THE REPUBLIC OF THE PHILIPPINES

THE REPUBLIC OF THE PHILIPPINES DATA COLLECTION SURVEY ON POST-HARVEST MODERNIZATION OF RICE IN THE REPUBLIC OF THE PHILIPPINES

FINAL REPORT

FEBRUARY 2025

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

SANYU CONSULTANTS INC. (SCI)

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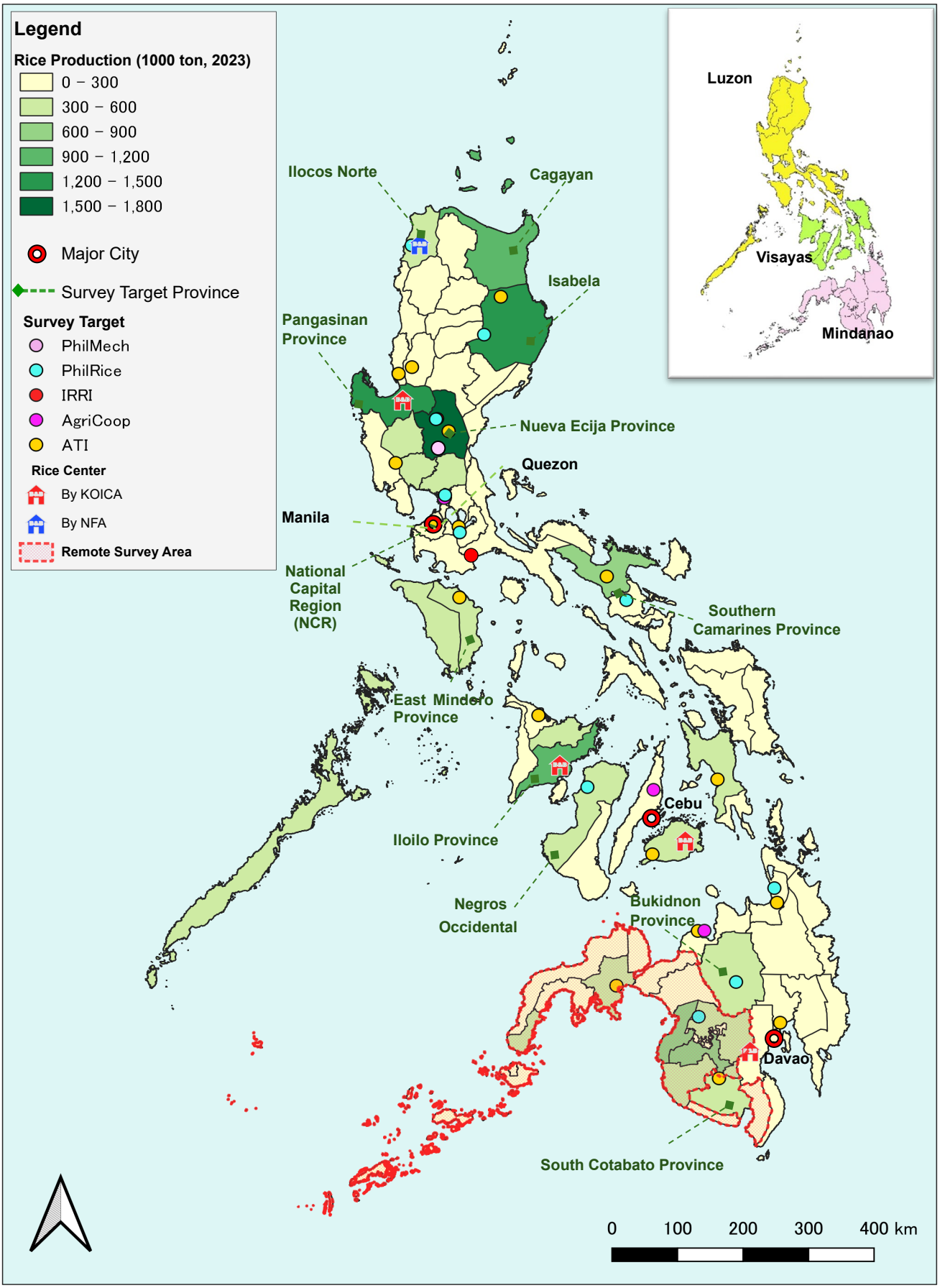
Location Map



Source: JICA Survey Team developed based on the production data from PalayStat System. Other information from;

1) ATI: Agricultural Training Institute
2) PhilMech: Philippine Center for Postharvest Development and Mechanization
3) PhilRice: Philippine Rice Research Institute
4) Restricted Zone indicates “Level 3” by Ministry of Foreign Affairs, Japan.

Photographs (1/5)

Consultation with related organizations

Discussions with DA Counterpart

Visited the office for the Special Concerns and for Official Development Assistance (ODA)-Foreign Aid/Grants of DA, a C/P agency, to discuss the status of assistance from various donors, and the challenges of the rice industry and rice farmers in the Philippines.

Discussions with DA Working Level Officials

Discussions with working-level officials on rice industry development in DA. Exchanged views on the status of implementation and challenges of rice-related projects such as NRP, MRIDP, F2C2, etc. currently underway in the Philippines.

PhilMech Headquarters

Visited PhilMech headquarters (Nueva Ecija) and held interview surveys on the progress and challenges of the machinery provision program at RCEF. Also, data and information on the status and challenges of agricultural mechanization in the Philippines was collected.

PhilRice Headquarters

The team visited PhilRice headquarters (Nueva Ecija) to hear about the progress of the seed distribution program at RCEF, the monitoring system, and the selection method of variety. They also exchanged opinions on improving rice quality.

NFA Headquarters

The team visited the NFA headquarters to review the progress and challenges of the MAFIM program, the functions of the NFA, the rice procurement process and the distribution of buffer stock rice, and to exchange views on food security.

NFA Region IV

Visited the NFA Region IV office to review the operation and maintenance of facilities and equipment, quality control of buffer stock rice, and issues related to the rice industry in the region.

Photographs (2/5)

Value Chain (VC) Workshop	
	
VC workshop in Iloilo (1) In Iloilo, which is the largest rice production area in Visayas, a VC workshop was held with participants from each stakeholder of rice VC. Groups were formed for each segment to understand the status of rice VC and to identify issues.	**VC workshop in Iloilo (2)** Issues and problems of rice VC were shared in the WS, and opinions were exchanged on how to improve VC. While there was a common understanding of the importance of cooperation in rice cultivation, many participants expressed that physical land consolidation is a tough task.
	
VC workshop in Nueva Ecija (1) A VC workshop was held in Nueva Ecija, one of the largest rice production areas in Luzon area, with participants from all segments of the rice VC, including farmers, collectors, millers, wholesalers and retailers, in addition to the government officials from DA, Province, Municipality, NFA, NIA, and RCEF.	**VC workshop in Nueva Ecija (2)** Issues raised by each group were shared in the presentations, and opinions were exchanged among VC stakeholders and officials. Discussions were actively held on the unification of varieties among farmers, adjustment of cropping seasons, quality standards for rice, etc., in line with the spread of machinery including combine harvesters.
	
The VC workshop in Bukidnon (1) In Bukidnon, the largest rice production area in Mindanao, a VC workshop was held with stakeholders from various rice VC segments. Because of the area's high rainfall, opinions specific to the island were raised that losses during drying were higher than in other regions.	**VC workshop in Bukidnon (2)** Each group shared their issues in the form of presentations and exchanged opinions. In particular, there was a lively discussion on how to strengthen VC, such as providing management training to farmers and entrusting VC to private sector.

Photographs (3/5)

Interviews with VC stakeholders

Interviews with NIA contract farmers

Interviews were conducted with farmers participating in NIA's rice contract farming pilot project, in which NIA supports production costs and provides cash incentives to contract farmers on the condition that they deliver a certain amount of paddy to NIA. A system is being piloted whereby the paddy is milled and released to the market at a low price.

Interviews with F2C2 cluster

Interview with PASAMASI, an excellent F2C2 cluster, in Laguna province, to confirm the cluster development plan promoted by F2C2, to hear about the cluster's operation and management status, and to inspect the facilities it owns.

Interviews with agricultural cooperatives

The team visited an agricultural cooperative in Nueva Ecija to gasp the cooperative's management situation and the use of the agricultural machinery. It became clear that the high operating costs of operating the rice milling facility was a financial challenge for the cooperative.

Interviews with small irrigation cooperatives

Visited a small-scale irrigation cooperative in Nueva Ecija to inspect small-scale irrigation facilities and conduct interviews related to their operation, and confirmed issues related to the operation of small-scale irrigation and rice production managed by DA's Bureau of Soil and Water Management.

Interviews with private rice millers

Visited private rice millers in Bulacan and interviewed them about the current status and challenges of rice distribution. The survey revealed that the quality of domestic rice is less stable than that of high-quality, inexpensive imported rice.

Market surveys

Market surveys in Luzon, Visayas, and Mindanao were conducted to confirm consumer preferences. Fragrant rice is relatively expensive, and old rice (Laon) and broken rice are sold at 20% lower prices than regular rice.

Photographs (4/5)

Facilities & Equipment

RCEF Procurement Equipment (Tractor: Bukidnon)
Agricultural machinery such as four-wheel tractors owned by FCAs are frequently stolen for parts such as batteries, and some are poorly maintained, with no daily inspections, car washes, or simple repairs being performed. In addition, the durability of some foreign-made machinery is low, and some of these machines deteriorate in operation after 3-4 years.

RCEF Procurement Equipment (Rice transplanter: South Cotabato)
Riding rice transplanters are in high demand due to the aging of farming communities, but are not being utilized because the seedling cultivation is not widespread. In recent years, Japanese manufacturers have begun to disseminate the technology to agricultural machinery service providers.

NFA Facility (in warehouse: Iloilo)
Due to the aging of existing mechanical dryer, the harvested paddy from the rainy season crop is being dried naturally in the NFA warehouse. The paddy is subjected to heat of more than 50°C due to respiration heat, resulting in severe quality deterioration due to yellowing rice and fermentation. The eating quality reputation of NFA rice is generally poor.

NFA Facility (Rice milling facility: Isabella)
The largest rice milling facility in the Philippines, with a performance of 10 tons/hr (made by a Japanese manufacturer); procured in the 1980s, it has operated for over 40 years with few breakdowns. The maintenance condition is good, but the rice milling capacity has dropped by more than 60% due to aging.

Private rice mill facility (Isabella)
Country elevator of one of the largest private rice milling companies in the Philippines. After mechanical drying, the paddy is tempered with steam heat and the dried paddy is stored in silos.

Private rice mill facility (East Mindoro)
Milling facilities owned by medium-sized private rice mills. In recent years, made in Vietnam has been increasing. Initial investment is low, but motor efficiency is low, including those from China, there are issues in terms of cost reduction.

Photographs (5/5)

Post-harvest losses

Traces of harvesting machinery crossing farmland

The wheel tracks of a combine harvester crossing a farm field before harvesting. Combine harvesters have spread rapidly in recent years, but access to each field is poor due to absence of access roads within the paddy field, forcing large machines to cross fields before harvest.

Losses due to typhoon damage

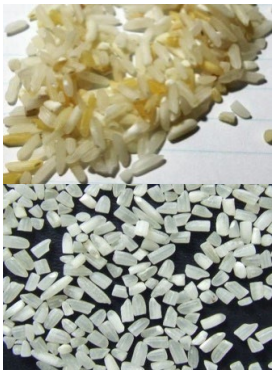
Drying typhoon-damaged paddy on the roadside beside the field. In 2024, typhoon No. 26 hit northern Luzon, and seven of the typhoons either landed on or approached northern Luzon.

Losses due to drying on the roadside

Farmers and paddy collectors who do not have drying yards dry their paddy on the roadside. On busy roads, the passing of vehicles causes quantitative and qualitative losses, such as scattering and crushing of paddy, contamination by foreign matter, and deterioration due to rainfall.

Losses incurred during transportation after harvest

Paddy being delivered to NFA's warehouse. Bagged paddy is spread out to dry in the warehouse. After harvesting, paddy was sometimes packed in bags without sufficient drying and left to sit while waiting to be transported, resulting in high temperatures and humidity, and some paddy was seen to be fermenting and deteriorating.



Yellow rice and crushed rice

Rice milled at NFA. Yellowing rice has occurred during storage due to storage without sufficient drying (Above). Long-grain and short-grain varieties are mixed and milled at the same time, resulting in a lot of broken rice (Bottom).

Losses due to improper storage

Rice bags stored flat in FCAs' warehouses are covered with excrement from rats and birds. Animals have infiltrated the warehouses, making them a poor environment for storing food products.

Table of Contents

Figures and Tables

Abbreviations

ACEF	Agricultural Competitiveness Enhancement Fund
ACEP	Agricultural Credit Enhancement Program
ACPC	Agricultural Credit Policy Council
ACSP	Agricultural Credit Support Project
ADB	Asian Development Bank
AEWs	Agricultural Extension Workers
AFF	Agriculture, Forestry, and Fisheries
AFFORD ARBs	Accessible Funds for Delivery to Agrarian Reform Beneficiaries
AFMA	Agriculture and Fisheries Modernization Act
AFMech	Agricultural and Fisheries Mechanization
AGFC	Agricultural Guarantee Fund Corporation
AJDF	ASEAN-Japan Development Fund
AMTEC	Agricultural Machinery Testing and Evaluation
ALERT ARBOs	Accessible Loans for Empowered, Resilient, and Transformed Agrarian Reform Beneficiary Organization
APCP	Agrarian Production Credit Program
APTERR	ASEAN Plus Three Emergency Rice Reserve
ASEAN	Association of Southeast Asian Nations
BAFPS	Bureau of Agriculture and Fisheries Product Standards
BAFS	Bureau of Agriculture and Fisheries Standards
BARMM	Bangsamoro Autonomous Region in Muslim Mindanao
BAS	Bureau of Agricultural Statistics
BioMech	Center for Agri-Fisheries and Biosystems Mechanization
BPI	Bureau of Plant Industry
BRIA-FARMERS	Better Rice Initiative Asia-Fostering Agriculture and Rice Marketing by Improved Education and Rural Advisory Services A-FARMERS
BPRE	Bureau of Postharvest Research and Extension
BSP	Bangko Sentral ng Pilipinas (Central Bank of the Philippines)
CALF	Comprehensive Agricultural Loan Fund
CAR	Cordillera Administrative Region
CARP	Comprehensive Agrarian Reform Program
CDA	Cooperative Development Authority
CDP	Cluster Development Plan
CFID	Coconut Farmers and Industry Development
CH	Consolidation Hub
CIF	Cost, Insurance, and Freight
CLSU	Central Luzon State University
CoC	Certificate of Compliance
CODEX	Codex Alimentarius

C/P	Counterpart
CRD	Credit Risk Database (Credit Management by the Central Bank of the Philippines)
CRPSD	Crop Research and Production Support Division
CS	Certified Seed
DA	Department of Agriculture
DA-ACPC	Agricultural Finance Policy Council (Department of Agriculture)
DA-AMAD	Agribusiness and Marketing Assistance Division (Department of Agriculture)
DA-AMAS	Agribusiness and Marketing Assistance Service
DA-ATI	Agricultural Training Institute (Department of Agriculture)
DA-BAFE	Bureau of Agriculture and Fisheries Standards (Department of Agriculture)
DA-BAR	Bureau of Agricultural Research (Department of Agriculture)
DA-BPI	Bureau of Plant Industry
DA-BSWM	Bureau of Soils and Water Management
DA-FOS	Field Operations Service
DA-ICTS	Information and Communications Technology Service (Department of Agriculture)
DA-ITCAF	Information Technology Center for Agriculture and Fisheries
DA-NCP	National Corn Program (Department of Agriculture)
DA-NRP	National Rice Program (Department of Agriculture)
DA-PDS	Project Development Service
DA-RFO	Regional Field Office (Department of Agriculture)
DBM	Department of Budget and Management (DBM)
DBP	Development Bank of the Philippines
DENR-EMB	Department of Environment and Natural Resources - Environmental Management Bureau
DH	Distribution Hub
DOF	Department of Finance
DOST	Department of Science and Technology
DSWD	Department of Social Welfare and Development
DTI	Department of Trade and Industry
ECA	Environmentally-Critical Area
ECC	Environmental Compliance Certificate
ECP	Environmentally-Critical Project
EIA	Environmental Impact Assessment
EO	Executive Order
ERCA-RCEF	Expanded Rice Credit Assistance under the Rice Competitiveness Enhancement Fund (Implemented by Land Bank)
EU	European Union
F2C2	The Farm and Fisheries Clustering and Consolidation
FAO	Food and Agriculture Organization

FAOSTAT	Food and Agriculture Organization Corporate Statistical Database
FCA	Farmers Cooperative Association and Federations
FFS	Farmer Field School
FMR	Farm to Market Road
FNRI	Food and Nutrition Research Institute
FPA	Fertilizer and Pesticide Authority
FSSP	Food Staples Sufficiency Program
FVC	Food Value Chain
GAP	Good Agricultural Practices
GDP	Gross Domestic Product
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit (German International Cooperation Agency)
HACCP	Hazard Analysis and Critical Control Points
HARP	Rapid Response to Post Typhoon Haiyan Agriculture Rehabilitation Programme
HARVEST	Harnessing Agribusiness Opportunities through Robust and Vibrant Entrepreneurship Supportive of Peaceful Transformation
HP	Horsepower
HoReCa	Hotel, Restaurant, and Catering
IA	Irrigators Association
ICT	Information and Communication Technology
IFAD	International Fund for Agricultural Development
IMT	Irrigation Management Transfer
IPB	Institute of Plant Breeding
IRPEP	Irrigated Rice Production Enhancement Project
IRRI	International Rice Research Institute
ISSEP	Industrial and Support Services Expansion Program
JICA	Japan International Cooperation Agency
KOICA	Korea International Cooperation Agency
KOPIA	Korea Program on International Agriculture
KRC	Korea Rural Community Corporation
LBP	Land Bank of the Philippines
LFTs	Local Farmer Technician
LGU	Local Government Unit
LIDP	Logistics Infrastructure Development Project
MAFAR	Department of Agriculture, Fisheries, and Agrarian Reform
MAFIM	Comprehensive Masagana Agricultural Food Infrastructure Modernization Plan (Implemented by NFA, etc.)
MAFRA	Ministry of Agriculture, Food, and Rural Affairs
MLGU	Municipal Local Government Unit
MPC	Multi Purpose Cooperative

MRIDP	Masagana Rice Industry Development Program
NABCOR	National Agribusiness Corporation
NAFMP	National Agriculture and Fisheries Modernization Plan
NCIP	National Commission on Indigenous Peoples
NCR	National Capital Region (Metro Manila)
NEDA	National Economic and Development Authority
NEP	National Expenditure Program
NFA	National Food Authority (Department of Agriculture)
NGA	National Grains Authority
NIA	National Irrigation Administration
NOAP	National Organic Agriculture Program
NPCC	National Price Coordinating Council
NRP	National Rice Program
OMR	Over milled Rice
OP	Office of the President
OURID	Office of the Undersecretary for Rice Industry Development
PACC	Philippine Agricultural Credit Corporation
PBME	Project Benefit Monitoring and Evaluation
PCAARRD	Philippine Council for Agriculture, Aquatic, and Natural Resources Research and Development
PCRC	Philippine Rice Consumption Report
PD	Program Development Department
PDP	Philippine Development Plan
PEER	Project Evaluation and Endorsement Report
PFDA	Philippine Fisheries Development Authority
PhilMech	Philippine Center for Postharvest Development and Mechanization (Department of Agriculture)
PhilRice	Philippine Rice Research Institute (Department of Agriculture)
PhilSCAT	Philippine Sino Center for Agricultural Technology
PhilSCAT TCP	Technical Cooperation Project Philippine-Sino Center for Agricultural Technology
PH	Post-Harvest
PHP	Philippine Peso (1 PHP = 2.68 JPY, June 2024)
PLEA	Production Loan Easy Access
PLGU	Provincial Local Government Unit
PNS	Philippine National Standard
PP	Presidential Proclamation
PSA	Philippine Statistics Authority
PUNLA	Program on Unified Lending to Agriculture
QCBS	Quality and Cost Based Selection
RA	Republic Act

RaFPEP	Rapid Food Production Enhancement Programme
RasSFiP	Rapid Seed Supply Financing Project
RBFHS	Rice-based Farm Households Survey
RCA	Rice and Corn Administration
RCEF	Rice Competitiveness Enhancement Fund
RESP	Rice Extension Services Program
RFO	Regional Field Office
RICOB	Rice and Corn Board
RMR	Regular Milled Rice
RPC	Rice Processing Complex
RPS	Rice Processing System
RRP	Rice Resiliency Project
RS	Registered Seed
RSBSA	Registry System for Basic Sectors in Agriculture
RSIS	Rice Seed Information System
RTC	Regional Training Center
RTL	Enacted Rice Tariffication Law
SAFP	Sustainable Agribusiness Financing Program
SCP-SIDA	Socialized Credit Program under the Sugarcane Industry Development Act
SEC	Securities and Exchange Commission
SIDC	Sorosoro Ibaba Development Cooperative
SME	Small and Medium-sized Enterprises
SSTC	South-South and Triangular Cooperation
SURE	Survival and Recovery Loan Program
SWISA	Small Water Irrigation System Association
TESDA	Technical Education and Skills Development Authority (Department of Labor and Employment, Department of Education, Culture, and Sports)
TSL	Two Step Loan
UMR	Undermilled Rice
UPLB	University of the Philippines Los Baños
USAID	United States Agency for International Development
USD	United States Dollar
USDA	United States Department of Agriculture
VC	Value Chain
WB	World Bank
WMR	Well Milled Rice
WS	Workshop
WTO	World Trade Organization

Chapter 1 Outline of the Survey

1.1 Background

The agricultural sector remains an important sector in the Philippines, accounting for 8.6% of GDP (Philippine Statistics Authority (PSA), 2023) and 21.1% of the total working population (PSA, June 2024). The Philippine Development Plan (2023-2028) emphasizes the "modernization of agriculture and agribusiness," and the government of the Philippines attaches importance to the development of the agricultural sector from the perspectives of job creation, poverty reduction, and food security. However, the poverty rate of agricultural workers in the Philippines in 2021 is 30.0%, which is higher than the poverty rate of 18.1% (PSA) for the entire country in the same year, and further modernization and development of the agricultural sector and increase in farmers' income are required.

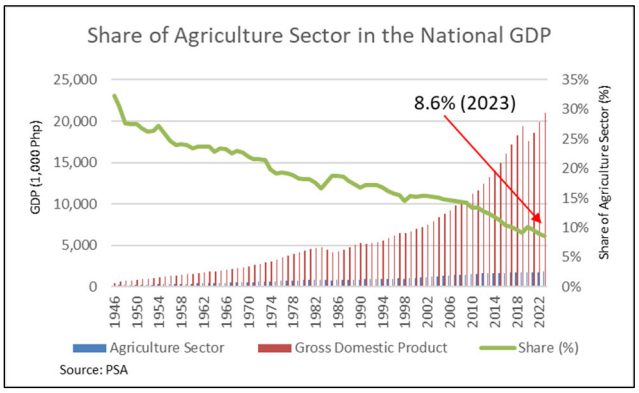


Figure 1.1.1 GDP Share of Agriculture Sector

Rice, in particular, is the most important crop in terms of food security as a staple food in the Philippines. However, while the total population has increased by 16% in the past 10 years since 2012 and domestic consumption of rice has increased by 32%, paddy production has only increased by 9.6% in the same period (FAOSTAT, PSA). As a result, rice self-sufficiency remains at 77% in 2022 (PSA), making the country the world's largest rice importer after 2023.

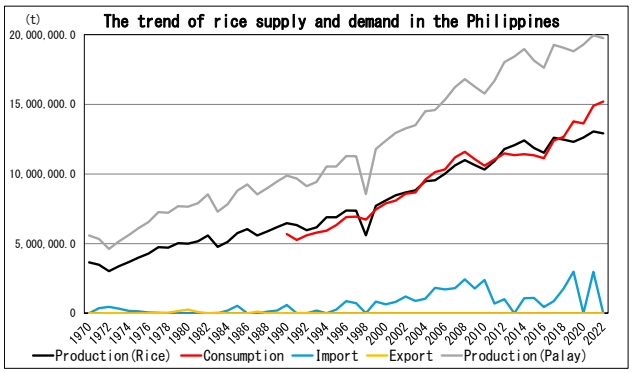


Figure 1.1.2 Trends of Rice Supply and Demand in the Philippines

The Government of Japan has provided a number of technical cooperation programs, including the development of infrastructure such as irrigation facilities and agricultural guidance, and has achieved a certain degree of success, with rice yields in the Philippines exceeding 4.1 t/ha (in 2022, PhilRice) (the ASEAN average is 3.88 t/ha). On the other hand, statistics show that the post-harvest loss rate of rice harvested in the Philippines is about 15% (FAO), indicating that there is still much room for improvement in the post-harvest processes of drying, storage, hulling, milling, and distribution. In addition, the country's agriculture sector suffers annually from the risk of natural disasters due to climate change and other factors, and maintaining a stable supply and price of rice is also an issue from the perspective of food security.

1.2 Purpose and Scope of the Survey

The purpose of this work is to collect information on development issues, policies, status of initiatives, and requests related to the post-harvest sector of rice (drying, storage, threshing, milling, distribution, etc.) in the Philippines, analyze issues, and collect information on preconditions for implementation in order to formulate individual cooperation programs and projects in this sector.

1.3 Survey Area

The survey covered the entire region of the Philippines. The Philippines is a nation based on diversity, with 7,641 islands stretching 1,850 km from north to south, and approximately 175 ethnic groups, each with their own customs, traditions, and languages. Economically, three economic zones, Luzon, Visayas, and Mindanao, have been formed due to physical conditions such as transportation and logistics, as well as linguistic and religious backgrounds.

For this reason, in this study, we held value chain (VC) workshops and conducted a survey of stakeholders in Nueva Ecija in Central Luzon, Iloilo City in Visayas, and Bukidnon in Mindanao, to investigate the actual status of rice VC that has been formed in each region. A survey was conducted on the actual status of rice VCs that have been formed in each region.

Figure 1.3.1 Survey Area

In addition, market surveys were conducted in the consumption areas of Metro Manila, Iloilo City, Davao City, etc., to study the purchasing behavior of rice by consumers, and visits were made to northern and southern Luzon Island, Mindoro Island, Bicol Region, etc., to collect information and conduct research on the best practices in rice VC formation. In addition, we visited northern and southern Luzon Island, Mindoro Island, and Bicol Region to collect information and conduct surveys.

1.4 Survey Methodology

The study was conducted from August 2024 to February 2025, of which fieldwork was conducted in the Philippines for three months from September to November. The survey results were summarized and the draft final report were prepared at the end of December 2024, and the final report was submitted in February 2025. A flowchart of the survey process is shown below.

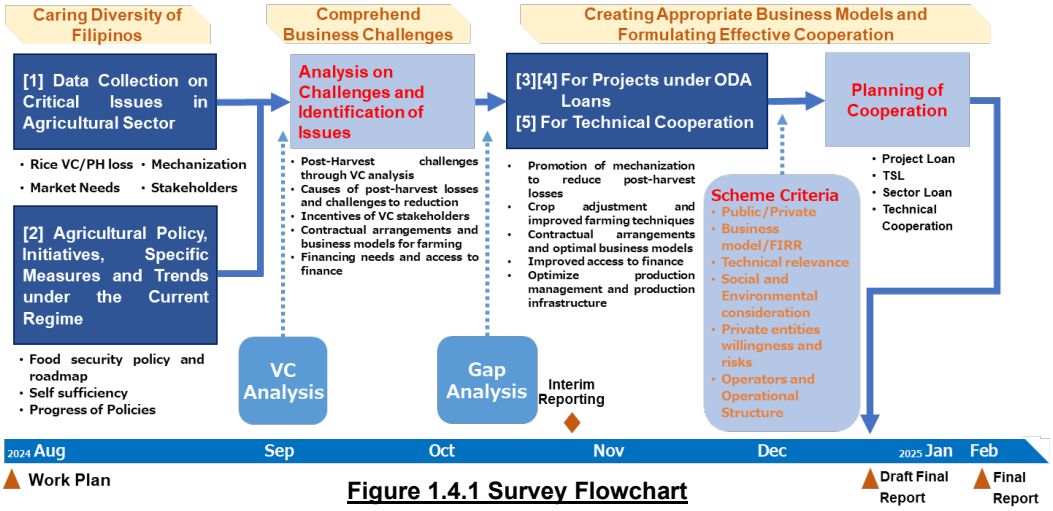


Figure 1.4.1 Survey Flowchart

The counterpart (C/P) agency for this study was the Department of Agriculture, with the full support of the Office of Undersecretary for Special Concerns and for Official Development Assistance (ODA)-Foreign Aid/Grants. The government agencies involved in rice sector in the Department of Agriculture are diverse. For this reason, we focused on the departments related to post-harvest handling processes in the rice VC and exchanged views on the status of implementation of the support measures, challenges, and future efforts. The government agencies that the team visited during the survey period or through

online meetings are listed below.

Table 1.4.1 Visited Government Organizations

Department	Offices/ Agencies/ Services/ Authorities
Department of Agriculture (DA)	Office for Undersecretary for Special Concerns and for Official Development Assistance (ODA)-Foreign Aid/Grants
	OURID: Office of Undersecretary for Rice Industry Development
	FOS: Field Operation Service
	PDS: Project Development Service
	AMAS: Agribusiness and Marketing Assistance Service
	ATI: Agricultural Training Institute
	BAFE: Bureau of Agriculture and Fisheries Engineering
	BPI: Bureau of Plant Industry
	BAR: Bureau of Agriculture Research
	BSWM: Bureau of Soil and Water Management
	PhilMech: Philippine Center for Postharvest Development and Mechanization
	PhilRice: Philippine Rice Research Institute
	NFA: National Food Authority
Office of the President of the Philippines (OP)	NIA: National Irrigation Administration
Department of Trade and Industry (DTI)	CDA: Cooperative Development Authority
Bangsamoro Autonomous Region in Muslim Mindanao (BARMM)	MAFAR: Ministry of Agriculture, Fisheries, and Agrarian Reform
Banks	ACPC: Agricultural Credit Policy Council
	DBP: Development Bank of the Philippines
	LBP: Land Bank of the Philippines

In order to efficiently collect information within a short period, the field survey was divided into three regions (Luzon, Visayas, and Mindanao), as described above, and intensive research was conducted at each of the survey sites. Specifically, in order to identify the current status and issues of rice VC, VC analysis and VC mapping were conducted in the form of workshops with participants from the three target regions including Nueva Ecija, Iloilo, and Bukidnon. Based on the VC maps created in the workshops, additional information was collected by visiting VC stakeholders.

Furthermore, a market needs survey was conducted in consumption areas such as Metro Manila, Iloilo City, and Davao City to ascertain the decision criteria of consumers and HoReCa vendors when making purchases. The survey of rice consumers was conducted with 120 respondents in one city, for a total of 360 respondents, to identify their determinants and attitudes toward quality when purchasing rice. A total of 81 retailers, wholesalers, and HoReCa industry workers (27 per city) were also surveyed using a questionnaire to grasp the determinants of their rice purchases.

In addition, surveys on the status and issues of existing drying and milling facilities for post-harvest processing, agricultural policy measures and trends, and agricultural finance were conducted through direct visits to private companies, National Food Authority (NFA) facilities, Rice Processing Systems (RPS), etc. For some provinces in Mindanao, such as the Autonomous Region of Muslim Mindanao and Bangsamoro (BARMM), online remote surveys were conducted. We would like to take this opportunity to once again express our gratitude to the rice VC stakeholders who accepted and willingly cooperated with the short and intense visit of the survey team.

Chapter 2 Current Issues and Analysis of the Agricultural Sector

2.1 Important Issues and Problems in the Agricultural Sector

The Philippine Development Plan (PDP) (2023-2028) identifies "modernization of agriculture and agribusiness" as a key challenge for the agricultural sector, citing as specific problems, low agricultural and labor productivity, low access to credit and insurance for small farmers, unsustainable agricultural practices, weak exports, low investment, inadequate infrastructure, fragmentation of farmland, and high vulnerability to multifaceted shocks.

It then identifies the following outcomes to be pursued by 2028 to address the above challenges during the plan period: 1) increase production efficiency, 2) improve market access and expand agro-enterprises, 3) strengthen the resilience of value chains (VCs), and 4) strengthen relevant organizations. Below are the details of the outcomes.

Table 2.1.1 Strategic Framework for the Agricultural Sector in the PDP

Outcome	Description
Efficiency of AFF production enhanced	・Diversify farm and non-farm income ・Consolidate/cluster farms ・Create and facilitate adoption of improved technology ・Improve access of primary producers to production requirements
Access to markets and AFF-based enterprises expanded	・Create opportunities for the participation of primary producers in value-adding of AFF (Agriculture, Forestry, and Fisheries) products ・Develop the blue economy ・Improve physical and digital infrastructure ・Improve the regulatory system for greater private sector investments ・Protect local AFF against unfair competition and supply/price manipulation
Resilience of AFF value chains improved	・Create and adopt climate- and disaster-resilient technologies ・Strengthen local food systems ・Develop and mainstream early warning systems/anticipatory mechanisms ・Integrate climate and disaster risks in AFF planning and programming ・Develop innovative insurance schemes ・Boost local capability on the production of AFF inputs
Agricultural institutions strengthened	・Improve coordination and convergence of government agencies in planning, programming, and budgeting ・Enhance support to agricultural education and job-skills matching

Source: Philippine Development Plan (2023-2028)

In addition, the "Philippine Rice Industry Roadmap 2030," which is positioned as a supporting measure for the PDP, identifies three main goals under the subtitle "Toward a rice-secure Philippines"; improving competitiveness, strengthening resilience against disaster and climate risks, and ensuring access to safe and nutritious rice.[1] The challenges related to improving competitiveness include the high cost of both production and post-harvest processes compared to other countries, as well as high post-harvest losses of 14.29%, of which 30% are incurred during harvest, 27% during drying, 39% during milling, and 4% during storage. In light of the challenges outlined in the above high-level plan, the following is a summary of the current challenges in the rice sector.

2.1.1 Challenges in Rice Policy

In addition to the above high-level plans, based on the recent policy implementation of the Department of Agriculture (DA), projects and other initiatives, and the latest available statistical information, the following key rice policy issues are identified; low self-sufficiency of rice, uncertainty about future food security, high rice prices, low income for rice farmers, and the impact of other agricultural products on the distribution of rice.

