTs are regularly operating, on irregular status, or non-operational, respectively. For MFTs, 69%, 1%, and 30% are operating, on irregular status, or are not operating, respectively (MADECOR 2013). Net returns in high-value crops such as vegetables are 11 and 18 times higher than rice and corn, respectively (Briones and Galang 2013). However, the presence of functioning trading posts and packinghouses are essential to ensure that quality produce is brought to markets where farmers can realize these types of returns.

The BFTs that were visited are mostly operational to varying degrees; level of operation and utilization of a BFT is highly dependent on the quality of management that is in charge of the facility. BFTs were also observed to be managed either by the LGU, a farmer or fishers' cooperative, or a regional council. Households within the barangay where the BFTs are located serve as suppliers of produce being sold at the terminal as well as consumers of the products being sold there. Other BFTs documented by DA that are successfully operating include Manito (Albay), MacArthur (Leyte), and Vega (Nueva Ecija). Techniques employed by BFTs to ensure success include:

1. Selection of a strategic location – access to a road network and transport terminals (to capture commuters), proximity to demand centers (churches, schools, government offices)
2. Variety of products available – rice, meat and poultry, fruit, vegetables, root crops, processed / canned goods, and dry goods are being sold in BFTs to serve as a one-stop shop (*sari-sari*) that can serve the day-to-day needs of the community. Fresh produce being sold in MFTs are also varied, especially with respect to vegetables (Table 20).
3. Paying suppliers in cash – farmers are attracted to bring their harvest to BFTs when paid in cash; they may also choose the option of barter trade to procure goods with an equivalent cash value. The system of *lako-lako* has been eliminated since farmers have a ready market for their products. Postharvest losses, transport costs, and the time and effort involved in marketing products are largely eliminated by selling to the BFT.
4. Selling at lower prices – BFTs can sell farm products at a lower price since these are procured directly from suppliers.
5. Professional services – to ensure accurate and updated record-keeping and accounting, some BFTs have hired full time staff. For example, BFT MacArthur has now hired an administrative officer and bookkeeper; from 2 workers at the start of operations, the BFT now has 9 full-time and 3 part-time staff.
6. Monitoring and recording system – this helps the BFT to program purchasing of goods and satisfy demands of customers while minimizing waste due to over-procurement.
7. Quality assurance – BFTs should not be content with just maintaining sales volume, but should strive to continually improve quality and safety of products being sold.
8. Synergy with local business – rather than competing with other local businesses, BFTs can provide them with affordable raw materials and other necessities (DA-AFMIS 2013).

Table 20. Profile of products sold by barangay food terminals

Facility	Category	Provinces visited			
		Iloilo	Bohol	Davao	Pangasinan
Barangay food terminal	Vegetables	Ampalaya, bell pepper, chili, eggplant, lettuce, spinach, patola, pechay, tomato	Alugbati, ampalaya, baguio beans, cabbage, cucumber, eggplant, ginger, mungbean, okra, patola, pechay, sayote, squash, string beans, upo	Bottle gourd, eggplant, tomato, malunggay, okra, pechay, cucumber, sitaw, squash, string beans	Eggplant, okra, sitao, squash, tomato
	Bulb and root crops	Cassava	Onion, sweet potato, cassava, gabi, singkamas, ube	Sweet potato, cassava	Cassava
	Grains	Paddy	Milled rice	Milled rice	Paddy
	Meat products		Chicken, chorizo, hotdogs, pork	Dressed chicken, live pigs, goat	
	Seafood		Bangus, dalagang bukid, galunggong, laga, lapu-lapu, squid, tamban, tulingan		
Municipal food terminal	Vegetables	Alugbati, ampalaya, amargoso, beans, cabbage, camote leaves, carrots, cauliflower, chili, cucumber, eggplant, hot pepper, radish, lettuce, malunggay, mustard, okra, patola, pechay, saluyot, sayote, sigarilyas, string beans, spinach, squash, sweet pepper, tomato			
	Bulb and root crops	Sweet potato, cassava			
	Grains	Black rice			
	Meat products	Tocino, chicken, embotido, cordon bleu			
	Seafood	Tilapia			

Location of a MFT plays a major role in determining its utilization. The presence of an existing major trading center that is already patronized by both wholesale suppliers and traders can result in unused or under-utilized MFTs. For example, a MFT in Binalonan, Pangasinan is only operational during Thursdays and Saturdays at present. Half of the facility is rented out to fresh vegetable and fruit retailers and to fast food (carindaria) operators to augment earnings to cover operating costs (Figure17).

The lack of utilization is due to Urdaneta City which has traditionally served as the meeting point for suppliers and traders based in Manila. Since Urdaneta City is only 9.7 km away from Binalonan, suppliers tend to bypass the MFT and go directly to Urdaneta which has an existing trading center that is undergoing upgrading. The MFT in Villasis (9 km away from Urdaneta City) is also underutilized for the same reason.

In contrast, the MFT in Leon, Iloilo is a commercially active facility with regular market days (Figure 18). Agricultural produce is transported by farmers to the terminal daily and wholesaler-traders frequent the facility to buy their goods. The facility was recently enlarged to provide more space for trading. Traders are able to transact their business within a shorter time period by using the food terminal. They are also assured that the products that they buy are graded uniformly. Farmers, on the other hand, are assured of a market for their harvests and receive a fair price for what they sell. The facility is actively monitored by the local government; only registered traders are allowed to transact business to control the activities of middlemen and unscrupulous traders. Operations of the facility are supported by a transaction fee charged to traders; farmers do not pay any fees for use of the MFT.



Figure 17. Municipal food terminal in Binalonan, Pangasinan that is partially used as a food court due to low utilization. Inset shows the wholesale trading area sitting idle; it is used as a retail area on certain days of the week.



Figure 18. Municipal food terminal in Leon, Iloilo during a trading day. Wholesalers arrive with cargo trucks or jeepneys (inset) to procure fruits, vegetables and root crops for trading

Impact Assessment

For BFTs, the main impact is the reduction in transport cost on the part of farmers; since the facility is located within the community, passenger fees in public transport are reduced or eliminated entirely. Furthermore, for suppliers bringing their produce to market, the reduced distance translates to less mechanical damage. For consumers, transport cost is also minimized, while the variety and quality of fresh produce available to them is improved. BFTs also offer an opportunity for entrepreneurs so engage in retail of fresh fruits and vegetables by providing a venue at low cost. Table 21 and 22 summarizes the impact of barangay and municipal food terminals, respectively, on suppliers and consumers with respect to the program objectives; these are findings as reported by DA and as determined from interviews with key informants during the impact assessment.

In general, the concept of establishing food terminals at the barangay and municipal level appears to have uplifted several communities by providing employment, better food choices, and reducing transaction costs. What is needed is to multiply the number of successful facilities by studying what has worked for these food terminals and their communities and replicating them on a case-by-case basis.

Operation and Maintenance

Repair and maintenance of chillers and freezers are the main technical problems encountered by BFT managers. Since some of the facilities are in isolated areas, requesting inspection visits by technicians is difficult. Equipment may be brought to service centers but requires a vehicle for hauling.

The minimum requirements for a packing facility include providing protection from sun and rain, proper flooring, providing ventilation, and sufficient lighting. For general working areas within a packing facility, light intensity should be 200 lux. For working tables and surfaces, 500 lux should be provided. For 200 lux, three 20-W bulbs or one 40-W bulb should be provided for every 10 m² of work area. To achieve a 500-lux intensity, there should be one 20-W bulb per square meter of work area (Yaptenco and Esguerra 2012). However, for some facilities observed during the assessment, lighting may not be sufficient, especially for some facilities that are blocked by surrounding structures or vegetation. The situation will be worsened at night if workers are forced to sort and grade produce under limited lighting.

Table 21. Impact of barangay food terminals.

Objectives	Reported Impact^a	Findings of Impact Assessment
Provide immediate access to markets	<i>Lako-lako</i> system eliminated, transport cost reduced, farmers paid in cash or by barter	Eliminated transport costs, mechanical damage
Provide agri-fishery commodities and basic necessities at affordable prices	One-stop shop serves daily needs of housewives; large variety of produce available and still expanding; organic farming encouraged	Sourced from backyard gardens, small farms; eliminated transport cost; wide variety of produce available (Table 12)
Create employment	Hiring of personnel for BFT, provide support to local businesses, reduced incidence of unemployment, gambling	
Develop entrepreneurship	Expansion of production areas, development of additional products, higher selling prices for growers; source of raw material for business ventures (broom manufacturing, restaurants)	Provides support for small business ventures
Strengthen LGU-private sector partnership		BFT collects user fees for maintenance, supplies ingredients to processors

^aSource: DA-AFMIS 2013

Table 22. Impact of municipal food terminals

Objectives	Findings of Impact Assessment
Provide immediate access to markets	<i>Lako-lako</i> system eliminated, transport cost reduced, growers obtain better selling prices
Provide agri-fishery commodities and basic necessities at affordable prices	Facilitates exchange of goods between growers and traders
Create employment	
Develop entrepreneurship	
Strengthen LGU-private sector partnership	MFT collects fees from traders, stall rentals; monitors transactions, assists farmers to recover payments

Background of Flatbed Dryer Project

Technology Description

The UPLB flatbed dryer (FBD) was developed in the 1970's as an alternative to large sophisticated dryers that were intended for use at the farm level. The original FBD had a batch capacity of 2 tons (40 cavans x 50 kg/cavan); about eight hours was needed to dry rice paddy during the wet season; this was reduced to four hours during the dry season. The dryer is composed of three main components: (1) a grain bin with perforated floor, (2) a blower to move conditioned air through the floor and grain mass, and (3) a burner as heat source. Despite its effectiveness in drying grain and simplicity in design and operation, adoption rates were low among farmers and traders. Farmers still preferred to sell wet paddy directly to traders or millers at very low prices, or dry the grain themselves. For the latter option, sun-drying was still the most financially viable. For traders, the capacity of the FBD was too low considering the amount of grain that was harvested during peak harvest season.

The Maligaya FBD is a modified version of the UPLB design, featuring a 6-ton capacity. This version was developed by PHILRICE and disseminated to farmers under the Fertilizers, Irrigation, Extension, Loans, Dryers & Postharvest Facilities (FIELDS) Program of the DA during the administration of Pres. Gloria M. Arroyo. Under this program, about 1,000 units of the Maligaya version were initially distributed (Ragudo 2011). Included with the dryer was a biomass furnace and drying shed; the total budget for each recipient was around PhP700,000.

The general objective of the program was to "preserve grain quality and reduce quantitative losses through appropriate and efficient drying technologies". The specific objectives were (1) "to improve rice farmers' productivity and income through expediting access of farmers to low-cost drying technology (mechanical dryer equipped with rice hull-fed furnace)", and (2) "to reduce postharvest losses through provision and promotion of flatbed dryers".

The FIELDS Program has since been superseded by the Rice Mechanization Program of the DA under the term of Pres. Benigno Aquino Jr. The program started in 2014 and will terminate in 2016; it has two main components, namely the (1) On-Farm Mechanization Program and the (2) Postharvest Mechanization Program. Under the postharvest component, flatbed dryers will continue to be disseminated along with other drying facilities and machinery such as recirculating dryers, mobile dryers, collapsible drying cases, and multi-purpose drying pavements.

Funding Source

Through a series of Administrative Orders (with accompanying amendments, addendums) in 2006 and 2007, the DA was able to tap the Agricultural Competitive Enhancement Fund (ACEF) to finance the dissemination of FBDs. The provision of FBDs through ACEF was considered a public investment to support the rice industry. Under the postharvest component of the GMA-Rice Program, the establishment of mechanical drying facilities was given priority; it was hoped that the program would satisfy 10-20% of the total drying requirement of the Philippines.

Fund releases for the flatbed dryer program totaled PhP 1.6-B, broken down by source as follows:

- PhP 500-M from ACEF funds
- PhP 982-M from DA funds in 2008 and 2009
- PhP 75-M from NHMP funds

Implementing Agencies

PHILMECH was the main implementing agency in cooperation with NABCOR, DA Regional Field Units, PHILRICE, the National Irrigation Administration (NIA) and local government units (LGUs).