[1] "The Philippine rice Industry Roadmap 2030", Department of Agriculture, September 2018.

(1) Low self-sufficiency in rice

From 2012 to 2022, the population grew by 16% and rice consumption by 32%, while rice production increased by only 9.6% (FAOSTAT/ PSA). As a result, the Philippines' rice self-sufficiency rate will be 77% in 2022, and its dependence on imported rice is increasing year by year.

The upward trend in rice consumption in the Philippines is opposite that of other ASEAN countries, but data from both the Bureau of Agricultural Statistics (BAS) and the Food and Nutrition Research Institute (FNRI) indicate that rice consumption per capita (PCRC) is still on the upward trend. In addition to population growth, this has been attributed to a shift in the weight of rice consumption in provinces where maize had been the staple food.[2]

The shortfall in rice supply has resulted in increased dependence on imported rice. According to a USDA report, Philippine rice imports are expected to reach 3.65 million tons in 2023, 4.7 million tons in 2024, and 5.4 million tons in 2025, making it the world's largest rice importer for three consecutive years (USDA 2025).

(2) Competition with imported rice

In an effort to control inflation, the President of the Philippine sign Executive Order No. 62 (EO No. 62) dated June 20, 2024, changing the tariff on rice from 35% to 15% until 2028.[3,4] This was expected to lower the price of rice in the market by 5-7 Php per kg by lowering the price of imported rice, but it has not been effective enough and it has been noted that rice prices have remained high.[5,6]

In addition, actual rice imports are expected to exceed the calculated shortfall; according to the PSA, only 2.28 million tons per year should have been imported as of 2020 to meet domestic rice demand, but the liberalization of rice imports is believed to have actually resulted in about 1.7 times the amount being imported.[7] The high quality and popularity of imported rice may provide an incentive for importers to increase imports, and demand may grow more than to compensate for the shortfall; the implementation of EO No. 62 has tended to further increase imports due to lower tariffs, and domestic rice quality must improve to compete. In addition, since rice production costs in the Philippines are higher than in neighboring rice exporting countries such as Thailand and Vietnam[8], domestic rice producers are under pressure to reduce production costs as well as improve quality.

(3) Increasing rice prices

Rice prices have been increasing in recent years, with retail prices rising by approximately 1.4 times between 2021 and 2024 (Figure 2.1.1). The causes of this rise include restrictions on rice exports by India, soaring international prices due to strong demand from Malaysia and Indonesia, declining domestic production due to El Niño and typhoons, and rising production costs due to soaring fossil fuel and chemical fertilizer consumption for transportation and agricultural machinery.[6] In addition, despite the reduction in import tariffs under EO No.62, prices remain high, and there are concerns that rice traders may be artificially inflating prices.[9]

[2] "Increasing Per Capita Rice Consumption in the Philippines: Facts and Realities," Sergio R. Francisco et al, Oct 13 2011
[3] https://www.fas.usda.gov/data/philippines-philippines-issued-eo-62-modifying-import-duty-rates#:~:text=On%20June%2020%2C%202024%2C %20President,Favored%20Nation%20(MFN)%20rates.
[4] https://www.manila-shimbun.com/category/english/news277279.html
[5] https://manilastandard.net/news/314534575/neda-puzzled-lower-tariff-failed-to-reduce-rice-prices.html
[6] https://www.da.gov.ph/agriculture-chief-targets-rice-pricing-manipulation/
[7] The world's largest importer of rice, retail price down 18.6% (Philippines) | Business Briefing - JETRO's Foreign News - JETRO
[8] Php12.41 per kg of milled rice in the Philippines, Php8.86 in Thailand, and Php6.53 in Vietnam, with analysis showing that slow mechanization has led to higher production costs (PhilMech, 2019).
[9] https://www.da.gov.ph/agriculture-chief-targets-rice-pricing-manipulation/

A DA press release dated 18 September 2024 reported that the DA Secretary stated importers had increased their imports in anticipation of supply shortages caused by El Niño, but that most of these imports were made under the 35% rice tariff. In July 2024, the rice tariff was reduced to 15%. However, another press on 24 December 2024 stated that many traders were hesitant to sell in an attempt to prevent price drop and minimize losses, which was identified as the primary reason for the persistently high rice prices.

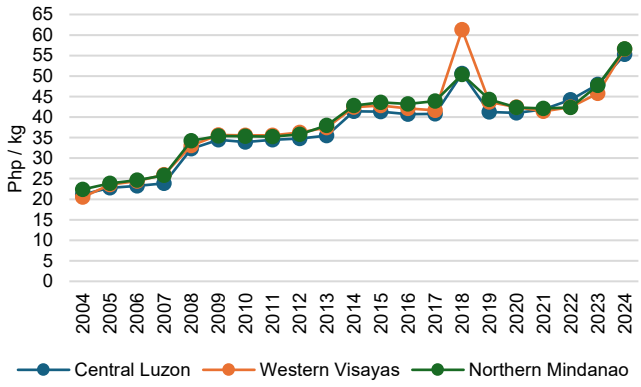


Figure 2.1.1 Trends in Rice Retail Prices by Region
Source: PSA

Furthermore, since the liberalization of private-sector rice imports, it is said that it has become difficult to accurately grasp the amount of stocked rice in the private sector and the amount in market. Therefore if the government is to stabilize therice prices through the release of buffer stock rice, it will be essential to accurately grasp the volume of stocked rice in the private sector in a timely manner through closer cooperation with the Port and Customs Bureau in the inspection of imported rice. In addition, in order to accurately grasp the volume of domestic distribution, including that of private companies, the DA will need to refine its data, by measuring the rice crop index, yield per unit area, and the actual yield of milled rice.

The poor are the most severely affected by high rice prices, FAO reports that 6.8 million people in the Philippines (5.9% of the total population) were categorized as "severe food insecurity[10]" in 2023, and 51 million people (44%) were in "moderate or severe food insecurity," the largest in Southeast Asia. The government has taken measures to stabilize rice prices, such as reducing tariffs on rice and supplying cheap rice through the KADIWA Center, but these have not had sufficient effect, and as of December 2024, rice prices remain high. For this reason, in December 2024, a law was revised to enable the NFA to supply stockpiled rice to the KADIWA Center.

(4) Low income for rice farmers

The estimated average income per season[11] (6 months) for rice farmers in the Philippines in 2023 is 41,000 Php/farmer as the national average, with 41,000 Php/farmer for the Luzon average, 19,000 Php/farmer for the Visayas average, and 49,000 Php/farmer for the Mindanao average (Table 2.1.2). On the other hand, the minimum necessary income for a five-person household to purchase basic food and daily necessities is 83,000 Php/6 months[12] (PSA, 2023), implicating that many rice farmers do not meet. For this reason, some rice farmers in Central Luzon, for example, have introduced melon, a cash crop with a short cropping season, as a secondary crop to increase their income from farming. Nowadays, tricycle drivers can earn about 500 Php per day[13], equivalent to 90,000 Php per 6 months. Such situations discourage youngsters to engage in rice farming.

To improve this situation, the Rice Competitiveness Enhancement Fund (RCEF) was implemented by Republic Act. No. 11203 which was started in 2019 as a policy to support farmers using rice import tariffs. In this fund, several farmer support measures were included such as agricultural mechanization, distribution of high-quality seeds, agricultural training, and financial assistance. However, because the

[10] Severe food insecurity means no food for a day or more, FAO
[11] Normally rice cropping takes 3 to 4 months in the Philippines, considering the preparation period before and after, one season was regarded as 5 to 6 months. The comparison was made assuming double rice cropping per year, both wet and dry season, and the cost of living for six months is obtained from one season of cropping.
[12] 13,873 Php/month = 83,238 Php/6 months = 166,476 Php/year, PSA
[13] Hearing at Asian United Bank

fund targets farmer associations and cooperatives, its effect on small farmers who do not belong to any organization is limited, leaving small rice farmers in a difficult situation.[14]

Table 2.1.2 Average Income of Rice Farmers (Php/ha/Season)

Region	Gross Returns (Php/ha)	Total Costs (Php/ha)	Net Returns (Php/ha)	Farm Size (ha/farmer)	Net Returns (Php/farmer)
Philippines	82,847	55,814	27,033	1.52	40,995
CAR	69,928	54,501	15,427	1.67	25,686
Ilocos Region	105,358	66,955	38,404	0.88	33,603
Cagayan Valley	97,869	72,255	25,614	1.50	38,507
Central Luzon	110,995	60,797	50,198	2.07	103,710
CALABARZON	74,062	60,353	13,709	1.35	18,507
MIMAROPA Region	74,510	54,199	20,311	2.27	46,038
Bicol Region	73,530	56,483	17,046	1.31	22,245
Luzon Total	**86,607**	**60,792**	**25,816**	**1.58**	**41,185**
Western Visayas	66,932	47,837	19,094	1.15	21,911
Central Visayas	60,513	56,249	4,263	0.63	2,686
Eastern Visayas	64,207	43,067	21,140	1.56	33,049
Visayas Total	**63,884**	**49,051**	**14,833**	**1.11**	**19,215**
Zamboanga Peninsula	81,757	57,276	24,481	1.16	28,316
Northern Mindanao	100,993	58,580	42,413	2.13	90,339
Davao Region	90,042	58,318	31,724	1.33	42,114
SOCCSKSARGEN	73,450	45,923	27,527	1.39	38,355
Caraga	63,621	44,101	19,521	1.82	35,430
BARMM	67,061	41,446	25,615	2.25	57,633
Mindanao Total	**79,488**	**50,941**	**28,547**	**1.68**	**48,698**

Source: JICA survey team calculations based on data from Philippine Statistics Authority (Gross Returns, Total Costs, Net Returns) and PalayStat System (Average Farm Size)

The number of agricultural workers relative to the total population has been declining compared to the 1990s, although it has remained at around 10% in recent years (Figure 2.1.2). The rate of decline has slowed since 2017, with an increase between 2022 and 2023. This is presumably since the number of people registered with the RSBSA (Registry System for Basic Sectors in Agriculture) has increased in recent years. Once farmers register with the RSBSA, they are allowed to receive government services and benefits related to agriculture and fisheries. In addition, the percentage of agricultural workers by age group shows that the percentage of young people is decreasing, indicating an aging population. (Figure 2.1.3) In 2012, about 81% of farmers were under the age of 55, while in 2022, this percentage had decreased to about 74%. Although the total population continues to increase, the number of young people engaged in agriculture, which provides less income than other industries, is gradually declining.

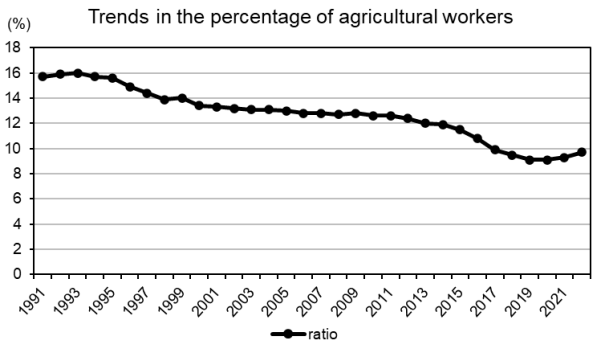


Figure 2.1.2 Trends in the Percentage of Agricultural Workers
Source: FAOSTAT

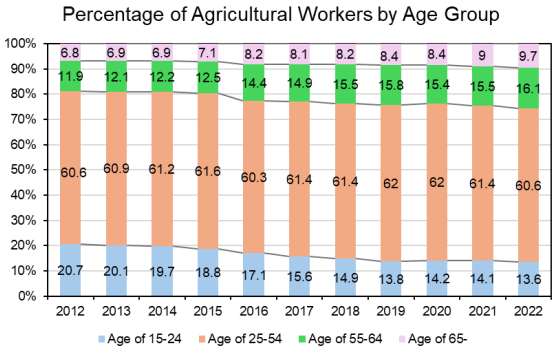


Figure 2.1.3 Percentage of Agricultural Workers by Age Group
Source: FAOSTAT

[14] https://jp.reuters.com/world/europe/CNZ334MER5IQHDWJG6KRYR4FBA-2024-11-09/

In Nueva Ecija, Iloilo, and Bukidnon, 20%, 47%, and 43%, respectively, of cultivators are engaged in agriculture, either renting land or as tenant farmers, paying tenant fees to landowners.[15] Tenant fees were, for example, 10% of the harvest in the dry season and 8% in the wet season in the Luzon region. In addition, many of the smallholders borrow money to pay for cultivation, and therefore must pay further interest from the above. Interest varies from region to region and from person to person, but in the Luzon region, it was 1,000 Php per 1 bag of paddy (50 kg), or 25 to 30%/season, or 5%/monthly, and so on. For reference, the average household income in the Philippines in 2023 is 353,230 Php/year (29,436 Php/month), according to the PSA.

(5) Influence of other agricultural products on rice distribution

In the Philippines, white corn is the second most important agricultural product after rice. In Mindanao and the Visayas in particular, maize is the staple food in some areas, and in some areas rice and maize are mixed together in the diet. However, in recent years, even in provinces where maize is the staple food, the emphasis has shifted to rice consumption, and this is one of the reasons for the increasing trend in rice consumption.

Against this backdrop, the Philippine government has recommended reducing dependence on rice, and companies such as AgriNurture, Inc. are working to expand corn production, but statistics show that rice consumption continues to increase.

2.1.2 Current Distribution and Sales of Rice and Related Issues

(1) Value Chain workshops

In order to understand the current distribution and marketing situation of rice and the challenges it faces, VC workshops were conducted in Luzon, Visayas, and Mindanao to better understand the regional characteristics of rice VC in the Philippines. The participation of a wide range of rice VC stakeholders, from upstream to downstream, including rice producers, collectors, dryers, millers, wholesalers, retailers, and government agencies such as NFA, NIA, PLGU, and MLGU, was conducted.

In the VC workshops, participants were divided into groups of producers (FCA), collectors, millers, and wholesalers/retailers, with government officials joining each group to provide support. Machinery/facilities, loss rates/measures, and challenges were discussed by the participants and organized in a matrix format. The information was then verified, and opinions were exchanged through presentations from each group to promote mutual understanding. The network of VC stakeholders established through the workshop was also intended to be used for future information exchange among stakeholders, as well as for use by the survey team to confirm data at the site and gather additional information later.

The VC workshops were conducted with the following arrangement.

Table 2.1.3 Arrangement of the VC Workshops

Date	Region	Location	Participants
9/13	Region 6 (Visayas)	Iloilo City, Visayas (Venue: EON Centennial Resort Hote)	Farmers (5), MPC (3), Private Sector (3) Gov. Officials (8), JICA/ Team (6) Total (25)
9/17	Region 3 (Luzon)	Nueva Ecija, Luzon (Venue: Acropolis Water Camp, and Country Club, Cabanatuan)	Farmers (-), MPC (18), Private Sector (-) Gov. Officials (5), JICA/ Team (8) Total (31)
9/20	Region 10 (Mindanao)	Bukidnon, Mindanao (Venue: Jocels Garden Suites, Valencia)	Farmers (7), MPC (1), Private Sector (1) Gov. Officials (12), JICA/ Team (7) Total (29)

[15] Average Farm Size and Farm Ownership by Province (2016), RBFHS, PhilRice-SED, 2019

The summary of the result of VC matrix is provided below. The originals created during the workshop are organized in Appendix 3.

1) Central Luzon (Nueva Ecija)

The results of the workshop in Central Luzon (Nueva Ecija) are shown in the following VC matrix. At the farmer/collector stage, cultivation and trading are conducted for each variety of Inbred and Hybrid. However, after milling, rice is classified not only by milling yield and variety but also by milling grade. For example, Special Rice includes varieties with special qualities such as glutinous rice, aromatic rice, colored rice, Japonica rice, and high-nutrient rice. Additionally, milling grades are based on the Philippines National Standard (PNS) set by the Bureau of Agriculture and Fisheries Standard (BAFS). Depending on the percentage of remaining bran, rice is classified as follows: more than 40% is UMR (Undermilled Rice), 20% to 40% is RMR (Regular Milled Rice), less than 20% is WMR (Well Milled Rice), and almost 0% is OMR (Overmilled Rice).[16]In the wholesale/retail stage, rice is sold with brand names such as "Sinandomeng" and "Dinorado," along with the milling grade. These brand names used to be the names of varieties of rice in the past, but with the advancement of varietal improvement, these pure varieties have already disappeared in recent years.

However, since these varieties were very popular and acceptable in the past years, the millers and suppliers use them as a marketing strategy, as these are the brands acceptable to the customers. Some rice millers and wholesalers are selling the varieties under the names of Inbred and Hybrid varieties. In addition, the rice produced on Mindoro Island is reputed for its high quality, and the name of the place of production is becoming a brand.

In terms of trading conditions, moisture content and variety are important at the paddy stage, and some collectors offer high prices for bulk quantities. At the milling stage, grain length and foreign matters, which affect milling yield, are considered important, while at the wholesale/retail stage, characteristics that consumers consider brand name, eating quality and aroma, affect price setting. Some wholesalers indicated that they use the variety as a reference for trading conditions.

It should be noted that the post-harvest losses in the matrix are empirical figures and not statistical information by each stakeholder. In Central Luzon, the response for post-harvest losses was at a low level of 5%, due to the high adoption of combine harvesters. The milling yield was 63 to 67%, with a tendency for relatively long grain varieties to have poor yields and short grain varieties to have good yields, which nods to the fact that in the above, millers are raising grain length as a trading condition.

As for measures to improve post-harvest losses, it was recognized among stakeholders that in addition to improving post-harvest processing facilities and equipment, measures are also necessary at the production stage, such as adjusting the timing of rice planting and harvesting, cultivation and harvesting of different varieties. Also as cited by some of the wholesaler/retailers, there is need for improvement on weighing methods due to inaccuracies of total weight indicated in the packaging which at times is much lower.

Table 2.1.4 VC Workshop Results (Nueva Ecija)

Item	Farmer	Rice trader	Rice miller	Wholesale/Retail
Product Overview	● (taxonomical) form Inbred, Hybrid	● (taxonomical) form Inbred (NSIC216/222) Hybrid (LP937/5434/ SL8H)	● Straight mill ● Semi graded ● Whole grain ● Special rice	● RMR (Sinandomeng, Anjelica) ● WMR (Dinorado, Jasmine) ● Inbred: RC216/218 ● Hybrid: Longping, Magat, Mestizo
Terms and	● Moisture content	● Moisture content, cash	● Moisture content	● Long grain type, moisture

[16] The reference values for PNS/BAFS can also be found in Appendix 5, "Rice Quality Standards and Factors Affecting Quality in the Philippines."

Item	Farmer	Rice trader	Rice miller	Wholesale/Retail
conditions (e.g. of a purchase or trade)	25-30 ● paying cash	payment ● Price by Type ● High purchase price for large quantities	14-15%. ● By variety (Long grain, Hybrid/Inbred, foreign matters)	content, variety (reference), Straight mill/ Whole grain ● Taste and Aroma
Post-harvest losses	● Loss at harvest: ma 5% (lack of drying facilities, poor weather)	(inclement weather, storage methods, rats/birds, bag refills)	● Warehouse: 2%. ● milling recovery rate: 63-67%.	● Dry loss: 16-20%. (bugs/mice/disease, measuring inaccuracies, price volatility, rot)
Measures against post-harvest losses	● Construction of post-harvest processing facilities	● Adjustment of rice planting time ● Adjustment of harvest time ● Cultivation and harvest by variety	● Improved storage methods, moisture control, harvest timing, rodent control	● Improvement of measurement methods ● mechanization
VC Improvement/ Challenges	● Dissemination of drying facilities ● Increase in storage facilities	● Increase in dryers, storage, farm roads, and transport machinery ● Mitigation of manpower shortage	● Initial dryness improvement ● moisture regulation	● Improved quality, improved milling yield, improved storage methods, handling of variety cliques, stable prices, improved in-home storage

Source: JICA survey team

Note: The numbers in the VC matrix are the numbers agreed upon by the participants in each group during the WS, and while they may be LGU statistical data, they may also be the average of the numbers held by the participants.

2) Visayas (Iloilo)

In the Visayas, the VC workshop was held in Iloilo City. The workshop confirmed that different stakeholders have distinctive views of paddy/rice. While farmers cultivate with variety in mind, collectors handle this variety broadly as long-grain and short-grain. This may be related to the effect on yield at the next milling stage. After milling, rice is traded by grade, such as Regular Milled Rice (RMR) and Well Milled Rice (WMR), and at the wholesale/retail stage, the distinction between domestic and imported rice is an important factor in product identification.

The conditions that farmers, collectors, millers, and wholesalers/retailers place importance on in their business dealings are also distinctive. At the farmer's level, rice for traders is dried, while rice for IA is dried in the sun before use. The collectors who purchase paddy indicated that they set prices by variety, and also use color to identify if the paddy is immature or not. Rice millers distinguish hybrid rice by whether it is seed distributed free of charge by the DA or the certified seed, indicating that they have confidence in the seed certification system.

Post-harvest losses were relatively high for farmers and harvesters at 12 to 15%. The higher post-harvest losses for both groups were attributed to the fact that in the year 2024, when the survey was conducted, the area was particularly affected by heavy rains and typhoons. They also reported losses of 2 to 5% at the wholesale stage and 10% at the retail stage due to presence of rodents and humidity control during transportation and storage. It is noteworthy that a wide variety of measures to address post-harvest losses were mentioned from the production to the retail stage.

Table 2.1.5 VC Workshop Results (Iloilo)

Item	Farmer	Rice trader	Rice miller	Wholesale/Retail
Product Overview	● Varieties (RC10/222/216, Hybrid)	● Short grain (RC10,/222), Long grain (RC216, etc.)	● RMR (Regular milled),. ● WMR (Well milled),. ● Hybrid	● Local: RMR, WMR ● Imported: Vietnam, Thailand
Terms and conditions (e.g. of a purchase or trade)	● Unseasoned for Vendor ● Dried for IA ● Prices are by quality	● paying cash ● Color (green＝ immature should be less than 20%)	● Seed (Hybrid or certified seed provided by DA) ● Moisture content	● Quality (color, texture: softness, broken rice ratio, aroma rice)

Item	Farmer	Rice trader	Rice miller	Wholesale/Retail
	and variety		(unseasoned/dried), color (white)	
Post-harvest losses (Cause)	● PH loss: 12%. (inclement weather, disasters, water shortages)	● PH loss: 15%. (heterogeneous, immature, rodents, transport)	● Loss during milling: 4%. (Retention in the field)	● Wholesale: 2-5%. ● Retail: 10%. (rodents, humidity, transpor
Measures against post-harvest losses	● Lack of dryers and warehouses ● insufficient funds ● Lack of appropriate information ● Lack of irrigation water	● Removal of foreign matter ● Harvest at 80-85% ripeness ● Pickup trucks, warehouses	● Appropriate agricultural guidance ● Irrigation retrofit, soil improvement ● Introduction of dryer ● Conduct of technical training	● Modernization of warehouses and improvement of storage methods (stacking methods, rodent control) ● Improve transportation facility
VC Improvement/ Challenges	● Improvement of production methods	● Climate change measures, fuel measures, and improvements in rice milling, warehousing, and transportation,	● Adjustment of varieties and harvest time, land consolidation, reduction in production costs, introduction of combine harvesters, expansion of warehouses	● Competition with imported rice, reduction of transportation costs, communication, reduction of excessive competition, inventory control

Source: JICA survey team

Note: The numbers in the VC matrix are the numbers agreed upon by the participants in each group during the WS, and while they may be LGU statistical data, they may also be the average of the numbers held by the participants.

3) Mindanao (Bukidnon)

In Mindanao, the VC workshop was held in Bukidnon. The provinces with high rice production in Mindanao include Maguindanao and Cotabato, but since both provinces are target sites for remote surveys, Bukidnon was selected as the province for the VC workshop. Participants in Bukidnon indicated that rice is distributed by variety at the upstream stage of VC and pricing by quality at the downstream stage, but confirmed that popular varieties such as RC160 are also traded by variety name at the market. In Bankerohan, the largest market in Davao, rice was sold under a variety of labels, including variety name, product name, and place of origin, in both the wholesale and retail markets. The fact that some retailers sell rice with the name of origin, such as Cotabato, Bansalan, Banay Banay, etc., is particularly noteworthy. The municipality of Banay-Banay located in Davao Oriental is famous in the area for its rice quality, hence, sold as Banay-Banay rice. This municipality is recognized as rice production area, in the Davao Region.

Regarding post-harvest processing losses, both collectors and millers reported high levels of 14% to 20%. One of the reasons for this is that the spread and use of combine harvesters has been slow, and high loss rates in the harvesting, stacking, and threshing processes, which have traditionally been a problem in the Philippines, are still common in the region. In Bukidnon, where mechanical dryers have been slow to spread and sun-drying is still common, rainfall occurs throughout the year with no distinction between the wet and dry seasons, and high losses are incurred by having to repack bags every time it rains.

To address post-harvest losses, farmers cited mechanization during harvest, such as the availability of more of combine harvesters and the use of haulers in poorly drained paddy fields. In addition, reflecting the delay in mechanization of the post-harvest treatment process, there are calls for mechanization and modernization of this process. Another feature of the VC improvement issues is the improvement of basic infrastructure, such as farm to market road (FMR) re-construction and /or repair and unstable electricity supply, has also been raised as an issue for VC improvement.

Table 2.1.6 VC Workshop Results (Bukidnon)

Item	Farmer	Rice trader	Rice miller	Wholesale/Retail
Product Overview	● Variety: red rice, Inbred (RC222/216/440, TH82, Longping) Hybrid (Bigante, Quadro, Alos)	● Varieties Inbred, Hybrid	● Paddy → Polished rice	● Polished rice
Terms and conditions (e.g. of a purchase or trade)	● Instant cash: Buyer harvests ● After 1 week :+1Php/kg ● After 1 month :+1.5-2Php/kg	● by breed ● Moisture content, purity, quantity, reference to current FGP	● by breed	● By Quality ● cash transaction
Post-harvest losses	(combine harvester shortages, delays in harvest services, poor weather, poor field drainage, threshing machine malfunctions)	● Loss from field transport to milling: 15-20%. ● Drying at NFA: 1%. ● Storage and transportation: 3-5%. (Environmental Factors)	● Post-harvest loss: 14%. At time of transport 1%. When dry: 5 In storage: 5%. When milling: 3%. ● milling recovery rate: 61-67	● milling recovery rate High quality: 60-67 Low quality: 48
Measures against post-harvest losses	● Spread of combine harvesters ● Widespread use of paddy field transporters ● Availability/ increase of post-harvest processing facilities	● Widespread use of transporters ● Variety Selection ● Modernization of post-harvest handling	● Replacement of Bag ● Introduction of sowing machine ● Warehouse Modernization ● Modernization of rice milling machines	● Moisture Content Adjustment
VC Improvement/ Challenges	● FMR Rehabilitation ● Mechanization of Agricultural Work ● Modernization of post-harvest handling	● Reduction of labor shortage ● Stable power supply ● Stabilization of fuel costs ● Dispersal and introduction of more of silos	● Insufficient funds for facility construction and/or repair ● Lack of training in facility management ● Lack of rice mill operation technology	● Lack of dryers

Source: JICA survey team
Note: The numbers in the VC matrix are the numbers agreed upon by the participants in each group during the WS, and while they may be LGU statistical data, they may also be the average of the numbers held by the participants.

(2) Issues by VC process

The table below is a summary of the VC process-specific issues and measures identified during the VC workshop and subsequent field visits and interview and follow-up surveys of other stakeholders. In the follow-up survey after the VC workshop, the production stage was also included for the purpose of considering the most effective ways to reduce post-harvest processing losses. Bearing in mind that post-harvest processing losses cannot be reduced without analyzing the production stage, such as seed quality, variety selection, and cultivation management, the survey tried to understand the issues from a broad perspective of the rice VC.

Table 2.1.7 Issues and Measures by VC Stage

VC Phase	Issue	Countermeasure
Seed	・ Mismatch between varieties popular in the market and those preferred by farmers ・ Inadequate quality maintenance (purity) by seed production cooperatives. Also, milling and sale of seeds by some members due to lack of funds and to get immediate cash. ・ Aging and no upgrading and improvement of seed storage facilities at Bureau of Plan Industry (BPI)	・ Market-oriented seed production and a shift to rice production based on market needs ・ Strengthen certified seed production system ・ Modernization of seed storage

VC Phase	Issue	Countermeasure
Production	・ Not synchronized planting dates in the region. ・ Inadequate post-IMT (Irrigation Management Transfer) river management (e.g. sedimentation) ・ Lack of farm roads and drainage channels, and narrow plots prevent the effects of mechanization ・ Aging farmers, lack of agricultural successors ・ Low farm-gate prices and rising production costs (labor, chemical, fertilizers). While many farmers rely on chemical fertilizers, the recent rise in the price of chemical fertilizers has become a major factor in the increase in costs. ・ Burning of fields after harvest (CO^2 emissions)	・ Strengthening of cooperation between rice mills, FCAs and producers and other agricultural related service providers (varieties, planting time, training service providers) ・ Land consolidation in consideration of local characteristics ・ Value addition using local by-products, use of composted stables and useful microorganisms, introduction of green manure crops ・ Diversification from continuous rice cropping situation
Agricultural machinery	・ Extremely poor maintenance of agricultural machinery provided by RCEF, etc. ・ Lack of specialized service providers ・ Abandoned rice transplanters, mobile dryers, fossil fuel dryers	・ Operational support in RCEF 2.0 ・ Strengthening AMTEC's agricultural machinery inspections (especially tractor rear axle output measurement) ・ Identification and strengthening of specific agricultural service providers
Harvest	・ No access road for combine harvesters in the field ・ In areas where combine harvesters are not widely used, losses due to hand harvesting, threshing, and piling up at the side of the field are common. ・ High moisture content of paddy due to poor drainage conditions ・ Packing is by bag/sack, which is inefficient and causes a lot of losses.	・ Promotion of increase and advantages of using combine harvesters ・ field improvement ・ Promotion of bulk handling (bulk transport)
Dryness	・ High losses when loading and unloading bags due to drying in the sun along roads, etc. ・ Lack of mechanical dryers in drying operations for rainy season crops (losses due to waiting for drying) ・ Rising labor cost of sun drying and labor shortage	・ Expansion of mechanical dryers (as part of climate change countermeasures at the end of unpredictable rainy seasons and larger typhoons)
Rice polishing	・ Un reliable source of paddy supplies due to uncertain commitment from FCA members to deliver after harvest ・ Unable to procure paddy due to lack of financial resources of FCAs and even small private millers, etc. ・ The rice mills provided by RCEF are not fully operational because some FCAs have not been able to secure a responsible person to operate them. ・ Milling by mixing many varieties of rice results in a large amount of broken rice. ・ Repair, restoration and or replenishment of aging and outdated rice milling machines is overdue which results in low milling recovery rate	・ Influence/control of production activities of FCA members provided with loans or under contract growing ・ Access to credit for working capital ・ Operational guidance, including financial support for upgrading and/or replenishment of outdated rice processing facilities.
Storage	・ Deterioration of NFA storage facilities and long-term storage (more than 6 months) in bags deteriorate the raw paddy quality. ・ Insufficient rice supply for victims of frequent natural disasters (NFA stockpile target = 0.32 kg/person/day× population x 9 days is sufficient?) ・ Damages by rats, birds, and insects ・ Many small farmers store paddy in outdated and/or conventional warehouses leading to quality deterioration.	・ MAFIM Assistance ・ Promotion of bulk storage ・ Tighter control of imported rice (prevention of excessive and unauthorized imports) ・ Partial legal strengthening of NFA functions (e.g., clarification of stockpile levels)
Distribution	・ Slump in rice prices and increase in quality imported rice due to implementation of rice tariff law in 2019 ・ Losses during transportation due to adverse weather conditions (rising humidity, submersion, etc.) ・ High land and water transportation costs	・ Lobbying support for returning the 15% tariff to 35%. ・ Strengthen guidance on rice labeling, apply rice quality standards

VC Phase	Issue	Countermeasure
	・ Counterfeit origin by rice sellers, blending of imported and domestic rice, ambiguity in labeling	
Organization	・ Many FCAs have management difficulties ・ Weak horizontal cooperation among organizations related to rice production	・ Provision of Management support to FCAs ・ Collaboration with AMTEC, BioMech, IPB of the University of the Philippines Los Baños (UPLB), IRRI Mechanized Post-Harvest Treatment Division, Association of Private Agricultural Equipment Producers and Sellers, agricultural service providers, etc.

Source: JICA survey team

(3) Post-harvest losses of rice

Post-harvest losses for rice in the Philippines are generally 14.52% - 16.47% (Table 2.1.9), although they vary depending on the survey method (method, location, and sample size) and time of year. The loss rates in the Philippines are high compared to other ASEAN countries, ranking third to Myanmar and Laos as shown in the following table below.

Table 2.1.8 Post-harvest Loss Rate for Rice in the Selected ASEAN Countries

Country*1	Post-harvest Loss Rate
Myanmar*2	16.8%
Laos*3	15.0%
Philippines*4	14.5%
Cambodia*5	10.0%
Thailand*6	9.8%
Indonesia*7	8.8%
Vietnam*8	7.0%
Malaysia*9	6.5%

*1 Among ASEAN member countries, Singapore and Brunei were excluded due to their extremely low rice production.
*2/*6/*7 "The Losses in the Rice Harvest Process" (MPDI, 2021)
*3 "Laos Rice Report Annual" (USDA-FAS, 2020)
*4 “Sectoral Commitments in Rice Postharvest (PhilMech, data in 2016)”
*5 "Productivity and Market Participation: Cambodian Rice Farmers" (IFAD, 2023)
*8/*9 "Research and Technologies to Reduce Grain Postharvest Losses: A Review" (MDPI, 2024)

The current post-harvest losses in the Philippines by each process are shown in the table below. According to PhilMech, the latest post-harvest loss rate is 14.52% as of 2016, whereas the average for 2008-2009 was 16.47%, an improvement of 1.95 percentage points from this point. However, the Regular Milled Rice (RMR) sold by weight in the wholesale market contains broken rice, yellowed rice, and blackened rice, which should originally be accounted for as losses. Therefore, it is estimated that the actual loss rate exceeds 14.52%.