Figure 19 shows the mechanics of the FBD program. PHILMECH was the proponent and main implementer of the program in line with its mandate to develop and extend postharvest technologies to reduce losses, increase quality of food and feed products, and promote food safety. Funds were received by PHILMECH and transferred to NABCOR, DA RFUs and PHILRICE. These agencies receiving funds from PHILMECH were responsible for fund management, as well as for procurement and installation of drying facilities. Aside from acting as the conduit for project funds, PHILMECH also provided the engineering plans for establishment of drying facilities.

A counter-parting scheme was implemented between the Rice Program and the dryer recipients. The program provided the FBD (with biomass furnace), shed and moisture meter as a grant. Recipients provided the land, an additional structure for storage, and initial operating funds and labor.

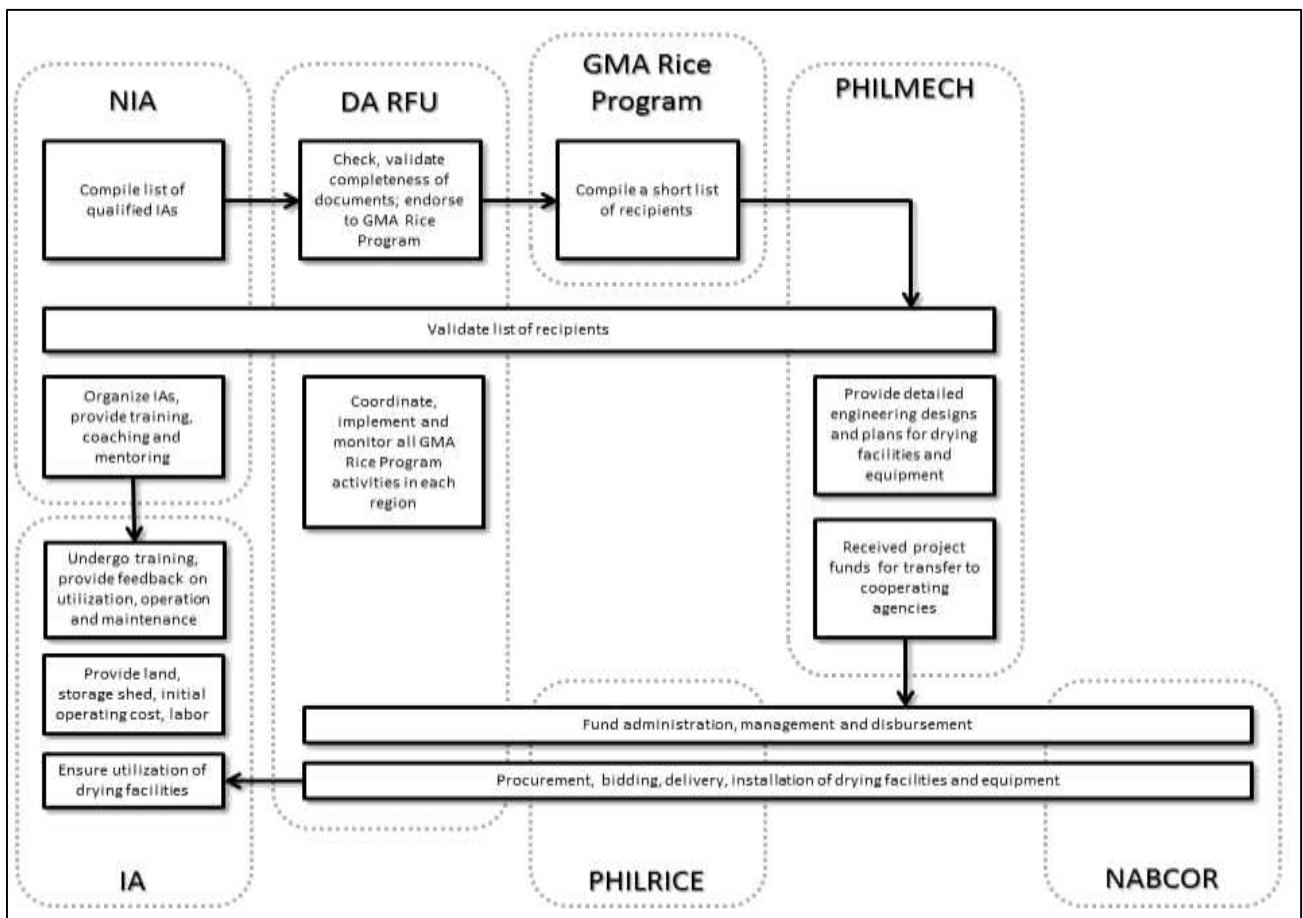


Figure 19. Mechanics of the flat bed dryer program implemented by PHILMECH as proponent of the flatbed dryer project under the FIELDS Program. Solid boxes within the dotted areas represent responsibilities of implementing agencies; common responsibilities cut across several dotted areas.

Technical Assessment

Based on interviews with operators of drying facilities with FBDs, the main technical problem appears to be corrosion of the perforated steel flooring of the grain bin. The material initially specified was prone to rusting and deteriorated after a few growing seasons. The alternative material being recommended by PHILMECH is stainless steel sheet; this material is more resistant to corrosion but is much more expensive. A low-cost alternative is the use of bamboo slats overlaid with nylon netting to prevent grain from slipping through the gaps. This has been tested by operators and has been found to be effective.

The following observations were made during field assessment of FBDs:

1. Gauges are not in working condition – the drying temperature of the FBD when in use should be in the range of 40-45°C. A stainless steel dial-type thermometer is provided for monitoring air temperature. However, during assessment activities, thermometers of some FBDs were not registering the correct temperature while drying paddy (Figure 20). Furthermore, gauges for temperature or pressure should be properly labeled to inform operators and inspectors of the parameter being measured.



Figure 20. Pressure and temperature gauges of a flatbed dryer in Alaminos, Pangasinan. Gauges should be properly labeled and replaced as soon as possible if malfunctioning. The temperature gauge at the right is showing a temperature reading of 90oC; however, drying temperature of rice paddy is supposed to be 40-45oC. Is the gauge malfunctioning or is it measuring air exhaust of the biomass furnace directly?

2. Lack of safety shields and warning signs – FBDs have rotating or oscillating components when in use. These include the belt drive for the fan, the fan blades and the feeding mechanism of the biomass furnace. To prevent accidental contact, safety shields should be retrofitted to existing dryers (Figure 21). Engineering designs should be modified to include shields if these are still lacking. Highly visible signage should also be provided as a warning to operators. Hot surfaces on the biomass furnace should also be shielded and/or labeled with warning signs to prevent injury.



Figure 21. Some flatbed dryers need retrofitting of safety shield for rotating / moving components.

Regardless of the condition of the equipment or the need for safety features, the FBDs that were visited were all in working condition. Results of the in-depth assessment showed that farmers consider dryers as essential, especially during the rainy season. This is mainly due to weather which prevents them from using sundrying.

Impact Assessment

Based on results of the survey, the presence of the FBD eliminates the risk of grain deterioration during the rainy season. Deterioration takes the form of stress cracking, mold development, grain fermentation and grain sprouting. During the dry season, however, the impact of FBDs is less pronounced since farmers prefer the less costly method of sundrying (especially if grain volume to be dried is small).

5.2. Benefits Derived from the Postharvest Facilities Projects

5.2.1. Benefits Derived from the KOICA-Rice Processing Centers

Value Loss Prevented When Farmers Sell Wet Paddy to the KOICA-RPCs

The value loss prevented when farmers sell their wet paddy to the KOICA-Rice Processing Centers was estimated using Teter's formula. The paddy sold to the RPCs would have been dried improperly if the RPC facilities were not established since farmers would have no choice but to sell to the traders/millers.

Actual paddy procurement of the KOICA-RPCs during the months of July to October was used for the value loss estimation (Table 23). July to October are the months when the wet season harvest for paddy occurs. The value loss estimation further assumes that majority of private traders and millers use sundrying to dry the paddy that they procure and that, on the average, drying is delayed for three days during these months for every batch of paddy procured. The percent moisture content used was the average of the moisture content of paddy for the indicated months of procurement. Thus, the resulting MC values were: 27.53% for RPC Pangasinan (i.e., $[28.6+27.9+26.1]/3$) and 28.21% for RPC Iloilo (i.e., $[27.7+28.7+28.22]/3$). No specific moisture content values were reported by RPC Davao, so an MC of 28% was assumed to facilitate computation.

Table 23. Paddy procured by RPCs at MC greater than 18% during the wet season

PROCUREMENT, Kg								
MONTH/YEAR	PANGASINAN	% MC	ILOILO	% MC	DAVAO	% MC	BOHOL	% MC
2013								
JUL								
AUG	12,563	28.6						
SEPT	426,826	27.9			258,363			
OCT	485,718	26.1			366,393			
2014								
JULY	62,678	>18%	no data		62,678	>18%		
AUGUST	450,991	>18%	86,846	27.70	450,991	>18%		
SEPTEMBER	616,485	>18%	280,040	28.70	616,485	>18%		
OCTOBER	no data	>18%	436,906	28.22	2,624,215	>18%		
TOTAL	2,055,261		803,792		4,379,125			
SOURCE: RPC Procurement Reports								

Table 24. Percent value of paddy procured by the RPCs with 3 days delay in drying

RPC	Tons	Days Held	% MC	% Value	Tons x Value
Pangasinan	2,055,261	3	27.53	70.50	144,886,996
Iloilo	803,792	3	28.21	69.40	55,783,104
Davao del Sur	4,379,125	3	28	69.74	305,384,449
Total	7,238,178				506,054,549

Table 24 provides a summary of the % value of the paddy bought by the RPCs assuming a 3-day delay in drying.

Using the data in this table, the economic loss that was prevented by the presence of the RPCs was estimated. The computational steps are presented as follows:

- (1) Weighted % value = $506,054,549 / 7,238,178 = 70.00\%$
- (2) Value of paddy immediately dried = $\text{PhP } 20.50/\text{Kg} \times 7,238,178 \text{ Kg} = \text{PhP } 148,382,649.00$
- (3) Actual value of paddy = $7,238,178 \times \text{PhP } 20.50 \times 70\% = \text{PhP } 103,867,854.00$
- (4) **Value loss prevented = PhP 44,514,795.00**

The value loss that was prevented by the presence of the RPCs was estimated to be PhP 44.51 million based on an actual combined procurement of 7,238,178 Kg of wet paddy. A buying price of PhP 20.50/Kg was used representing the price of the best grade paddy at 14% MC.

Quantitative Losses Prevented When Farmers Sell Wet Paddy to the KOICA-RPCs

Reduction of quantitative losses (drying)

Quantitative drying losses that were averted by using the drying facilities of the RPCs were estimated by taking 5.8% of the total RPC paddy procurement for 2013 and 2014 (Table 25). Altogether, the RPCs were able to save 3,355,325 Kg of paddy from being wasted. In terms of milled rice (using 68% milling recovery), proper drying will add 2,281,621 Kg to the supply of milled rice in the market. The value of this additional volume of rice was computed by using a selling price of PhP 38.00/Kg if sold as well-milled rice by an RPC; the total value amounted to PhP 86,701,598.00.

Table 25 .Paddy procured by RPCs wet and dry seasons in 2013 and 2014

Table . Paddy procured by RPCs wet and dry seasons, 2013, 2014					
PROCUREMENT, Kg					TOTAL
MONTH/YEAR	PANGASINAN	ILOILO	DAVAO	BOHOL	(Kg)
2013					
JAN	18,634				
FEB	103,978				
MAR	57,306				
APR	126,177				
MAY	14,293				
JUN					
JUL	26,365				
AUG	35,448				
SEPT	587,043		258,363		
OCT	640,178		1,594,213		
NOV	17,082		3,779,348		
DEC			7,455,346		
2014					
JAN		600,000	6,670,201		
FEB		400,000	2,601,756		
MAR		200,000	3,661,052		
APR		168,000	4,342,913		
MAY		168,000	4,030,995		
JUN		168,000	1,576,107		
JULY	62,678	168,000	4,083,325		
AUGUST	450,991	168,000	4,240,814		
SEPTEMBER	616,485	600,000	4,268,866		
OCTOBER		550,000	2,624,215		
NOV		168,000	870,713		
DEC		168,000	103,916		
TOTAL	2,756,656	3,190,000	51,903,780		57,850,436
Drying loss @ 5.8%	159,886	185,020	3,010,419		3,355,325
SOURCE: RPC Procurement Reports					

Reduction of quantitative losses (Milling)

The amount of milled rice that would have been lost was determined by computing for the milled rice yield obtained from the KOICA-RPC rice mills and from the traditional single-pass rice mills of most private millers. In both milling systems, a total of 57,850,436 Kg of paddy were used as the initial quantity to be processed (from Table 26). This value represents the total paddy procured by the RPCs (excluding Bohol) for 2013 (RPC Pangasinan and Davao del Sur) and 2014. Using 68% and 60% as percent milling recovery for the RPCs and the traditional milling method, respectively, a loss reduction of about 4.63 million Kilograms milled rice was estimated. Using PhP 38.00/Kg (wholesale price of Well-milled Rice of RPC-Pangasinan), the saved milled rice has an estimated value of PhP 175,865,325.00 (Table 27).

Table 26. Quantitative losses, RPC vs traditional milling facility

	KOICA-RPC	Traditional Method
	Multi-stage Mill	Single-pass Mill
Procured paddy, all RPCs (Kg)	57,850,436	57,850,436
Milling recovery (Kg)	39,338,296 (68%)*	34,710,262 (60%)*
Difference (Kg)	4,628,035	
Value (PhP 38/Kg)	175,865,325	

Market Value of Total Reduced Losses

The availability of large capacities for mechanical drying and modern milling facilities in the KOICA-RPCs reduced qualitative and quantitative postharvest losses in rice. The value attached to these reduced losses when summed up together reached an amount equivalent to PhP 307, 081, 718.00 (Table 27).

Table 27. Value of reduced losses from proper grain drying and milling

REDUCED LOSSES	VALUE (PhP)
Value loss (delay in drying)	44,514,795.00
Quantitative loss (improper drying)	86,701,598.00
Quantitative loss (milling)	175,865,325.00
Total	307,081,718.00

Farmers' Gain from Selling to the KOICA-RPCs

The Impact Assessment noted that the price paid for wet paddy by the KOICA-RPCs are, on the average higher than what private traders/millers are paying for the same product. Davao del Sur and Iloilo rice farmers benefited by PhP 0.79/Kg (Davao del Sur) to as much as PhP 1.11/Kg (Iloilo) for selling wet paddy to the rice processing centers during the wet season (Table 28). The difference between the buying prices offered by the RPCs and traders/millers for both provinces were proven to be statistically significant at $\alpha = 5\%$. Dry season prices also exhibited differences in favor of the RPCs but did not show any statistical significance. A similar observation was obtained buying prices in Pangasinan were compared. However, no statistical analysis was conducted since only a limited number of respondents who sold paddy to traders/millers were interviewed.

Table 28. Average price received by rice farmers for wet paddy sold to RPCs vs traders/millers, wet season (Aug-Oct)

Market outlet	Davao del Sur		Iloilo		Pangasinan	
	KOICA-RPC	Traders, Millers	KOICA-RPC	Traders, Millers	KOICA-RPC	Traders, Millers
Condition of paddy sold	Wet	Wet	Wet	Wet	Wet	Wet
Ave. price (PhP/Kg)						
Wet season	20.49*	19.7*	16.66*	15.55*	17.13	16.17
Dry season	21.13	20.38	17.58	16.94		

*Significantly different at $\alpha=5\%$

The farmers' gain from selling to the RPCs was estimated by determining the volume of paddy sold to the RPCs during the wet season and multiplying this by the price margin. Only transactions for the months of August, September and October were considered. These are the months that represent the peak harvest period during the wet season where commercial mills tend to significantly depress their prices. For farmers who sold their paddy to the Davao del Sur, Iloilo and Pangasinan RPCs, the total gain from a higher price difference was PhP 14,221,153.00. (Table 29)

Table 29. Farmers' gain from higher RPC buying price for wet paddy for wet season procurement

MONTH/YEAR	PROCUREMENT, Kg				TOTAL (Kg)
	PANGASINAN	ILOILO	DAVAO	BOHOL	
2013					
AUG	35,448				
SEPT	587,043		258,363		
OCT	640,178		1,594,213		
2014					
AUGUST	450,991	168,000	4,240,814		
SEPTEMBER	616,485	600,000	4,268,866		
OCTOBER		550,000	2,624,215		
TOTAL	2,330,145	1,318,000	12,728,108		16,376,252
Price Margin (PhP/Kg)	1.16	1.11	0.79		
Farmers' gain (PhP)	2,702,967.62	1,462,980.00	10,055,204.94		14,221,153

5.2.2. Cost-Benefit Analysis

The KOICA-Rice Processing Centers have been in full operation for only two years. The four existing facilities (Bohol, Davao, Iloilo, Pangasinan) have a combined project value equivalent to PhP865 million excluding the farmer organizations' counterpart worth PhP 2 million per center. Determining returns on investment for projects approaching this amount usually has to consider a useful life of more than 15 years. Thus, an *ex-post* cost-benefit analysis can only be done sometime near the end of the projects' useful life. For purposes of this study, the appropriate method of analysis is the Capital Recovery Approach. This method treats the benefits obtained from the projects as repayment to the capital investment. Benefits generated over a period of time

(e.g. 2 years) is compared to the project cost, thereby determining the proportion (in percent) of the project cost that has been recovered.

The benefits gained by the RPC project include the market value of the reduced postharvest losses for using the RPC facilities (PhP 307,081,718.00) plus the farmers’ increase in income from selling their wet paddy to the RPCs (PhP 14,221,153.00). The benefits sum up to PhP 321,302,871.00. Comparing this amount to the project cost, we have:

$$\begin{aligned} \% \text{ capital recovery} &= (321,302,871/865,000,000) \times 100 \\ &= 37.14\% \end{aligned}$$

After two years of operation, about 37.14% of the project cost (PhP 865 M) has been “recovered” using the estimated benefits as repayment.

5.2.3. *Threshers and Flatbed Dryers*

The importance of the Thresher Project under the Rice Mechanization Program can be appreciated when viewed from the situation that the farmer beneficiaries experience during the peak harvest period. This situation can be described as follows:

1. Most of the farmers’ rice crops are ready for harvesting. This means that threshers are also in high demand since threshing immediately follows harvesting.
2. Threshers are in short supply in their area and threshers from other municipalities are also occupied.
3. Farmers cannot opt not to have their paddy threshed because they cannot sell unthreshed paddy. There is **urgency** in selling the paddy because farmers need money to repay debts and to spend for household needs.

Sixteen (76%) out of the 21 farmers interviewed regarding the usefulness of the threshers emphasized that they were able to thresh their paddy “immediately” as a result of the additional unit of thresher provided by DA (Table 30). The term, “immediately”, should, however, be qualified as including a one day waiting time based on the interviews. Nevertheless, it can be assumed that the farmers experienced less waiting time to have their paddy threshed as compared to their situation before the threshers were made available to them.

Table 30. Benefits gained from the additional thresher

Table . Benefits gained from the additional thresher		
Advantages	Freq	%
Paddy could be threshed immediately	16	76
Threshing fee is additional income for the farmers' assoc.	5	24
Total	21	100

Delay in threshing has a similar effect as a delay in drying (Mendoza and Quitco, 1985). Yellow kernels increase as harvested paddy is left unthreshed for days. For instance, a one-day delay in threshing results in 11.7% yellow kernels. Since most farmers sell their harvest unmilled, (based on the key informants' report, Table 31), it is the millers who benefit from immediate threshing since the effect is only felt after the paddy is milled.

Table 31. Marketing practices of farmers after harvesting of paddy

Marketing Practice	Frequency	%
Sold as wet paddy	5	25
Sold as dry paddy	13	65
Dry then mill and sell	1	5
For home consumption	1	5
Total	20	100

Table 32. Volume of paddy threshed, 20 farmer key informants

Volume of Paddy Threshed (Kg)				
Bohol	Davao	Iloilo	Pangasinan	Total
10,000	4,400	760	4,000	19,160
20,000	4,800	4,240	4,800	33,840
3,160	4,960	600	20,000	28,720
	8,800	8,320	24,000	41,120
	10,000	960		10,960
	3,600	1,320		4,920
		3,000		3,000
		3,200		3,200
33,160	36,560	22,400	52,800	144,920

The monetary value of the grain quality deterioration that was minimized due to the DA threshers can be estimated but limited to the volume of harvest of the farmer-key informants (Table 32) We assume that all key informants experienced a one-day delay in threshing instead of a zero delay (to be conservative in our estimate). It was earlier noted that a one-day delay translates to an 11.7% yellowing of rice kernels. This is equivalent to a 6.2% decrease in the price of paddy (based on the pricing system of the National Food Authority). Assuming that the price of premium quality paddy is PhP 20.50/Kg, the 6.2% decrease in peso value is PhP 1.27/Kg. Thus, instead of PhP 20.50/Kg, the value of the paddy with 11.7% yellowing has been reduced to PhP 19.23/Kg. The harvested paddy volume of the key informants was 144,920 Kg. If these were sold to a private miller, the value loss due to a one-day delay in threshing may be derived as follows:

- 1) Value of premium quality paddy: 86,952 Kg x PhP 20.50/Kg = PhP 1.78 M
- 2) Value of paddy with 1 day delay in threshing: 86,952 Kg x PhP 19.23 = PhP1.67 M
- 3) Value loss = PhP 1.78 M - PhP 1.67 M = PhP 110,000.00

In the case of Flatbed Dryers (FBDs), the technology is most appreciated during the wet season harvest. According to the key informants, the market outlets for their paddy are private traders/millers. These farmers either have a credit-marketing linkage or a “suki” relationship with the traders/millers. Thus, they do not consider selling to the KOICA-RPC as an option. During the rainy season, traders/millers tend to attach a very low price on wet paddy. In 2014, this ranged between PhP 16.00/Kg to PhP 17.00/Kg. On the other hand, dry paddy was given an added premium of at least PhP 1.00/Kg. The FBDs became useful to farmers who were accommodated at the drying centers. Ideally, all farmers wanting to use the FBDs will be accommodated for drying at the time that they need the service. However, this was not totally possible because a unit of dryer can only service one farmer at a time. It takes around 8 hours to completely dry a batch of paddy to 14% MC. Since the dryers are operated 16 hours/day at the most, only two batches of paddy can be dried per day. According to the farmers who were interviewed, the flatbed dryers are useful only to the extent that their wet paddy can be dried immediately.

5.2.4. Benefits of Farmers/Fisherfolks in Selling to Barangay Food Terminals (BFTs) and Municipal Food Terminals (MFTS)

Savings due to less transport expenses was identified by suppliers of farm produce as a significant benefit derived from BFTs (Table 33). Instead of bringing their harvest to other market outlets that are farther from their farm (usually at the Poblacion), they now spend less in transport cost because they have an alternative market outlet within their barangay. Other respondents reported that they do not incur any transport cost at all since they can deliver their produce by walking to the BFT. Savings ranged from PhP 7.50 to PhP 275.00 depending on the type of commodity being transported (Table 34). The largest savings in transport cost was generated by selling paddy to the BFT since it is usually sold in 40-Kg sacks which require higher transport cost due to bulk and weight. However, another respondent said that he incurred additional transport cost by selling to the BFT because his paddy was being picked up previously by a rice trader at no cost.