Table 2.1.9 Current Status of Post-harvest Losses

Process	Status	Actor	Loss*		Causes	
			2008-09	2016	Quantitative Loss	Qualitative Loss
Harvesting	Combine harvesters are becoming more popular in the north (Luzon), but lagging in the south (Mindanao)	Farmer/ agricultural cooperatives/ associations (FCAs)	2.03%	2.72%	・ Grain drop, dispersal, and bird damage due to variety characteristics ・ Shoddy work, fallen grain during transport, leftover harvest, neglected grain of rice	・ Rainfall during harvest, alteration due to grain soaking in water for long periods of time (yellowish rice, black rice, rice with split body, fungal growth)

Process	Status	Actor	Loss*		Causes	
			2008-09	2016	Quantitative Loss	Qualitative Loss
Piling	Piling up grain of paddy in preparation for threshing operations (Areas where the dissemination of combine harvesters is lagging behind)	farmer	0.08%	0.05%	・Grain scattering, dehulling, and grain alteration due to moisture temperature rise ・Damage caused by insects, rodents and fungi ・Theft of Paddy	・Insufficient dryness due to bad weather at harvest time and not hanging rice on a rack
Threshing	Threshing machines or combines	farmer	2.18%	1.91%	・Deterioration and scattering due to late harvesting ・Shortage of skilled labor ・Foreign matter contamination (good grains blown off and mixed with rice husks, not threshed and mixed with residue)	・High rice broken rate due to high mechanical breakage ・Grain alteration due to threshing with high moisture content ・Alteration due to waiting for a long time for transportation by the side of the field with in the bag
Drying	Machine drying is being introduced, but sun drying is still common. With spreading combine harvesters, become a bottleneck in PH process	Farmer/ freight forwarder /Agricultural Cooperative/. rice miller	5.86%	3.52%	・Leakage, scattering and loss that occur when taking out of and putting back into the bag, as well as wind and rain during sun drying and traffic ・Animal predation (chickens, ducks, goats, rodents, insects)	・Drying speed cannot keep up with combine harvester yield ・Insufficient drying and discoloration/mildew formation due to rain during drying
Milling	Small-scale rice milling machine (one-pass type) Medium to large scale rice milling plant (multi-pass type)	Agricultural Cooperatives/ rice miller	5.52%	5.52%	・One-pass rice polishing machines complete the rice polishing process in a single pass, so milling recovery rate tends to be low due to improper maintenance and adjustment, or due to the settings of the rice polishing machine (e.g. pressure or rotation speed) (60% or less)	・Insufficient drying, contamination with different plants or foreign matter, improper seeds ・Small amount of whole head rice, colored rice, stones, adulteration, broken rice mixed, etc.
Storage	Paddy storage period is about 0.5 to 3 months (Storage period for milled rice depends on financial capacity)	Agricultural Cooperatives/ rice miller	0.80%	0.80%	・Destruction of grains due to infestation and proliferation of storage pests such as rats and cockroaches	・Yellowing rice due to inadequate drying (inadequate ventilation, temperature control in warehouses), growth of rice yeast pathogens
Total amount			16.47%	14.52%		

Source: JICA Survey Team developed based on "Postharvest Losses in Paddy and Maize in Major Producing Provinces of the Philippines: Stakeholders' Perceptions",. Renita Dela Cruz, et al, PhilMech (2016).

* Loss figures: Sectoral Commitments in Rice Postharvest (PhilMech).

(4) High production costs

The cost of rice production in the Philippines is relatively high among ASEAN countries. According to a study by PhilRice and IRRI[17], the cost of producing 1 kg of rice is Php 6.2/kg in Vietnam and Php 8.9/kg in Thailand, compared to Php 12.7/kg in the Philippines. The table below shows that labor and interest costs in the Philippines are particularly high.

[17] "Competitiveness of Philippine Rice in Asia", Flordeliza H. Bordey, et al. PhilRice/ IRRI, 2016.

Table 2.1.10 Comparison of Rice Production Cost (Php/kg) (2013-2014)

Activity	Thailand	Viet Nam	Philippines	Indonesia
Land Rent	1.90	1.40	2.19	6.64
Input	3.93	2.76	3.81	3.00
Machine, Animal	1.67	0.78	1.77	0.51
Labor	1.31	1.20	**4.53**	5.32
Capital Interest	0.07	0.09	0.44	0.31
Total Production Cost	8.88	6.23	**12.74**	15.78

Source: JICA survey team based on "Competitiveness of Philippine Rice in Asia", (P103), Flordeliza H. Bordey, et al, PhilRice/ IRRI, 2016

This is partly due to structural changes in rural society (aging population, labor shortages, etc.), but given that Thailand is also facing similar problems, it can be pointed out that the concentration of labor demand is causing a rise in wages. It is necessary to employ more labor during busy periods due to the delay in mechanization.

the delay in mechanization should be recognized as an important cause. Below is a comparison of agricultural mechanization levels between Thailand, Vietnam, Philippines and Indonesia. It should be noted that the data is before RCEF was started. The table below confirms that the Philippines was slower in adopting combine harvesters as compared to Thailand and Vietnam.

Table 2.1.11 Comparison of Agricultural Mechanization Levels with Neighboring Countries (2013-2014)

Activity	Thailand*	Viet Nam*	Philippines	Indonesia
Combine Harvester	100%	100%	3%	0%
Axial Thresher	0%	0%	97%	63%
Four Wheel Tractor	55%	76%	-	-
Two-wheel Tractor	44%	24%	**98**%	96%
Power Sprayer	1%	0%	1%	-
Mechanical Transplanter	0%*	0%*	**-**	-

*All farmers in Thailand and Vietnam use direct seeding

Source: PhilRice (2016), Implementing Guideline of the Mechanization program under the Rice Competitiveness Enhancement Program (RCEF)

Below is a comparison of labor input between Thailand, Vietnam, Philippines and Indonesia. Compared to Thailand and Vietnam, which are rice exporting countries, the labor input for each process of field preparation, cultivation, and harvesting can be confirmed to be significantly higher in the Philippines. Note that the data for these cost comparisons are based on the survey from 2013 to 2014, but they are one of the base data on which the RCEF is planned.

Table 2.1.12 Comparison of Labor Input in Rice Production (man-days/ha) (2013-2014)

Activity	Thailand	Viet Nam	Philippines	Indonesia
Land Preparation	1.8	2.4	**8.8**	14.7
Crop Establishment	0.9	6.3	**20.7**	21.7
Crop Care/ Management	6.3	11.0	**18.8**	27.3
Harvesting/ Threshing	0.7	1.2	**18.3**	25.6
Post-harvest	0.0	1.1	2.0	6.9
Total Labor Cost	9.7	21.9	**68.7**	96.2

Source: "Competitiveness of Philippine Rice in Asia", (P76) Flordeliza H. Bordey, et al, PhilRice/ IRRI

(5) Regional Challenges

An overview of the challenges in the Philippine rice sector is summarized in the table below from a regional perspective. The three regions covered are the Luzon, the Visayas, and the Mindanao region.

Table 2.1.13 Regional Challenges in the Philippine Rice Sector

Island Group	Contents
Luzon area	・It is the most advanced region in the country with the most advanced agricultural mechanization, with the representative granary of the Philippines, Central Luzon is located and where irrigated agriculture is flourishing, and very close to the large consumption area of Metro Manila. However, the southern part of Luzon area lags slightly behind the northern part in terms of opportunities. ・Although combine harvesters have become increasingly popular in recent years, there are cases where there are no in-field access roads for combine harvesters to enter, forcing them to cross fields before harvesting. ・Mechanization of the drying process has lagged behind the increase in harvest speed associated with the widespread use of combine harvesters, resulting in qualitative losses of rice due to waiting for drying. ・The island is susceptible to typhoons, floods, and other pre-disasters, causing damage to agriculture. In particular, in 2024, typhoons made landfall in the northern part of Luzon Island, causing extensive damage to pre-harvest rice. ・MPC purchases paddy from farmers and handles drying, milling, and sales (wholesale and retail). Vertical integration of VC is underway and there is a desire for VC rationalization.
Visayas	・The second largest rice producing region after Luzon region. Mechanization of tractors, combine harvesters, etc. is relatively advanced, but new demand of these machineries is still expected in the future compared to the Luzon region. ・Although Cebu is one of the largest city in the Philippines and has a large population of rice consumers, local production for local consumption is recommended due to the high cost of marine transportation and the high cost of transporting goods in the region. ・Net income for rice farmers is lower than in Luzon and Mindanao, according to PSA, that is about half the level of both regions. The region consists of numerous islands, and both farming and distribution expenses tend to be high, including fertilizer, pesticides, and fuel costs for agricultural machinery, which are highly dependent on imports. ・Poor access to combine harvesters and other farm machinery is a constraint to farming operations.
Mindanao Region	・There is no distinction between wet and dry seasons, and rainfall occurs throughout the year. Harvesting and drying must be done quickly during the few sunny periods, and combine harvesters and mechanical dryers are highly needed. ・Originally, the region was not subject to typhoon damage, but in recent years, it has been affected by typhoon crossings and has also been significantly affected by climate change (El Niño, rising temperatures, heavy rains and drought). ・Private investment lags behind other regions due to security risks. Infrastructure development, such as FMR, is also lagging behind, and public works projects are highly needed. ・The BARMM (Bangsamoro Autonomous Region in Muslim Mindanao) region is lagging far behind other regions in terms of government and donor support. The mechanization rate is by far the lowest in the country, and the level of infrastructure and other development is also low.

Source: JICA survey team

1) Luzon

Luzon Island is the Philippines' leading granary, and in the central area there is a large-scale irrigation areas. It is also the most advanced region in terms of agricultural mechanization, being close to the large consumer market of the Metro Manila. In terms of agricultural mechanization, the presence of both tractors and combine harvesters has spread extensively in the northern part of Luzon Island, and there is an expected demand for replacement in the future. On the other hand, in the southern part of Luzon Island, it is still in the process of spreading, and there is an assessment that new demand will continue in the future.[18]

As combine harvesters become more widespread, in fields where there are no access roads for combine harvesters, it is necessary to cross other farmers' fields before harvesting. In such cases, farmers who need to cross other farmer’s fields have to pay compensation, which has become one of the issues. In some areas that can be accessed from the roadside (usually long, narrow strips), farmers coordinate the varieties and planting periods before planting, so that they can harvest at the same time using combine harvesters.

[18] According to a Japanese company, the mechanization rate at harvest time is 100% in northern Luzon, 60% in southern Luzon, just under 50% in the Visayas, and 30% in Mindanao.

In addition, the speed of the drying process lags behind the speed of harvesting using combine harvesters. This means that there is a backlog of rice waiting to be dried, and while it is waiting, the quality deteriorates, resulting in a bottleneck in the post-harvest processing process. This is due to the lack of mechanized drying process, causing loss of rice due to waiting to be dried.

Luzon Island is an area with a relatively clear wet and dry season. It is vulnerable to damage from typhoons that occur in the nearby sea every year, especially from June to September. In particular, in 2024, typhoons caused damage in the north of the island, including Isabela and Ilocos, causing extensive damage to rice before harvest.

Luzon Island is a leading region for rice production in the Philippines, and activities by Multi-Purpose Cooperatives (MPCs) are quite active. Many MPCs purchase rice from farmers, handle drying, milling and sales (wholesale and retail), and there is a strong motivation for VC rationalization as vertical integration of VC.

2) Visayas

It is the second largest rice-producing region in the country after Luzon, and although mechanization is relatively advanced, it is still in the process of spreading, and new demand for purchasing agricultural machinery is larger than the demand for its replacement. The third largest city in the Philippines, Cebu, has a large population of rice consumers. However, the region is an island region, and transportation costs are relatively high, so “local production for local consumption” is recommended. The region consists of islands, thus, farming and distribution costs tend to be high due to high transportation costs. Income for rice farmers in this area is lower than in Luzon and Mindanao, and according to PSA, is about half the level of both regions. Irrigation projects have been implemented in the past, but the catchment area is narrow in many areas, and due to the recent El Niño, water shortages are severe in some areas.

Poor access to farm machinery such as combine harvesters is a constraint to farming. In addition, many farmers often have difficulty in preparing for costly fertilizers, pesticides, machinery expenses, and labor costs, and tend to rely on loans from local influential people, while government subsidies for inputs (coupon system) are a powerful support measure for farmers. In addition, NIA has introduced a contract farming system that includes subsidies for inputs starting in 2024, but since it is currently in the pilot project phase, there is a strong desire to see it widely implemented.

Farmers tend to grow many varieties of rice for various reasons, including high yield, ease of cultivation, and risk avoidance. The agricultural cooperative purchases each variety from the farmers, and in some cases (but only a minority of cases) it also requests the rice millers to mill each variety separately. However, this is only to maintain quality, and there is no price difference between varieties (although there is a price difference between the wet and dry seasons). Rather, for the rice millers, the distinction between long-grain and short-grain varieties is more important, as the mixture of the two affects the milling recovery rate.

There is a common understanding among VC stakeholders about the importance of moving from “Kanya Kanya” to “Sama Sama”. “Kanya Kanya” is a concept that encapsulates the idea of individualism and self-reliance in the Philippines and the idea that individuals have their own way, desires, and responsibilities that have been fostered historically. However, this concept has many issues when it comes to improving agricultural productivity and strengthening competitiveness, and the F2C2 (Farm and Fisheries Clustering and Consolidation) program is suggesting to shift from “Kanya Kanya” to “Sama Sama” (which means “together” in Tagalog), or in other words, to move towards collective or clustered agriculture.

However, many people involved in the F2C2 program believe that the word “consolidation” in the

program only refers to networking, and that it is difficult to achieve physical consolidation (i.e. land consolidation). One of the reasons for this is the complex rights relationships regarding farmland. Many farmers cultivate land as tenants or leaseholders, and there are many absentee landlords. Landowners are afraid of losing their rights to the land to the tenant farmers, and are reluctant to carry out land consolidation projects that involve land reallocation or land consolidation.

3) Mindanao

Mechanization is relatively slow, and this is a growing market where new demand for tractors, harvesters, and other equipment is expected to expand. The slow diffusion of combine harvesters has resulted in losses in the harvest process due to stagnant harvesting operations, waterlogging damage during rainfall, and losses due to manual harvesting.

There is no clear distinction between wet and dry seasons, and rainfall occurs throughout the year. Therefore, during the drying process, some paddy is washed out due to rainfall, resulting in large drying losses. Harvesting and drying must be done quickly during the few sunny periods, and combine harvesters and mechanical dryers are highly needed. However, there are issues such as the inability to use dryers at the right time due to unstable power supply, and sun drying is also necessary.

Originally, the region was not affected by typhoons, but in recent years, there has been damage from typhoon and the effects of climate change (El Niño, rising temperatures, heavy rains and drought) have become more pronounced in the island. In addition, private investment lags behind that of other regions due to security risks. Infrastructure development, such as farm to market roads and irrigation, has also lagged behind.

Another problem is the lack of farm labors, due to exodus to the cities, due to the demand for labor to work in large agribusiness cooperations, as well as for public works projects such as road construction. This is one of the reasons why mechanization of agriculture is urgently needed in the area.

Domestic shipping costs in the Philippines are high due to cartels in the shipping industry, and it is cheaper to import goods from Vietnam to Davao than to ship them from Davao to Manila. This fact indicates the need to promote local production for local consumption.

2.1.3 Nationwide and Regional Adoption of Machinery and Facilities for Production and Post-Harvest

(1) The current situation of disseminating agricultural machinery for production and postharvest processes

Although the Philippines is the world's 8th largest rice producer, rice cultivation is done primarily manually. The country's self-sufficiency rate for rice is 77% (2022) and it relied on imports, about 30% in 2024. As economic development expanded, the rural economy faced a shortage of agricultural laborers, hence requires agricultural mechanization of rice cultivation. RCEF, which began in 2019, contributed greatly to mechanization. Tilling operations (plowing and rotary tilling) were shifted from hand tractors to four-wheel tractors (except in upland areas), and harvesting operations were shifted from hand harvesting, collecting, and threshing machines to combine harvesters. The numbers of agricultural machinery and facilities procured by the DA and eligible for fuel subsidies were 17,659 four-wheel tractors, 8,813 combine harvesters. Prior to 2019, the number of tractors was about 80,000, but mostly for upland crops, while equipment procured by the DA accounted for most of the equipment for rice production. In the rice milling process, most of the rice consumed in rural areas are single-pass rice hulling mills, while private rice milling companies operate multi-pass milling lines where the milling capacity is 1 ton/hr or higher. Furthermore, the RCEF has allowed FCA to operate rice mills. The following table shows the number of agricultural machinery units procured under government

projects or serviced by government-related projects. Of the machinery procured, 63.4% were from Japanese manufacturers, that includes four-wheel tractors, rice transplanters, cultivators, combine harvesters, and rice milling lines. The rest were from manufacturers in the Philippines, Korea, China, and Vietnam.

Table 2.1.14 Number of Agricultural Machinery Procured in Government Projects or Serviced in Government-Related Projects

Region	Four-Wheel Tractor	Rice Transplanter -Walk Behind	Rice Transplanter -Riding-type	Rice Combine Harvester	Flatbed Dryer	Mechanical Dryer-Recirculating	Single-pass Rice Mill	Multi-pass Rice Mill
Region I	3,726	214	69	421	38	61	1,126	95
Region II	2,539	368	40	1,631	199	354	2,007	284
Region III	5,940	484	155	3,240	323	519	601	525
Region IV-A	297	257	19	538	50	109	286	80
Region IV-B	883	163	47	421	24	532	725	175
Region IX	338	122	27	338	76	94	211	37
Region V	405	300	47	242	59	88	646	173
Region VI	689	492	205	288	30	97	278	67
Region VII	202	175	59	156	10	42	150	12
Region VIII	408	326	180	205	4	75	149	23
Region X	534	292	57	299	61	54	365	64
Region XI	370	153	60	155	10	197	138	111
Region XII	260	100	66	60	9	76	92	39
Region XIII	661	266	93	627	228	330	635	185
CAR	308	47	3	159	38	46	312	95
BARMM	99	113	13	33	0	0	28	3
Total	17,659	3,872	1,140	8,813	1,159	2,674	7,749	1,968

Note*: Multi-pass Rice Mill is the cumulative number of component units.
Source: PhilMech, Dec 2024

According to PhilMech's analysis, the national average is 2.6 HP/ha, as shown in the figure on the right, when power (in horsepower) per hectare of rice cultivation land is evaluated by combining human, animal, and mechanical power. Currently, only 11% of the land is used for carabao and other livestock power, and mechanization is progressing at 84%. However, it is necessary to carefully examine the operating status of the rice-growing machinery that has been introduced.

The number of power units for rice cultivation machinery in Figure 2.1.4 includes rice cultivators, four-wheel tractors, reapers, power threshers, and combine harvesters. The Ilocos region, Calabarzon region, and the eastern part of Panay Island have relatively high power sufficiency. On the other hand, the Caraga, Soccsksargen, Zamboanga Peninsula, BARMM, and eastern Samar regions of Vsayas are underpowered. Also, Palawan and Cebu, but these are not rice-growing regions. From the standpoint of equity, mechanization is urgently needed in the rice-growing areas in each region of Mindanao.

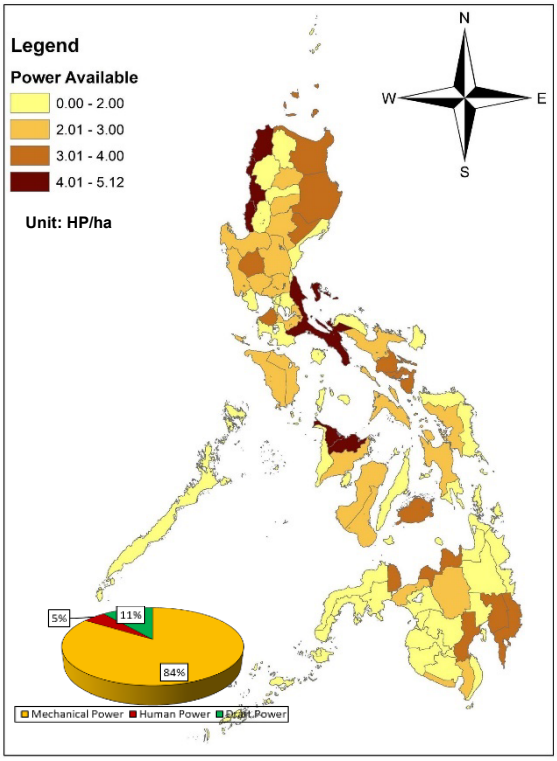


Figure 2.1.4 Available Power per Hectare for Paddy Field by Province
Source: PhilMech

PhilMech estimates that implementing the RCEF until 2031 will increase the average power per hectare to 4.0 HP/ha. Nueva Ecija, which has the highest domestic rice production, was already more mechanized than other regions in 2019 when the RCEF started, so it was not covered by the RCEF.[19] The latest figures published by PhilMech as of October 2024 show that the national average has increased to 2.77 HP/ha, and is expected to reach 3.0 HP/ha by June 2025 with RCEF 1.0.[20]

According to DA-BAFE's GEOAGRI analysis, the regions that are not meeting their tractor requirements are as follows. (Note that PhilRice evaluates by number of horsepower, while DA-BAFE evaluates by number of units)

Region II, Isabela: The number of tractors is insufficient for the overwhelming rice acreage. According to AgriComponent (secretary of the Philippine Association of Agricultural Machinery Manufacturers and Distributors), which is located in the province, the number of tractors in the private sector is likely to increase in the future.

Region V, Camarines Sur and Albay: Areas with widespread rice shortages. These regions have a small number of tractors, and it is expected that mechanization through FCA operations via RCEF 2.0 will penetrate these areas in the future.

Region VI, Iloilo and Capiz: A single plot is small and conversion from cultivator to four-wheel tractor has been slow, but FCA could streamline plowing/tilling and harvesting operations through joint operations.

Region VIII, Leyte: A single plot is small and conversion from cultivator to four-wheel tractor has been slow, but with FCA's support for joint operations, plowing/tilling and harvesting operations could be made more efficient.

Region XII, Sultan Kudarat and South Cotabato: The number of tractors is overwhelmingly small, and mechanization through FCA operation via RCEF2.0 is expected to spread in the future. Surplus rice from this region is also distributed to Region VIII, and early mechanization is expected.

(2) The current status of the rice mill

Private rice mills range in milling capacity from 1 ton/hr to 10 ton/hr. According to the survey team's research, small-scale rice mills are increasingly going out of business due to the enforcement of the Rice Tariffication Law. Small and medium-sized rice millers handling less than 1,000 tons of milled rice per year have been forced by the enforcement of the rice tariff law to prefer a certain quality of milled rice by consumers over low-quality domestic rice with low whiteness and high broken rice content. On the other hand, farm gate price of paddy are on the rise, resulting in declining profits for rice mills. Large-scale rice milling companies are responding by blending rice with Vietnamese rice, increasing shipments to major fast food restaurant and major supermarkets by improving the quality of domestic rice, and branding their own products. Large-scale rice mills that handle tens of thousands of tons per year are upgrading their facilities while increasing the volume handled, resulting in a polarization of rice mill sizes. The RCEF is procuring equipment for multi-purpose cooperatives and local governments as part of the Rice Processing System (RPS) project. RPS-1 has a milling capacity of 1 ton/hr, RPS-2 2.5 tons/hr, and RPS-3 5 tons/hr. The NFA ranges from 1 ton to 10 ton/hr, but some of the rice milling machines in operation are out of service due to aging.

[19]https://www.philmech.gov.ph/?page=stories&action=storyFullView&recordID=20248634842PM3c17fb9&storyCateg=RCEF& storyYear=&storyMonth=3
[20]https://www.philmech.gov.ph/?page=stories&action=storyFullView&recordID=2024111342405PMe5a9e&storyCateg=RCEF& storyYear=&storyMonth=11

Table 2.1.15 Number of Rice Mills by Province

Region	Commercial Private Rice Miller	RCEF Rice Processing System Program**			NFA***.	
		RPS 1	RPS 2	RPS 3	Operational	Non-operational
NCR	87	0	0	0	0	1
Regio I	226	4	0	0	2	0
Region II	167	4	2	1	6	0
Region III	357	6	2	0	1	0
Region IV-A	139	0	1	0	2	0
Region IV-B	126	1	0	0	0	1
Region V	236	0	1	0	3	0
Region VI	210	2	0	0	4	0
Region VII	131	1	0	0	2	1
Region VIII	140	2	0	0	1	3
Region IX	111	0	0	0	0	1
Region X	73	0	2	1	0	1
Region XI	116	0	0	0	1	0
Region XII	109	0	0	1	2	1
Region XIII	86	2	1	0	0	1
CAR	27	0	0	0	0	0
BARMM	22	2	0	0	0	1
Total	2,363	56+(14)	17+(36)	5+(1)	24	11

Source: *1 K Dragon Company LTD. (private) Nov 2024, **PhilMech Dec 2024, ***NFA Dec 2023

(3) Competitiveness of Japanese manufacturers and the presence of agricultural machinery manufacturers from other countries in the Philippines

Japanese products of agricultural machinery and post-harvest processing facilities have advantages in terms of light vehicle weight, engine efficiency, and water and dust proofing for field machinery for rice cultivation. Of the 16,658 units procured by RCEF, 68.6% of machinery was made by Japanese manufacturers, followed by 14.5% by Korean manufacturers and 9.9% by Taiwanese manufacturers. By type of machinery, Japanese-made tractors and combine harvesters had a high share of 72.0% and 94.4%, respectively. On the other hand, 56.5% for hand tractors, 57.2% for rice transplanters, and 50.0% for rice milling lines, respectively, the competitors are Korean manufacturers for hand tractors, Korean manufacturers for rice transplanters, and Swiss manufacturers (fabricated in China) and Taiwanese manufacturers for rice milling lines. As for mechanical dryers, Taiwanese and Korean manufacturers account for 41.5% and 31.8%, respectively, putting Japanese manufacturers at a disadvantage in terms of price (see Appendix 7). Japanese manufacturers of dryers and rice milling machines are forming technical alliances with local manufacturers to strengthen their competitiveness in terms of prices of equipment and installation costs, and to improve their after-sales-service systems.

Regarding the competitors of Japaneses manufacturers, the number of Chinese combine harvesters (FM World) are low due to frequent breakdowns. 6-12 ton/batch recirculating mechanical dryers are widely used by Taiwanese (Sankyu), Filipino (AgriCompo), Korean (ShinHueun), and Yamamoto Mfg. In some cases, large-size circulating mechanical dryers and storage bins with a capacity of 100 tons/batch or more are made in Europe and the U.S. (Cimbiria, GSI). Rice milling lines were mostly made in China, but in recent years, Vietnamese milling machines (Buivanngo) have been adopted in many cases; Satake and Bühler (Germany) milling lines are installed in many NFA facilities and are also used by large rice milling companies that emphasize rice milling quality. Chinese products are generally widespread in uses widely used for small- and medium-scale rice mills. Both products need to respond quickly to user requests, and problems have been noted with equipment procured through RCEF and

bilateral aid, where spare parts are not supplied promptly, resulting in lower utilization rates than equipment sold commercially.[21]

Now, four-wheel tractors for upland crops with a high output of 90 hp or more are sold by Chinese manufacturers (YTO, Lovol, ZoomLion, etc.), European/American manufacturers (John Deere, Massey Fergason, NewHolland, Claas), and Indian manufacturers (Farmtrac, Sonalika, Solis). Chinese-made tractors have an advantage in terms of price, but European-made tractors are stronger in terms of durability. According to the mode tests for the four-wheel tractor conducted by AMTEC, 10 (2022), 3 (2023), and 9 (2024) of Japanese manufacturers' models (including Thai production) are tested, while 7 (2022), 8 (2023), and 14 (2024) were tested for Chinese manufacturers' models. Entering the Philippine market with Chinese products is activated. The following table shows the Japanese manufacturers that have operations in the Philippines, and the survey team obtained information by visiting the offices of each company and meeting with them at agricultural exhibitions.

Table 2.1.16 Achievements of Japanese Companies in Agricultural Mechanization

Company Name	Main Products	Achievements, etc.
Kubota Corporation	4 Wheel Tractor, Combine Harvester, Hand-walk Tiller, Diesel Engine	In 2011, the company made a locally capitalized company as a subsidiary and have now 26 dealers. The company's tractors and combine harvesters have the largest penetration rate. The company is working to develop service providers to promote seedling growers and rice transplanters.
Yanmar Co.	4 Wheel Tractor, Combine Harvester, Diesel Engine	The company has 39 dealers nationwide. The company's tractor and combine harvester sales are second only to Kubota. The company is collaborating with Japanese drying and rice milling equipment manufacturers to develop post-harvest processing facilities. Together with a consulting firm, the company is conducting demonstration test of AWD using the carbon credit system.
Satake Corporation	Rice Milling Machine	Used in rice milling plants above 3 ton/hr at NFA and large rice milling companies; established a local subsidiary in 2024 to provide technology to local manufacturers to reduce product cost.
Yamamoto Industry Co.	Mechanical Dryer, Rice Mill	The company has the largest number of circulation-type mechanical dryers among Japanese manufacturers. The company is collaborating with local manufacturers to reduce costs.
Hokoku Plant System Ltd.	Mechanical Dryer	A strong manufacturer of conveyors for transferring grain and other materials, with a proven track record in circulating mechanical dryers and silos in partnership with Japanese and local manufacturers.

Source: JICA survey team

2.1.4 Analysis of Transactions and Stakeholders in the Rice Value Chain, and Challenges in Trade

(1) Role of Stakeholders in Rice VC

Rice VC involves various stakeholders from the production area to the consumption area. Generally, rice "producers" are small and have little capital power, so there are many "collectors" in the production area who collect the paddy and deliver a certain volume of paddy to a drying and milling company. These collectors often have a certain amount of power in rural areas and have a strong influence over rice farmers. The collectors sell the paddy to private millers and government agencies such as NFAs, but there are also cooperatives and associations (FCAs) that collect paddy from their member farmers and sell to both (NFA and private millers).

Additionally, there are cases where multiple FCAs come together to form a cluster recommended by the F2C2 program. Under RCEF, single or multiple FCAs operate vertically integrated processing facilities

[21] Southeast Asia Agriculture, Natural Resources and Rural Development Facility - Phase II - Rice Competitiveness Enhancement Fund Midterm Evaluation (Dec 2023), ADB

that handle everything from rice collection to drying, milling, and marketing, known as the Rice Processing System (RPS). The Rice Processing Complex (RPC), established under the auspices of KOICA, is another form of rice VC vertical integration, although the operating entities vary from FCA to LGU.

Rice millers are usually located near the production area, but in some cases, such as in Bulacan in Luzon, the large-scale millers are concentrated near the consumption area. In any case, the larger the consumption area, the greater the number of stakeholders between rice milling and consumption, including wholesalers, retailers, intermediaries between them, traditional markets, supermarkets, convenience stores, HoReCa industry players and their intermediaries, etc.

The roles and characteristics of each stakeholder in VC are summarized below.

Table 2.1.17 Roles and Characteristics of Key Stakeholders in Rice VC in the Philippines

Rice VC stakeholders	Roles and Characteristics
Rice grower	・ Although their role is to produce paddy based on the market's demand (quantity and quality), they basically tend to grow varieties that have high yield and are resistant to pests and diseases. ・ Of the producers, 57% are farmland owners, 39% are renters or tenant farmers, and remaining 4% are others.
FCA (Farmers Cooperatives and Associations)	・ FCA has various forms such as Cooperative, Irrigators Association (IA), SWISA (Small Water Irrigation System Association), etc. Cluster of F2C2 is one of these forms. ・ Traditionally, their role is to collect paddy, jointly purchase inputs, and provide small loans to their members, but some organizations are vertically integrated in rice VC, including collection, drying, milling, and marketing, and are diversified in management, including RPS operations and businesses. ・ Some organizations are only formed as recipients of the government supports/ aids. They are accustomed to receiving agricultural machinery free of charge, and if it breaks down, they sometimes leave it without repairing.
Collectors/Agents	・ Its primary role is to procure paddy from small producers scattered throughout rural areas and sell it to millers located along main roads in rural areas. ・ They often have strong interdependent relationships with farmers. They have long-term business relationships (so called “Suki”) that have been nurtured in a boss-henchman culture and often provide small loans to farmers. ・ When purchasing paddy, quality evaluation is conducted based on physical criteria such as moisture content, appearance, and whether wet or dry and presence of foreign matter. Moisture content may be measured by crushing or biting hard.
Rice millers/traders	・ Its main role is to mill paddy, classify, package, store the rice, and then sell to consumers. There are two types of rice mills: those that purchase paddy and mill the rice to sell, and those that provide rice milling service only (Custom Milling). Some millers mill rice by variety, but many mix it up (to avoid the hassle of distinguishing between many varieties and to seek economies of scale). Others, at the request of distributors (rice buyers), ship rice in bags printed with brand names unrelated to the variety. ・ Some FCAs are in a state of suspension due to a lack of funds for purchases caused by the concentration of paddy procurement periods. There is a dilemma of not being able to respond to farmers who demand immediate payment.
NFA (National Food Authority)	・ The paddy to be procured is basically for disaster relief, and after the storage period (maximum of six months), it is given to the LGU and DSWD, etc. at a low price. Furthermore, according to Republic Act No. 12078 of December 2024, in areas where there is a shortage of rice supply or a rise in prices, it is possible to sell stocked rice to the general public through KADIWA centers. ・ No consideration on quality and variety. ・ There is competition with private rice millers when purchasing paddy from farmers. When market prices are high, it is difficult to procure rice as planned. ・ As a result of accepting and storing rice with poor quality, rice that is not suitable for eating is supplied as food.
RPS (Rice Processing System)/ RPC (Rice Processing Center)	・ It is a sort of Vertically integrated rice VC from paddy collection, drying, milling, to distribution, often managed by MPCs, and /or the operated by PLGUs. In some cases, they have difficulty buying paddy from farmers due to competition with the private sector, and they end up having to suspend operations. ・ Economies of scale are essential for business stability, but the challenge is that they do not have the financial resources to achieve this.
Wholesaler	・ A trader that exists between the miller and the retailer/end-user, but may also serve as both miller and retailer.

Rice VC stakeholders	Roles and Characteristics
	・ The number of wholesalers is smaller than that of retailers and is said to be strongly dominated by a small number of wholesalers.
Retailer	・ A vender that purchases rice from millers and wholesalers and sells it to end-consumers. There are many retailers and they are constantly exposed to competition. ・ In addition to small retailers in traditional markets, there are also modern corporate entities such as supermarkets, piper markets, and convenience stores in urban areas. ・ In most cases, depending on consumer preferences, the products are sold by brand name (“Dinorado”, “Sinandomeng”, etc.), variety name (NSIC Rc218, NSIC Rc160, etc.), or production area name (Mindoro, Cotabato, etc.).
HoReCa Industry	・ The one who purchases rice through wholesalers, retailers, or intermediaries, and use rice for making processed foods, and supply it to customers, allowing the company to communicate consumer preferences to the supplier.
Consumer	・ Consumer surveys show that when purchasing rice, consumers tend to pay attention to price, taste, softness, brand name (“Dinorado”, “Sinandomeng”, etc.), and quality, with particular emphasis on whiteness in terms of quality. In terms of quality, imported rice is popular.