Table 33. Perceived advantage/disadvantage of Barangay Food Terminals

Perceived advantage/disadvantage of Barangay Food Terminals	Frequency	%
1. Less transport cost	14	33.33
2. Ready market for fresh produce	11	26.19
3. Able to sell vegetables raised in our backyard; added revenue	2	4.76
4. Reduced damage to produce; less travel time	2	4.76
5. More time to do other things since no need for me to peddle my produce	3	7.14
6. Number of sellers increased; income from selling decreased	7	16.67
7. Higher buying prices compared to other market outlets	3	7.14
	42	100

Table 34. Comparison of buying prices and transport (delivery) cost between Barangay Food Terminals and other market outlets

		Bahol BFT		Davao BFT		Iloilo BFT		Pangasinan BFT	
Products		Price	Savings from	Price	Savings from	Price	Savings from	Price	Savings from
		Difference	Transp. Cost	Difference	Transp. Cost	Difference	Transp. Cost	Difference	Transp. Cost
Paddy			0.00	-5.00	25.00	3.00	0.00	1.00	-275.00
Vegetables									
1	alugbati								
2	ampaya	0.00				-2.50	4.00		
3	bagu beans								
4	batang	0.00	-35.00						
5	beans								
6	bombay	0.00							
7	cabbage								
8	chili pepper					-10.00			
9	corn			0.00	0.00				
10	cucumber	0.00	-35.00	4.50	-150.00				
11	eggplant	17.50	-35.00	-5.00	-90.00	-10.00			-110.00
12	ginger								
13	mungo								
14	mustard					-10.00			
15	okra	0.00		5.00	-80.00				-110.00
16	onion								
17	patola	0.00				-7.50	0.00		
18	Pechay								
19	sayote								
20	Squash		-30.00	-1.50	-90.00				-110.00
21	Stringbeans	-10.00		3.00	-90.00				-110.00
22	tomato					1.50	10.00		-110.00
23	upog			-6.00					
Rootcrops									
1	camote	7.50		5.00	-1.00				
2	cassava			0.50	-1.00	2.00	0.00		5.00
3	gabi		-10.00						
4	inglamas								
5	ube	-20.00							
Meat									
1	chikan	70.00		35.00	-120.00				
2	Charizo								
3	hitoche	0.00							
4	pork	30.00							
5	live pig			12.50	-200.00				
6	goat			500.00	0.00				
Seafoods									
1	bangus		0.00						
2	bulgan								
3	dalagangbukid	-20.00	0.00						
4	fish	0.00							
5	galinggong	20.00	0.00						
6	laga								
7	lapulapu								
8	liquid	0.00							
9	tamban								
10	tulingan	0.00	0.00						
No. of items where price or transp cost is higher at BFT		5	0	8	1	3		1	1
No. of items where price or transp cost is lower at BFT		3	5	4	9	4	2		6
No difference		9	5	1	2		1		

The hypothesis that suppliers would benefit from a higher buying price at the BFT was not validated by a majority of the respondents. In fact, Table 34 shows that BFT buying prices exhibited a varying behavior in relation to the buying prices of other market outlets, i.e., they were either higher, lower or the same depending on the commodity being sold and the location of the BFT. For instance, the BFT in Guindulman, Bohol bought eggplants from farmers at a price higher by PhP 17.50 compared to market outlets in Tagbilaran. The Davao BFT, on the other hand, bought eggplants at PhP 5.00/kg less than other outlets. Still in Bohol, buying price of *Dalagang Bukid* was reported to be lower by PhP 10/kg than the price in the Tagbilaran market. The farmer supplying cucumber in Davao benefited both in terms of a higher buying price (PhP 4.50/kg) and savings in transport cost by PhP 150.00 while in Bohol, the buying price for cucumber at the BFT was the same as the price at Tagbilaran.

The purpose of a “Bagsakan” Center (Municipal Food Terminal) is to provide the physical infrastructure that will serve as a ready market for agricultural producers and as a source of goods for wholesalers and “viajeros” of fruits and vegetables. Observations made by the Impact Assessment Team at the Leon, Iloilo MFT validated that this objective is being met. In Leon, baskets of chilli pepper, tomatoes, mangoes and watermelon were brought to the facility by farmers. Wholesalers from as far as Antique, Capiz go there to purchase the goods that they will sell in their respective wet markets. The process of buying and selling and the accompanying documentation is systematic resulting in smooth transactions. Similarly, the MFT at Bansalan, Davao del Sur provides the facility for a convenient transaction among farmers and buyers. However, business is only carried during Wednesdays and Sundays.

5.2.5. *Employment Generation*

The employment generated by the Postharvest Facilities projects is an added benefit that can be attributed to the implementation of the projects. From the four KOICA-RPCs, 28 technical monthly-salaried positions and several daily-paid personnel were hired (Table 35). The Pangasinan-RPC estimated that around PhP 120,000 to PhP 150,000 is the monthly expenditure for salaries and wages depending on the month of operation. Peak harvest months require more laborers and, if necessary, longer hours of work that must be compensated. The amount of salaries and wages being spent by the other RPCs would be similar.

Table 35 RPC employees and respective compensation

	Pangasinan	Davao	Iloilo	Bohol	
Number of management staff	6	6	6	7	
Employees	Plant manager Admin officer/bookkeeper Plant engineer Warehouseman QA/Cashier Procurement and marketing Officer	Plant Manager Plant Engineer Bookkeeper Marketing Officer Procurement Officer/Field Classifier Cashier	1 manager 1 Cashier 1 Bookkeeper 1 Plant Engineer 1 Warehouseman 1 QA Officer 2 Dryer//Milling Operator 3 Security Guards (c/o DA) 5 Job Order/ On Call	General manager Plant Manager Plant Engineer Cashier Bookkeeper Warehouseman Procurement Marketing Officer Maintenance Driver Laborer	PhP 15,000 PhP 19,500 PhP 16,900 PhP 14,300 PhP 14,300 PhP 14,300 PhP 10,000 300/day 250/day 200/day
Salary range for management team	PhP120-150,000 a month on salaries and wages	PhP-12,000-20,000	PhP 24,000-31,000	PhP 10,000-19,500	

Obtained from data provided by the RPC's

At least two persons are necessary to operate the flatbed dryers: the flatbed operator and assistant who helps in the loading and unloading of the paddy into and out of the dryer bin. They are paid PhP 800-1000 for every load in the flatbed dryer. Similarly, two laborers operate the rice threshers. Payment for their services is based on the number of sacks of paddy threshed.

In the case of the Barangay Food Terminals, monthly paid storekeepers were hired at the barangay facilities but at varying salary rates (Table 36). Salaries ranged from PhP 600/month to PhP 3,000/month. Some BFTs hire the services of a Bookkeeper.

Table 36. Number BFT of employees and their compensation

	PANGASINAN		DAVAO		ILOILO	BOHOL	
	BFT MONA	BFT KINUSKUSAN	BFT KIBA-O	BFT MALAWANIT	BFT JOLASON	BFT RIZAL	BFT LIBAONG
NUMBER OF EMPLOYEES	1 STOREKEEPER	1 STOREKEEPER	2 STOREKEEPERS	1 STOREKEEPER 1 BOOKKEEPER (ON CALL)	1 STOREKEEPER	1 STOREKEEPER 1 BOOKKEEPER	1 STOREKEEPER
SALARY	PHP 2000-3000/MONTH	PHP 4167/MONTH	5000 A MONTH ON MANAGEMENT COST	1050/MONTH		VARIES DEPENDING ON INCOME OF BFT STOREKEEPER PHP 1857/MONTH PHP 750/MONTH BOOKKEEPER	600/MONTH

Municipal Food Terminals also hire a manager to oversee the business transactions in these facilities (Table 37). The salaries of the managers are obtained from the budget of the Local Government Unit where the MFT is located. Daily-wage labors (*kargador*) are also employed to unload agricultural products coming in, as well as to load products for buyers/"*viajeros*".

Table 37. Number of MFT employees and their compensation

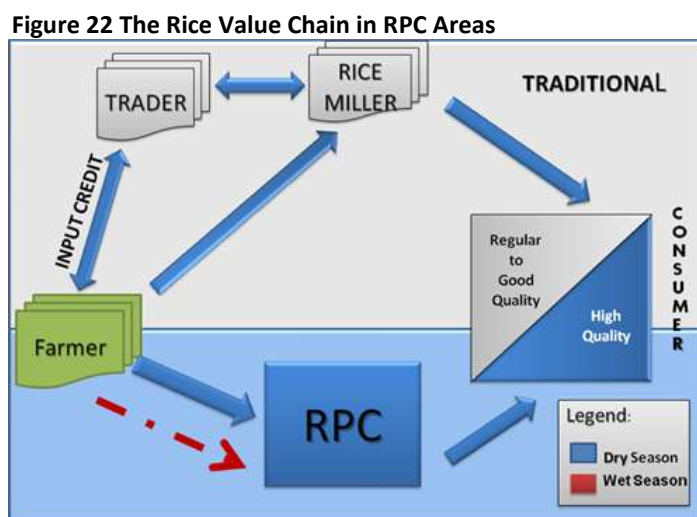
	ILOILO		BOHOL
	MFT Leon	MFT Tubungan	MFT Guindulman
NUMBER OF EMPLOYEES	Depending on the availability of the employees of the LGU	Depending on the availability of the employees of the Municipal Economic Enterprise	4
SALARY	Included in the monthly salary of the LGU employee	Included in the monthly salary of the LGU employee	170/day/per person

5.3. Rice Value Chain Upgrading associated with PHF

Value chain (VC) analysis approach generally looks at the elements of the food chain comprised of the stakeholders and their roles, the changes in the physical form, packaging and location/availability of the product, as well as the coordination and the relationships or interface within the chain. These elements characterize the chain and reflect the quality of its operation. Doing one's role right and or adding value are strategies for chain stakeholders to contribute and be considered an important part of the chain worthy of partaking whatever gains are achieved through enhancements of the VC.

Rice Processing Centers

The traditional rice VC in the study areas is generally comprised of at least 4 major stakeholders, namely: rice farmers, traders, millers and consumers (Figure 22) There could be cases that traders and millers use agents as "feelers" who assess paddy volume expected out of a particular area even before harvest and when to expect harvest. They may likewise double up as village assemblers, once their trader/miller bosses decide what volume to buy and at what price.



The usual "arm's length" or "*abutan*" buy and sell relationship gets complicated when traders/millers provide credit in terms of cash or production input that binds farmers to sell their produce to the credit providers. The purchase price per kilogram paid to the farmers is usually one peso less than the prevailing market price.

Picked up or delivered is the usual mode of transporting produce from the farm to the buyers. In the case of the latter, the farmers incur additional cost of about PhP 0.25 per 40 Kg sack of paddy depending upon distance between the farm and the mill/trader's facility.

This VC set up is true only for the dry season, because when the wet season comes, paddy prices paid by the traders and millers dip significantly (e.g., from PhP 20.00/Kg to PhP 12.00/Kg). If farmers are not willing to sell at this price, they are left to find other traders/millers who are willing to buy their paddy at a better price or totally lose their harvest to spoilage.

With the establishment of the RPCs, farmers are afforded the option to sell direct to RPCs and in the process cut short the VC, eliminating the traders and millers. This is the first point of VC upgrading associated with RPCs (Table 38). Related to this first point is the elimination of transport (delivery) cost incurred by farmers since RPCs usually pick up produce at farms or otherwise refund the farmers the cost of delivery equivalent to the amount of PhP 0.23/Kg.

Transparency in the procurement process is the second VC upgrading point attributable to the RPCs. Traditionally, traders/millers determine paddy price using “sensory grading” which is considered by farmers as highly subjective. Samples from bags of threshed paddy are visually inspected for moisture content, discoloration of the unhusked kernels (presence of molds), grain temperature and foreign matter (stones, rice straw) that are mixed with the paddy. In contrast, RPCs determine paddy price by digitally measuring moisture content and assessing milling quality. Moisture content and weight is determined when paddy is poured out of the sack containers into the receiving hopper. From the hopper, paddy passes through moisture sensors while in transit to the weighing scale. Milling quality, on the other hand, is assessed by laboratory milling using a mini rice mill, a test not used by traders and millers. A sample of the paddy is dried, milled using the mini rice mill and then the output is assessed for milling and head rice recovery, yellowed and chalky kernels, percent broken grains and foreign matter content. Appropriate price for the paddy is immediately determined after the assessment process is completed. This built-in transparency feature of the RPC operation serves as an example of good business conduct and ethics in the rice industry which is laden with opportunities for shortchanging the farmers. Setting an example for good business conduct (later on emulated by some traders and millers for fear of being left out of the industry band wagon) is the third VC upgrading point.

The next RPCs upgrading VC point is its role in stabilizing rice prices. The RPCs’ purchase price of paddy is at least a peso above the PhP 17/kg buying price of the government’s National Food Authority (NFA). This is to account for the premium quality of RPCs’ milled rice (which is the fifth VC upgrading point) thus pegging purchase price at PhP 18/kg. A price that traders or millers have to approximate, as against their usual price offering of PhP 12/kg to PhP 14/kg. Producing premium milled rice (achieved through combined strategies of selectivity in varieties purchased, MC control and proper milling process) is the sixth VC upgrading point of RPCs.

Having a choice and information out of transparent market conduct afforded farmers informed decisions, the 7th VC upgrading point, and greater chances of being better off in the process through better returns (least selling cost, better purchase price options). The 8th of the VC upgrading of RPCs is affording the farmers a market for their wet season produce as depicted in red arrows in Figure 22.

Other opportunities for upgrading are on the works, such as (a) credit tie ups though not by RPC but rather thru RPCs with the Land Bank of the Philippines (LBP)’ SikatSakaProgram and (b) coordinated planting schedule In the LBP’s SikatSaka program, the loan beneficiaries are required to pay their loans through RPCs by selling at least 70 percent of their harvest to RPC, this afford the loan beneficiaries ready market at better prices for their produce, while ensuring RPCs have sure paddy supplies. This is a very crucial window for VC upgrading as non RPC paddy suppliers inability to sell their paddy to RPC (in addition to smallness of volume of produce) is their credit/input dependency on traders/millers. However, this will not result in a true upgrading unless harvest scheduling is undertaken as the loan beneficiaries bring not only 70% but all of their produce is putting pressure on RPCs’ operation.

This leads us to the next VC upgrading opportunity which is enhanced coordination, the key in any value chain operation. RPCs (the Bohol RPC in particular) is looking at the possibility of scheduled planting to ensure paddy supply at any given time for RPC, at the same time addressing possibility of low price (over supply) and sure market for their produce in the case of the farmer suppliers.

Table 38. Comparative assessment of value chains key elements with or without RPCs

Value-Chain-Key-Elements	Prior-to-RPC	With-RPC
Stakeholder (Product-and-value-added)	Farmer-Trader- Rice-Miller- Consumers	Farmer-RPC Shortened-the-rice-value-chain
Coordination ••With-the-most-information/knowledge-of-the-industry-(Supply-and-Resources) ••Has-the-ability-to-influence-prices	Rice-millers	Rice-miller-and-RPC ••Possibility-for-coordinated-planting/-harvesting-schedule-to-maximize-plant-capacity-both-scheduling/timing
Interface Relationships-developed	Farmer-Trader/Miller Credit-relationship (still-predominant)	••Farmer-truckers(delivery-to-the-RPC) ••Socialized-disposal/-rice-by-products-bran/hulls(free-reduced-cost-to-farmer-suppliers) ••Afforded-transparency-in-the-relationship(-MC,-weight,-prices) ••Sikat-Saka-lending-facility-of-Land-bank-beneficiaries-and-RPC

5.3.1. MFTs and BFTs

The VC upgrading attributable to the MFTs and BFTs are providing market options to the suppliers at lesser cost (nearer to source, less transport) being within a particular town/barangay and with regularity. The latter is afforded by MFTs/BFTs owing to its regular market days, usually twice a week, in some cases, even daily market operations. Household processing of produce otherwise marketed fresh are encouraged given a regular venue to sell goods otherwise peddled or “lako” in the local dialect.

On the part of the consumers, making products more accessible at affordable prices and with variety of choices are resultant VC upgrading as well. Convenience with goods almost at one’s doorstep is a value added offering of BFTs that leads to better customers’ satisfaction.

Enhanced economic activity within the community with residents of other municipalities/barangays supplying as well as buying from MFTs/BFTs are VC upgrading as well with the expanded number and types of chain participants.

5.3.2. Flatbed dryers and threshers

Better quality arising from uniformity of heating in the case of FBDs and timing of threshing right after harvest (quicker return on investment, in time for periods of better prices) are VC upgradings afforded by FBDs and threshers. This is true not only for produce intended for the table but for seeds as well as appropriate threshing and milling lead to higher germination rate of paddy for seed purposes.

6. PROJECT MANAGEMENT

The technical assessment part of the report already tackled the process of PHF facility selection, their respective capacities as well as how sites and beneficiaries were selected. This part will, on the other hand, look at the PHF projects from the perspective of the users and nonusers as well as local implementers.

6.1. Project Cycle: Process and Issues

The middle column of Table 41 provides the ideal steps in project development from initiating process to preparation, approval, implementation to completion and phasing out stages. This provides a reference point on how well PHFs Projects under study fared in terms of the process of project development undertaken. In general, all PHF projects pass through the major stages, with KOICA RPCs having the most detailed process from preparation to operation phase (complete with operations manual), while flatbed dryer and thresher projects having the simplest process while MFTs and BFTs in between in terms of complexity of process. This is but expected given the variation in terms of unit cost of facilities to put up.

Despite having passed through the said processes, there are field generated evidences that point to the fact that some process components are wanting as far as ensuring smooth project implementation is concerned. A most glaring issue is the undisclosed project cost breakdown in the case of RPCs. While it is understood that it is a grant, it is still a natural expectation for the receiving institution to be curious about the composition of the grant, more so when it has an equipment component which will need parts replacement, sooner or later.

The project stage with the most number of cited issues are the preparatory activities prior to or during the early stages of project implementation. This is Some beneficiaries are unaware of the extent of required contribution or counterparts as in the case of MFTs (power requirement, lack of product volume resulting to low utilization capacities) while some have unclear notions of their roles and responsibilities as far as PHF project implementation are concerned.

Problems at procurement level of equipment previously done by lot during the NABCOR days and later on by regions/province through bidding process proved problematic. There are equipment-design related concerns affecting performance efficiency given different equipment suppliers,

While criteria were applied in location selection, there are nontransparent or hidden clauses that renders area choices prone to political “muscling-in” or interference. These lead to project implementation delays and power play with the farmers the one at the losing end. Problem on selection extends further to beneficiary selection both for RPCs and FBD. The operation of more than one RPC suffered due to selection of FOs still lacking in capacities to manage the RPCs. In the same manner that DA RFUs have to recall awarded FBDs due to the FOs inability to make them operational within an ideal period of time

It was the study team’s observation that performances of any PHF facilities are enhanced by the presence of an individual who champions the cause of the PHF project.

Table 39 Project Development Process Evaluation

KOICA RPC	FBD/T	MFT/BFT	Ideal Project Devt Stages	KOICA RPC	FBD/T	MFT/BFT
Evidences From the Field (issues/proofs that the project steps worked, didn't worked, found wanting)				Actual Project Development Process (activities undertaken under each project cycle level, complete with date if possible)		
			1. Initiating process (proj concept, funding request, etc)	Pre Project Phase 1.RPC project proposal preparation/submission 2. Project Planning 3. Site Selection 4.Coordination w LGU 5. Approval of Philippine government and Korea.	Letter of intent of the FO , addressed to DA	<ul style="list-style-type: none"> Submission of Letter of intent First Tranche(50% of project cost)¹ <ol style="list-style-type: none"> SB Resolution and MOA Approved PP Work &Financial Plan Audited liquidation report Release request 1st tranche
	Alternative drying method during the wet season (FBD)	Ready market	Project Concept	<ul style="list-style-type: none"> August 13, 2008- BPRE submission of proposal to DA August 28,2008 DA project endorsement to KOICA 	Implemented by PHiMech, NABCOR, DA-RFUs NIA, Phil Rice& LGU's	Implemented by DA-AMAS
			Funding Request		Budget Proposal	Financial Plan
	While consultation is done down to the local unit level, once consolidated at the regional/ national, level, the submitted plans have been changed. Realignment is the last resort to bring it back to original request		2. Preparation		<ul style="list-style-type: none"> Board Resolution of the FO FO Registration LGU Endorsement 	<ul style="list-style-type: none"> Second Tranche(40% project cost)¹ <ol style="list-style-type: none"> Inspection & second release requests Inspection/Accomplishment report of LGU Certificate of acceptance of inspection Report DA-RFU Project Pictures signed by MAO or municipal engr First tranche (100%) liquidation report Project documents authenticated copies
			Thematic/ sector Analysis	Dec 2-11, 2008 KOICA Evaluation Team Assessment in the Philippines		
			Assessment Studies	March 2009 Dispatch of KOICA Project Team Implementation &Survey Mission		
		Reefer Van returned- high power required	Consultation			
<ul style="list-style-type: none"> Undisclosed project cost breakdown 			3. Approval	Construction Phase – (RPC Physical Establishment) 1.Site development -LGU's		

				<ul style="list-style-type: none"> 2. Building construction machinery installation by KOICA 3. Testing/commissioning 4. Turn over to Philippine govt ● Dec 2008- KOICA Approval of Proj ● April 2009-NEDA & ICC Tech Board approval ● May 2009 Approval- Cabinet Cluster 		
Unwritten requirements for site selection such as visibility	<ul style="list-style-type: none"> ● Equipment designs problems due to different manufacturers, choice based on bidding ● Political influences in distribution of threshers 		Requirements Met	<ul style="list-style-type: none"> ● 1000 ha service area ● Eagerness of the LGU to support the developments of the project 	<ul style="list-style-type: none"> ● Provision- of counterpart (T) ● Land agreement (FBD) ● SEC certification ● IA;s request for equipment ● NIA/MAO Certificate of Good standing ● Feasibility Study 	Provision of 15% counterpart of recipient
<ul style="list-style-type: none"> ● Encourage production of good quality grains ● Unclear roles & responsibilities of institutions involved ● Insufficient funds for - paddy purchase ● RPC operation legality 	<ul style="list-style-type: none"> *Higher cost for flatbed drying vs solar drying *FBD design related high repair/ maintenance cost *Short useful life *Scheduling of the use of the FBD/threshers *FBD Low supply; while oversupply of threshers in some areas 	<ul style="list-style-type: none"> ● Reefer Van returned due to high installation cost power requirement ● Inadequate volume of products to fill the equipment ● Seasonal demand ● Employment generation ● Income generation 	4. Implementation	<ul style="list-style-type: none"> ● Pre-operation Phase (Transition to RPC Enterprise) <ol style="list-style-type: none"> 1. Consultation meetings 2. Recruitment 3. Hiring and training of management team 4. Business Planning 5. Business trial operation ● October 2009 Pangasinan RPC groundbreaking 		
<ul style="list-style-type: none"> ● FOs Inability to manage the RPC ● Unaccounted depreciation cost 	Threshers not a priority for farmers already familiar	Insufficient FT mgt capability of coop/FO	Recipient Orientation	<ul style="list-style-type: none"> ● Sept 30 2012 ● Selection and training of FO 	<ul style="list-style-type: none"> ● Operation and maintenance training 	Operator's Training
<ul style="list-style-type: none"> ● Delay in repair and maintenance due to absence of locally available parts ● Inadequate supply of paddy 	<ul style="list-style-type: none"> ● Drying option during the wet season. ● Uniform drying for seeds ● Overutilization during the wet season , underutilization during the dry season 	<ul style="list-style-type: none"> ● Nearby and ready market 	5. Completion	<ul style="list-style-type: none"> ● Operation Phase (Full business operation of the RPC Enterprise by FO) ● Sept 2011 	<ul style="list-style-type: none"> ● Awarding of facilities and equipment 	Third tranche (10%)¹ 1. Final inspection and last tranche request

<ul style="list-style-type: none"> • Safe and clean operation • Negative income • Farmers not selling to RPC ,have loans from traders • Fluctuating supply of paddy 	<ul style="list-style-type: none"> • Income generation for the FO • Employment generation 	<ul style="list-style-type: none"> • Repair and maintenance of chillers and freezers • Underutilization of some FT attributed to location 		<p>Turn Over to the Philippines (Pangasinan RPC)</p>		<ol style="list-style-type: none"> 2. Inspection/Accomplishment report of LGU 3. Acceptance of inspection report of DA RFU 4. Project Pictures signed by MAO or ME 5. Certificate of completion 6. Certificate of acceptance of recipient 7. Second tranche (80%) liquidation report
<ul style="list-style-type: none"> • December 2014 Security of tenure of MGT team • Reduction of losses • Reduction in transport cost & Production of well milled rice • Competes in the market in terms of quality milled rice 	<ul style="list-style-type: none"> • Institutional Development of the Coop • Oversupply of thresher in some areas • Short useful life • Low utilization • Shorter delay in threshing • Smaller thresher for easier transportation • Conflicts due to the scheduling of the FBD 	<ul style="list-style-type: none"> • FT success largely depends on LGU/ FO mgt capability • Cut off of funds • No. of sellers increased; selling income decreased • Higher buying price vs other markets 	<p>Transition/ Phasing out phase</p>	<p>September 29, 2014 Turn over of the Pangasinan RPC to FO beneficiaries</p>	<p>Ensures maximum utilization otherwise the unit will be pulled</p>	<p>Monthly monitoring and evaluation</p>

6.2. Project Monitoring and Evaluation

The presence of monitoring and evaluation (M&E) systems are observed in most PHFs reviewed.