Source: JICA survey team

While a large survey is needed to get a quantitative picture of rice VC in the Philippines, PhiliRice's 2020 survey results[22] provided a rough, quantitative picture. The survey attempted to understand rice distribution in the top 20 rice-producing provinces throughout the Philippines (including Luzon, Visayas, and Mindanao) through a survey of rice VC stakeholders (producers, paddy collectors, millers, wholesalers, and retailers). According to the survey, 61% of farmers sell to paddy traders, 30% sell to rice millers, and 2% each go to growers' associations and NFAs. The general distribution channels are divided into five types, as shown below, which can explain 63% of the total rice distribution.

Table 2.1.18 Major Distribution Channels of Rice in the Philippines

No.	Channels	Volume (%)
1.	Farmer→ Paddy Trader→ Custom Milling→ Rice Retailer→ Consumers	27.1%
2.	Farmer→ Paddy Trader→ Custom Milling→ Consumers	15.4%
3.	Farmer→ Paddy Trader→ Rice Miller→ Wholesaler→ Retailer→ Consumers	7.6%
4.	Farmer→ Rice Miller→ Wholesaler→ Retailer→ Consumers	7.1%
5.	Farmer→ Paddy Trader→ Rice Miller→ Wholesaler/Retailer→ Consumers	5.9%

Source: "Rice Value Chain Analysis in the Philippines: Value Addition, Constraints, and Upgrading Strategies", Alice B. Mataia, et al., Asian Journal of Agriculture and Development, Volume 17, Number 2, December 2020.

The structure of rice VC in the Philippines is shown in Figure 2.1.5. In the figure below, the NFA is allowed to handle imported rice. Although the NFA had stopped handling imported rice in recent years due to the downsizing of its functions, Republic Act No. 12078, approved by President Marcos on December 9, 2024, allows the NFA to supplement its rice stock with domestically produced rice or imported rice when the supply of domestic rice is insufficient. Under the Marcos administration, which emphasizes food security, the role of the NFA is being strengthened, and the above law officially allows the NFA to sell rice stock to government agencies and the public through the KADIWA ng Pangulo Center in areas where rice supply shortages or abnormal price hikes are occurring.

According to the table below, the Cooperative's distribution volume is only 1.87%, which seems rather low. 2023 CDA statistics show that there are 7,669 agricultural cooperatives with 2,034,273 members. Since the population employed in agriculture is approximately 10 million, this means that about 20% of the population are members of cooperatives. The number of rice farmers in the Cooperative is even smaller, and those farmers who belong to the Cooperative do not necessarily distribute all their production to the Cooperative. Many farmers purchase agricultural inputs by borrowing money from local collectors/ traders, and it is thought that, in many cases, they sell more to them than to the

[22] "Rice Value Chain Analysis in the Philippines: Value Addition, Constraints, and Upgrading Strategies", Alice B. Mataia, et al., Asian Journal of Agriculture and Development, Volume 17, Number 2, December 2020.

Cooperative in order to repay the debt.

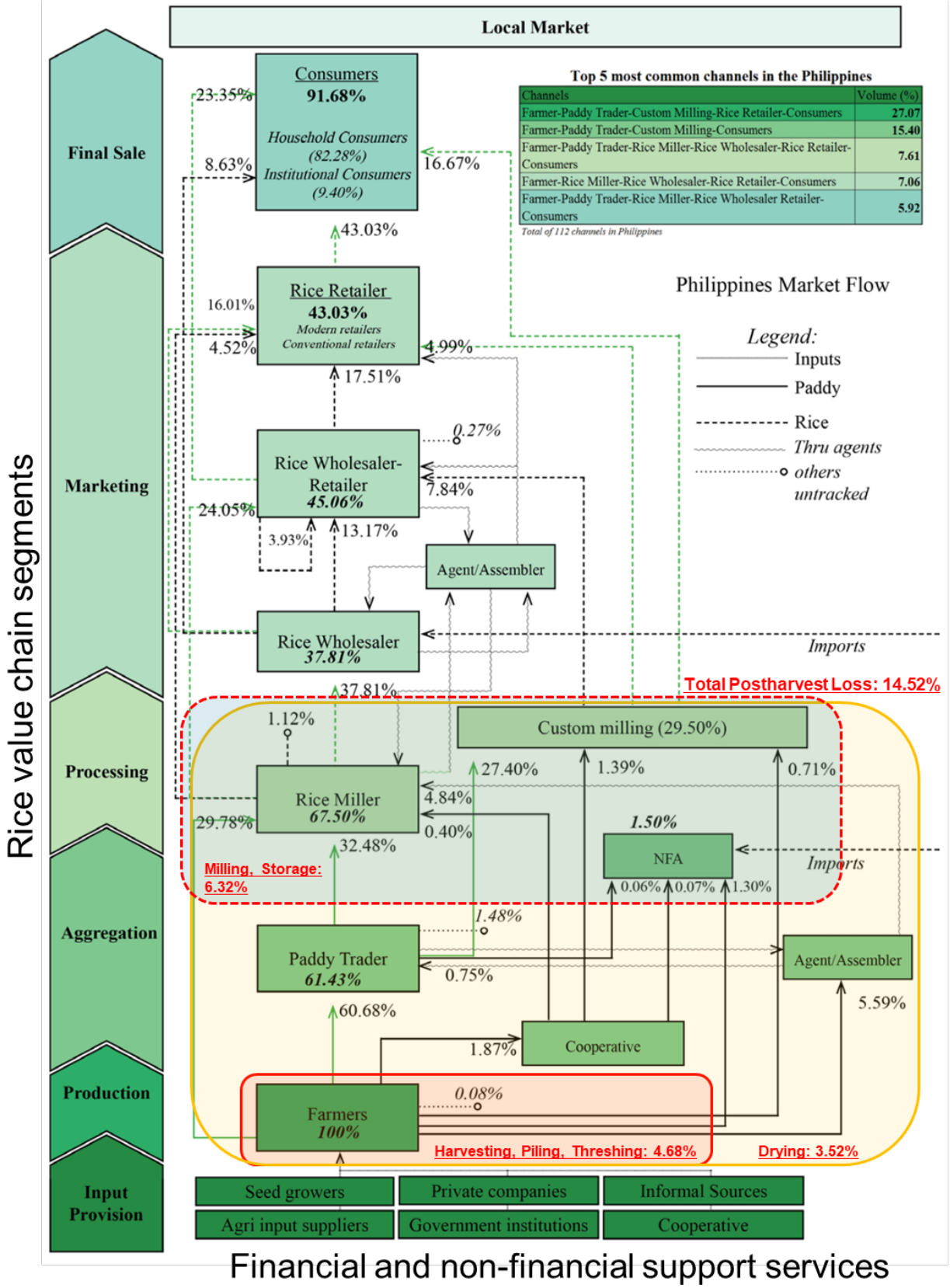


Figure 2.1.5 Typical Rice Distribution Channels in the Philippines

Red color: Percentage of post harvest loss

Source: "Rice Value Chain Analysis in the Philippines: Value Addition, Constraints, and Upgrading Strategies", Alice B. Mataia , et al., Asian Journal of Agriculture and Development, Volume 17, Number 2, December 2020.

(2) Status of Agricultural Cooperatives

In the Philippines, cooperatives are voluntarily formed organizations aimed at addressing the economic, social, and cultural needs and goals of their members. These organizations are governed by the Cooperative Code of the Philippines (Republic Act No. 9520) and are defined as member-owned and democratically managed entities. Cooperatives encompass a wide range of categories, including not only producer cooperatives like agricultural cooperatives but also credit cooperatives, service cooperatives, and others, totaling 26 categories. The Cooperative Development Authority (CDA), under the Department of Trade and Industry (DTI), is responsible for the registration, accreditation, and supervision of these cooperatives.

The table below shows the number of agricultural cooperatives registered with the CDA, including the subset dedicated to rice farming. Nationwide, there are 7,669 registered agricultural cooperatives, of which 939 are rice farming cooperatives. Approximately one-third of the rice farming cooperatives are located in Region 3, where Nueva Ecija is situated. Besides rice farming, cooperatives specializing in crops like corn, bananas, and coconuts are also prevalent.

Table 2.1.19 Number of Agricultural Cooperatives by Region in 2023

Region	Number of Coops		
		Palay Coop (share)	
Region 01	804	100	(11%)
Region 02	625	79	(8%)
CAR	298	38	(4%)
Region 03	1,129	275	(29%)
NCR	113	3	(0%)
Region 04-A	457	17	(2%)
Region 04-B	415	73	(8%)
Region 05	541	48	(5%)
Region 06	501	59	(6%)
Region 07	409	25	(3%)
Region 08	350	28	(3%)
Region 09	267	17	(2%)
Region 10	520	45	(5%)
Region 11	432	39	(4%)
Region 12	366	60	(6%)
CARAGA	442	33	(4%)
Grand Total	7,669	939	(100%)

Source: CDA

Cooperatives that meet the registration requirements of CDA are issued a Certificate of Compliance (CoC), granting them legal recognition and the rights of a cooperative. The CoC is valid for one year, and its renewal requires compliance with several annual requirements, such as the submission of activity reports, financial statements, and minutes of the general assembly. However, many agricultural cooperatives face challenges in meeting these requirements. As of 2023, approximately 10% of agricultural cooperatives and 27% of rice farming cooperatives are not compliant, which means they do not hold CoC (Table 2.1.20).

Table 2.1.20 Compliant Agricultural Cooperatives (2023)

Category	Number of Coops		
		Palay Coops (share)	
Compliant (With CoC)	3,385	675	(72%)
Non-Compliant	832	258	(27%)
New	3,452	6	(1%)
Total	7,669	939	(100%)

Source: CDA

The RCEF's beneficiaries include not only cooperatives but also farmers' associations, such as Irrigators'

Associations. Farmers' associations are organizations defined under the Philippine Civil Code (Republic Act No. 386) and other related laws. Unlike cooperatives, which are registered and regulated by CDA, associations are registered and regulated by the Philippine Securities and Exchange Commission (SEC). Compared to farmers' associations, cooperatives are eligible for more benefits, including tax incentives, e.g., access to government facilities, and eligibility for credit surety funds when applying for loans.

(3) Vertical integration of VC by producer organizations

Generally, in the Philippines, it has been said that in traditional distribution channels, paddy and milled rice change owners 5 to 7 times before reaching the hands of consumers. In recent years, the vertical integration of rice VC has been progressing, and there is a trend toward shortening distribution channels in order to improve the efficiency of rice VCs. Vertical integration of rice VC can take several forms, including cases in which FCAs such as MPCs are involved, and cases in which private firms and LGUs are also involved. The following section summarizes the cases where FCA is used.

In general, Cooperatives and Associations engaged in the purchase of inputs to provide to producers, undertake paddy collection and procurement, farm machinery rental services, and provide small loans to members. Collected paddy may be dried in the organization's own sun-drying plant, or it may be sold to rice millers or NFAs.

In some cases where vertical integration has advanced, the FCA may own dryers and rice mills and convert paddy into milled rice for marketing. In some cases, MPCs with strong financial resources manage their operations relatively well by using capital accumulated through other businesses, such as credit and gas station operations, to fund the purchase of paddy. The biggest advantage of this case is the incentive to rationalize and streamline the VC by adding value to the paddy from collection, through drying and milling, to distribution and marketing, thereby reducing the losses that occur after harvest and increasing the rate of return.

Clusters, for example, can be formed by FCAs in the same municipality, which can create economies of scale and generate profits from the processing process that require large capital investments, such as drying and rice milling. In this situation, economies of scale can be created, and a mechanism can be established to generate profits from processes that require large-scale capital investment, such as drying and rice milling.

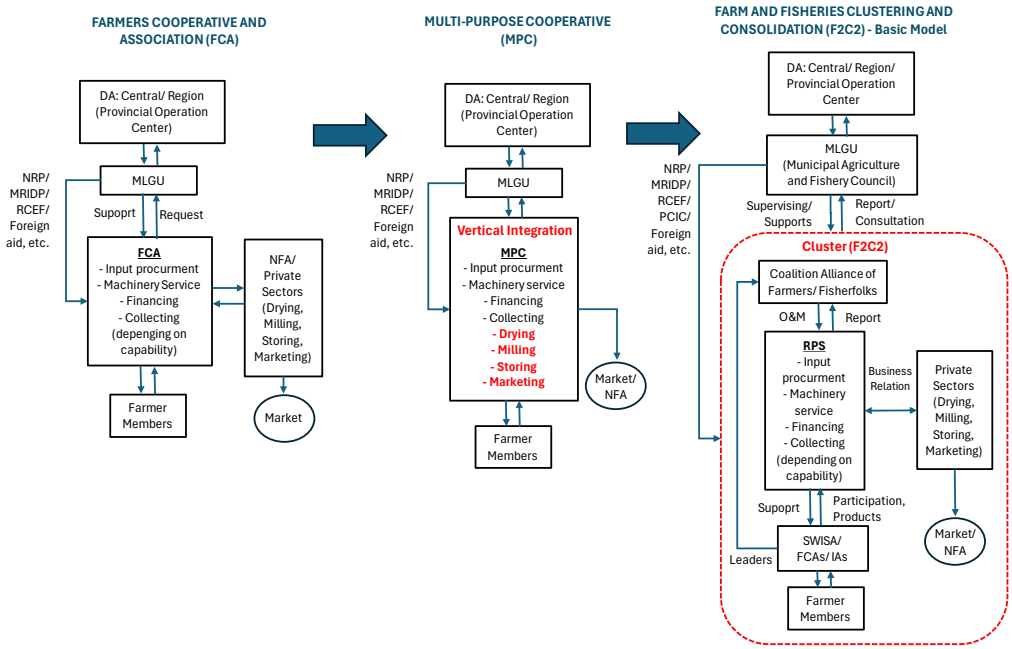


Figure 2.1.6 Examples of Vertical Integration of Rice VC by Producer Organizations

Source: JICA survey team

In addition, the formation of clusters in each municipality makes it easier to receive support from MLGUs. In the PASAMASI Cluster in Siniloan, Laguna, an RPS operated by the Cluster and a drying station operated by the Municipality is located in the same vicinity together on a site provided by the Municipality. The Municipality is in charge of seedling production for rice transplanters, which is a time-consuming and unprofitable process. In addition, the Municipality's agricultural officer provides marketing advice. This type of public-private partnership can serve as a model for RPS management.

(4) Contracts for the use of agricultural machinery

In recent years, contracts for outsourced farm work have begun to be introduced, as shown in the table below. Traditionally, most of the work has been done by hand, but contracts for a mixture of machinery and manual labor (hybrid contracts) and contracts for complete mechanization have been introduced. Since it is difficult for small-scale farmers with weak capital to own agricultural machinery, and it is also not cost-effective for them to do so, large-scale farmers and agricultural cooperatives often own such machinery and provide services such as work contracting or renting to farmers.

In some cases, LGUs borrow loans from banks to purchase tractors and harvesters to provide farmers with farming services, a system that is appreciated by small farmers who lack the collateral to obtain loans. Consequently, the ownership of farm machinery by cooperatives and irrigators' associations could lead to the capital accumulation within them and become the most profitable business model for farmers.

Table 2.1.21 Types of Contract Farming

	Contract Type	Work Details	Evaluation
a.	Old contract (manual)	Tilling and plowing (manual labor - carabao) + rice planting (manual labor) + rice harvesting (manual labor) + threshing machine (manual labor + mechanization)	Long hours + high losses + high employment
b.	Hybrid contracts (mechanized + manual labor)	Tilling and plowing (mechanized) + rice planting (manual) + harvesting (mechanized - no bagging) + threshing machine (mechanized) Mechanized harvesting uses a reaper	Time saving + high loss + medium employment
c.	Fully mechanized contract	Tilling and cultivating (mechanized) + planting (mechanized) + harvesting (mechanized + threshing machine + bagging) Reaper used for mechanized harvesting	Time savings + loss reduction + employment reduction

Source: JICA survey team

(5) NIA Rice Farming Support Program

The NIA Rice Farming Support Program (NRFSP) is a complementary program of rice production support of the DA and is intended to contribute to lowering the price of milled rice. It was launched on a pilot basis in 2024 with a budget of 3.4 billion Php. The contract is between NIA and IA. Not all members of the IA[23] participate in the contract growing arrangement.

The NIA provides P50,000 worth of money to the contract growers, the amount of which is allocated for seeds and inputs to be used by the farmer and the remaining amount to be provided in cash for land preparation and others. In the NIA guidelines, it stated a ratio of 70-30 for inputs and cash allocation per hectare. However, this is not the usual case as the ratio of allocation differs by region depending on the condition of the farming area, cost and other factors. The seed, inputs and others are delivered to the IAs by

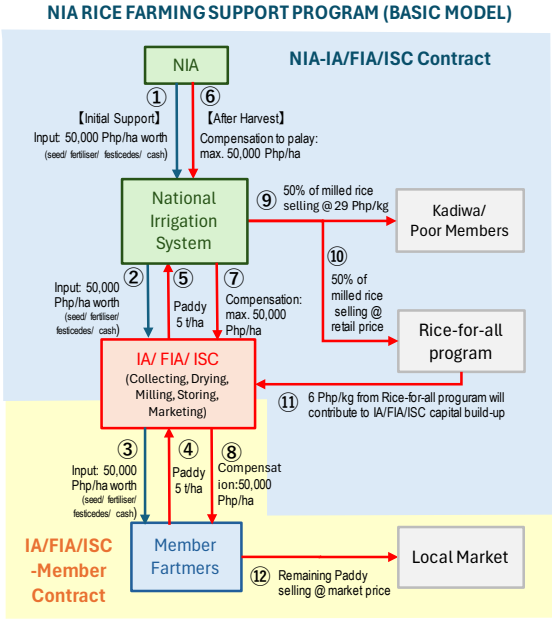


Figure 2.1.7 Structure of Contract Farming by NIA

Source: JICA survey team

[23] IA here includes Farmers' Irrigators Association (FIA), Irrigators Service Cooperative (ISC).

NIA in kind and the remaining allocation in cash through the IAs. After harvest, the Farmer-cooperator deliver to NIA 5 Metric Tons of palay and in return NIA provides another P50,000 to the farmer as incentive after compliance of documentary requirements.

Based on NIA-IA MOA, the drying and milling of the paddy is taken cared of by the IA including packaging of the milled rice. If the IA has no drying and milling facility, the IA contract out these activities to rice millers within the area. NIA pays the IA the amount of P25,000 for the post-harvest activities by the IA. Once milled and repack, the 50% is delivered and /or picked up by NIA and sell the rice to the Kadiwa Centers to vulnerable groups at P29.00 Php per kg. (only 10 kgs. for each person at any given time). The remaining 50% are sold to IA members and other markets under the "DA-Rice for all markets program" at the price of P35.00 per kilo. The IA is given a P6.00/kg incentive so that the amount remitted to NIA for the sale of the 50% remaining rice is deducted.

Milled rice produced through the program will be sold to vulnerable groups through the Kadiwa Rice program. The program also saves farmers from having to borrow money from local influential people and allows farmers to use the surplus to accumulate capital. While this system is very gratifying to farmers, the NIA needs to come up with significant funds to sustain this contract. Figure 2.1.7 illustrates the structure of contract farming by the NIA.

2.1.5 Ownership Ratio of Public and Private Post-harvest Drying and Milling Facilities and Challenges Faced by Each Stakeholder

According to PhilConGrains, the national organization of rice millers in the Philippines, there are about 10,000 rice millers in the country, but only 60 percent were in operation as of July 2019.[24] This is attributed to the cheaper price of paddy, which was purchased at a high price at harvest, and is noted to be due to the liberalization of the rice industry. On the other hand, by 2024, the domestic price of rice had risen sharply, forcing the mill to operate under unstable conditions.

In the Philippines, rice post-harvest facilities are operated by both the public and private. The public side is mandated to provide relief in the event of natural disasters and support to government agencies and the poor, while the private side is for commercial purposes.

The private sector has taken the lead in rice milling processing in the Philippines. There are rice mills, both small-scale wage-service rice mills at the rural level and rice processing and wholesale companies that handle large amounts of rice. As of 2024, the number of private rice mills known to the survey team is 2,363, which is equivalent to 94% of the total of 2,516, including FCAs that own rice milling facilities and NFA warehouses that can operate rice milling facilities.

The national rice post-harvest processing facility is owned by the NFA, which was established under the name of the National Grains Authority (NGA) by PD No. 4 on September 26, 1972, with an initial mission to promote the integrated growth and development of rice, corn, feed grains, sorghum, cassava, and peanut. The decree abolished two agencies, the Rice and Maize

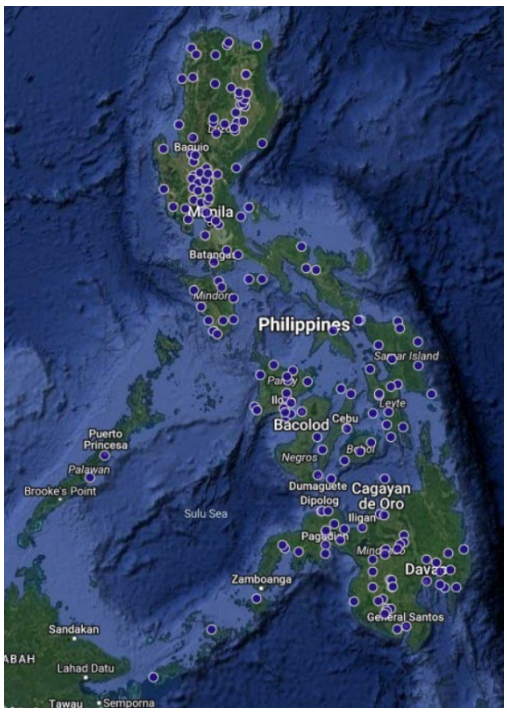


Figure 2.1.8 Nationwide NFA Facilities

Source: BAFE

[24] PhilSter Global (July 30, 2019)

Commission (RICOB) and the Rice and Maize Authority (RCA), whose functions were absorbed into NFA. The NGA aimed for national self-sufficiency in rice, with the Masagana 99 program playing an important role in helping the country achieve a paddy yield of 99 cavan per ha (about 5 tons/ha).

On January 14, 1981, Presidential Decree (PD) No. 1770 reorganized the NGA into the NFA and expanded its social responsibilities and commodity coverage. This included not only grains, but also other foods such as fresh fruits, vegetables, fish, and a variety of processed and packaged foods, collectively referred to as non-grain commodities. This decree laid the foundation for the establishment of the Kadiwa Market, a government retail outlet selling affordable basic foods and household items, which was delegated to the private sector and LGUs by the end of 1986. PD No. 1028, issued on May 31, 1985, provided for the NFA's non-grain marketing activities deregulation, resulting in the termination of non-grain trading and the transfer of feed grains and wheat imports to the private sector.

On May 5, 2014, PD No. 165 reassigned the NFA to the Office of the President, and tasked with ensuring national food security and the stability of rice supply and prices; the NFA performed these functions through paddy procurement, rice stockpiling and milling, and strategic release. On February 14, 2019, significant changes occurred with the approval of Republic Act No. 11203, known as the Rice Tariffication Act. This law transformed the NFA from a grain trading and regulatory agency to an agency dedicated to rice buffer stocks, and moved it to the procurement, storage, and distribution of locally produced paddy. The law mandated the NFA to distribute rice during emergencies and disasters and to support government disaster relief programs. Effective March 5, 2019, the NFA suspended its regulatory and licensing functions for international and domestic trade in rice.

It is presently mandated to ensure national food security by maintaining rice stocks at optimal levels, procuring paddy only from domestic farmers, and maintaining a national disaster relief program for distribution during emergencies. For this reason, NFA was supplying milled rice at the request of the Department of Social Welfare and Development and the Bureau of Defense. Meanwhile, the Senate debated the possibility of selling milled rice at KADIWA Markets at low prices for the poverty population, and this became possible with the passage of Republic Act No. 12078 on December 9, 2024. Based on the data of 2023, the current buffer stock target is 300,000 tons of milled rice in constant base, and with a milling yield of 62%, this is only 2.4% of the total production of 20,059,562 tons of paddy.[25] The role of the NFA is important in the Philippines, where the frequency of natural disasters is high and the poverty level is high. The following table shows the procurement of paddy and the supply of milled rice by NFA. The reason for the supply of milled rice to LGUs in 2020 was the affection of COVID-19.

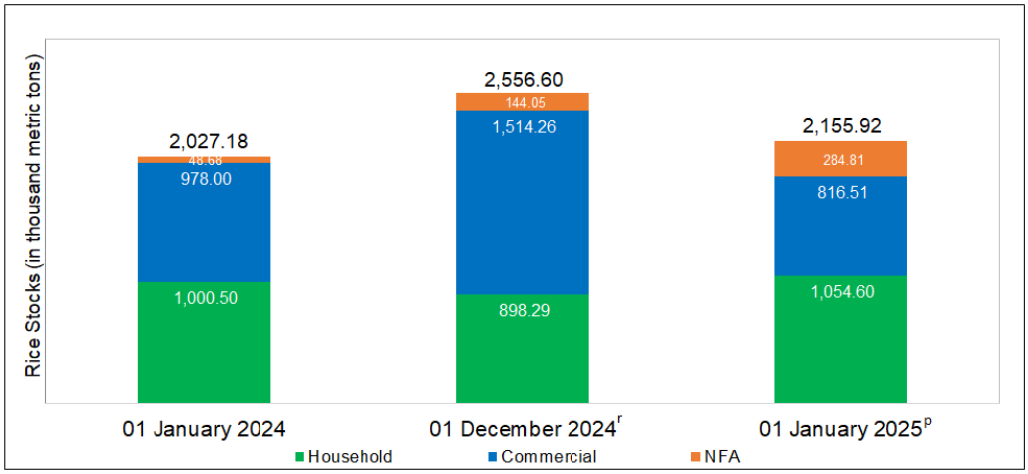
Table 2.1.22 Paddy Procurement and Milled Rice Supply by NFA (ton)

Year	Annual Procurement	Annual Handling Volume		Annual Supply by Delivered Agent				
	Paddy	Paddy	Milled rice	LGU for Disaster Victims	DSWD for Social Welfare	DND for Army	DOJ for Prisons	Others
2024	442,439	2,057,642	178,989	4,850	8,198	4,412	1,501	255
2023	78,419	539,704	459,653	7,875	7,875	2,067	1,094	1,512
2022	299,648	1,315,787	984,611	26,180	8,997	633	1,922	2,667
2021	460,482	2,432,807	776,792	44,965	17,901	212	4,155	27,821
2020	683,132	3,338,886	1,017,522	219,167	19,912	1,710	13,260	54,707
2019	732,571	3,092,021	3,297,109	4,200	4,406	1,491	1,030	2,585
2018	61,783	119,798	712,434	2,776	6,315	294	292	113
2017	29,441	342,911	2,306,769	10,784	25,669	510	425	1,257
2016	118,258	72,759	649,497	19,866	24,453	750	0	0
2015	227,935	-	-	9,803	24,302	263	46	3,690

Note: NFA procurement includes losses. NFA handling volume is from the Quality Stored Assessment Report (QUASAR). The original data unit is in Cavan (or bag), and it is converted at 42 kg/Cavan for paddy and 50 kg/Cavan for milled rice.
Source: Compiled by JICA survey team based on data provided by NFA.

[25] Philippine Statistics Authority-Open Stat, 2023

Domestic rice stocks totaled 2,556,600 tons overall, of which 144,500 tons were NFA, as of December 2014, when the revised Rice Tariffication Law went into effect, according to the PSA. After the harvest season, in January 2025, the total was 2,155,920 tons, of which 284,810 tons were NFA. As rice began to flow into the market, rice prices fell 10-20% to 50 Php/kg at the end of February 2025 from the high price in October 2024. Since some NFA facilities have been aged, lots of stocking paddy will deteriorate during storage in the future.



p – preliminary estimates
r – revised estimates
Note: 1. Details may not add up to total due to rounding.
2. Starting January 2025, the Milling Recovery Rate of palay to rice is computed at 63.0% from 65.4% as per approved PSA Board Resolution No. 17 Series of 2024 entitled "Approving the Updated Milling Recovery Rate of 63.0 percent from Palay to Rice"
Sources: Philippine Statistics Authority, Rice and Corn Stocks Survey: Household (RCSS:H) and
Rice and Corn Stocks Survey: Commercial (RCSS:C)
National Food Authority (NFA), NFA Grains Situation Report

Figure 2.1.9 Prediction of Rice Domestic Stocks

Source: PSA

Meanwhile, the distribution by private rice milling companies is undergoing major changes with the implementation of the Rice Tariff Law, which reduced tariffs on rice imports from ASEAN from 35% to 15% and increased imported milled rice supply to 23% of consumption by the end of 2022. As a result, it has become difficult to earn a reasonable profit from domestic rice milling operations, and commercial rice milling companies are polarizing, either closing down business operations or increasing the volume of rice handled. In the Intercity Industrial State and Gloden City Business Park located in Bocaue City, Bulacan, which is adjacent to Metro Manila, the largest rice consumption area, there is a concentration of more than 100 rice milling wholesalers, but 7% of them have closed their businesses since the implementation of the rice tariff law[26][27]

The largest rice mills in the region are located in the Bocaue, Bulacan, so called, Intercity Industrial State where a large number of rice millers and wholesalers are located. Investment opportunities have been created at large local rice mills to upgrade milling equipment to increase the whiteness of rice, blend milled rice with foreign rice, burn rice husks to dry rice, and expand silos. In addition, with the support of the National Rice Program and RCEF, rice milling by multi-purpose cooperatives is increasing. Although the number of rice mills is limited to cooperative members, Kadiwa Market, and LGUs, PhilMech has designated 90 FCAs as model farmers' associations. The rice milling machines, warehouses, and electricity supply facilities are planned to be gradually developed through the RCEF-Rice Processing System project.

2.1.6 Issues on Existing Post-harvest Drying and Milling Facilities, with Perspectives on Operation and Maintenance

The Rice Tariffication Act of 2019 has brought about significant changes regarding rice distribution.

[26] Information on Bocaue Multi-Purpose Cooperative, October 2024

This is due to the increased distribution of imported rice and the fact that many consumers have become more conscious of the quality of rice. The distribution zone for rice is changing, as the unit cost of shipping rice from Ho Chi Minh City to Davao is lower than that from Davao to Manila, for example. The competition in price is also intensifying, and PhilMech has procured agricultural machinery and post-harvest processing facilities for FCA using RCEF funds from tariff revenues, including four-wheel tractors, rice transplanters, combine harvesters, mechanical dryers, and rice milling lines. However, the rice milling operation is minimal at the FCAs, due to insufficient funds to purchase paddy.

In RCEF's RPS business, rice milling lines have been upgraded with the addition of mist grinders and color sorters to improve quality. Large-scale rice milling companies are also upgrading milling lines and expanding dryers and silos with their own funds. It may be necessary to control administrative costs by improving operational efficiency through bulk transportation and processing. Private paddy traders are an integral part of distribution, and some transport long distances from Cagayan Valley Province and Mindoro Island to the outskirts of Manila, and from Southern Cotabato Province to Leyte and Cebu Island. Some may ship to NFA as a distribution option.

At present, the NFA is limited to collecting domestic rice during regular time and supplying it for disaster relief, as well as selling it to the LGU, the military, and the police, but in the event of an emergency, it is possible to stock imported rice and release rice from buffer stock and stabilize rice prices. The purchase price set by the NFA serves as a benchmark in rice-producing areas and helps prevent a collapse in the rice market. In addition, because NFA rice acts as a safety net for disaster victims, hence, renovating key warehouses and upgrading equipment is recommended. The main issues for each management entity are as follows.

Table 2.1.23 Issues by Operating Entity

Operating entity	Issue	Countermeasure
commercial miller	・ Lower profit margins due to the Rice Tariff Act ・ Quality requirements of consumers or shipping destinations (quality of imported rice waves) ・ The small amount of paddy of the variety demanded by the market for the paddy brought in (the difference between the variety demanded by farmers and commercial rice mills) ・ Rising electricity costs	・ Two choices: larger scale or discontinued operations, adoption of bulk transportation, review of the 15% tariff rate on rice imports, and use of by-products such as the annexation of a feed plant. ・ Introduction of rice grinders, color sorters, and two-stage sorting, the distinction between long grain (indica rice) and short grain (tropical japonica rice) ・ Improve seed production and distribution, maintain purity ・ Adoption of efficient motors
Paddy trader	・ Quality loss due to mixing of handled varieties (especially mixing of varieties with different shapes can cause broken grains) ・ Quantity loss due to sun drying on the road at the shipping destination ・ increase in labor wages	・ Collaboration with seed production groups ・ Introduction of mechanical dryers at collection warehouses or development of a system for receiving high-moisture paddy immediately after harvest at the NFA. ・ Promote the introduction of flexible containers (1-ton capacity)
Multi-purpose associations and other FCA	・ Increased imports of inexpensive, constant quality rice ・ Difficulty in maintaining selling prices due to rise in electricity and labor costs. ・ Limited market size (union members, LGUs, government programs, etc.) ・ Shortage of competent managers in many organizations (especially small, medium and micro associations) ・ Insufficient funds to purchase paddy; diversification of rice milling business (production of rice bran mixed feed, production of compressed rice husk blocks, direct sales business, etc.)	・ Limit the number of varieties, increase whiteness, introduce aromatic rice varieties, promote RCEF 2.0 ・ Promote bulk transportation, adoption of high-efficiency motors, and seedling and rice planting services ・ Collaboration with *Kadiwa Market*, with consumer cooperatives in consuming areas, federation or merger with other cooperatives like F2C2, etc. ・ Provide direct management assistance ・ Strengthen manager development programs ・ Access funds for contract growing ・ Utilization of low interest loans

Operating entity	Issue	Countermeasure
NFA	・ Aging rice milling facilities that are more than 40 years old, lack of storage silos, and deteriorating quality of paddy due to long-term storage (6 months to 1 year) in bag storage ・ Drying during harvest of rainy season crops, lack of operable mechanical drying facilities ・ Limited distribution of milled rice due to legal restrictions ・ Difficulty in recovering money for milled rice contributions to LGUs and other organizations. ・ Many broken grains during milling due to a mixture of long-grain and short-grain varieties of rice brought in. ・ Improper paddy sales	・ Promotion of MAFIM Program ・ Establishment of mechanical drying facilities to enable immediate arrival of goods after harvest ・ Revision of the Rice Tariff Law to sell NFA stockpiled rice to low-income earners (RA 12078 will take effect in December 2024), reexamination of the appropriateness of the goal of 300,000 tons in constant base of strategical buffer stock rice in the face of increasing typhoons and other natural disasters. ・ Sequential write-off of accounts receivable to LGUs ・ Long-grain and short-grain segregated storage and collaboration with PhilRice in the distribution of original seed ・ Thorough logistics management (introduction of an inventory management system modeled after the efforts of NFA Region I)

Source: JICA survey team

2.1.7 Current Conditions of Management and Maintenance of Existing Agricultural Machinery and Facilities, with Related Challenges

Although equipment procured by DAs such as RCEF and the Rural Development Program varies according to the capacity of the operating organization and the farmers' farming style and size, there are cases where routine inspections are generally not conducted and proper repairs and management are not carried out. Although classroom training is provided by ATI and PhilRice, there is a need for more hands-on training in operational demonstrations, daily and periodic inspections, and troubleshooting and trouble-shooting methods. The agricultural machinery and facilities procured by the DA for the FCA are as follows, particularly, four-wheel tractors and combine harvesters that are poorly managed, and while rice transplanters are in high demand, they are not used due to lack of sufficient guidance on seedling cultivation techniques and lack of seedling boxes. In addition, there is little demand for mobile rice mills and mobile dryers.