The KOICA RPCs have the most active M&E system and similar venues in place given a project coordinating team coming from PHILMECH, who are well abreast of project activities and performance as well as membership in coordinating boards at all levels (national, provincial, RPC). The joint annual meeting of all RPCs provides venue for performance evaluation and cross learning,

MFTs and BFTs visited, on the other hand, are well monitored by respective provincial/municipal agricultures officers (PAOs/MAOs) with regular performance reporting system in place (monthly sales and commodities traded) in the same manners that the FOs managing them have their own records and reporting systems to keep track of operation

FBDs and threshers are likewise monitored by DA RFUs.

7. SUMMARY OF FINDINGS

7.1. Relevance of PHF

The overall impact of the RPC project has been positive. With state of the art equipment and well-trained personnel, RPCs are generally able to produce properly dried paddy and consequently good-quality milled rice. The presence of RPCs also provides a safety net for farmers during periods of oversupply, when drying facilities are over utilized and private traders are not willing to accept wet paddy and/or offer very low buying prices.

MFTs and BFTs impacts are observable through the enhanced economic activities continually observe in areas where they were established, including expanded trade which afford suppliers and consumers alike greater product choices at lesser transaction costs.

Flatbed dryers, on one hand, are crucial and essential, especially during the rainy season. This is mainly due to weather which prevents them from using sun drying. This is particularly so for farmers who are unable to avail of RPCs services due to the smallness in volume of their harvested paddy. Threshers, on the other hand are reported to be critical in meeting farmers urgent need to immediately turn harvest into cash for household and loan repayment needs. The DA provided additional unit of threshers enable them to thresh their paddy immediately. However, the Rice Mechanization Program is currently disseminating combine harvesters that harvest and thresh the grain at the same time. Farmers have been receptive to the technology and some areas have adopted the machine. PHILMECH should identify the areas where threshers may still be used (e.g. upland farms) to maximize utilization.

7.2. Strengths and Weaknesses of PHF

7.2.1. Project Management

The strengths of the government's postharvest development program, in general, lies on its strategic direction and component mix. The PHF identified and provided are those truly responsive to the needs of the marginalized farmers such as RPC, food terminals and FBD and threshers. This project mix covered key areas of agricultural development, namely: production, processing and marketing. Having involved champions committed to the cause of PHF facilities is a potent force in successful project implementations.

Weaknesses, however, are the absence of proper planning as early as the preparatory stages that opens up the project to implementation flaws. These includes inappropriate area and beneficiary selection, faulty PHF design, nonsocialization of project details, noninclusion of performance indicators at the onset and ineffective consultation process (if ever done at all), among others. Process of equipment procurement is an issue from supplier selection to quality of equipment delivered.

7.2.2. Operational Level

KOICA-Rice Processing Centers:

The RPCs proved to be highly effective in the government's vision of reducing postharvest losses in rice. The complexes are equipped with modern drying and milling facilities with capacities large enough to accommodate large quantities of procurement. Their weaknesses at the moment are limited working capital and sources of paddy to be processed. PhP 20M worth of working capital is considered small in relation to the operating capacities of the RPCs and the volume of harvest from a targeted rice production area of 1,000 has. It was estimated that around PhP 80 M is needed as capital for this size of land area. Also, the RPCs are still weak in marketing and promotion. Many farmers have unclear or incorrect perceptions regarding the RPCs. As a result, they hesitate to sell their produce to the facilities.

Municipal and Barangay Food Terminals,

In general, these projects have uplifted several communities by providing employment, better food choices, and reducing transaction costs. It is worth noting that the Leon, Iloilo MFT operates a hot water tank to control postharvest disease of 'Carabao' mango. A fruit processor in San Ildefonso, Iloilo has been a client for several years; treated fruit are ripened, scooped out and frozen; the final product is exported to Japan. In addition, three shipments of fresh fruit in 2014 have been treated at the facility and successfully exported to Qatar. In comparison, there are no technologies being adopted to preserve the quality of other perishable high value products.

Flatbed Dryers and Threshers

These postharvest machineries eliminate the risk of grain deterioration during the rainy season. Deterioration takes the form of stress cracking, mold development, grain fermentation and grain sprouting. During the dry season, however, the impact of FBDs is less pronounced since farmers prefer the less costly method of sundrying (especially if grain volume to be dried is small). However, the usefulness of FBDs are delimited by the main technical problem of corrosion of the perforated steel flooring of the grain bin. The material used is prone to rusting and deteriorates easily after a few growing seasons. Innovativeness of several users surfaced by using bamboos as alternative flooring.

8. RECOMMENDATIONS

8.1. Project Planning and Implementation

1. Preparatory activities should be given equal if not greater attention (than project implementation) as effects of flaws at the early projects stages (project concept, design and plans) cannot be compensated even by good implementation strategy.

2. Beneficiaries and project stakeholders need be involved as early as possible for greater understanding, appreciation and consequent “buy in” and even project ownership in the process. Identify potential individuals who will champion the cause of the project to enhance rate of project success.

3. Strict adherence to project guidelines (MOA, TOR, etc.) and processes are ways by which organizational and implementation processes may be improved. The same way that political interference and power play may be initially addressed. Possible a “project incubation clause” could be added at least for a year that delimits interference of political figures to enable the projects to develop and progress as intended.

8.2. Enhanced Facility Utilization

8.2.1. KOICA RPCs:

Capacity utilization and effect on reduction of postharvest losses are major issues in the KOICA-RPCs operation. Plant operations and management are equally pressing concerns as both sets affect the viability and sustainability of RPCs.

1. Increase operating capital to allow RPCs to scale up procurement. Based on interviews with RPC managers, the ideal amount of operating capital should be in the range of PhP 40M
2. Provide additional cargo trucks for timely pickup of harvested paddy and delivery of milled rice; vehicles should be of mixed capacities to allow access via field roads;
3. Scheduled planting and harvesting in identified areas to rationalize deliveries of paddy to RPCs; one issue that needs to be considered is the tendency of animal and insect pests to gravitate towards areas that are ready for harvesting.
4. Provide financing and crop insurance for farmers to reduce their dependence on private traders who charge high interest rates for loans while procuring paddy at very low prices.
5. Identify and/or train a reputable and capable Philippine distributor of Korean spare parts and equipment for RPC facilities and equipment.
6. Provide specific guidelines as to:
 - a. The limit of management’s prerogative. sustain plant operation at whatever cost (buy beyond 1,000 ha service area)
 - b. cost/revenue treatment
 - c. Sustainability measures (clear as early as planning stages)
7. Enhancing role of RPCs as rice value chain coordinator through
 - a. Providing Information to enable farmers to make informed decisions
 - b. Planting and harvesting programs develop in consultation with farmer suppliers.

8.2.2. MFTs/BFTs

Given initial gains of MFT and BFT projects, it will help a lot to push these forward if success stories are documented, analyzed and best practices disseminated. Issues like “What has worked for these food terminals and their communities?”, “Are new business models

developed?” and if so, “What will it take to outscale or upscale them?” are questions when answered will provide a lot knowledge to others.

For technical improvement of food terminals, the following recommendations can be considered:

1. Improvement of lighting systems for better working conditions. This will reduce worker strain, errors in sorting and grading of produce, and accidents.
2. Institute unitized handling – provision of plastic crates and manual forklifts will greatly reduce worker injuries, mechanical damage to produce, and time and labor needed for loading and unloading of cargo vehicles. However, this will require additional investment and a scheme for returning plastic crates will be needed.
3. Hygienic handling – a program for worker and workplace hygiene should be put in place to keep products safe. Some training will be needed on the basics of Good Manufacturing Practices which can be provided by several government agencies or the academe.

8.2.3. Flat Bed Dryers

With the implementation of the DA Rice Mechanization Program until 2016, there should be a concerted effort to further improve the design, fabrication, and utilization of flatbed dryers nationwide. The program is currently targeting a level of intervention of 6%; i.e. only 359 FBDs will be disseminated out of a total national requirement of 5,670 units. However, the total cost of these dryers will reach more than PhP251-M (at PhP700,000 per unit). To ensure the maximum recovery of this investment in the form of reduced losses and improved product quality, the following recommendations could be considered by DA:

1. Close monitoring of accredited fabricators to ensure quality of disseminated units, compliance with specifications, and proper and timely servicing if defects are present.
2. Thorough evaluation of recipients and proper site selection to maximize the utilization of dryers. Farmer organizations and/or irrigators’ associations with a proven track record should be the preferred beneficiary of FBDs. Sites for facilities should be strategic with respect to production areas, water and power sources, supply of biomass waste as furnace fuel, and access to road networks.
3. Incorporate design improvements to improve safety and durability.
4. Continuous monitoring and testing by the government agencies concerned to ensure proper operation of the dryers.

8.3. Areas For Further Study

A number of study themes surface during the course of study and were found to be worth pursuing. They are as follows:

1. Local development and production of RPC equipments, parts and tools. For example, PHILMECH has already developed image analysis techniques for evaluating rice and corn grains on a laboratory basis. This can serve as the starting point for development of a color sorter to reduce dependence on imported technology.

2. Looking into other PHF programs such as the Agricultural Tramline and Cold Chain Programs.
3. Documentation of PHF best practices business models for possible outscaling and upscaling.

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10. APPENDIX

Appendix 1 Key Informants

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BOHOL						
85	Acero, Jose Paolo	PhilMech Coordinator for Bohol	DA-PhilMech		9291127843	paoloacero@yahoo.com
86	Algerica Pilvera	NIA Staff	NIA-Malina	(038) 510 8465	9199999522	alhipil@yahoo.com
87	Alvin Mante	General Manager	Bohol RPC		9995812023	
88	Artemio B. Cubu	Flatbed Dryer Recipient	Caluasan, Dagohoy		9203687761	
89	Avelino Baliong	Flatbed Dryer Recipient	Cambailan, Catigbian Bohol			
90	Balajadia, Cesar	PhilMech Coordinator for the Region	DA-PhilMech		9328623678	balajadiacesar@yahoo.com
91	Cahiles, Eugene	Chairman of the RPC board	DA-Bohol APC	(038) 411 2436	9189087027	apceugs@yahoo.com
92	Carmen Cubrado	Municipal Agriculturist	LGU-Pilar		9053347148	
93	Cecilio S. Bauy	Flatbed Dryer Recipient	Flatbed Dryer Recipient			
94	Celestino Jamil	Former Brgy Captain	Rizal, Pilar		9084990405	
95	Erlinda T. Vargas	BFT Chair and Brgy. Captain	LGU-Pilar		9295571176	
96	Fabian Aranaso	BFT Chair and Brgy. Captain	LGU-Libaong		9159759563	
97	Geoffrey Gulay	Municipal Agriculturist	LGU-Guindulman		9215152390	
98	Jimmy C. Baldero	Plant Manager	Bohol RPC		9127347567	baldero.jimmy@yahoo.com
99	Joel A. Rasonable	Flatbed Dryer Recipient	San Miguel, Dagohoy		9129474124	
100	Larry M. Pamugas	Provincial Agriculturist	PLGU Bohol	(038) 411 5892		
101	Maria Wencisa B. Egama	Chief- Socio Economic Section	DA-Bohol APC	(038) 411 2436/ (038) 501 7538	9176311655	mwbegama@yahoo.com
102	Peter Caramba	Flatbed Dryer Recipient	Dagohoy		9066216368	
103	Primitivo Sarigumba	Flatbed Dryer Recipient	Similian IA		9128978387	
104	Rodrigo Pechon	Agriculturist	DA-Bohol APC	(038) 411 2436	9214445848	rickypechon@yahoo.com
105	Rogelio O. Paderanga	Flatbed Dryer Recipient	San Isidro, Pilar		9208026976	
106	Tereso C. Cruda	Flatbed Dryer Recipient	San Miguel, Dagohoy		9079812709	

Appendix 2. Sample survey instruments used in the in depth field assessments

Questionnaire # _____ Interviewer _____ Reviewer _____ Date _____

Survey Form for Farmers

Province: Pangasinan Davao del Sur Iloilo Bohol

Barangay:.....

Municipality/City:.....

Section 1

PERSONAL INFORMATION OF RESPONDENT

- Respondent name : _____
1. Gender ; Male Female
2. Birth date / Age : _____
3. Contact Info/Phone number : _____
4. Main occupation : Farming Others (specify) _____.
5. Income from rice farming :PhP _____ [] per cropping [] per year
6. Years in rice farming : _____
7. Member of farm-related organization : Yes No
8. Name of organization : _____
9. Position in organization : _____
10. Years in organization : _____
11. Location of farm : _____
12. Land tenure: Owned ___% Tenant___% Lease ___% Others:___%
13. Do you plant other crops for commercial purposes? Yes No
(If Yes, answer #14)

14. Other commercial crops planted:

Crop	Area Planted (ha)	No. Of cropping per year	Harvest per cropping		Net Income
			Volume	Value	

15. Do you avail of the services of the RPC? : Yes No
- If YES; do you**
- Avail of custom drying from RPC (answer Section 2-A)
- Sell wet paddy to RPC (answer Section 2-B)
- Sell dry paddy to RPC (answer Section 2-C)
16. Before the establishment of the RPC, were you already a rice farmer? Yes No
- If YES, then; do you**
- Sell wet paddy to traders/millers
- Sell dry paddy to traders/millers
- Conduct sun drying
- Use a flatbed dryer

17. Were you previously a user of RPC services?

No

Yes (If yes, why, did you stop using the RPC?)

Too far, transport cost too high: PhP _____/kg

Service fee too expensive

No truck for hauling

Buying price too low: PhP _____/kg

Others, (Pls. Specify: _____)

Section 2-A

FARMER USING CUSTOM DRYING SERVICE OF RICE PROCESSING

COMPLEX

1. What is your production volume (in cavans of wet paddy)? _____
2. Area harvested (hectares) _____
3. What portion of total production volume is:
 - a. Dried by RPC: _____
 - b. Dried by other means _____ (specify)
 - c. Sold as wet paddy to RPC: _____
 - d. Sold as wet paddy to other buyers: _____
4. Do you buy paddy from other farmers? Yes No
 If YES:
 from farmers of the same area; _____ cav (wet); _____ cav (dry)
 from farmers of other areas _____ cav (wet); _____ cav (dry)
 Transport cost (Php per _____) _____ from same area _____ from other areas
5. Why do you choose to avail of the custom drying service offered by the RPC?

6. How much is the custom drying fee of RPC:
 wet season (Php/kg) _____ dry season (Php/kg) _____
7. What other costs are incurred when availing of the custom drying service of the RPC?

Item	Cost at RPC (Php)	Cost before RPC(Php)
Transportation		
Pick Up		
Labor		
Others (pls. specify): _____		

8. Before the presence of the RPC, how did you dry your palay?
 Sun drying flatbed dryer of cooperative
 Others, (specify) _____
9. How much was the custom drying fee? _____ wet season _____ dry season
10. How much were the other related expenses? **(go to #7)**
11. To whom do you sell your dry paddy?

12. What are your future plans?
 Continue availing of the custom drying service of the RPC, same volume
 Continue availing of the custom drying service of the RPC, increase in volume
 Continue selling to RPC, decrease in volume
 Others (specify): _____

1. What is your production volume (in cavans of wet paddy)? _____
2. Area harvested (has) _____
3. What portion of your total paddy produce do you sell as wet paddy?
 - a) To RPC 100% 50% Others (specify)____ Month: _____
 - b) To Others (specify) 100% 50% Others (specify)____ Month: _____
4. Do you buy paddy from other farmers? Yes No
 If YES:
 - from farmers of the same area; _____ cav (wet); _____ cav (dry)
 - from farmers of other areas _____ cav (wet); _____ cav (dry)
 - Transport cost (Php per _____) _____ from same area _____ from other areas

5. Why do you choose to sell wet paddy to the RPC?

6. How much is the buying price for wet paddy at the RPC:
 wet season (Php/kg) _____ dry season (Php/kg) _____

7. What are the costs incurred when selling wet paddy?

Item	Cost at RPC (Php)	Cost Before RPC (Php)
Transportation		
Pick Up		
Labor		
Others (pls. specify): _____		

8. Before the presence of the RPC, to whom do you sell wet paddy?

9. How much were the other related expenses? (go to #7)

10. What are your future plans?
 Continue selling to RPC, sell more
 Continue selling to RPC, sell less
 Others (specify): _____

Section 2-C

FARMERS SELLING DRY PADDY TO THE RICE PROCESSING COMPLEX

1. What is your production volume (in cavans of wet paddy)? _____
2. Area harvested (has) _____
3. What portion of your total paddy produce do you sell as dry paddy?
 - a) To RPC 100% 50% Others (specify) _____ Month: _____
 - b) To Others (specify) 100% 50% Others (specify) _____ Month: _____
4. Do you buy paddy from other farmers? Yes No

If YES:

from farmers of the same area; _____ cav (wet); _____ cav (dry)

from farmers of other areas _____ cav (wet); _____ cav (dry)

Transport cost (PhP per _____) _____ from same area _____ from other areas
5. Why do you choose to sell dry paddy to the RPC?

6. How much is the buying price for dry paddy at the:
 - a) RPC : wet season (PhP/kg) _____ dry season(PhP/kg) _____
 - b) Others : wet season (PhP/kg) _____ dry season(PhP/kg) _____
7. What are the costs incurred when selling dry paddy?

Item	Cost at RPC (PhP)	Cost before RPC (PhP)
Drying		
Transportation		
Pick Up		
Labor		
Others (pls. specify): _____		

8. Before the presence of the RPC, to whom do you sell dry paddy?

9. How much were the other related expenses? (go to #7)
 8. What are your future plans?

Continue selling to RPC, sell more

Continue selling to RPC, sell less

Others (specify):

Section 3

OTHER ISSUES AND CONCERNS

1. Other than the issues, challenges, and other concerns mentioned previously, is there anything you want to mention (both local or national) which you believe affects you and the rice industry in general?

Questionnaire # _____ Interviewer _____ Reviewer _____ Date _____

Survey Form for Non Users of RPC

Province: Pangasinan Davao del Sur Iloilo Bohol

Barangay: Municipality/City:

Section 1

PERSONAL INFORMATION OF RESPONDENT

- Respondent name : _____
1. Gender : Male Female
2. Birth date / Age : _____
3. Contact Info/Phone number : _____
4. Main occupation : Farming Others (specify)_____.
5. Income from rice farming : PhP_____ [] per cropping [] per year
6. Years in rice farming : _____
7. Member of farm-related organization : Yes No
8. Name of organization : _____
9. Position in organization : _____
10. Years in organization : _____
11. Location of farm : _____
12. Land tenure: Owned ___% Tenant ___% Lease ___% Others: ___%
13. Do you plant other crops for commercial purposes? Yes No
(If Yes, answer #14)

14. Other commercial crops planted:

Crop	Area Planted (ha)	No. Of cropping per year	Harvest per cropping		Net Income
			Volume	Value	

15. Before the establishment of the RPC, were you already a rice farmer? Yes No
If yes, then; do you
Sell wet paddy to traders/millers
Sell dry paddy to traders/millers
Conduct sun drying
Use a flatbed dryer
16. Were you previously a user of RPC services?
No
Yes (If yes, why, did you stop using the RPC?)
Too far, transport cost too high: PhP_____/kg
Service fee too expensive
No truck for hauling

- Buying price too low: PhP _____/kg
- Others (Pls. Specify): _____

Section 2

FARMERS NOT USING THE RICE PROCESSING COMPLEX

1. What is/are the reason(s) why you don't avail of the services of the RPC?
 - Not aware of any services offered Service fees are too expensive
 - Waiting time is too long Buying price is too low
 - Trucking is not available (pick-up or delivery) Not a member of farmers' assoc.
 - Trucking is too expensive
 - Others (specify): _____

2. How do you dispose of your paddy?
 - Sell wet paddy to private traders / millers (answer Section 2-A)
 - Sell dry paddy to private traders / millers (answer Section 2-B)
3. If you do not avail of the RPC then , do you
 - Sell wet paddy to traders/millers (answer Section 2-A)
 - Sell dry paddy to traders/millers (answer Section 2-B)
 - Conduct sun drying (answer Section 2-B-1)
 - Use a flatbed dryer (answer Section 2-B-2)

Section 2-A

FARMER SELLING WET PADDY TO PRIVATE TRADERS /

MILLERS

1. What is your production volume (in cavans of wet paddy)? _____
2. Area harvested (hectares) _____
3. What portion of your total paddy produce do you sell as wet paddy?
 - 100% 50% Others (specify) _____ Month: _____
4. How much is the buying price for wet paddy at the:
 - Wet season (PhP/kg) _____ Dry season (PhP/kg) _____
5. What are the benefits of selling wet paddy to private traders/millers?
 - _____
 - _____
 - _____
6. What other costs are incurred when selling wet paddy from farm to private traders/millers?

Item	Cost (PhP)
Transportation	
Pick Up	
Labor	
Others (pls. specify): _____	

7. What are your future plans?

Continue selling to traders/millers, sell more

Continue selling to traders/millers, sell less

Start selling to RPC as [] wet paddy or [] dry paddy

Others (specify): _____

Section 2-B

FARMER SELLING DRY PADDY TO TRADERS /

MILLERS

1. What is your production volume (in cavan of wet paddy)? _____

2. Area harvested (has) _____

3. What portion of your total paddy produce do you sell as dry paddy?

100%

50%

Others (specify) _____ Month: _____

4. Why do you choose to sell dry paddy to traders/millers?

5. How much is the buying price for dry paddy in the:

Wet season (PhP/kg) _____

Dry season (PhP/kg) _____

6. What other costs are incurred when selling dry paddy from farm to traders /private millers?

Item	Cost (PhP)
Transportation	
Pick Up	
Labor	
Others (pls. specify): _____	

7. What drying method do you use?

[] Sun drying (answer Section 2-B-1)

[] Flatbed dryer (answer Section 2-B-2)

8. What are your future plans?

Continue selling to traders/millers, sell more

Continue selling to traders/millers, sell less

Start selling to RPC as [] wet paddy or [] dry paddy

Others (specify): _____

Section 2-B-1

DRYING

1. Why do you choose to do sun drying?

2. How many days does it take you to sun-dry? _____

3. Are you using your own facilities for sun drying? Yes No

	One batch	Whole crop
Wet Season		
Dry Season		

If No, how much do you pay for renting a sun drying facility? PhP _____

4. Please fill up the table of materials used in sun drying (e.g. mats , rakes, Others):

Item	Initial Cost (PhP)	Useful Life

5. What are the costs incurred when conducting sun drying?

Item	Cost (PhP)
Labor	
Transportation	
Others (pls. specify): _____	

6. What are the disadvantages of sun drying?

7. What are your future plans?

- Continue selling to traders/millers, sell more
- Continue selling to traders/millers, sell less
- Start selling to RPC as [] wet paddy or [] dry paddy
- Others (specify): _____

Section 2-B-2

FARMERS USING A FLATBED

DRYER

1. Why do you choose to use a flatbed dryer?

- 2. How much is the drying fee? _____
- 3. What is the waiting period for using the flatbed dryer? _____ hours / days / weeks (choose one)
- 4. How long does it take to dry your harvested crop? _____ hours / days (choose one)
- 5. What are the costs incurred when using a flatbed dryer?

Item	Cost (PhP)
Labor	
Fuel	
Transportation	
Facility	
Others (pls. specify): _____	

6. What are your future plans?

- Continue selling to traders/millers, sell more
- Continue selling to traders/millers, sell less
- Start selling to RPC as [] wet paddy or [] dry paddy
- Others (specify): _____

Section 3

OTHER ISSUES AND

CONCERNS

1. Other than the issues, challenges, and other concerns mentioned previously, is there anything you want to mention (both local or national) which you believe affects you and the rice industry in general?

9. Who buys the rice?

10. Have there been any complaints regarding the quality of the RPC products? Yes No

11. Average distances from suppliers, type and costs of transport.

12. Who is responsible for transportation?

Supplier

Buyer

Others, pls. specify

13. Transportation cost

Expense	Cost (Php)
Cost of Transportation (per distance of delivery)	
Labor fee per trip	
Other cost per trip (toll, etc.)	
Maintenance cost per month	

14. How frequent do you procure paddy in a month?

Wet season _____ Dry season _____

15. Are there monitoring/technical assistance programs for paddy suppliers? Yes No

16. Please describe the rice chain (from production to end user) as you understand it
(In the province, region)

17. Are there optional processes done to the rice to increase its value? No Yes
(If yes, what are these processes and how much (PhP) is the service fee?