Table 2.1.24 Maintenance of Agricultural Machinery and Facilities Provided under the Rice Program and RCEF

Agricultural Machinery and Equipment	Frequency of use and maintenance status
Four-wheel Tractor	There are a large number of Kubota and Yanmar units in operation. Many FCAs have this facility but do not usually undertake daily inspections, hence, maintenance is not undertaken regularly causing fast deterioration . According to information from a Japanese company, the utilization rate after 5 years is 70%. Theft of equipment parts is occurring.
Hand Tractor	Kubota is often selected and used frequently but is not utilized in areas where the field size is large.
Floating Tiller	Many models are manufactured by Kubota with local manufacturers. They are used in rice paddies on soft ground that is inaccessible to riding tractors and are being utilized in some areas.
Transplanter	Many are made by Kubota or Korea. Seedling cultivation technology is not widespread and is used infrequently. However, there are many requests from farmers for rice planting services from a labor-saving perspective.
Reaper, Thresher, Combine Harvester	With the exception of paddy fields on sloping terrain, combine harvesters are becoming the mainstay of harvesting operations, with most being made by Kubota and Yanmar, and some being procured from China. Combines have many worn parts and require daily inspections and frequent parts replacement, and daily inspections and periodic maintenance will lead to longer service life. Currently, there are many cases where combine harvesters are scrapped after 2-3 years as parts are removed. According to information from a Japanese company, the utilization rate after 5 years is 60%.
Mobile Dryer	Many are locally made. The model uses diesel oil for fuel, which is expensive, hence used infrequently. The use of fossil fuels was not accepted by farmers because of the high cost.
Mechanical Dryer	Taiwanese, Korean, and locally made products are being procured. In recent years, demand has increased during the harvest of rainy-season crops due to irregular rainfall and rising labor costs for sun-drying. The burner section and the circulating and rotating section are the key components, and their maintenance is relatively good. However, there are some FCAs with poor management of biomass such as rice husks that serve as a heat source.
Single-Pass Rice	Many are locally made. Mobile rice mills are not in great demand because they are powered by diesel

Agricultural Machinery and Equipment	Frequency of use and maintenance status
Mill (mobile)	engines and are expensive to use and move.
Single-Pass Rice Mill (Stationary)	Many are made by Satake and China. There is a demand for wage-sliding for rice consumption in rural areas. These machines have relatively few parts and have been in use for many years.
Impeller Rice Mill	It is a locally made rice hulling machine that combines hulling and wind screening. Generally, humidity is high and brown rice is not often stored, so there is no demand for this equipment.
Multi-Pass Rice Mill	This is a rice milling facility/machine that goes through the rice milling process of feeding paddy, qualifying, removing stones, hulling, sorting paddy, milling, polishing, polishing, color sorting, weighing, and packaging. Only a few FCAs and private mills have this milling equipment due to the high cost of the machine and the high cost of operation. This kind of equipment would require competent managers to make it fully operational at all times. The operation of this facility would also require three-phase electricity (380 V), which is not available in all areas, especially the rural areas. The cost of operation for this facility is high. Proper guidance on the operation and maintenance of this facility is very crucial.

Source: JICA survey team

The procurement of power machinery under the RCEF starting in 2024 excludes the requirement of a minimum of 30 years of corporate experience in the Philippines and specifies an engine specification of Tier-3 under the diesel engine emission regulations. According to a decision by the Department of Environment and Natural Resources (28), there are emission regulations for airborne particles, nitrogen oxides, and sulfur oxides with regard to internal combustion engines. 55hp engine output (8 hours of operation x 120 days) with PhilMech's Tier-3 designation would result in about 11.8g/year of PM and 18.5g/year of nitrogen oxides. Although it is not possible to compare these figures with those of the Philippines because of the dilution in the air, air pollution regulations in the Philippines are very strict.

Table 2.1.25 Emission Regulations

Noxious Substance	Department of Environment and Natural Resources National Emission Standards for Specified Source Air Pollutants - Internal Combustion Engines	U.S. Emission 37 - 56kW (50 - 76hp) class	
		Tier-2	Tier-3
Suspended particulate matter (PM)	Less than 75 mg/m^{3}N ^{in} cities Less than 100 mg/m^{3}N ^{in} rural areas	0.40 g/kW/hr or less	0.30 g/kW/hr (option1) 0.40 g/kW/hr (option2)
Nitrogen oxides (NOx)	NO_2-converted 1,000 mg/m^{3}N or less	7.5 g/kW/hr or less (NOx + non-methane hydrocarbons)	4.7 g/kW/hr or less (NOx + non-methane hydrocarbons)
Sulfur oxides (SOx)	SO_2-converted 350 mg/m^{3}N or less		

Source: Philippine Department of Environment and Natural Resources

The requirements that have become stricter from Tier-2 to Tier-3 are nitrogen oxide and hydrocarbon emissions. To reduce nitrogen oxides (NOx) in diesel engines, it is necessary to lower the combustion temperature in the cylinder to reduce nitrogen oxidation. As one means of achieving this, there has been a shift from supercharged engines to water-cooled aftercoolers and then to engines with air-cooled aftercoolers in order to lower the feed air temperature before combustion. In addition, the adoption of a common rail system with optimized injection timing and combustion improvement technology using multiple injections has been adopted to further reduce nitrogen oxides. The reduction of particulate suspended solids has been achieved by shortening the injection period, atomizing the spray, and improving combustion through electronic control, high-pressure injection systems, and injector nozzles. Thus, when foreign matter enters the fuel, injection system nozzles clog and electronic control systems fail frequently. The Department of Energy has announced that the blending ratio of biodiesel will be increased to 3% starting in October 2024 and to 5% in October 2026, which raises concerns about the presence of impurities. Legally, emission regulations must be emphasized, but the adoption of Tier-3 in tractors and other power machinery is likely to be an obstacle to maintenance.

[28] Updating of Section 19 of RA 8749 on the National Emission Standards for Source Specific Air Pollutants (NESSAP), Establishment of Mass Emission Rate Standards (MERS) for Particulate Matter (PM), Sulfur Oxides as Sulfur Dioxide (SOx as SO_2), Nitrogen Oxides as Nitrogen Dioxide (NOx as NO_2), and Carbon Monoxide (CO) and Establishment of Emission Charge System Pursuant to Section 13 of RA 8749, Nov 2024

2.1.8 Financial Challenges on Operating Post-harvest Facilities

(1) Financial Challenges of Rice Center

The financial challenges faced by rice centers, regardless of their operating entities, are largely similar. These include insufficient working capital to cover the cost of purchasing paddy, significant seasonal fluctuations in harvest volumes, and difficulties in securing adequate paddy supply year-round to match the processing capacity of their facilities. As a result, achieving profitability is a persistent struggle.

For example, an agricultural cooperative in Nueva Ecija operates facilities with a milling capacity of 2.5 tons/hour and a circulating mechanical dryer with a capacity of 12 tons/batch, serving a production area of 500 hectares. While the cooperative plans to purchase 4,800 tons of paddy annually (400 tons/month) and estimates its breakeven point at 3,600 tons annually (300 tons/month), actual procurement is limited to only 250 tons/month due to insufficient working capital and limited supply from the production area. This shortfall has resulted in operating losses.

Table 2.1.26 Result of Paddy Procurement in Iloilo RPC

Year	Paddy Procurement (ton)
2014	1,903
2015	1,802
2016	565
2017	641
2018	2,287
2019	1,041
2020	2,387
2021	1,240
2022	1,298
2023	1,271
average	1,444

Source: Iloilo Rice Processing Complex

Similarly, the Iloilo Rice Processing Complex (RPC), supported by KOICA, has a large milling capacity of 5.0 tons/hour. However, over the past decade, its average annual paddy procurement has been just 1,444 tons. This translates to only 289 operational hours annually, or about 36 days of operation based on an 8-hour workday. Due to the inability to achieve profitability, the operating entity has changed multiple times in recent years.

Under the Rice Competitiveness Enhancement Fund (RCEF), PhilMech has introduced three types of Rice Processing Systems (RPS): RPS-1, RPS-2, and RPS-3. For instance, the standard specifications for RPS-2 include a milling capacity of 2–3 tons/hour and a circulating mechanical dryer with a capacity of 12 tons/batch, requiring a minimum production area of 600 hectares.

The table below presents an estimated annual revenue, cost of sales, and gross profit for an RPS-2 system, assuming a planned paddy supply from a 600-hectare production area. With an annual paddy production of 3,987.6 tons, a purchase price of Php 18.25/kg, and a milled rice selling price of Php 44.0/kg, the annual revenue is estimated at Php 98.1 million. However, the cost of sales amounts to Php 87.8 million, of which Php 72.8 million is attributed to paddy procurement costs alone. This results in a gross profit of Php 10.3 million, with a gross profit margin of 10.5%.

To sustainably operate rice centers, two critical factors must be addressed: securing sufficient working capital to cover the high costs of paddy procurement and implementing planned paddy procurement aligned with the facility's processing capacity.

The Gap Analysis described in the latter part revealed that existing projects in the rice sector predominantly focus on upstream components of the rice value chain, such as cultivation techniques and seeds. These initiatives mainly adopt approaches like equipment provision and technical training, with limited efforts directed toward strengthening the management capacity of rice centers. Additionally, Japan has developed management improvement approaches originating from its manufacturing industry, such as Kaizen and the 5S methodology (Sort, Set in Order, Shine, Standardize, and Sustain). In recent years, these approaches have been recognized as beneficial not only in manufacturing but also in agricultural management contexts. Supporting the management capacity enhancement of rice centers by leveraging these perspectives could represent a unique form of assistance from Japan.

Table 2.1.27 Estimated Sales and Gross Margin of RPS-2

Item	Unit	Value	Remark
Revenue			
Area (Wet season)	ha	600.0	
Area (Dry season)	ha	360.0	Assuming 60% of the wet season planting
Yield (Wet season)	t/ha	4.03	PhilRice M&E 2023
Yield (Dry season)	t/ha	4.36	PhilRice M&E 2023
Paddy production (Wet season)	t	2,418.0	
Paddy production (Dry season)	t	1,569.6	
Annual paddy production without loss	t	3,987.6	
Post-harvest Loss	%	14.5%	PhilMech 2016
Annual paddy production with loss	t	3,408.6	
Milling recovery	%	65.4%	PSA
Annual milled rice production with loss	t	2,229.2	
Selling price - Fresh paddy	Php/kg	44.00	Center Coop
Gross sales	Php	98,085,887.4	
Cost of Goods Sold (COGS)			
Required Procurement volume of fresh paddy	t	3,987.6	
Buying price - Fresh paddy	Php/kg	18.25	Center Coop
Procurement cost of fresh paddy	Php	72,773,700.0	
Other running costs*	Php	14,985,688.1	estimated by PhilMech (RPS-2)
Total COGS	Php	87,759,388.1	
Gross Margin	Php	10,326,499.3	
Gross Margin Ratio	%	10.5%	

*This includes salaries wages, handling costs, electricity costs, packaging materials, fuel, repair and maintenance.
Source: survey team from data from PhilRice, PhilMech, and other agricultural cooperatives.

(2) Business and financial condition of the cooperative

Agricultural cooperatives are typically registered as Multi-Purpose Cooperatives (MPCs), engaging in diverse business activities rather than being limited to a single purpose. These activities vary widely by cooperative but generally include aggregation and marketing of produce, mechanized farming services, and lending programs for members. Notably, in recent years, many cooperatives have adopted combine harvesters, with mechanized harvesting services becoming a key revenue stream. Below, the business activities and financial status of two agricultural cooperatives with rice-related operations, including drying and milling facilities, are outlined.

1) Business Activities and Financial Status of Cooperative A

Cooperative A is a medium-sized multi-purpose agricultural cooperative in the rice-producing region of Nueva Ecija. It has approximately 600 member farmers and manages about 1,200 hectares of farmland. Through assistance from the Department of Agriculture (DA) and the Rice Competitiveness Enhancement Fund (RCEF), the cooperative has acquired drying and milling facilities to engage in rice-related business operations.

Membership	660 farmers
Farmland Area	1,200 ha
Main Businesses	Paddy drying and milling, rice trading business, agricultural material business, and credit business,
Equipment	Millier 2-3 TPH Mechanical dryer 12 TPB, 15 TPB Farming machineries (tractors combine harvesters) Vegetable refrigeration facilities Truck scales, etc.

Box 2.1.1 Overview of Cooperative A

Table 2.1.26 summarizes the profitability of each business activity based on Cooperative A's income statement for 2023. To compare the profitability across activities, selling, general, and administrative expenses common to all operations were allocated proportionally to revenue.

Table 2.1.28 Business Activities of Cooperative A (Unit: Php '000, 2023)

Business	Gross sales	COGS	Gross income	Gross Margin	Net Income	(Share)	Net Income Margin
	a	b	c	d=c/a	e		f=e/a
Palay Trading	40,742.8	39,862.9	1,618.6	4.0%	424.3	(9.2%)	1.0%
Rice Trading	27,437.3	25,818.8	1,905.3	6.9%	1,081.3	(23.4%)	3.9%
Inputs Trading	22,630.1	20,582.0	2,048.1	9.1%	1,538.5	(33.3%)	6.8%
LPG sales	25.0	24.1	0.9	3.5%	0.9	(0.0%)	3.5%
Truck scale	68.3	0.0	68.3		48.1	(1.0%)	70.4%
POS	1.2	0.0	1.2		1.2	(0.0%)	100.0%
Re-lending	39,487.4	0.0	39,487.4		1,523.3	(33.0%)	3.9%
Total	130,392.1	86,287.8	45,129.8		4,617.6	(100.0%)	3.5%

Source: prepared by the JICA survey team from the financial reports of multipurpose cooperatives in the state of Nueva Ecija.
*1Common personnel expenses, office-related expenses, etc. are allocated as SG&A and general administrative expenses of the re-lending business.

Palay Trading and Rice Trading represent the paddy aggregation, drying, and milling operations, collectively forming the rice business. While the rice business accounts for more than 50% of total revenue (Php 68 million out of Php 130 million), its high cost of sales (Php 66 million) results in modest gross profits: Php 1.6 million (4.0% gross profit margin) for Palay Trading and Php 1.9 million (6.9% gross profit margin) for Rice Trading. The net profit margins are even lower at 1.0% and 3.9%, respectively.

Other activities such as Input Trading (6.8% net profit margin) and Re-lending (3.9% net profit margin) contribute 66% of the cooperative's overall net profit. Importantly, the revenue from Re-lending subsidizes selling and administrative expenses, making it difficult for the rice business to operate sustainably on its own.

2) Profit Contribution by Business Activities of Cooperative B

Cooperative B, also located in Nueva Ecija, is a large-scale multi-purpose agricultural cooperative with 1,500 member farmers and a farmland area of about 1,400 hectares. Its business activities include rice operations, financial services, and agricultural input sales.

Membership	1,500 farmers
Farmland Area	1,400 ha
Main Businesses	Rice drying and milling, rice trading business, wholesale of agricultural materials, and credit business, Fuel sales, etc.
Equipment	Rice miller 4~ 6 t/h Mechanical dryer 15 t/batch tractor combine harvester Vegetable refrigeration facilities Truck scales, etc.

Box 2.1.2 Overview of Cooperative B

Table 2.1.27 shows the profit contributions of Cooperative B's business activities over the past three years. In 2020, the total net profit was Php 13.6 million, with rice operations contributing only Php 1.8 million (21.1%) and financial services generating Php 4.9 million (36.5%), the largest share. Despite limited data on revenue and costs, it is evident that financial services are the primary profit driver.

Compared to Cooperative A, Cooperative B encourages its members to cultivate specific varieties, focusing primarily on high-yield hybrid varieties, thereby establishing an efficient production system from the cultivation stage. Additionally, to maximize the operation of its large-scale drying and milling facilities, Cooperative B actively purchases paddy from non-member farmers, achieving economies of scale as a large cooperative. These factors contribute to the higher proportion of rice-related business in Cooperative B's overall revenue compared to Cooperative A.

Table 2.1.29 Net Profit by Business Activities of Cooperative B (Unit: Php '000)

Business	2018		2019		2020	
Rice Trading	1,088.1	(9.2%)	1,257.9	(9.7%)	1,519.1	(11.1%)
Palay Trading	1,016.7	(8.6%)	1,284.7	(9.9%)	1,381.2	(10.1%)
Lending Business	5,038.8	(42.8%)	4,848.9	(37.5%)	4,976.9	(36.5%)
Farm Inputs Trading	3,410.0	(29.0%)	3,710.1	(28.7%)	3,760.1	(27.5%)
Rice Bran/Husk Trading	1,341.8	(11.4%)	1,560.9	(12.1%)	1,680.7	(12.3%)
Diesel Retailing	-131.4	-(1.1%)	120.0	(0.9%)	160.9	(1.2%)
Rental of machineries	0.0	(0.0%)	162.2	(1.3%)	170.3	(1.2%)
TOTAL	11,764.0	(100.0%)	12,944.6	(100.0%)	13,649.2	(100.0%)

Source: survey team, from financial reports of multipurpose cooperatives in the state of Nueva Ecija.

Rice-related operations, such as paddy aggregation, drying, and milling, require substantial working capital not only for initial investments in facilities (e.g., dryers and mills) but also for ongoing expenses such as paddy procurement and facility operation. Even cooperatives that receive subsidized or free equipment through RCEF and other government programs often struggle to sustain operations due to capital shortages.

Moreover, rising costs of paddy procurement, fuel, and labor, coupled with intense price competition from high-quality, low-cost imported rice, make it difficult for cooperatives to generate stable profits from rice operations.

To enable cooperatives to sustainably engage in rice operations:

1. Access to Affordable Financing: Establish an environment where cooperatives can access low-interest financial markets to address working capital shortages.
2. Diversified Revenue Streams: Develop income sources beyond rice operations, such as financial services or agricultural input sales, to strengthen the business portfolio and enhance overall profitability.

2.1.9 Market Needs Survey and Identification of the Actual Conditions and Issues Related to Rice Supply and Demand

A market survey was conducted to determine the market needs for rice within the Philippines. The survey covered Metro Manila (Quezon City), Iloilo City, and Davao City as rice consumption areas in the Luzon, Visayas, and Mindanao regions, respectively. The summary of the survey is as follows.

Table 2.1.30 Outline of Market Needs Survey

Survey Location	Metro Manila (Quezon City), Iloilo City, Davao City
Survey Period	October - November 2024
Survey Subjects and Number of Surveys	Consumers: 360 samples (120 samples x 3 regions); Retailers: 27 samples (9 samples x 3 regions); Supermarkets: 9 samples (3 samples x 3 regions); Hotels: 18 samples (6 samples x 3 regions); Restaurants: 18 samples (6 samples x 3 regions); Wholesalers: 9 samples (3 samples x 3 regions)
Methodology	Interview using a survey questionnaire (convenience sampling)
Survey Items	Quality, price, packaging, variety, grade, production area (domestic rice or imported rice such as Vietnam), brand, etc. Basic information about the purchaser (age, gender, family structure, intended use, etc.) Motives for purchasing rice (price, degree of whiteness, aroma, taste, blandness, variety, production area, broken rice ratio, brand, etc.), frequency and quantity of purchases.

Source: JICA survey team

(1) Consumer survey

The consumer survey was conducted in Metro Manila (Quezon City), Iloilo City, and Davao City, targeting 120 respondents in each location for a total of 360. The survey was conducted by interviewing customers at the entrances and exits of markets and supermarkets using a survey questionnaire.

a) Characteristics of consumer survey targets

In Metro Manila, of the 120 people interviewed, 43 were male and 77 were female; in Iloilo, 11 were male and 109 were female; and in Davao City, 37 were male and 83 were female. In every region, the number of women exceeded that of men, suggesting that women were more likely to purchase food than men.

Figure 2.1.10 shows the age structure of the survey participants. In Metro Manila and Iloilo City, the largest group of participants was in their 40s, with the second-largest group being those in their 30s in Manila and those in their 50s in Iloilo City. In Davao City, the largest group was in their 50s, followed by those in their 40s. Comparatively, the youngest participants were found in Manila, followed by Iloilo City and then Davao City. This trend is likely due to the migration of young working individuals from the provinces to Manila.

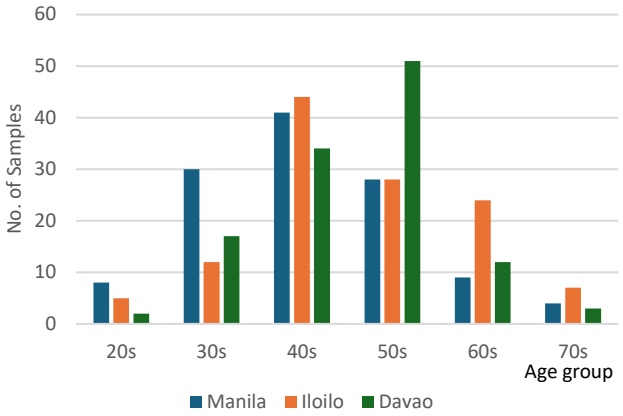


Figure 2.1.10 Age Structure of Consumer Survey Respondents

Figure 2.1.11 shows the number of household members among the interviewees. In Metro Manila, the most common household size was 4, followed by 5 and 3. In Iloilo City, the most common household size was 5, followed by 4 and 3. In Davao City, the most common household size was also 5, followed by 4 and 3. Overall, households with 4–5 members were most prevalent. However, in Iloilo City, there were noticeably more households with more than 6 members, with some households even having more than 10 members, indicating a relatively higher proportion of larger households compared to the other cities.

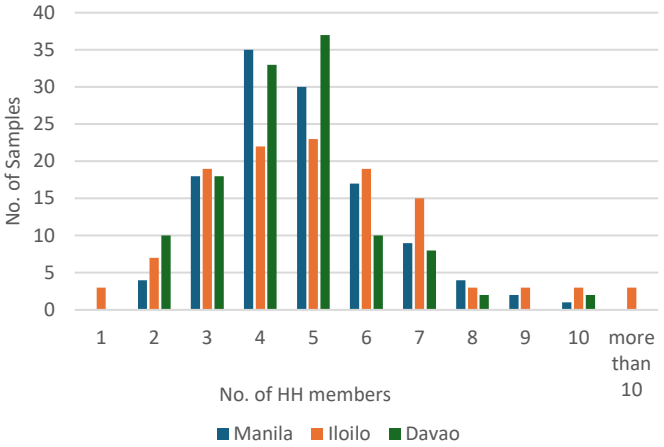


Figure 2.1.11 Number of Household Members of Consumer Survey Respondents

The monthly income of the surveyed households was interviewed. The average household income in the Philippines is reported as Php 353,230 [29]. Therefore, incomes were categorized into three brackets: less than Php 10,000, Php 10,000–30,000, and more than Php 30,000 per month. The results (Figure 2.1.12) showed no significant regional differences, with approximately equal numbers of households in each income bracket. Conversely, the average monthly income calculated from the average annual income was Php 29,435—approximately Php 30,000. Since only about one-third of the

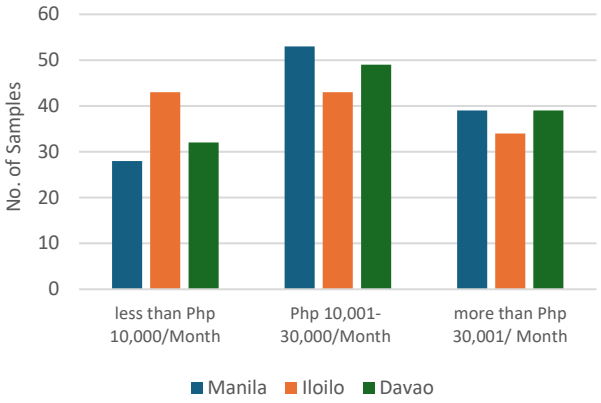


Figure 2.1.12 Monthly Household Income of Consumer Survey Respondents

[29] PSA 2024

respondents reported monthly incomes greater than Php 30,000, it can be inferred that a majority of households earned less than the average monthly income.

The number of meals consumed per day by households was surveyed. The results (Figure 2.1.13) indicate that in all regions, more than 80% of households consumed three meals a day. In Metro Manila and Iloilo City, approximately 10% of respondents reported consuming two meals a day, while in Metro Manila, about 10% reported consuming four meals a day.

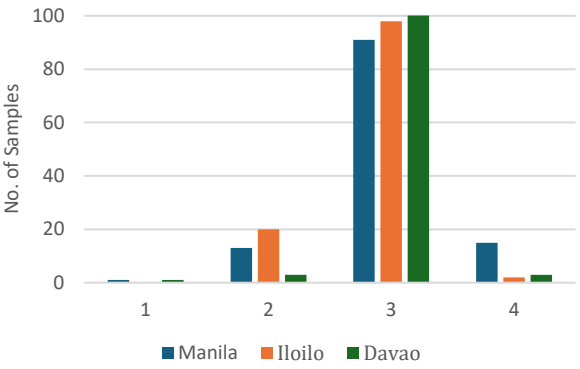


Figure 2.1.13 Number of Meals per day for Consumer Survey Respondents

Regarding the frequency of rice purchases, in Manila, most households purchase rice weekly, while in Davao City, most households purchase rice once every two weeks (Figure 2.1.14). In Iloilo City, on the other hand, there is no trend in frequency of purchase. A comparison of the three regions confirmed a trend of relatively high frequency of rice purchase in Manila and relatively low frequency of purchase in Davao City.

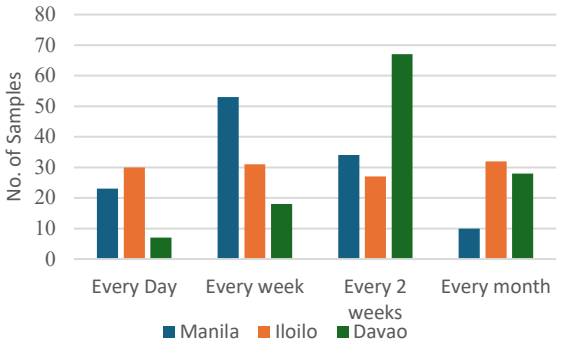


Figure 2.1.14 Frequency of Rice Purchases of Survey Respondents

The highest number of rice purchased at one time by this survey households was 11-25 kg in Manila and Davao City, while the highest value was less than 5 kg in Iloilo City (Figure 2.1.15). Since milled rice is often packed at 25 kg bags in the Philippines, those who responded 11-25 kg were considered to be purchasing milled rice in bags. On the other hand, those who purchase 5 kg or less buy by the kilo in the market, indicating regional differences in purchase of milled rice based on the volume of rice purchased at one time.

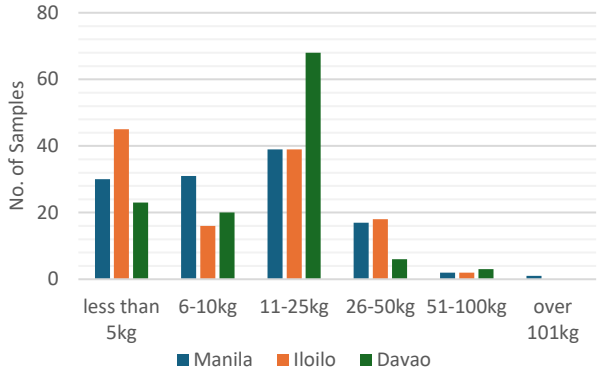


Figure 2.1.15 Amount of Rice Purchased per Time by Survey Respondents

Figure 2.1.16 shows the current purchase price of milled rice. The results indicate that, across all cities, many survey respondents purchased milled rice at Php 51–60 per kilogram. In Metro Manila and Iloilo City, many respondents purchased milled rice at Php 60 or more per kilogram, whereas in Davao City, many respondents purchased it at Php 41–50 per kilogram. Since the port of Davao receives high-quality, inexpensive Vietnamese rice, it is suggested that rice there is less likely to be purchased at higher price ranges compared to

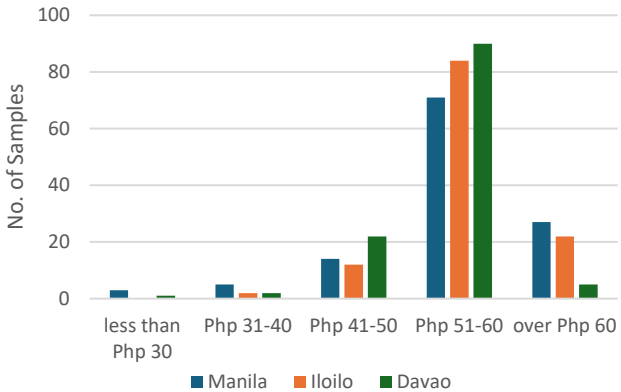


Figure 2.1.16 Purchase Price per kg of Milled Rice for Consumers Survey Respondents

other regions.

On the other hand, when the desired purchase price of rice was checked, less than 20% of all respondents indicated a price range of Php 51 or more per kilogram, which is the most common price range among those who currently purchase rice, and more than 80% of respondents desired a price below Php 50 per kilogram (Figure 2.1.17). It is evident that the current price of milled rice is higher than what consumers would like to pay. In particular, more than 30% of respondents in Manila wanted to pay less than Php 30, indicating a desire to keep rice prices low due to the rising cost of living in urban areas.

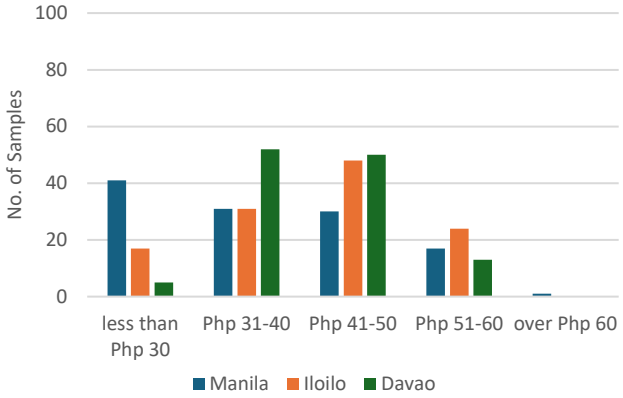


Figure 2.1.17 Desired Price per kg of Milled Rice for Consumers Survey Respondents

b) Criteria for consumers when purchasing milled rice

Consumers were asked about 16 criteria for purchasing milled rice (1) price, 2) taste, 3) softness, 4) aroma, 5) variety, 6) rice swelling, 7) brand name, 8) production area, 9) package, 10) newly milled, 11) grade, 12) milling degree, 13) quality, 14) nutrition, 15) reputation, 16) imports) were interviewed. Each item was rated in the following categories: 3 points: very important, 2 points: important, 1 point: somewhat important, and 0 points: not important at all.

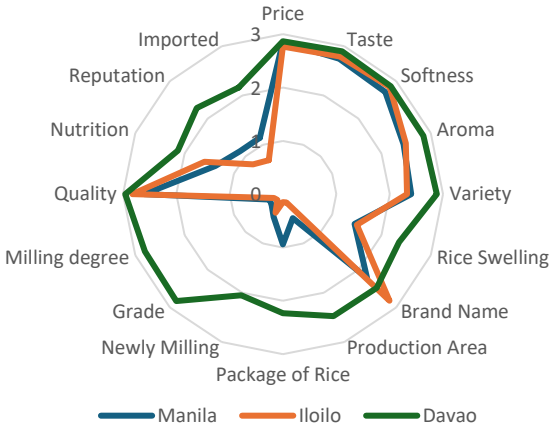


Figure 2.1.18 Average Consumer Scores for Rice Purchase Criteria

Figure 2.1.18 shows the average criteria score used by consumers by region when purchasing milled rice. Overall, consumers in Davao City tended to be more conscious of the condition of milled rice when purchasing. However, since the survey was conducted by separate researchers in each region, differences may have arisen due to differences in the way the researchers asked the questions. On the other hand, "price," "taste," "softness," “aroma”, "variety," "brand name," and "quality" showed high values in all three regions. Thus, it is clear that consumers in the Philippines are making decisions on which rice to purchase based on these seven criteria.

Contrary to these, "cooking swelling," "package," "newly milled," "grade," "milling degree," "nutrition," "reputation," and "imported" were not considered important criteria for judgment. In particular, "package," "newly milled," and "grade" were largely unnoticed, with the exception of Davao. Regarding "package," when rice is purchased in the market, it is often displayed and sold already removed from the bag and placed in a special container, so it is not always possible to check the package. In addition, although the "grade" is sometimes written on the package, the consumers do not seem to be aware of the grade when the rice is taken out of the bag and sold in a container at the market. On the other hand, respondents in Davao City were more aware of the "package" and "grade" than those in the other two cities, which may be attributed to the fact that in Davao City, the products are often purchased in 25 kg bags.

c) Quality items that consumers check when purchasing milled rice

Almost all consumers cited "quality" as a very important criterion in their decision to purchase milled rice. Regarding quality, more detailed questions were asked about seven specific items (1) whiteness, 2) broken rate, 3) chalky rate, 4) yellowish rate, 5) long or short grain, 6) stone, and 7) immature).

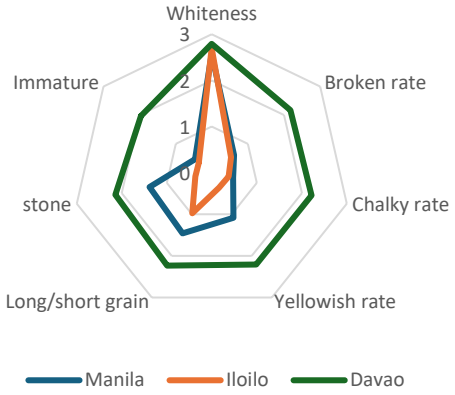


Figure 2.1.19 Average Consumer Scores for Milled Rice Quality Criteria

In Davao City, as with the previous item, the overall value was higher than in the other two cities (Figure 2.1.19). On the other hand, the only item that also showed high values in Manila and Iloilo City was whiteness. Observation of consumers when buying rice at the market shows that they compare rice arranged in containers and select the rice they want to buy. The whiteness of the milled rice was the most important consideration when making a purchase.

(2) Survey of rice value chain stakeholders

Surveys of rice value chain stakeholders were conducted with a) retailers, b) supermarkets, c) hotels, d) restaurants, and e) wholesalers, using the same survey instrument as that used for the consumer survey.

a) Results of survey of retailers

Retailers were interviewed at 9 locations in each city, totaling 27 locations. The results are shown in Figures 2.1.20 and 2.1.21. Compared to the consumer survey, all items were answered as very important. Notably, many respondents indicated that "reputation" and "imports" were not very important. On the other hand, as in the survey of consumers, "whiteness" was cited as the most important characteristic in judging the quality of milled rice.

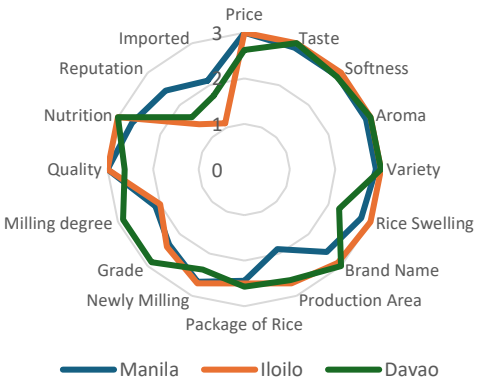


Figure 2.1.20 Average Retailers Scores for Rice Purchase Criteria

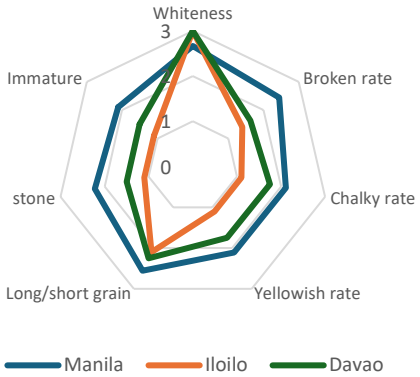


Figure 2.1.21 Average Retailers Scores for Milled Rice Quality Criteria

b) Results of survey of supermarkets

For supermarkets, interviews were conducted at 3 locations in each city, totaling 9 locations. The mean values for supermarkets varied widely, partly due to the small sample size. In Davao City, many respondents rated almost all items as "very important." In contrast, Manila and Iloilo City showed similar trends for many items, with "package," "newly milled," and "grade" receiving higher ratings

only in Manila. In terms of quality criteria, as with the consumer survey, "whiteness" was cited as the most important quality characteristic in all regions, followed by "long or short grain."

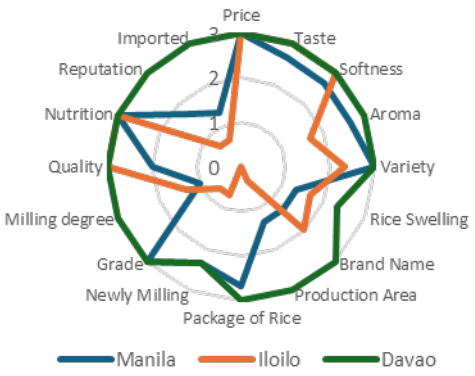


Figure 2.1.22 Average Supermarket Scores for Rice Purchase Criteria

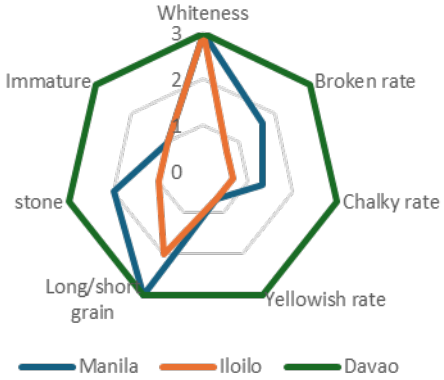


Figure 2.1.23 Average Supermarket Scores for Milled Rice Quality Criteria

c) Results of survey of hotels

For hotels, the survey was conducted at 6 locations in each city, totaling 18 locations. In Manila and Iloilo City, respondents indicated that "taste," "softness," "aroma," "variety," and "rice swelling" were more important than "price." This suggests that hotels select the milled rice they purchase based on taste rather than price, as they serve the rice to their customers. In addition, as in other stakeholders, "whiteness" was identified as the most important quality criterion.

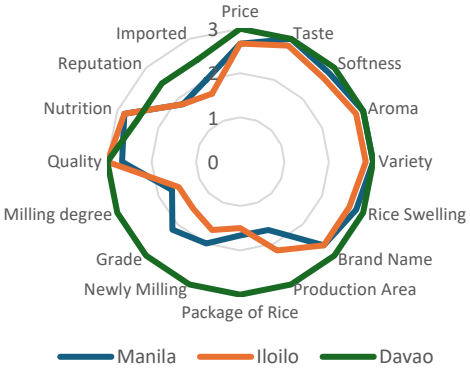


Figure 2.1.24 Average Hotels Scores for Rice Purchase Criteria

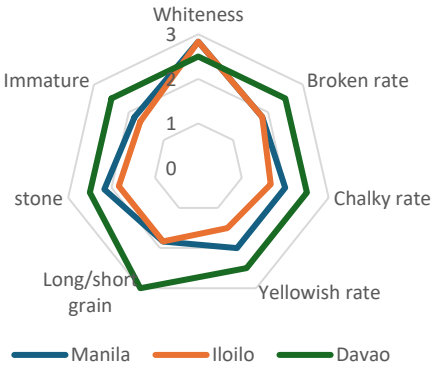


Figure 2.1.25 Average Hotels Scores for Milled Rice Quality Criteria

d) Results of survey of restaurants

As with hotels, the survey of restaurants was conducted at 6 locations in each city, totaling 18 locations. Similar to hotels, respondents indicated that characteristics other than "price" were more important when selecting milled rice for restaurants (Figure 2.1.26). The most important characteristic was "rice swelling." In restaurants, "rice swelling" is particularly valued because it allows a larger quantity of rice to be produced from a given amount of milled rice. In particular, restaurants that offer free refills have become increasingly popular in recent years, making the "rice swelling" feature especially important for these establishments. Additionally, the growing popularity of restaurants offering free refills is thought to be related to the recent sharp rise in the price of rice.

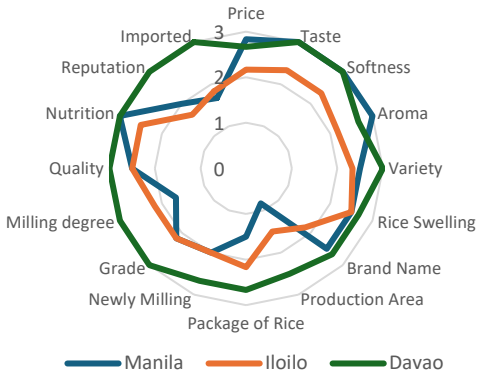


Figure 2.1.26 Average Restaurants Scores for Rice Purchase Criteria

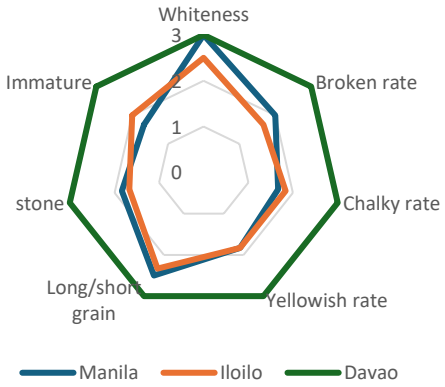


Figure 2.1.27 Average Restaurants Scores for Milled Rice Quality Criteria

e) Results of survey of wholesalers

Wholesalers were interviewed at three locations in each city, totaling nine locations. Although the sample size was small, the results (Figure 2.1.28) indicated that wholesalers tended to prioritize the characteristics of milled rice more than any other rice value chain stakeholder. In Iloilo City, "imported" was not considered important, whereas in Manila, "production area" was considered important. However, all other items were judged to be "very important" as criteria for purchasing milled rice. Because wholesalers purchase milled rice to sell to retailers, they were thought to scrutinize its characteristics more strictly. Moreover, in Iloilo City, "whiteness" and "long-grain or short-grain" were rated as "very important," whereas in Manila and Davao City, all seven criteria were considered "important" or higher.

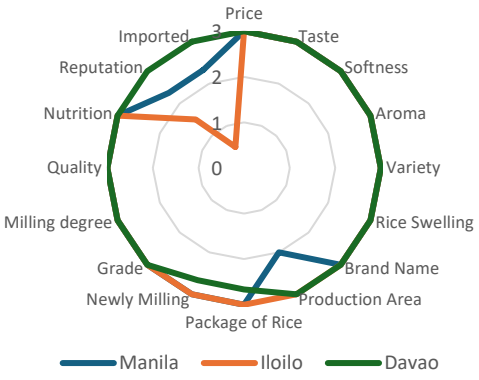


Figure 2.1.28 Average Wholesalers Scores for Rice Purchase Criteria

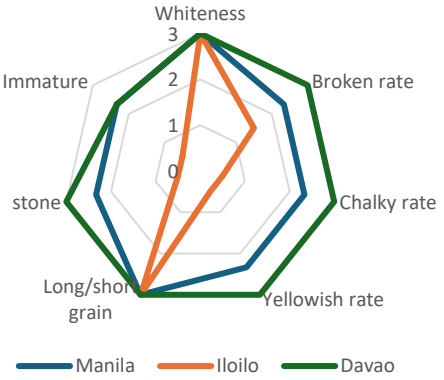


Figure 2.1.29 Average Wholesalers Scores for Milled Rice Quality Criteria

f) Survey of rice VC stakeholders on current rice prices and quality

VC stakeholders, excluding consumers, were interviewed regarding the current price of rice and their perceptions of an appropriate price. The results showed that, similar to the consumer survey, most respondents purchase rice at Php 51–60 per kg, followed by Php 41–50 per kg (Figure 2.1.30). In contrast, when asked about the appropriate price for milled rice, the most frequent response was Php 41–50 per kg, followed by Php 31–40 per kg. These findings confirm that many rice value chain stakeholders believe that the current price of milled rice is too high.

Rice value chain (VC) stakeholders were asked to rate their satisfaction with the current price and quality of milled rice (Figure 2.1.31). They were interviewed using four levels of satisfaction: very satisfied, satisfied, somewhat satisfied, and unsatisfied. The results showed that "unsatisfied" was the most common response regarding the price of rice, followed by "somewhat satisfied." In contrast, with respect to the quality of milled rice, the most frequent response was "satisfied," followed by "somewhat satisfied" and then "very satisfied." These findings indicate that while rice VC stakeholders are generally satisfied with the quality of milled rice, many consider its price to be high. Therefore, it is important to maintain the quality of milled rice while implementing measures to lower its price in order to enhance overall stakeholder satisfaction.

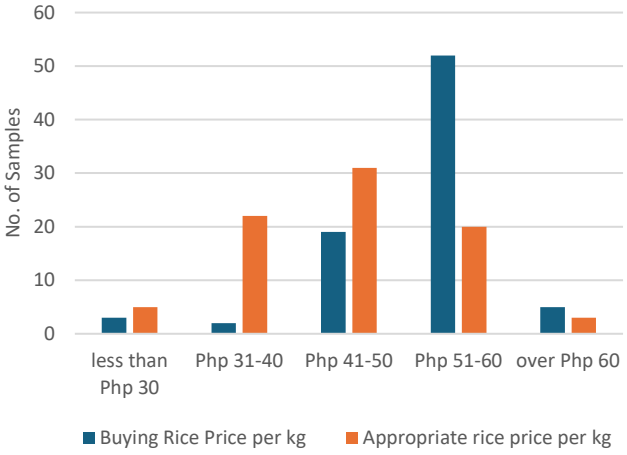


Figure 2.1.30 Current and Fair Purchase Price per kg of Milled Rice for Rice VC Stakeholders

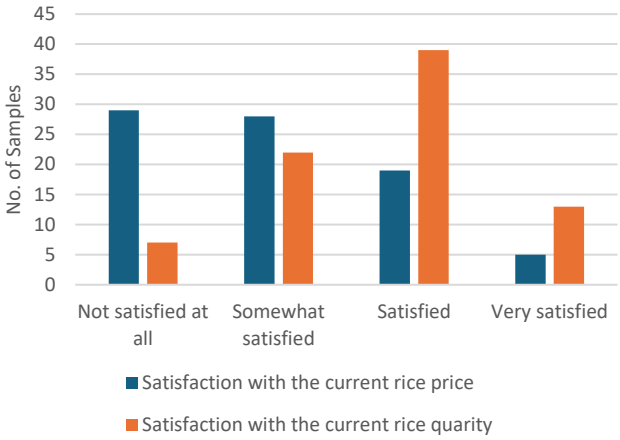


Figure 2.1.31 Satisfaction of Rice VC Stakeholders with Current Milled Rice Prices and Quality

(3) Results of survey on criteria and quality when purchasing milled rice for each stakeholder of rice VC

Figure 2.1.32 shows the average decision criteria used by each stakeholder in all target cities when purchasing milled rice. The results indicate that, compared to other stakeholders, consumers did not consider "production area," "packaging," "newly milled," "grade," "milling degree," "reputation," or "imported" to be important factors in their purchasing decisions. Wholesalers had the most stringent criteria for purchasing milled rice, followed by retailers; since they both purchase and sell milled rice, they pay close attention to its characteristics. Across all stakeholder groups, "reputation" and "imported" were consistently rated as less important compared to other items. Although there are rumors that a large amount of imported Vietnamese rice in the Philippines is produced using significant quantities of pesticides, this issue is rarely used as a criterion when purchasing milled rice.

In terms of judging the quality of milled rice, "whiteness" was rated as the most important criterion by all stakeholders (Figure 2.1.33). However, consumers tended to regard criteria other than "whiteness" as less important compared to other stakeholders. Among other than consumers, the next most important criterion after "whiteness" was "long grain and single grain." All other criteria were uniformly rated as important.

Because "whiteness" is the most important factor in assessing the quality of milled rice for all stakeholders, many rice mills in the Philippines have installed color sorters. It has been observed that some rice mills separate the grades of milled rice by increasing the number of times the rice passes through the sorting machine; however, each pass removes additional colored rice, thereby reducing the overall milling yield. To improve milling yield, it is essential to produce high-quality rice right from the paddy production stage.

Figure 2.1.32 Average Scores of Rice Purchase Criteria by Rice VC Stakeholders

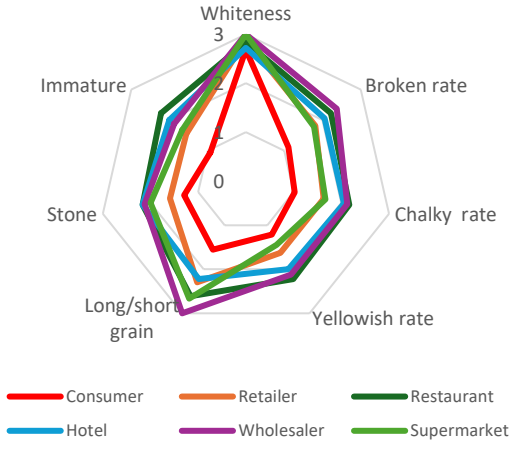


Figure 2.1.33 Average Scores of Milled Rice Quality Criteria by Rice VC Stakeholders

This survey revealed that respondents want to maintain the current quality of rice while lowering its price. In addition, the fact that rice is "imported" is not a primary purchasing criterion. Instead, factors such as "price," "taste", "softness," "aroma", "variety," and "quality"—especially whiteness—are considered more important (Figure 2.1.32). Therefore, if high-quality, low-priced domestic rice can be produced, it could gain an advantage over imported rice (which incurs tariffs and transportation costs) and become more competitive in the market.

To lower the price of domestic rice while maintaining its quality, it is vital to reduce production costs by enhancing production efficiency and minimizing losses through appropriate post-harvest processing. In the Philippines, delays in agricultural mechanization compared to major rice-exporting countries such as Thailand and Vietnam have led to higher labor costs, which, in turn, have increased rice production costs. Furthermore, post-harvest losses can be as high as 14.52%. Therefore, introducing agricultural machinery, providing technical guidance for its proper and efficient operation and maintenance, and improving post-harvest processing techniques are all necessary steps.

2.1.10 Outcomes and Challenges of Projects and Programs by the Philippine National Authorities and by Other Donors in Rice Post-Harvest Sector

(1) Gap Analysis

A Gap analysis was conducted to organize the response status of the Philippines government and other donors. For each project, the number of projects was categorized by VC stage and project content, and the number of projects was summarized in a matrix format: VC stage was categorized in four categories: seed, production, post-harvest handling, and market, and project content in six categories: infrastructure, mechanization, training, provision/support services, R&D, and credit/financial assistance. Projects that fall under more than one category are accounted for in each category, and the number of projects in the matrix is the cumulative total number of projects.

Table 2.1.31 GAP Matrix (Projects by the Philippine National Authority)

		Project Component					
		Infrastructure	Mechanization	Training	Provision/ Support Service	Research and Development	Credit/ Financial Assistant
VC phase	Seed				1	1	
	Production	2	2	1	4		2
	Post-harvest		1				
	Marketing			2			

Source: JICA survey team

Philippine government agencies have implemented a total of 8 projects related to rice within the last 10 years, and if these are classified by VC stage and project content, a total of 16 projects have been implemented. The results of this classification are shown in the Gap Matrix in Table 2.1.30. Of these 16 projects, 11 were related to "production", accounting for approximately 69% of the total. The provision of agricultural materials is 4 projects, the most common. In terms of the content of the support, the largest number of cases involved free provision/support services is 5 projects. On the other hand, there was only one case of support for post-harvest, which was the smallest at around 6% of the total. This is the provision of post-harvest equipment by the RCEF.

The international organizations have implemented a total of 15 projects within the last 10 years, and if classified by VC stage and project content in the same way as the projects of Philippine government agencies (Table 2.1.30), a total of 30 projects. The results of this classification are shown in the Gap Matrix (Table 2.1.31). Many projects were implemented in specific regions. There are 22 projects in Region III, the major rice-producing region, and there are 16 projects in Region VI. The number of projects in Regions II, VIII, and XI are around 10 projects each. NCR and Region IV-A are no projects (See Appendix 4).

Region III has 11 projects supporting "production", and Region VI has 8. Support for "production" is the most common type in the VC stage. In Region III, there are 3 projects related to mechanization in the production field, and there is a concentration of projects such as the provision of agricultural machinery. In addition, there are 5 projects related to research and development "seed" and "production", which is a very high number compared to other regions. This is because there are organizations such as PhilMech and PhilRice, and there are also projects for these organizations.

In the Philippines, 22 projects, or approximately 73% of the total, were for the support for the upstream stages of the VC, such as "seed" and "production". In terms of the method of support, there were a total of 7 projects related to training. There are 3 projects related to post-harvest, which was about 10% of the total and the lowest of all the VC stages. The content was the construction of modern post-harvest facilities by KOICA and training related to the operation of these facilities, as well as the repair of post-harvest equipment and support services by IFAD.

Table 2.1.32 GAP Matrix (Projects by International Organizations)

		Project Component					
		Infrastructure	Mechanization	Training	Provision/ Support Service	Research and Development	Credit/ Financial Assistant
VC phase	Seed	2	1		2	3	
	Production	2	3	4	2	2	1
	Post-harvest	1		1	1		
	Marketing	1		2			2

Source: JICA survey team

(2) Projects or Programs by Philippine Agencies

The following is a summary of activities related to rice VC by Philippine government agencies in 10 years. The activities are based on interviews conducted during the field survey, e-mail responses, and information provided on the website.

1) Agri-Pinoy Rice Program (from 2011 to 2016)

It is a major program that supports the Food Staples Sufficiency Program (FSSP), which was developed by the Philippine government to ensure food security from 2011 to 2016. The main efforts were 1) production support, 2) irrigation extension, 3) provision of infrastructure and post-harvest equipment, 4) strengthening market access and market linkages, 5) agricultural extension activities, and 6) research and development.

2) Agri-Puhunan Pantawid Program (from 2024) (DA-DBP)

This is a financial assistance initiative for rice farmers that began in 2024. The program is rolled out in partnership with the Development Bank of the Philippines (DBP). It provides low-interest loans with a maximum of Php 60,000 to provide the necessary equipment and materials to continue farming. The program also includes an agricultural insurance initiative, one of the objectives of which is to provide countermeasures against unpredictable disasters and to promote agricultural insurance among young farmers.

3) Farm and Fisheries Clustering Consolidation (F2C2) Program (from 2020) (DA-RFO, FOD, AMAD, ATI, ATI-RTCs, AMAS)

The program aims to generate economies of scale for agricultural products and improve market access. The program targets single FCAs or communities of multiple FCAs to develop Cluster Development Plans (CDPs), establish market linkages, and provide training in management. By enhancing the business aspects, it seeks to improve productivity and income. The CDPs are overseen by the Field Operations Division (FOD) of the Regional Field Office (RFO) of the DA, which assists in the preparation and approval of CDPs. Establishing market linkages is overseen by the Agribusiness and Marketing Assistance Division (AMAD) of the DA, which is responsible for market matching. Management training is provided by the Agricultural Training Institute (ATI), ATI-Regional Training Centers (ATI-RTCs), Agribusiness and Marketing Assistance Service (AMAS), and capacity building to support clustering.

4) Masagana Rice Industry Development Program (MRIDP) (from 2023 to 2028) (DA-FOS (Field Operations Service)

The program is designed to address challenges in the rice sector and strengthen the rice value chain. It aims to strengthen the rice sector through four main strategies: climate change action, farmer clustering, digitalization, and commercialization of agriculture. The goal is to increase rice self-sufficiency by 2028.

5) National Rice Program

The program is designed to help farmers increase their productivity and income. The content of the program changes from year to year, but it is a constant program and is currently positioned as one of the Banner Programs. The program to distribute discount coupons for fertilizer was launched in 2021, and the program to distribute hybrid seeds in 2023. The targeted recipient are farmers registered with RSBSA nationwide. The program encourages the production of quality rice by distributing high-quality seeds and fertilizers. The fertilizer distribution program promotes the use of nitrogen-fixing biofertilizers to maintain yields while reducing fertilizer use. The budget for 2024 is Php 30 billion.

6) NIA Contract farming (from 2024) (NIA)

This initiative, which began in 2024, is designed to promote sustainable, high-quality rice production. The system provides contract farmers with distribution and financial support for agricultural field operations and materials necessary for production and pays a fixed amount of money based on the yield of paddy. The budget for 2024 is 3.4 billion Php.

7) Rice Competitiveness Enhancement Fund (RCEF) (from 2019 to 2024) (RCEF-Project Management Office), DA-ICTS (Information and Communications Technology Service), PhilMech, PhilRice, Land Bank of the Philippines (LBP), DBP, ATI, TESDA (Technical Education and Skills Development Authority).

The program is designed to improve the productivity and profitability of rice farmers and increase their international competitiveness through improved rice production and post-harvest handling facilities. Implementation of the Project started in 2019. Specifically, the program has four components: 1) providing machinery to rice farmers, 2) seed improvement and free seed distribution, 3) financial assistance through loans, and 4) extension activities related to rice production through training and other means. The project distributed more than 30,000 farm machineries and equipment.

Information from some farmers have indicated that some machinery and equipment provided were not suitable to the local conditions. Another concern voiced out was the slow delivery of facilities. Also, while certified seeds distribution have reached 83% (as of 2022), there were delays in seed distribution and insufficient quantities have been noted. In financial assistance, delays in repayment and other problems have been reported. The project's first phase is scheduled to end in 2025, but it has been announced that the program will be extended until 2031. The budget is Php 60 billion (Php 10 billion each year) for the six years from 2019 to 2024, with Php 5 billion allocated for machinery, Php 3 billion for seed distribution, Php 1 billion for loan projects, and Php 1 billion for training.

It has been decided that RCEF will be extended until 2031, as RCEF2.0, and the budget will be increased to 30 billion Php per year. The target area was the 57 priority provinces under RCEF 1.0, but under RCEF 2.0, it will be expanded to all rice-producing provinces nationwide, and in addition to the four components mentioned above, it will also include components such as improving soil health, pest and disease management, solar-powered irrigation systems, and small-scale water storage projects.

8) Rice Resiliency Project (RRP) (from 2020) (DA-RRP Management Office, DA-ICTS, DA-RFO, ATI, FPA (Fertilizer and Pesticide Authority), PLGU, MLGU)

The free seed and fertilizer distribution project started in 2020 and complements the projects for seed and fertilizer distribution in the RCEF and the National Rice Program.

(3) Projects or Programs by International Organizations

The following is a summary of projects and programs related to rice VC by international organizations. Activities are based on interviews conducted during the field survey, e-mail responses, and information provided on the website.

1) International Fund for Agricultural Development (IFAD)

a) Rapid Food Production Enhancement Program (RaFPEP) (from 2008 to 2016) (DA, NIA, NFA)

The Rapid Food Production Enhancement Program (RaFPEP) was implemented in Regions II, III, V, VI, VIII, X, and XI from December 2008 to December 2016 to address the 2008 food price hike and to achieve self-sufficiency in rice. The project was implemented in two phases, from 2009 to 2011 and from 2010 to 2015. The first phase implemented was the “Rapid Seed Supply Financing Project” (RasSFiP) while the second phase was the “Irrigated Rice Production Enhancement Project” (IRPEP). RasSFiP provided certified seeds, while IRPEP enhanced sustainable food production focused on

strengthening IAs, rehabilitating irrigation facilities, supplying agronomic inputs, repairing post-harvest facilities, and training in marketing. The budget was Php 1,973 million, of which USD 15.9 million was from IFAD (loan), USD 13.2 million from EU as grant assistance, and USD 4.5 million as counterpart of the Philippine government. As a result of the Program, 112 water users' associations were formed and 9,347 ha of irrigated paddy fields and post-harvest facilities were repaired. In addition, 2,091 farmers were trained in marketing.

b) Rapid Response to Post Typhoon Haiyan Agriculture Rehabilitation Program (HARP) (from 2014 to 2015) (DA-RFO (Region VI, VIII))

From April 2014 to June 2015, the Rapid Response to Post Typhoon Haiyan Agriculture Rehabilitation Program (HARP) was implemented in Regions VI and VIII to help small farmers affected by the 2013 typhoon in the region. The main activity is the supply of quality certified seeds and fertilizers. The budget for the project was Php 179 million.

2) United States Agency for International Development (USAID) (from 2017 to 2021) (PhilRice)

Assistance was provided from 2017 to 2021 under the U.S. Agricultural Trade Promotion Assistance Act to strengthen research and modernize the food system in the agricultural sector in the Philippines. In the rice sector, a grant was allocated for the construction of state-of-the-art research equipment, conference rooms, and training facilities at PhilRice. The budget is Php 302 million, consisting of Php 277 million in loans under the Agricultural Trade Promotion Assistance Act and Php 25 million counterparts of the Philippine government.

3) Korea International Cooperation Agency (KOICA)

a) Establishment of Modern Integrated Rice Processing Complexes in the Philippines (from 2009 to 2014) (PhilMech)

Establishment of Modern Integrated Rice Processing Complexes in the Philippines (RPC), the project was implemented from 2009 to2014 with the objective of providing modern integrated post-harvest facilities, The project includes the installation of complete post-harvest facilities like drying, and milling facilities and temporary storage in the four provinces of Pangasinan, Iloilo, Bohol, and Davao del Sur, including training in operations, maintenance, and repair. The organization initially responsible for the operation was NABCOR but was abolished in 2013. Thereafter, the management and operations of the facility were turned over to a cooperative and the local government. The budget of the Project is Php 865 million. According to the evaluation report (2022), the three facilities other than Pangasinan are still in operation, with the highest operation rate being in Iloilo and the lowest in South Davao[30].

b) Enhancing the Capacity Production and Distribution of High-Quality Rice Seeds (from 2013 to 2017) (PhilRice, BPI)

A follow-up project was also implemented, the “Enhancing the Capacity Production and Distribution of High-Quality Rice Seeds” from November 2013 to May 2017. The project provided equipment for the production of high-quality seeds to seed growers to enhance their production capacity and promote the use of high quality seeds. The budget of the project was Php 180 million.

4) Korea Program on International Agriculture (KOPIA)

a) Follow-Up Project of High-Quality Seed Multiplication and Dissemination of Released Cultivar for Rainfed Lowland Environments (from 2018 to 2019) (PhilRice)

[30] Public Officials and Operators' Perceptions on the Implementation of the Four Modern Rice Processing Complexes (KOICA RPCs) in the Philippines: An Evaluation Study

With the aim of addressing issues related to increased rice production and smallholder income from July 2018 to December 2019, the Follow-Up Project of High-Quality Seed focused on increased production and distribution of high-quality seed to guarantee smallholder farmers' access to seed. Multiplication and Dissemination of Released Cultivar for Rainfed Lowland Environments was promoted. Farmers receive high quality seeds from the cooperative at the time of planting and return the same amount of cash (Php 1,000/sack) after harvest. The cooperative used the money generated by the project for lending to farmers and purchasing post-harvest equipment to sustain local rice production. In addition to support these initiatives, the project also provided free agricultural machinery and training on rice production.

5) Ministry of Agriculture, Food, and Rural Affairs (MAFRA)/ Korea Rural Community Corporation (KRC)

a) Improving the Rice Supply Chain to Ensure Quality of Seeds and Milled Rice for Distribution and Buffer Stocks in the Philippines (from 2022 to 2026) (PhilRice, NFA)

The project, Improving the Rice Supply Chain to Ensure Quality of Seeds and Milled Rice for Distribution and Buffer Stocks in the Philippines, provided PhilRice and NFA with facilities to improve the rice supply chain and was started in 2022. PhilRice was provided a seed cold storage warehouse and equipment to maintain seed quality, while NFA and PhilRice were provided with office automation equipment to streamline their operations. In addition, an ICT-based platform will be established at PhilRice's Rice Seed Information System (RSIS) and NFA to implement software to collect, integrate, and analyze seed production and seed distribution data at the provincial, regional , and national levels. The budget is USD 4.5 million and is expected to be completed in 2026.

6) Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)

a) Better Rice Initiative Asia-Fostering Agriculture and Rice Marketing by Improved Education and Rural Advisory Services (BRIA-FARMERS) (from 2014 to 2017) (ATI, PhilRice)

From March 2014 to November 2017, the Better Rice Initiative Asia-Fostering Agriculture and Rice Marketing by Improved Education and Rural Advisory Services (BRIA-FARMERS) project aimed to improve productivity, increase income, and ensure food security for small farmers. Another project is the Rural Advisory Services (BRIA-FARMERS), aimed at increasing productivity, income, and food security for small-scale farmers. Specifically, the project provided training on production and farm management, and improved market linkages. The budget was Php 90 million.

7) People's Republic of China

a) Second Technical Cooperation Project Philippine-Sino Center for Agricultural Technology (from 2011 to 2017) (DA-RFO (Region III))

China has established the Philippine-Sino Center for Agricultural Technology (PhilSCAT) at Central Luzon State University (CLSU) to provide technical cooperation mainly on hybrid rice research and mechanization from 2003 to 2008. A second project was implemented, the Second Technical Cooperation Project Philippine-Sino Center for Agricultural Technology (PhilSCAT TCP II)from September 2011 to July 2017. Specifically, the project provided support for the experimental cultivation of hybrid rice, the test installation of advanced machinery, and agricultural technology. The budget was Php 163 million.

b) Philippine-Sino Center for Agricultural Technology – Technical Cooperation Program Phase III (PhilSCAT TCP III) (from 2018 to 2023) (DA-RFO (Region III), PhilSCAT-Project Management Office)

From January 2018 to April 2023, another project, the Philippines-Sino Center for Agricultural Technology - Technical Cooperation Program Phase III (PhilSCAT TCP III), a technical cooperation

project aimed at introducing modern technology, climate change, sustainable agriculture, etc. was implemented. The main activities were the provision of machinery, development of hybrid rice, research on biogas, and construction of demonstration plots for seed production technology. The budget was Php 303 million.

8) Food and Agriculture Organization (FAO)

a) Building Capacity on Promoting Economically and Environmentally Efficient Rice Production through Direct-Seeded Rice (from 2022 to 2023) (PhilRice)

Building Capacity on Promoting Economically and Environmentally Efficient Rice Production through Direct-Seeded Rice from June 2022 to July 2023. By introducing precision direct-seeding machinery, the program sought to reduce the cost of rice production by reducing excess seed and labor.

b) Building Capacity on Promoting Economically and Environmentally Efficient Rice Production through Direct-Seeded Rice (from 2022 to 2023) (PhilRice)

Capacity Development and Experience Sharing for Rice Value Chains through South-South and Triangular Cooperation (SSTC), supported by Korea, from 2021 to 2024. The objective is to enhance the competitiveness of the rice value chain by sharing knowledge on rice value chain policies and strategies among Tanzania, Cote d'Ivoire, the Philippines, and Korea. Training for sustainable rice production was also provided. The budget is Php 3.5 million.

9) Asian Development Bank (ADB)

a) Support for Competitive and Inclusive Agriculture Development Program Subprogram1(from 2018 to 2020) (DA)

Funding for institutional reforms on trade and water management to enhance the competitiveness of rice as Subprogram 1 of the Support for Competitive and Inclusive Agriculture Development Program from May 2018 to April 2020. The budget is USD 4 million.

b) Food Security and Resilience of the Association of Southeast Asian Nations Member States to Food Price Volatility (from 2014 to 2016) (DA)

Increased rice stockpiling as Food Security and Resilience of the Association of Southeast Asian Nations Member States to Food Price Volatility from July 2014 to September 2016. Funding was provided to increase rice stockpiles and stimulate rice trade in the ASEAN. The budget is 0.8 million.