- a. _____
- b. _____
- c. _____

18. What are the benefits generated by the presence of the RPC?

19. What is the effect of the Rice Processing Complex with regards to private millers?

In terms of volume: _____

In terms of price : _____

20. Describe the installations/ equipment / processes with the top/best benchmarks you know.

21. How does the location affect the performance of the RPC?

22. What are byproducts of the processing facility and how are they disposed?

23. What is the actual milling recovery? _____

24. What is the average wholesale price of milled rice? _____

25. Estimated initial cost for the facility PhP _____.

26. What are the breakdowns of the monthly expense of the RPC?

Expense		Value (PhP)
Operating Cost	1.	
	1.	
	2.	
	3.	
	4.	
Managem ent Cost	5.	
	1.	
	2.	
	3.	
	4.	
	5.	

27. What is the ideal capacity of the plant, considering economies of scale? _____

28. What will make you decide to operate at ideal capacity level (if not yet at it)

29. What policies worked and did not work in favor of the sector?

30. Any other policy/institutional issues related to rice marketing/supply chain that affected the operations?

THANK YOU

Questionnaire # _____ Interviewer _____ Reviewer _____ Date _____

Survey Form for Flatbed Dryers

Province: Pangasinan Davao del Sur Iloilo Bohol

Barangay:..... Municipality/City:.....

Respondent name
:.....

1. Gender : Male Female
2. Contact Info/Phone number :
3. Birthdate / Age :
4. Main occupation : Farming Others(specify)_____
5. Income from farming : PhP _____ [] per cropping [] per year
6. Years in rice farming :
7. Member of farm-related organization : Yes No
8. Name of organization :
9. Position in organization :
10. Years in organization :
11. Land tenure: Owned ___% Tenant ___% Lease ___% Others: ___%
12. Do you plant other crops for commercial purposes? Yes No
(If Yes, proceed to #13)

13. Other commercial crops planted:

Crop	Area planted	No. Of cropping per year	Harvest per cropping		Net Income
			Volume	Value	

14. Do you dry your palay using the FBD in your community? Yes No
If Yes, go to Part A
If No, go to Part B.

**PART A
DRYER**

FARMERS USING THE FLAT BED

1. If yes, how often do you use the FBD?
 Every harvest season Wet season only Only when I am able to secure a cue to dry
2. What portion of your total harvest do you dry using the FBD?
 100% 50% Others _____
(If not, 100%) What do you do with the rest of your harvest?
 Sell them as wet palay to:
 RPC traders/miller
 Sundry
3. How much is the drying fee? PhP/cav _____
4. How much is the transport cost to the drying center? PhP/cav _____
5. Other costs? _____

6. What do you do with the palay dried using the FBD?

Sell to :

RPC 100% 50% Others _____

Private trader/miller 100% 50% Others _____

Mill the palay

7. If you sell the dried paddy, how much did you get for it from your most recent transaction?

PhP/cav _____

8. If you milled the paddy, how much did you received from the milled rice? PhP/cav _____

9. What is the advantage of having the flatbed dryer?

10. Was the traditional system of drying disturbed due to the introduction of the DA flatbed dryer?

Yes

No

If Yes, in what way was the system disturbed?

PART B

FARMERS THAT ARE PREVIOUS NON USER OF FBD

1. What do you do with your harvest?

1. Sell as wet paddy ----- 100% 50% Others

2. Sundry ----- 100% 50% Others

If A, how much were you getting from your harvest? PhP/cav _____

If B, how much were you spending for sun drying? PhP/cav _____

2. Why do you prefer to sundry rather than use available mechanical dryers?

OTHER ISSUES

1. Other than the , issues, challenges, and other concerns mentioned previously, are there anything you want to mention (both local or national) which you believe affects you and the rice industry in general?

THANK YOU!

Questionnaire # _____ Interviewer _____ Reviewer _____ Date _____

Survey Form for Threshers

Province Pangasinan Davao del Sur Iloilo Bohol

Barangay:..... Municipality/City:

PERSONAL INFORMATION OF RESPONDENT

Respondent _____ name _____
: _____

1. Gender : Male Female
2. Birth date / Age : _____
3. Main occupation Farming Others (specify)_____.
4. Income from farming :PhP_____ [] per cropping [] per year
5. Years in rice farming : _____
6. Contact Info/Phone number : _____
7. Member of farm-related organization : Yes No
8. Name of organization : _____
9. Position in organization : _____
10. Years in organization : _____
11. Location of farm : _____
12. Land tenure: Owned ___% Tenant___% Lease ___% others ___%
13. Do you plant other crops for commercial purposes? Yes No
(If Yes, answer #14)

14. Other commercial crops planted:

Crop	Area planted	No. Of cropping per year	Harvest per cropping		Net Income
			Volume	Value	

15. Were you always a thresher user?
 Yes, If yes please answer Part A,
 No , If No, please answer Part B

PART A.

FARMERS USING THE THRESHER

1. Volume of palay harvest in the most recent cropping season (in cavans of wet paddy) _____
2. What is the payment scheme for the use of the thresher?

3. Was the palay immediately threshed after harvesting? Yes No
If yes, go to question 4

If no, how many days did it take before the palay was threshed?

1 day delay 2 days delay 3 days delay others: _____

4. What did you do with the palay after threshing?
 Sold it as wet paddy
 Dried the paddy and then sold it
5. How much did you get from your palay?
 Wet Palay PhP/cav: _____ No. of cav. _____
 Dry Palay PhP/cav: _____ No. of cav. _____

6. What is/are the advantage/s of having the thresher?

7. Was the traditional system of harvesting disturbed due to the introduction of the DA thresher?
 Yes No

If Yes, in what way was the system disturbed?

PART B.

PREVIOUS NON USER OF THRESHER

1. Was the palay immediately threshed after harvesting? Yes No

If yes, go to question 2

If no, how many days did it take before your palay was threshed?

1 day delay 2 days delay 3 days delay others: _____

2. What did you do with the palay after threshing?

- Sold it as wet paddy
- Dried the paddy and then sold it

3. Please fill up the table below:

Item	Value
No. of days to finish threshing	
No. of Workers/day	
Labor Cost /person/day	
Other cost (Pls. Specify)	

4. What is the payment scheme for the traditional method of threshing?

OTHER ISSUES

1. Other than the , issues, challenges, and other concerns mentioned previously, are there anything you want to mention (both local or national) which you believe affects you and the rice industry in general?

Thank You

Questionnaire # _____ Interviewer _____ Reviewer _____ Date _____

Survey Form for Barangay/Municipal Food Terminal Suppliers

Province : Pangasinan Davao del Sur Iloilo Bohol

Barangay: Municipality/City:

Farmers

Fisherfolk

PERSONAL INFORMATION OF RESPONDENT

- Respondent name : _____
1. Gender : Male Female
 2. Birth date / Age : _____
 3. Contact Info/Phone number : _____
 4. Main occupation : Farming Others (specify)_____
 5. Income from farming : PhP_____ [] per cropping [] per year
 6. Years in farming : _____
 7. Member of farm-related organization : Yes No
 8. Name of organization : _____
 9. Position in organization : _____
 10. Years in organization : _____
 11. Location of farm : _____
 12. Location of the food terminal : _____
 13. Describe the basic function and operation of your trading.
Buying Selling Both
 14. Do you sell your products to the BFT? Yes No
 (If yes, what percentage of your products do you sell to the BFT?)
100% 75% 50% 25%
 15. Do you sell your products fresh or processed? _____.
 16. Do you sell produce all year? Yes No
 (If No, what are the usual months that you sell produce?)_____
 17. Do you avail of other services provided by the BFT , like food processing? Yes No
 (If yes, what are the services you avail from the BFT and how much do you pay for each service?

Services	Fees(PhP)
1.	
2.	
3.	

18. Does the presence of the BFT prevented if not lessened the postharvest losses, like spoilage? Yes No

19. What are the differences observed before and during the presence of the BFT?

20. Kindly fill up the Table below.

Type of Produce	Weight (kg or cav)	With the Food Terminal				Before the Food Terminal					
		Use of Food Terminal (Pls Check)			Selling Price	Transport Cost	Market Outlet (Pls Check)			Selling Price	Transport Cost
		Daily	Weekly	Others (specify): _____			Brgy. Wet Market	Public Wet Market	Others (specify): _____		
Rice											
Veg	1.										
	2.										
	3.										
	4.										
	5.										
Root Crop	1.										
	2.										
	3.										
	4.										
	5.										
Meat	1.										
	2.										
	3.										
	4.										
	5.										
Seafood	1.										
	2.										
	3.										
	4.										

Survey Form for Barangay/Municipal Food Terminal Customers

Province: Pangasinan Davao del Sur Iloilo Bohol

Barangay:..... Municipality/City:.....

Farmers

Fisherfolk

PERSONAL INFORMATION OF RESPONDENT

- Respondent name : _____
1. Gender: Male Female
2. Birth date / Age : _____
3. Contact Info/Phone number : _____
4. Main occupation : Farming Others (specify) _____.
5. Income from farming : PhP _____ [] per cropping [] per year
6. Years in farming : _____
7. Member of farm-related organization : Yes No
8. Name of organization : _____
9. Position in organization : _____
10. Years in organization : _____
11. Location of farm : _____
12. Location of the food terminal : _____
13. Describe the basic function and operation of your trading.

Buying Selling Buying and Selling Processing

18. Do you buy from the food terminal all year? Yes No
 (If No, what are the usual months that you buy produce?) _____
19. How long have you been a customer of the food terminal? _____
20. Do you avail of other services provided by the BFT, like food processing? Yes No
 (If Yes, what are the services you avail from the BFT and how much do you pay for each service?)

Services	Fee (PhP)
1.	
2.	
3.	

21. What are the differences observed before and during the presence of the BFT?

22. Issues and concerns

23. Kindly fill up the Table below

Type of Produce	Weight (kg or cav)	With the Food Terminal				Without the Food Terminal					
		Frequency of Use of the Food Terminal			Buying Price	Transport Cost	Market Outlet			Buying Price	Transport Cost
		Daily	Weekly	Others (specify): _____ _____			Brgy. Wet Market	Public Wet Market	Others (specify): _____ _____		
Rice											
V e g e t a b l e	2.										
	2.										
	3.										
	4.										
	5.										
R o o t C r o p	2.										
	2.										
	3.										
	4.										
	5.										
M e a t	2.										
	2.										
	3.										
	4.										
	5.										
S e a f o d	2.										
	2.										
	3.										
	4.										
	5.										

Survey Form for Barangay/Municipal Food Terminal Manager

Province: Pangasinan Davao del Sur Iloilo Bohol

Barangay:.....
Municipality/City:.....

Section 1

PERSONAL INFORMATION OF

RESPONDENT

Respondent name
:.....

- ...
1. Gender ; Male Female
 2. Birth date / Age :.....
 3. Contact Info/Phone number :
.....
 4. Main occupation : Farming Others (specify).....
 5. Monthly income :
.....
 6. Income from farming :PhP..... [] per cropping [] per year
 7. Years in farming :
.....
 8. Member of farm-related organization : Yes No
 9. Name of organization :
.....
 10. Position in organization :
.....
 11. Years in organization :
.....
 12. Main purpose of the organization :
.....

Section 2

BASIC COMPANY INFORMATION

1. Name of store :.....
2. Type of store : LGU Managed Coop Managed Others
3. Current production/processing capacity :.....(capacity at start up).....
4. Year of start of operation :
.....
5. Location of the store :
.....
 - b. Ownership of the land :
.....

7. How frequent do you purchase goods ?
From Within the Municipality/Barangay:

From Nearby
Municipality/Barangay: _____

8. Where do you store your products?

9. Have there been any issues with the quality of the products? Yes No
If yes , please state the issue/s:

10. Are there other service you provide to the customers (e.g. food processing) Yes No
(If yes, please answer No. 10, if no please answer No. 11)

11. What are these services, and how much do you charge for each service?

Service	Fee

12. What are the reasons that you **do not** provide food processing services?

13. What is the average monthly operating cost of the food terminal?

Item	Cost (PhP)
Utility Cost (Electric, Water, Telephone, Room or Land Rental)	
Transportation Cost	
Management Cost	

14. Please describe the chain (from production to end user) as you understand it (in your province, region).

Section 4

OTHER

CONCERNS

1. What are the benefits obtained from having a food terminal?

2. What are the disadvantages of the presence of the food terminal?

3. What policies worked and that did not work in favor of your sector?

4. Any other policy/institutional issues related to marketing/supply chain that affected your operations?

PLEASE ATTACH LIST OF COMMODITIES SOLD AND VOLUME SOLD ON A MONTHLY BASIS

THANK YOU