10) World Bank (WB)

a) Mindanao Inclusive Agriculture Development Project (MIADP) (from 2023) (DA, NCIP (National Commission on Indigenous Peoples), BARMM)

Launched in 2023, the Mindanao Inclusive Agriculture Development Project (MIADP) aims to improve agricultural and fishery productivity and market access in Mindanao. The main activities include the introduction of small-scale irrigation facilities and the construction of farm to market roads to improve physical access from farms to markets.

(4) Cooperation among development partners in the field of mechanization

As part of the projects implemented by the aforementioned international organizations, information on cooperation in the field of agricultural mechanization, which is considered particularly important for the development of rice production in the Philippines, was compiled. To verify the recent status of cooperation among development partners in agricultural mechanization for rice production, projects completed or currently underway over the past 15 years were reviewed. A total of eight projects were implemented during

this period. The implementation status of each project is summarized in Table 2.1.32 below. The funding agencies for these projects included South Korea, China, and FAO.

Table 2.1.33 Cooperation Projects of Development Partners in Agricultural Mechanization

No. 1	
Project name	Establishment of Modern Integrated Rice Processing Complexes in the Philippines (RPC)
Implementing agency	PhilMech
Period of support	2009-2014
Objective.	Post-harvest modernization for rice production
Activities	• Construction of modern integrated rice processing facilities • Conduct training on the operation, maintenance, repair, adjustment and management of RPC facilities and equipment
Summary of activities	In order to provide modern technology for rice post-harvest processes (drying, temporary storage, and milling), one modern Rice Processing Complex (RPC) was established in each of the four provinces—Pangasinan, Iloilo, Bohol, and South Davao—between 2011 and 2013.
Fund	Funding organization: the Korea International Cooperation Agency (KOICA) Total value: Php 865,450,000.
No. 2.	
Project name	Second Technical Cooperation Project Philippine-Sino Centre for Agricultural Technology (PhilSCAT TCP II)
Implementing agency	• DA (Regional Field Office III) • Central Luzon State University (CLSU)
Period of support	2011-2017
Objective.	Improvement in four areas (agricultural mechanization, research and development, capacity building and knowledge management)
Activities	• Promotion and commercialization of mechanized production and processing systems for hybrid rice • Developing more adaptable hybrid rice varieties for the Philippine market • Use of biogas technology and related technologies for energy generation in rural households and farms • Educate and raise awareness of stakeholders through relevant knowledge and management of PhilSCAT technology • Provision of technical assistance and consultancy services on PhilSCAT technology
Summary of activities	Aimed at demonstrating and disseminating advanced Chinese agricultural technologies that can be adapted in the Philippines. Activities take place on 9.78 ha of land within the CLSU site. Of this, 7.02 ha is a demonstration farm, while office buildings, accommodation, post-harvest processing facilities, integrated machinery testing facilities, agricultural machinery service facilities, a power station and pumping station are constructed on the remaining 2.76 ha.
Fund	Funding organization: the Government of China Total value: Php 163,219,100.
No. 3.	
Project name	Enhancing the Capacity Production and Distribution of High-Quality Rice Seeds
Implementing agency	• PhilRice • Bureau of Plant Industry (BPI)
Period of support	2013-2017
Objective.	• Strengthen the capacity for the production and distribution of quality rice seeds to ensure sustainable rice self-sufficiency and increase farmers' incomes. • Improve the efficiency of rice seed processing and certification through the introduction of modern facilities and equipment.
Activities	• 32 tons of certified inbred seeds were distributed to more than 400 farmers. • Training was conducted for seed inspectors, seed producers, and farmers. • Agricultural machinery was introduced, including two 6 t/hr circulating dryers, two 4 t/hr reversible flat dryers, two 2 t/hr air screeners, one 2 t/hr gravity separator, automatic bagging and bag-closure machines, and 50 m³ refrigerated storage units.
Summary of activities	The project aims to supply farmers and seed producers with high-quality rice seeds by providing facilities equipped with advanced machinery. The facilities provided under the project can process up to 2 metric tons of seed per hour.
Fund	Funding organization: the Korea International Cooperation Agency (KOICA) Total value: Php 180,000,000.
No. 4	
Project name	Follow-Up Project of High-Quality Seed Multiplication and Dissemination of Released Cultivar for Rainfed Lowland Environments
Implementing agency	PhilRice
Period of support	2018-2019
Objective.	• Ensure that smallholders and their cooperatives have access to quality seed as an initial input. • Help farmers learn modern cultivation techniques by providing them with machinery, training, and new technologies for rice cultivation. • Use seed money provided by the project for production loans, enabling farmer associations to support their members. • Provide training to farmers on the concepts of self-help and cooperation.

Activities	• Semi-annual planning and reporting by co-operators • Training, workshops and educational tours at PhilRice and in Korea • Participatory farm open days and demonstrations to improve availability and access to quality seed • Facilitating the exchange of views and technical experience between co-operators and local authorities • Free distribution of machinery and rice cultivation kits as start-up equipment for rice cultivation.
Summary of activities	The project adopted a system in which farmers were provided with high-quality seeds on loan and were required to repay them in cash after the harvest. During the harvest season, farmers paid Php 1,000 in cash per bag to their respective cooperatives. These funds were then used as revolving capital for the cooperatives. Over the course of the four-year project, the following support was provided: 1) Php 1,279,050 to Nueva Ecija, 2) Php 1,257,271.08 and a rice mill to Bohol, and 3) Php 479,000 and irrigation facilities for 100 hectares to Iloilo.
Fund	Funding organization: the Korea Program on International Agriculture (KOPIA) Total value: Php 4,500,000.
No. 5.	
Project name	Philippine-Sino Centre for Agricultural Technology - Technical Cooperation Program Phase III (PhilSCAT III)
Implementing agency	• DA (Regional Field Office III) • PhiSCAT Project Management Office • Central Luzon State University (CLSU)
Period of support	2018-2023 (original plan 2018-2021, first extension 2021-2022, second extension 2022-2023)
Objective.	Improve agricultural research and production capacity in the Philippines and increase rice self-sufficiency through farmers' use of PhilSCAT-bred varieties and developed technologies.
Activities	• Promoting exchange of experts for technical cooperation between the two countries. • Development of high-yielding hybrid rice. • Establishment of seed production technology demonstration sites in Nueva Ecija, Tarlac, Pampanga and Davao.
Summary of activities	Following Phase II activities, the focus will be on promoting agricultural mechanization, developing and promoting hybrid rice and using biogas technology. Implement activities to modernize agricultural technology, combat climate change, increase farmers' productivity, sustainable agriculture, food security and economic development.
Fund	Funding organization: the government of China Total value: Php 303,222,110
No. 6.	
Project name	Building Capacity on Promoting Economically and Environmentally Efficient Rice Production through Direct-Seeded Rice
Implementing agency	PhilRice
Period of support	2022-2023
Objective.	Demonstration of riding precision seeding machines and establishment of a promotion system.
Activities	Demonstration trials of the use of riding precision seeding machines and confirmation of their effectiveness in reducing production costs.
Summary of activities	To identify the economic and environmental benefits of introducing precision seeding machines and to encourage rice farmers to reduce production costs by promoting their use.
Fund	Funding organization: FAO Total value: Php 2,685,820.
No. 7.	
Project name	Capacity Development and Experience Sharing for Rice Value Chains through South-South and Triangular Cooperation (SSTC)
Implementing agency	PhilRice
Period of support	2021-2024
Objective.	• Sharing of rice policies between the Republic of Korea and target countries. • Pilot rice policy between the Republic of Korea and target countries. • Identify rice research, extension and training institutions in target countries • Training of leaders to disseminate knowledge to stakeholders, including farmers
Activities	• Organizing workshops for knowledge and best practice sharing on policy and strategy development in the rice sector • Study tours to the Philippines for government experts • Organization of workshops on the Rice Value Chain (RVC) curriculum • Development of RVC training curricula • Phased implementation of training for RVC stakeholders • Training/capacity/equipment needs assessment • Training for sustainable rice farmers • Mechanization training with provision of agricultural machinery • Organizing lesson-sharing events in South Korea
Summary of activities	Rice value chain stakeholders in the United Republic of Tanzania, the Republic of Côte d'Ivoire, and the Republic of the Philippines, supported by the Republic of Korea, will collaborate to discuss improvements in national rice sector policies to strengthen the rice value chain. Participating countries will also exchange best practices for enhanced policies and provide training on sustainable rice production and mechanization for extension agents, farmers, and service providers.
Fund	Funding organization: FAO Total value: Php 3,540,170
No 8.	

Project name	Improving the Rice Supply Chain to Ensure Quality of Seeds and Milled Rice for Distribution and Buffer Stocks in the Philippines.
Implementing agency	• PhilRice • NFA
Period of support	2022-2026
Objective.	Improving the rice supply chain and the quality of stockpiled rice
Activities	• Installation of a state-of-the-art warehouse and rice seed processing facility at PhilRice in Munoz, Nueva Ecija. • Installation of warehouses with cold storage and acclimatization rooms at PhilRice field stations in San Mateo, Isabela and Batac, Ilocos Norte. • Provision of necessary equipment and materials for office automation to PhilRice and NFA in order to optimize operational efficiency. • Implementation of a comprehensive capacity-building program, including training in Korea, local operational training and information systems consulting.
Summary of activities	Establish facilities to improve the quality of rice seed—ensuring higher germination rates, reducing losses, and accelerating nationwide distribution. In addition, the project will develop and implement the PhilRice Rice Seed Information System (RSIS) and provide related facilities to the NFA. These initiatives will create an ICT-enabled platform for real-time collection, integration, and analysis of data on rice seed production and distribution, thereby supporting informed decision-making by policy makers and key stakeholders at the municipal, provincial, and national levels.
Fund	Funding organization: the Ministry of Agriculture, Food, and Rural Affairs (MAFRA), Korea Rural Community Corporation (KRC) Total value: Php 281,036,610

Source: Each project document, summarized by JICA survey team

(5) Implementation status and prospects of RCEF's promotion of agricultural mechanization

The RCEF mechanization program was implemented by PhilMech with a budget of Php 5 billion over a six-year period from 2019 to 2024. The project results targeted (1) a reduction of 3 Php/kg-husk in production costs, (2) a 3 to 5% reduction in post-harvest handling from the current level, and (3) a 30% value addition from rice and by-products (30% increase in the sales amount of rice and by-products delivered from the rice mill run by the agricultural cooperative).

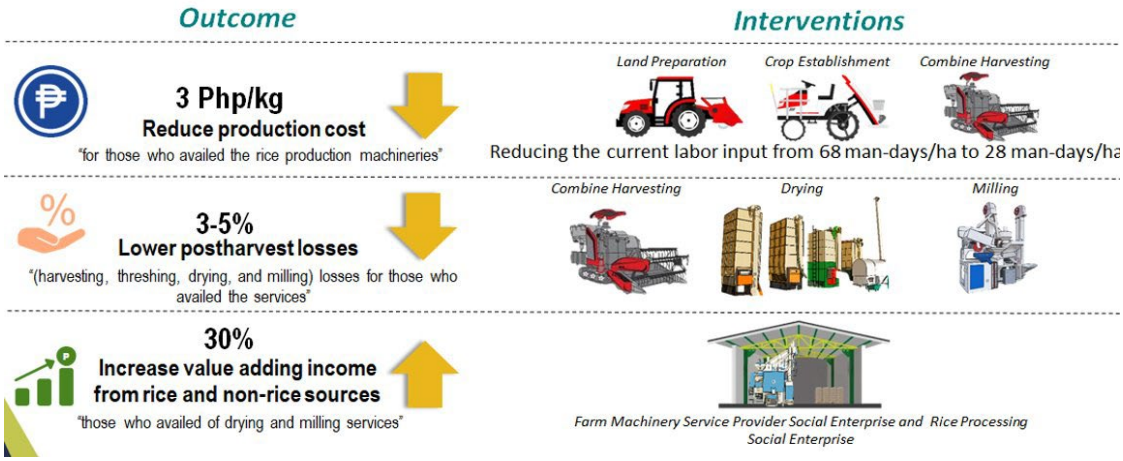


Figure 2.1.34 Expected outcomes and interventions in the RCEF mechanization program

Source: PhilMech

Procurement results are shown in the following table: 5,609 four-wheel tractors, 1,269 combine harvesters, and 126 rice milling lines were procured in 57 of the 81 states in the country.

Table 2.1.34 Equipment Procurement through RCEF

Machinery	BED Target						
	2019	2020	2021	2022	2023	2024	Total
Land Preparation	**4,616**	**4,356**	**2,300**	**2,857**	**677**	**694**	**15,500**
Four-wheel Tractor	1,345	1,364	1,500	1,000	100	300	5,609
Hand Tractor	2,264	2,052	500	982	290	350	6,438
Floating Tiller	1,007	940	300	61		44	3,052
PTO-Driven Disc Plow				114			114
Levee Maker					287		287
Crop Establishment	**1,038**	**975**	**540**	**834**	**623**	**380**	**4,390**

Machinery	BED Target						
	2019	2020	2021	2022	2023	2024	Total
Precision Seeder	94	*52*	50	32	167	80	475
Walk-behind Transplanter	706	748	200	501	260	200	2,615
Riding-type Transplanter	238	175	290	301	196	100	1,300
Mechanical Weeder							
Seed-sowing machine with trays							
Harvesting & Threshing	**2,175**	**2,406**	**800**	**1,598**	**600**	**590**	**8,169**
Reaper	850	840	150	799		45	2,684
Combine Harvester	828	889	600	799	600	500	4,216
Thresher.	497	677	50			45	1,269
Drying	**8**	**17**	**350**	**217**	**174**	**250**	**1,016**
Mobile Dryer		4					4
Recirculating Dryer	8	13	350	217	174	250	1,012
Milling	**75**	**242**	**231**	**198**	**126**	**161**	**1,033**
Single Pass Rice Mill (Mobile)	69	233			69		371
Single Pass Rice Mill (Stationary)	2	2	100	49		100	253
Impeller Rice Mill			31	49			80
Multi-Pass Rice Mill *	4	7	100	100	57	61	329
	7,912	**7,996**	**4,221**	**5,704**	**2,200**	**2,075**	**30,108**

Note*: The Rice Mill volume includes the Rice Processing System business.
Source: Data provided by RCEF PhilMech PMO

A mid-term evaluation of the ADB-funded RCEF project was conducted in 2023. The mid-term evaluation was favorable for the project as a whole, as it produced positive results for agricultural mechanization, but the following recommendations were made regarding the implementation of the project.

i. The procurement model for FCA should be further strengthened and many training opportunities should be provided to ensure sound management.

ii. PhilMech should demonstrate the machines to beneficiaries and provide information to farmers on their use and benefits that are appropriate or in line with local conditions and farmers' practices.

iii. Balers, laser levelers, drones, and transport vehicles should be added to the list of target equipment, and needs assessment should be strengthened.

iv. Emphasis should be placed on further post-harvest processing facilities, increased training, and demonstrations.

v. A guarantee of 50 to 100 operating hours should be added as a condition of bidding to the equipment supplier. A certain amount of spare parts should also be included.

vi. The number of FCA operators and PhilMech personnel present should be increased to expedite the process of on-site inspection and commissioning of equipment.

vii. Reducing penalties and damages to encourage more local machine suppliers would also reduce barriers to entry.

viii. PhilMech should expedite the process from identification of beneficiaries, preparation of bidding documents, procurement and processing of payments to suppliers.

ix. Data collection and research should be initiated to analyze the impact of agricultural mechanization in relation to the RCEF's top goals of reducing production costs, curbing post-harvest processing losses, and increasing beneficiaries' income.

In December 2024, the amended Rice Tariff Act (Republic Act No. 12078) was passed with the aim of extending the RCEF to strengthen food security and help millions of poor people. This will extend the RCEF until 2031, with an annual quota of 30 billion Php instead of 10 billion Php, 6 billion Php for distribution of high-quality seeds, 9 billion Php for agricultural mechanization, and 15 billion Php for extension and training projects which intend to shift from traditional farming to modernized farming, financial assistance to rice farmers, loans, soil improvement, solar power irrigation systems, and water storage facilities. RCEF 2.0 aims to expand the production and distribution of certified seed, and is

expected to allow PhilRice to distribute 5.5 million bags of seed rice per year starting in 2027, a 76% increase from current levels, covering 2.54 million hectares equivalent and increasing average yield by up to 21% in both dry and rainy seasons. This is a 76% increase from current levels and will cover 2.54 million hectares.

The mechanization program overseen by PhilMech will procure agricultural machinery free of charge for all identified producing rice. The effort aims to reduce post-harvest losses from the current 15% to 8%, which is equivalent to the annual rice consumption of about 340 thousand people. Once fully mechanized, the initiative will cover 1.73 million hectares and will reduce the cost of production as productivity and efficiency are improved, enabling it to compete with imported rice prices.

Wet Season	Area mechanized	173,000	ha	①、Target
	Yield (paddy)	4.10	ton/ha	②、Achievement（PhilRice）
	Volume of harvest	709,300	ton	③＝①×②
	Post-harvest loss reduction	7	%	④、Target
	Possible volume increase	49,651	ton	⑤＝③×④／100
	Milling recovery rate	0.62		⑥、Achievement（PhilMech）
	Rice in wet season	30,784	ton	⑦＝⑤×⑥
Dry Season	Irrigation rate	30	%	①'、Prediction
	Yield (paddy)	3.80	ton/ha	②'、Achievement（PhilRice）
	Volume of harvest	197,220	ton	③'＝①×①'／100×②'
	Post-harvest loss reduction	7	%	④'、Target
	Possible volume increase	13,805	ton	⑤'＝③'×④'／100
	Milling recovery rate	0.62		⑥'、Achievement（PhilMech）
	Rice in dry season	8,559	ton	⑦'＝⑤'×⑥'
Whole Year	Annual production	39,343	ton	⑧＝⑦＋⑦'
	Dayly consumption	320	g/day/person	⑨、Achievement（NFA）
	Annual consumption	116.8	kg/year/person	⑩＝⑨／1000×365
	Amount of rice milled ÷ annual consumption per person	336,840	person	⑪＝⑧×1000／⑩

Box 3: Estimation for Annual Consumption per Capita

The revised Rice Tariff Law implements RCEF 2.0 to offset the negative impacts on producers and agricultural cooperatives. It also has aspects of increasing the efficiency and economics of domestic production. To ensure the realization of those effects, and by establishing and maintaining a database of grain warehouse and storage facility accurate domestic buffer stocking (private stocks, NFA stocks, and farmers' stocks), the revised law will strengthen the DA's monitoring function and enable comprehensive monitoring of domestic rice buffer stock. In areas where milled rice is in short supply or experiencing abnormal price hikes, the NFA will be able to sell buffer stocked rice to government agencies and the poor through the Kadiwa ng Pangulo. It will also allow the NFA to replenish its buffer stock rice with domestic or imported rice in cases where domestic rice supplies are in short supply.

The amended law on Agricultural Tariffication provides for the establishment of a new rice management regime.

i. The President may authorize the importation of rice at low tariff rates for a limited time or in limited quantities in the event of an imminent or anticipated shortage or "other circumstances requiring government intervention". Such orders are effective immediately and may be issued only when Congress is not in session.

ii. If there is an oversupply of imported or domestically produced rice and domestic prices drop significantly, further imports will be suspended or prohibited for a certain period of time or in a certain quantity.

iii. Based on the recommendation of the National Price Coordinating Council (NPCC), declare a food security emergency for rice due to supply shortages or abnormal price increases. The NPCC will develop a formula to determine whether a rice supply shortage or abnormal price increase exists. If such a situation occurs, the DA may sell NFA buffer stock rice to government agencies

and the general public through Kadiwa Markets located in areas experiencing supply shortages or abnormal price increases.

iv. When domestic rice supplies are inadequate, NFA buffer stock rice will be supplemented with domestic or imported rice. The Secretary of DA may designate importing entities within the DA, except for the NFA. The newly signed law amends RA 11203. This amendment strengthens the DA's regulatory function by creating and maintaining a database of all grain warehouses and storage facilities for the purpose of monitoring rice stockpiles.

v. In the event of a rapid shortage or price spike in rice, the DA may take the necessary steps to stabilize the market.

vi. Extend the implementation period of RCEF to include soil improvement, pest control, solar irrigation projects, small-scale water storage projects, and deployment of composting facilities for biodegradable by-products.

The objectives of the RCEF project were to compensate rice farmers for the negative impact of the implementation of the Rice Tariff Law, to generate profits by adding value through rice milling processing and marketing, and to reduce post-harvest losses and improve rice milling quality. Among these, the Rice Processing System project aims to add value through the operation of FCA's rice processing facilities, which have been scaled up to three levels.

Table 2.1.35 Equipment Procured for the RCEF-Rice Processing System Project

Input equipment	Circulating mechanical dryer	Multi-stage milling line
Specifications and ancillary equipment	Fossil fuel or biomass heat sources, commercial electrical transformers, generators, portable moisture meters, vacuum cleaners, automatic bag stitch machines, fire extinguishers, tools	Portable moisture meter, 100-300 plastic pallets, vacuum cleaner, 2-ton weighing machine, portable bag gusset sewing machine, 3 rubber rolls, 3 screens, operating system, forklift
by size	Dryer capacity	Rice mill capacity
RPS-1	6 ton/batch	1.5 ton/hr
RPS-2	12 ton/batch	2-3 ton/hr
RPS-3	12 ton/batch × 2 units	4-5 ton/hr
Note 1) A multi-stage rice polishing line consists of a pre-sorter, stone separator, huller, rice husk sorter, rice polishing machine, agitator, rice grinder, length and width sorter, color sorter, weighing and packaging machine, and so on. Note 2) Annual expenses: RSP1 (no estimate) RSP2 (Php 15 million) RSP3 (Php 21 million)		

Source: PhilMech

Beginning in 2021, PhilMech also strengthened its FCA model approach with RCEF funds; RCEF consists of four components: agricultural mechanization, seed, education, and financing, with a focus on FCAs as the convergence point of interventions. The initial goal was to identify 120 FCAs across the country that would serve as convergence points for the four components. The initiative will be coordinated by PhilMech; as of 2022, 90 FCAs have been identified.

Table 2.1.36 Number of Model FCAs

Region	No. of Model FCA
CAR	3
Region I	4
Region II	7
Region III	15
Region IV-A	6
Region IV-B	0
Region V	6
Region VI	10
Region VII	5
Region VIII	2
Region IX	5
Region X	4
Region XI	9
Region XII	5
Region XIII	6
BARMM	3
Total	90

Source: RCEF PhilMech PMO

Among them, PhilMech has conducted needs assessments for 49 FCAs, of which 32 were identified as suitable for providing agricultural machinery services, 16 for rice processing, and 1 for FCAs that do both business models. These FCAs have received the machinery distributed under the program, and 49 have already completed training on enterprise management, including bookkeeping, etc. The overall workflow of the RCEF mechanization program is as follows, but time compression of the process is required.

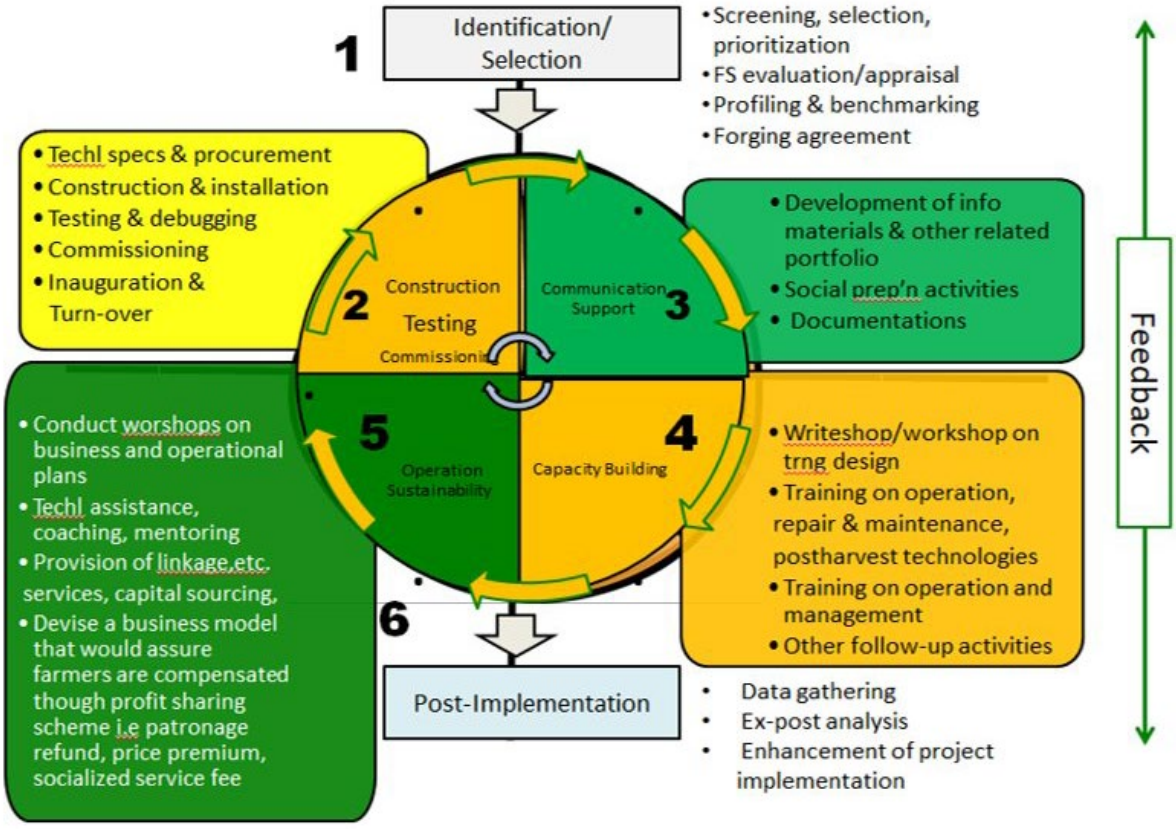


Figure 2.1.35 RCEF Agricultural Mechanization Program Work Process

Source: PhilMech

The target FCA is selected based on its financial situation, organizational structure, internal rules and regulations, and past performance, and the condition for providing equipment is that the warehouse and land must be within 1km of the three-phase power supply and not at risk of flooding. Providing machinery to the FCA has brought about improvements in the activities of some of the key players in the rice VC. At the farm level, it has been reported that the use of machinery has reduced post-harvest losses by 2% to 25%. This change is mainly due to the use of combine harvesters and threshers. While most farmers claim to have reduced post-harvest losses, despite the rise in production costs due to inflation, such as the increase in labor costs, it has resulted in an estimated 25% cost reduction in some areas through the introduction of agricultural machinery. The rapid shift from manual to mechanized farming has also led to an increase in crop yields and, in turn, an increase in overall income (The Manila Times).

For the aforementioned RCEF, the following allocations are made in consideration of the number of regional centers of two banks (LBPs and DBPs) to be handled.

Table 2.1.37 RCEF's Provincial Allocation for LBP and DBP

Area	LBP		DBP
Northern and Central Luzon	1. Abra	10. La Union	1. Benguet
	2. Apayao	11. Mountain Province	2. Bulacan
	3. Aurora	12. Nueva Ecija	3. Ilocos Norte
	4. Bataan	13. Nueva Viscaya	4. Isabela
	5. Batanes	14. Pampanga	
	6.Cagayan	15. Pangasinan	
	7. Ifugao	16. Quirino	
	8. Ilocos Sur	17. Tarlac	

Area	LBP		DBP
	9. Kalinga	18. Zambales	
Southern Luzon	1. Batangas 2. Camarines Norte 3. Catanduanes 4. Laguna 5. Marinduque 6. Masbate	7. Occidental Mindoro 8. Palawan 9. Rizal 10. Romblon 11. Sorsogon	1. Albay 2. Cavite 3. Camarines Sur 4. Oriental Mindoro 5. Quezon
Visayas	1. Aklan 2. Antique 3. Biliran 4. Capiz 5. Eastern Samar 6.Guimaras	7. Negros Oriental 8. Northern Samar 9. Aamar 10. Siquijor 11. Southern Leyte	1. Bohol 2. Cebu 3. Iloilo 4. Leyte 8. Negros Occidental
Mindanao	1. Agusan der Sur 2. Basilan 3. Bukidnon 4. Camiguin 5. Compostela Valley 6. Cotabato 7. Davao Oriental 8. Dinagat Island 9. Lanao del Sur 10. Maguindanao	11. Misamis Oriental 12. Sarangani 13. Sultan Kudarat 14. Sulu 15. Surigao del Norte 16. Surigao del Sur 17. Tawi-tawi 18. Zamboanga del Norte 19. Zamboanga Sibugay	1. Agusan del Norte 2. Davao City 3. Davao del Sur 4. Davao del Norte 5. Lanao del Norte 6. Misamis Oriental 7. South Cotabato 8. Zamboanga City 9. Zamboanga del Sur

Source: DA

2.1.11 Distribution Structure of Domestic and Imported Rice with Regional Characteristics

Rice distribution has developed since the 1970s, when the rice production was sufficient to supply the market from subsistence rice production, mainly through rice milling in rice-producing areas. The rice millers are engaged in the activities of collecting, storing, milling and selling rice, with the aim of ensuring a certain level of profit by keeping their facilities running for as long as possible. Currently, there are many rice millers operating in all provinces of the country, ranging from small-scale (Village Type Millers) to large-scale (Commercial Type Millers), with a total of 7,600 businesses nationwide (as of August 2017), according to the table below. However, since the implementation of the Rice Tariff Law, about 3,000 rice mills nationwide stopped operations due to the influx of inexpensive imported rice.[31]

Table 2.1.38 Number of Rice Businesses Licensed (as of August 2017)

	Retail trade	Wholesale (1)	Retail and Wholesale (2)	Rice milling (3)	Subtotal (%) (1)＋ (2)＋ (3)	Warehousing business	Importing business
Nationwide (except XII)	54,152 cases	3,820 cases	9,507 cases	7,606 cases	20,933 cases	14,531 cases	304 cases
NCR	9.0	3.1	5.0	0.4	8.5	8.8	14.5
Region I	5.6	10.5	16.7	16.0	43.2	5.5	6.6
Region II	6.3	24.0	6.5	15.3	45.8	15.4	1.0
Region III	6.8	16.3	9.4	8.5	34.2	11.8	38.5
Region IV	9.3	4.5	10.8	8.4	23.7	9.3	8.6
Region V	9.6	2.7	6.1	8.4	17.2	2.7	4.9
Region VI	7.4	5.9	12.4	8.1	26.4	3.1	5.6
Region VII	9.4	1.6	6.7	6.4	14.7	15.1	5.3
Region VIII	8.6	8.3	3.5	7.3	19.1	3.9	0.7
Region IX	3.2	5.3	4.8	5.9	16.0	3.3	4.3

[31] Food Sufficiency, Tariffication Policy and Business Strategy: A new Business Model for the Rice Milling Industry on the Philippines, MEC-J Volume 6 Number 2, August 2022)

	Retail trade	Wholesale (1)	Retail and Wholesale (2)	Rice milling (3)	Subtotal (%) (1)＋ (2)＋ (3)	Warehousing business	Importing business
Region X	5.9	8.1	4.0	4.6	16.7	5.6	2.6
Region XI	6.7	4.4	7.7	4.4	16.5	10.8	3.6
ARMM	2.1	0.3	1.4	0.2	1.9	0.8	0.7
Region XII	10.1	4.9	5.2	6.1	16.2	4.0	3.3

Note: Percentages are averages for 2013-15
(Source: Briones. R. M. (2019b) p13)
Source: PSA, Japanese source; Introduction of Rice Import Liberalization in the Philippines Katsumi Nozawa

Rice mills are located relatively close to farmers' paddy fields and can purchase rice from village (barangay) level collectors or city/province level collectors within a relatively short period of time after harvest. However, with the spread of combine harvesters, many paddies are not adequately dried and local rice mills are very careful about the moisture content of the paddy brought to them. In many cases, the paddy is dried in a sun-drying space after collection. They also have mechanical dryers, but they are used only on a limited basis. Sun-drying also requires turning the paddy over many times during the drying process, and the labor required to collect the paddy from a large space after drying and transporting it to the rice milling machine is also costly. Recently, the cost of mechanical drying and sun drying at rice mills has become almost the same. Furthermore, the cost of transporting 50 kg bags of paddy from the harvested fields to trucks has skyrocketed, and it has become a regular practice to pay 50 Php for the transportation of one bag.

The rice millers in the producing area also receive paddy from out-of-province collectors in areas with different harvest times for a longer operating period. After milling, the rice is sold to wholesalers in the consumption area and then to retailers. In some cases, milled rice from other regions is supplied, and some millers mix milled rice from several regions to create their own brand of rice by matching the appearance of the rice. The rice is then sold directly to retailers in the producing area. Local millers receive orders from wholesalers in the consuming regions and adjust the amount of rice milled each day for shipment.

Rice mills in the consumption area purchase paddy from agricultural cooperatives, collectors, and farmers in the production area. In some cases, the rice is milled immediately upon arrival, while in others, the rice is stored for about three months before milling. The millers collect various types of paddy and mixed after milling, and sold to wholesalers as several types of blended rice. There are also rice mills that handle imported milled rice.

Since rice can now be imported freely, it is first handled by importers who go through food and phytosanitary procedures, and then sold to domestic wholesalers and rice millers. Imported rice is sold in supermarkets in bags labeled with the country and brand name of the rice. It is thought that some of the imported rice that goes to the millers is blended with domestic rice to create a new brand of rice. The quality of imported rice, at least in appearance, is better than that of domestic rice, and while some rice is more expensive than domestic rice, much of it is sold at the same level as domestic rice.

According to Rice Import Companies in the Philippines[32], there are 939 importers nationwide, 39 of which handle Myanmar rice, 189 handle Vietnamese rice, 166 handle Thai rice, and 54 handle Pakistani rice. It is handled by 54 companies. In the August 2017 table above, there were 304 companies, which means the number has more than tripled since import liberalization. Price manipulation by importers and wholesalers is frequently reported in newspapers, and as recently as August 2023, the Customs Department seized over 200,000 bags of smuggled rice near Manila.[33]

[32] https://www.exportgenius.in/philippines-importers-of-rice; accessed October 18, 2024
[33] https://opinion.inquirer.net/166088/campaign-versus-rice-cartels-should-never-stop

Table 2.1.39 Milled Rice Retail Prices in Metro Manila

Date	Imported Commercial Rice (Php/kg)				Local Commercial Rice (Php/kg)			
	Special	Premium	Well Milled	Regular Milled	Special	Premium	Well Milled	Regular Milled
Oct 30,2024	55-63	51-60	45-55	45-48	59-61	52-58	43-54	40-50
Sep 30,2024	55-65	53-60	45-55	42-48	59-62	50-58	47-55	45-50
June 29,2024	55-65	52-62	52-55	47-51	57-65	51-58	48-55	45-52
Mar 29,2024	57-65	52-63	50-54	48-51	56-66	50-61	49-55	59*
Dec 29,2023	58-65	54-61	56-58	None	54-68	50-60	40-56	52-52
Sep 29,2023	53-60	47-58	45-48	None	54-62	47-60	45-48	40-44
June 30,2023	45-58	44-48	40-48	None	48-60	42-50	39-46	35-42
Mar 31,2023	50-58	43-52	40-46	37-44	48-60	42-49	39-46	34-40
Dec 30,2022	46-58	43-50	40-44	37-38	48-58	42-49	35-44	35-40
Dec 31,2021	50.00	45.00	40.50	37.00	50.00	45.00	40.00	38.00
Dec 29,2020	52.00	45.00	None	None	50.00	46.00	44.00	38.00
Dec 28,2019	52.00	46.00	44.00	n/a	54.00	45.00	40.00	35.00
Sep 30,2019	52.00	43.00	44.00	32.00	50.00	45.00	40.00	35.00

(Note: Prices for 2022-2024 are data for the price range of that date; for 2019-2021, they are the main market prices .
Source: DA-AMAS Price Watch (https://www.da.gov.ph/price-monitoring/)

Ports of landing of imported rice is nationwide, but the majority within the metropolitan area and central Visayas, where rice consumption is high.

Table 2.1.40 Average Rice Imports (2000-2012)

Region	Port	Arrivals (ton)
NCR	City of Manila	4,871,428
Ilocos Region	La Union	929,671
Central Luzon	Subic.	1,761,105
Southern Tagalog	Batangas City	1,121,945
Bicol Region	Tabaco	1,167,740
Western Visayas	Iloilo City	169,943
Western Visayas	Bacolod city	370,738
Central Visayas	Cebu City	2,078,745
Zamboanga Peninsula	Zamboanga City	717,696
Northern Mindanao	Cagayan de Oro City	839,827
SOCCSKSARGEN	General Santos City	363,082
Davao Region	Davao City	410,684

Source: Competition in the Rice Industry: An Issues Paper Roel M. Briones Senior Research Fellow Philippine Institute for Development Studies.

Davao City, for example, is a large city with a population of over 1.7 million and is a pure rice consumption area, so much of the rice must be brought in from outside. However, the distance between Davao City and Vietnam is close, and it is cheaper to bring in rice from Vietnam than from Central Luzon, the main rice-producing area to Davao City.

Some imported rice is sold as-is in 25 kg bags after landing at the port, after paying customs duties (35%) and other customs fees, and then transported to the place of consumption. Although it is not possible to make a simple comparison with domestic rice prices, imported rice prices (CIF) and wholesale prices are linked, and both have increased significantly in the last two years. The price increase for domestic rice is thought to be largely due to the cost increases, such as the rising cost of fertilizer, being passed on to the price, while the price increase for imported rice is thought to be largely due to the recent depreciation of the peso, the Indian embargo, and other factors that have improved the international trading price of rice. In July 2024, the tariff was reduced to 15%, and while there was a possibility that the wholesale price of imported rice would fall, it is reported that the retail price did not fall by much.[34] However, there was little change in import prices (CIF) from July to November 2024.

[34] https://www.philstar.com/headlines/2024/10/21/2394037/despite-imports-rice-retail-price-still-high-group

Retail prices did not change significantly after July 2024 for either imported or domestic rice.

Table 2.1.41 Imported Rice Prices (CIF) and Market Wholesale Prices

	Import volume	Wholesale price (Php/kg)			Imported rice CIF price (Php/kg)		
	(thousand tons)	Premium	Well Milled	Regular Milled	Thailand	Vietnam	Pakistan
2014	1,087	42.71	39.36	36.45			
2015	1,478	43.19	38.31	34.44			
2016	605	42.85	38.10	34.26			
2017	885	43.4	38.91	34.61			
2018	2,002	46.06	42.42	38.54	20.54	20.88	19.78
2019	3,118	43.35	38.8	34.67	19.48	18.16	18.9
2020	2,219	41.96	37.87	33.87	21.21	18.76	17.77
2021	2,967	41.79	37.7	33.76	19.13	19.17	18.22
2022	3,863	42.03	38.36	35.05	17.89	18.41	14.5
2023		45.43	42.95	39.48	27.58	24.03	26.98
2024*		52.71	49.84	46.34	28.68	28.69	30.25**

Source: PSA

However, assuming that the market price of imported rice (less than 5% broken rice) is the CIF price 28.68 peso/kg plus tariffs (35%) plus miscellaneous expenses (20 to 30%, hypothetically) plus freight (0.05 peso/kg; transportation cost of PSA rice production cost), the price in August 2024 will be 47.0-50.8 peso/kg. Since the tariff has been reduced to 15% since July 2024, this difference tends to be much larger. As mentioned above, many rice mills have reportedly closed due to the availability of inexpensive imported rice (see MEC-J Volume 6 above), so it is assumed that most imported rice is cheaper than domestically produced rice (Some imported rice brands, such as Basmati rice, are more expensive than domestic rice).

Therefore, simply increasing domestic rice production will not result in a decrease in imported rice and an increase in domestic rice in the Philippine rice market under the current rice import conditions where the quality of imported rice is better than most of the domestic rice, and low-quality domestic rice will have a difficult time finding a market.

The difference in the distribution structure of domestically produced rice and imported rice is not so great, with differences in transportation conditions favoring imported rice in some areas, such as Davao, which is closer to the southern Vietnam. The Port of Cebu also has a large volume of imported rice arrivals (Table 4), which is thought to be due to favorable transportation conditions from Vietnam. In addition, branded rice that is said to have aroma (Dinorado retail price P88/kg, Milagrosa, NSIC Rc 218, Ifugao Rice) is sold in all regions, placed on supermarket shelves, and consumed by the high-end segment of the population. However, the impact on the middle class, which constitutes the bulk of the consumption market, is small, and this is not a factor that causes regional differences in distribution. Some well-known brands such as Dinorado are sold with false labels on the bags due to the marketing strategies of rice millers and retailers, and as a result, they are sold in all regions. The true Dinorado is now hard to find out where it comes from.

2.2 Agricultural Policies and Directions of the Current Administration, Recent Specific Measures and Trends

2.2.1 Status of the Philippine Government Efforts to Improve Distribution of Agricultural Products in General

The distribution policy for agricultural products in the Philippines is based on the principle that harvests are purchased from farmers at the highest possible price and sold to consumers at a reasonable price and as low as possible. Trading centers throughout the country are being developed jointly by the DA and

LGUs. For important crops (rice, sugarcane, coconut, etc.), an institution (Attached Corporation) has been established to concentrate on the promotion of these crops and effectively implement measures to promote them, in addition to crop research, improvement of distribution, and support for the development of processing and distribution facilities.

(1) Development of trading centers, etc.

In Manila, there is the Food Terminal Inc. which was developed in the 1970s and is a wholesale-retailer of some of the agricultural products collected from all over the country. Initially, it was expected to serve as a hub for agricultural products coming to Manila, but it has not developed to the same extent, and traditional markets such as Divisoria and Balintawak remain central to the distribution of agricultural products in Manila.

On the other hand, in the production areas, region markets called "Region Trading Centers" have been established in various regions (12 locations) as shown in Figure 2.2.1, and serve as hubs for regional distribution. Agricultural products collected at the markets are consolidated by collectors, some of which are sorted and packaged for direct shipment to supermarkets, while others are shipped to traditional markets without going through this primary processing.

In addition, there are more than 100 retail markets (with simple processing facilities) called Food Terminals at the Municipal and Barangay levels throughout the country.

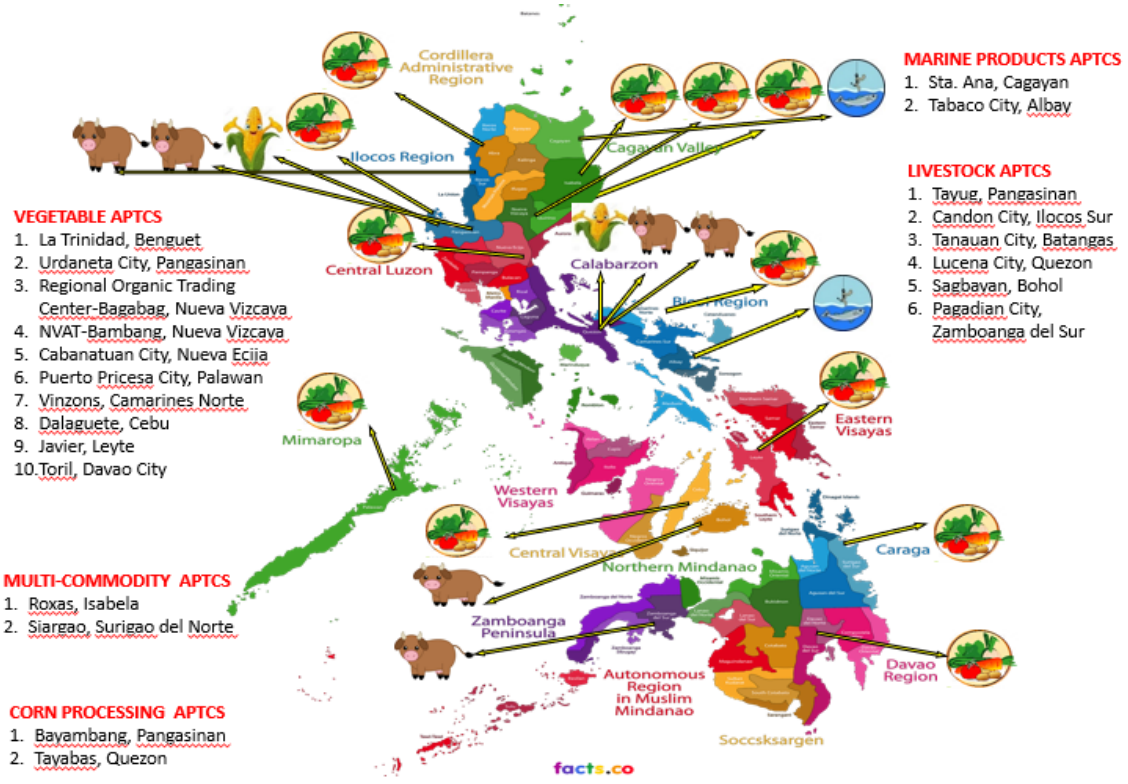


Figure 2.2.1 Location Map of Food Terminals
Source: DA-AMAS

(2) Market Information System

Price information on major agricultural products is collected weekly at 23 markets in Metro Manila and published on the DA's Web site. Price information on milled rice is also provided for four specifications: Special, Premium, Well-Milled, and Regular Milled. Information on the supply and demand of

agricultural products is compiled and published at DA's daily, monthly, and annual newsletters with analysis.

(3) KADIWA Policy

The KADIWA policy has been implemented since the 1960s during the former Marcos administration, changing its name and form as one way to achieve the above-mentioned low-cost sales of agricultural products.

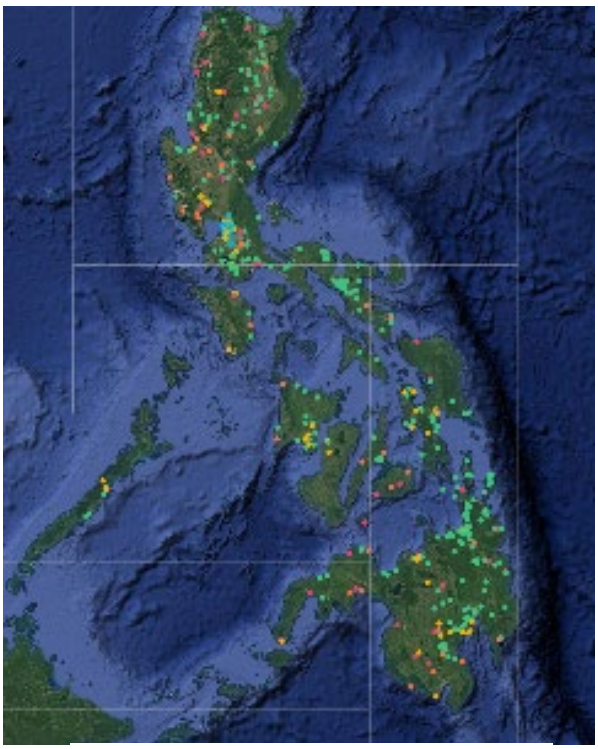


Figure 2.2.2 KADIWA Store Location Map

Source: DA-AMAS

At the beginning of the KADIWA policy, essential agricultural products (rice, eggs, sugar, poultry, etc.) were purchased by the government directly from farmers at high prices and sold to consumers at lower prices, but the sustainability of this trade was gradually criticized, and as a result, in recent programs the government has not purchased agricultural products directly.

The current KADIWA policy is being implemented as the KADIWA NG PANGULO PROGRAM (commonly known as KNP), a presidential program that has strengthened its partnership with the private sector, according to DA Memorandum Circular No. 37 Series of 2024. Aiming to expand nationwide, not just in the Manila metropolitan area, KADIWA centers (17 in the metropolitan area only as of September 2024), which are run by the private sector and serve as sales outlets for essential agricultural products, KADIWA stores (280 as of September 2024, 118 temporary stores), and 73 government-run stores (39 KADIWA stores in NIA, 34 KADIWA stores in PCC). At these stores, sales are conducted at prices set by DA. For example, milled rice is sold at 29 Php per kilogram to senior citizens, people with disabilities and other socially vulnerable groups. For all citizens who are not socially vulnerable, rice is sold at 45 Php per kilogram (well milled rice level), including both domestic and imported rice.

KADIWA centers are operated by private collectors licensed by the DA, where rice, eggs, sugar, vegetables, spices, root vegetables, fruits, fish (bangus, tilapia), poultry and other meat products, canned goods, cooking oil, cup noodles, etc. are sold wholesale and retail. All of these are commercial businesses and must be profitable. Therefore, logistics are subsidized by the DA and other governments. Specifically, they receive preferential use of vehicles owned by the DA, subsidies for gasoline, and so on. In the above Circular No. 37, it is stated that this type of distribution of agricultural products is possible because there is no middleman cost since the distribution is based on connecting farmers directly to consumers.

These sales offices are also responsible for supplying agricultural products, and some items are imported and procured (onions, garlic, etc.) when they cannot be supplied domestically due to seasonal restrictions. A supply network, as shown in the figure below, is being developed and procurement is being carried out to fulfill supply responsibilities.

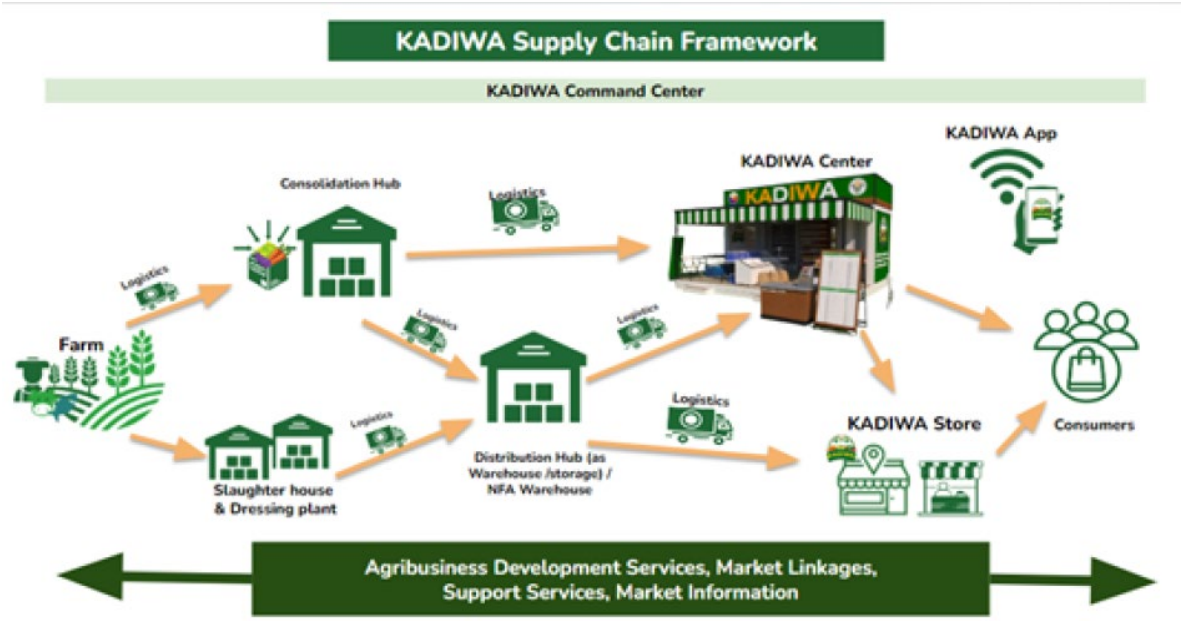


Figure 2.2.3 KADIWA Supply Network

Source: DA-AMAS

Farmers are members of agricultural cooperatives and associations (FCAs), etc., certified by the DA, and harvested produce is first collected from certified farmers at the Consolidation Hub (CH), then from the collection station to the Distribution Hub (DH), and from there to KADIWA centers and KADIWA stores. The supply chain is being established whereby CH is handled by local trading centers, fish landing centers, etc., and DH is handled by FTI (a collection and distribution center in Manila) and storage facilities of NFA, PFDA, etc. to supply KADIWA centers, etc., DA The supply to KADIWA centers, etc. is subsidized in terms of logistics (gasoline, etc.) by the DA. These distributions will be monitored in the future by consumer groups and AMAS using the KADIWA App, including traceability of agricultural products.

The milled rice sold at KADIWA Centers and other locations come from the NFA's stockpiled rice for disaster use after the six-month stockpile period has expired, and its safety as a food product has been inspected and confirmed by the relevant laboratory.

(4) Standardization and dissemination of agricultural products

In 1998, Administrative Order No. 7 established the Bureau of Agriculture and Fisheries Products Standards (BAFPS) as the agency charged with setting science-based and internationally consistent standards for agricultural products. Specifically, BAPFS is the nucleus for the establishment and implementation of agricultural commodity standards, with other government agencies also playing a role in their implementation. Through the implementation of the standards, the relevant agencies will work to ensure consumer safety and to increase the international competitiveness of agricultural products.

According to Administrative Order No. 17, 1998, the powers and functions of the BAFPS are as follows

- Establishment and implementation of quality standards for processing, storage, packaging, labeling, import/export, distribution, etc. of agricultural products
- Research on standards for agricultural products, harmonization of regional and international standards

- Regular inspections of processing and storage facilities, slaughterhouses, and public and private markets to ensure the freshness, safety, and quality of agricultural products.

In addition to these, in 2013, with the enactment of the Agricultural Mechanization Law, BAFS was further tasked with establishing standards and testing procedures for agricultural machinery in collaboration with the Agricultural Machinery Testing and Evaluation Center (AMTEC) and others. In 2016, with the enactment of the related law, the establishment of Halal standards was also added to its tasks.

With these, BAFS has established standards for 314 agricultural and other products to date. Of these, 49% are for crops, 22% for agricultural machinery and equipment, 12% for marine products, and 11% for livestock products. Of these, 56% are related to food quality and 44% to food safety, and the Philippines plans to adopt 100% of the ASEAN and CODEX standards by 2025.

For rice, six Grade (Premium, Grade 1 to 5) standards are also set in PNS 290, 2019 for broken rice percentage, colored rice percentage, and white rice percentage. According to the above-mentioned laws and regulations, BAFS is responsible for conducting physical inspections, etc., but BAFS inspectors are rarely present at the rice milling process. The judgment of rice milling standards is left to the voluntary judgment of the rice miller, and this is actually a self-inspection.

(5) Food safety measures and Phil GAP

In 2012, Administrative Circular No. 30 provided GAP certification for fruits and vegetables only. In 2013, the Food Safety Law was enacted to strengthen the food safety enforcement system. Circular No. 10 in 2013, the GAP system was implemented for all agricultural products with the aim of maintaining a high level of food safety and quality as well as environmental protection, health and safety, and welfare of producers. Subsequently, in 2018, Administrative Circular No. 1 established a specific implementation framework for Phil GAP. However, not much significant dissemination was done, and as of October 2023, there are about 540 Phil GAP certifications nationwide.

The "Code of Good Agricultural Practice for Rice" is also defined in PNS No. 141,2019 of the BAFS, which stipulates not only production but also post-harvest management. It also stipulates the health and safety of growers and post-harvest workers, as well as the traceability of rice. Phil GAP certification for rice is also issued.

2.2.2 Government Policies on Rice Distribution, Sales, and Mechanization

(1) Philippine Government Policy on the Distribution and Marketing of Harvested Rice

In principle, the distribution of rice is free, but apart from freely distributed rice, there is government-managed rice handled by the NFA. The legal basis for this is that according to the Agricultural Modernization Act (AFMA 1997), the government is obligated to guarantee food security, and the NFA was established in 1972 (then the National Grain Authority) as the implementing agency. The NFA has long been responsible for ensuring a stable supply of rice and stabilizing prices through such government control. However, with the 2019 Rice Tariff Law (RTL), imports were liberalized and the registration process for the above-mentioned rice distributors was also abolished; NFA rice was to be stockpiled and provided only for emergency needs and disaster relief, which would be covered solely by domestically produced rice. Therefore, NFA rice will not be supplied to the general market under the normal situation.

As mentioned above, BASF sets and is responsible for enforcing rice standards to ensure quality and safety, but the NFA applies rice standards only to stockpiled rice.

The NFA stockpile level is to be determined by the NFA Council (a committee chaired by the DA Secretary), but until recently, the buffer stock target was set at about 300,000 tons (milled rice) (10

billion Php at 23 peso/kg), or 9 days of the national daily consumption of 34,000 tons. The rationale for this was that the IRR of Act No. 11203 (Bylaws for the Implementation of the Rice Tariff Law), approved on March 28, 2019, provided that it would be determined based on a Study that would calculate independent stockpile levels, etc. as follows.

IRR of Act No. 11203 (Implementing Bylaws of the U.S. Tariff Act, Excerpt)

The NFA Council shall promulgate rules, regulations and procedures involving the acquisition, maintenance and distribution of buffer stocks.

Rule 8.2.1 No later than December 31, 2019 or earlier, the NFA Council shall promulgate rules, regulations, and procedures involving the acquisition, maintenance, and distribution of buffer stocks. The NFA Council shall commission an independent study to inform and accordingly revise these rules, regulations, and procedures. The study shall cover, among others: the acquisition, maintenance, and distribution of buffer stocks.

- - The optimal level of rice inventory to be held as national buffer stocks; and The optimal level of rice inventory to be held as national buffer stocks; -

- - The rules and procedures for procurement, composition, storage, processing, rotation or replenishment, and release of rice stocks; and The rules and procedures for procurement, composition, storage, processing, rotation or replenishment, and release of rice stocks; and

- - The locations and amounts of prepositioned stocks in anticipation of emergencies and disasters; and The locations and amounts of prepositioned stocks in anticipation of emergency and disaster; and

- - - The transaction flow and procedures for the release of rice stocks to government agencies as emergency response and disaster relief.

Rule 8.3. Prior to the approval and adoption by the NFA Council of the results and recommendations of the independent study in Rule 8.2.1 by December 31, 2019 or Prior to the approval and adoption by the NFA Council of the results and recommendations of the independent study in Rule 8.2.1 by December 31, 2019 or earlier, the NFA shall implement the following rules, regulations, and procedures involving the acquisition, maintenance, and operations of buffer stocks:.

NFA shall acquire the optimal level of rice inventory equivalent to 15 to 30 days of national rice consumption. Procurement shall be funded by its 2019 appropriations for palay Procurement shall be funded by its 2019 appropriations for palay procurement.

In September 2021, the final report of this survey was open to the public. In it, it was concluded that a stock of about 300,000 tons (polished rice) was needed, based on the disaster population from 2010 to 2019, which is the equivalent of 9 days of national daily consumption, and the figure was significantly lower than the provisional level of Rule 8.3.1 of the above IRR Public Act No. 11203. Therefore, the NFA has set a rice milling yield of 63% and is collecting around 476,000 tons of paddy as a target to meet this quantity of milled rice. In addition, the principle is that paddy procured as disaster relief should be disposed of within one year. According to the final report of the above survey, the details of the disaster are as shown in the table below, and events that do not directly affect the Philippines, such as long-term stoppages in distribution due to war in distant foreign countries, are not assumed.

However, on December 9, 2024, the Agricultural Tariff Law was amended to enact Republic Act No. 12078, which specified a new buffer stock volume up to 15 days of national daily consumption. According to the NFA, it had stored 15 million bags (750,000 tons, over 20 days' worth) in the Corona Virus disaster. The initial budget of 9 billion Php (General Appropriations Act (GAA) of Fiscal Year (FY) 2024, Republic Act No. 11975) plus 2 billion Php was budgeted for 2024 as well. In addition, according to Republic Act No. 12078, in case of emergency rice shortage, the DA Secretary shall establish an import enforcement mechanism that is not an NFA within the DA to conduct import measures.

Table 2.2.1 Types of Disasters Reported to NDRRMC

1. Air Mishap	1. Forest/ Grass Fire	1. Sinkhole
2. Armed Conflict	2. Hailstorm	2. Southwest Monsoon
3. Big Waves	3. Infestation	3. Super Typhoon
4. Chemical Leak	4. Internally Displaced Persons	4. TECF
5. Coastal Erosion	5. ITCZ	5. TECF & LPA
6. Collapsed Structure	6. Landslide	6. Tornado/Whirlwind/Strong Winds Incident
7. Continuous Rains	7. Lightning Incident	7. Tropical Depression
8. Disease Outbreak	8. LPA	8. Tropical Storm
9. Drought	9. Monsoon	9. Tropical Storm & Tropical Depression
10. Earthquake	10. Northeast Monsoon	10. Typhoon
11. El Niño	11. Rockslide	11. Typhoon & Tropical Depression
12. Fire Incident	12. Sea Swelling/Big Waves	12. Typhoon & Tropical Storm
13. Flashflood	13. Severe Tropical Storm	13. Volcano Activity/Eruption
14. Flashfloods/ Floodings	14. Severe Tropical Storm & Tropical Storm	14. Wild Fire/Bush Fire

Source: NDRRMC (2020).

In addition to the NFA stockpile, there are private and household stockpiles, and as of the beginning of August 2024, the non-NFA handle the majority of the buffer stock: 1.05 million tons for private, 460,000 tons for household, and 150,000 tons (about 9%) for NFA, and many NFA branches ask farmers to sell dried paddy.

In recent years, NFA's rice purchase price from farmers was set at 19 Php/kg until 2022, but it was raised to 23 Php/kg in September 2023 and during the time of the study at 30 Php/kg if the rice is sufficiently dried and has few adulterants, a level that is comparable to private collectors. The NFA's purchase price setting is conducted as described above, with the headquarters and local agencies consulting weekly based on price information from the collection sites. The capacity of NFA's rice milling facility is 7 to 10 tons/hr, which is larger than most rice milling businesses in the Philippines. This is because NFA anticipates that in the event of a disaster, a large amount of stored rice can be processed at once from a single NFA warehouse, and more than 200 tons of milled rice per day can be supplied to the disaster area.

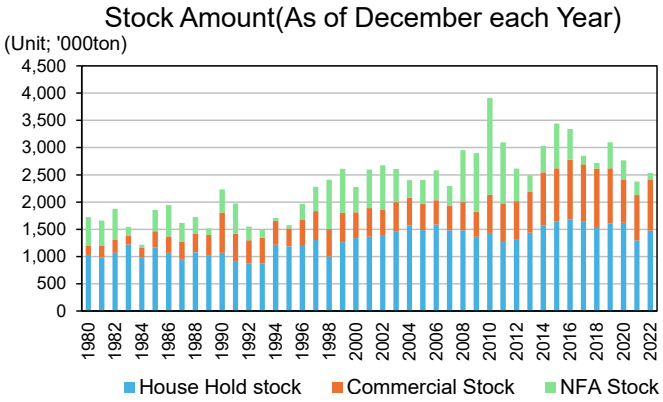


Figure 2.2.4 Stockpiles by Household, Commercial, and NFA

Source: PSA Open STAT

The government subsidizes the cost of drying and milling facilities for paddy to agricultural cooperatives and other farmers' associations through the National Rice Program (MASAGANA Rice Industry Development Program) and RCEF, and also assists in setting up matching arrangements such as contract cultivation with buyers.

On the other hand, NIA is implementing a new scheme under contract with IAs in irrigated lands of less than 38,000 ha nationwide that started in 2024 to support the cost of production materials (worth P50,000 in kind and cash for production inputs and farm operations) and expenses for post-harvests handling to the IA without drying and milling facilities. After harvest, farmer-cooperator provide back to NIA paddy of 5 tons /per hectare to be dried and milled with the assistance of the IAs. 50% of the milled rice is then delivered and/or picked by NIA to be sold at the Kadiwa center to vulnerable groups at 29 Php per kilo and the rest will be sold to farmers at 35 Php/kg. A new amount of 3.4 billion Php was allocated in the

initial budget for this scheme (General Appropriations Act (GAA) of Fiscal Year (FY) 2024, Republic Act No. 11975; not including the cost of purchasing the paddy).

(2) Status of promoting mechanization by Philippine agencies

1) BAFE (DA)

In the DA, BAFE was established in 2018 and is responsible for the agricultural mechanization administration and is positioned as the body responsible for planning (master plan and roadmap preparation), implementation, and evaluation of the promotion of mechanization and infrastructure development (facilities, farm roads, etc.) in the agricultural and fishery sector. Specifically, it promotes the development of laws pertaining to agricultural machinery, the licensing of agricultural machinery manufacturing, marketing, and importing companies, and the creation, evaluation, and validation of machinery design and technical specifications. In addition, it prepares certification guidelines for the 574 private test centers (inspections of machinery performance and safety) located throughout the country, and registers agricultural machinery that conforms to standards.

A database (ABEMIS, GEOAGRI) to view the level of mechanization has been established within the Bureau, and data has been entered and stored since 2016, allowing related agencies, including other departments and agencies down to the municipal level, to view the nationwide maintenance status of agricultural machinery, facilities, and farm roads.

2) PhilMech

PhilMech was established in 1978 as a post-harvest research and extension agency, reorganized as a DA internal agency (BPRE) in 1997, and reorganized as PhilMech in 2011 as a research and extension agency responsible for agricultural mechanization, including production as well as post-harvest. Since 2019, PhilMech has been responsible for the implementation of the agricultural machinery and facilities portion of the RCEF, which makes up half of the RCEF.

3) AMTEC (Agricultural Machinery Testing and Evaluation Center)

The Philippines' premier statutory certifying agency for agricultural machinery, located in the Department of Engineering and Agro-Industrial Technology within the UPLB, established through a Memorandum of Understanding with the DA in 1977. Section 18 of the Agricultural Mechanization Act states that all agricultural machinery sold in the country shall be tested and certified by AMTEC.

Other mandates of the AMTEC are, conducting laboratory quality tests and field tests of agricultural and fisheries machinery and evaluating test results, providing assistance to BAFE in setting agricultural machinery standards, providing training and information to relevant personnel, and providing technical assistance for the establishment and operation of test centers in the country.

4) RCEF (Rice Competitiveness Enhancement Program)

When the Rice Tarif Law was approved in February 2019, the Rice Enhancement Fund (60 billion Php, 10 billion Php each year) was created, and a project for the six-year period 2019 to 2024 to provide agricultural machinery (mostly tractors and combines, and also dryers, with a small preference for rice transplanters), rice seeds (free guaranteed seeds), farm loans (interest-free and unsecured), and extension services are underway. Funding is from rice tariff revenues. Of the fund, 50% is allocated to agricultural machinery (PhilMech), 30% to rice seeds (PhilRice), 10% to farm loans (Land Bank and Development Bank of the Philippines), and 10% to agricultural extension (ATI). (A 35% tariff is levied on imports from countries within the ASEAN region. Outside the region, the tariff is 40%. However, the tariff has been changed to 15% from July 2024).

The target area is 57 provinces (with high potential for rice production). Agricultural machinery and

facilities are provided to the agricultural cooperatives, other farmers' associations and local government units. Monitoring of the utilization rate of agricultural machinery and facilities by beneficiaries is also conducted, and if the utilization rate is low, the machinery may be withdrawn. For example, the following requirements and documents are required for the approval of RPS (drying, preparation, and milling system) development. The overall compilation, monitoring and evaluation is done by the DA-Project Management Office of the National Rice Program.

＜Main requirements for RCEF (RPS) beneficiary associations >

- The rice milling facility owned by the company is more than 15 years old and has low capacity.
- The cooperative shall provide the building construction costs for the installation of the facility.
- The villages involved in the cooperative must have at least 360 hectares of rice paddies.

<Main documents required at the time of application

- Letter of Intent, Resolution of the Association's Board of Directors on this matter.
- Proof of CDA registration
- Financial reports for the past two years
- Profile of the cooperative (area of rice paddies of farmers under the umbrella, list of machinery and facilities owned in the past, etc.)
- Proof of sufficient capital
- F/S for use of facilities (including management plan by the association, etc.)

Republic Act No. 12078, enacted on December 6, 2024, amending the Agricultural Tariff Law, that stipulates the implementation of the second phase (2025-2031) of the RCEF, which will establish a fund totaling 210 billion Php, or 30 billion Php annually. This will expand the contents of the first phase (9 billion Php annually for agricultural machinery and facilities, 6 billion Php annually for seeds, etc.), and the 15 billion Php to be allocated annually will be used for composting facilities to make up for deficiencies in soil elements, pest management, solar-powered irrigation, small-scale irrigation using well water, soil health measures, and contract farming through NIA. The NIA will also implement contract cultivation.

Of this amount, 425 million Php will be used to establish at least two service centers for assembly, repair, and maintenance of agricultural machinery in the provinces where RCEF is implemented. Funding will come from rice import tariff revenues, and any shortfall will come from the DA budget, while various programs within the DA (National Rice Program, National Corn Program, etc.) are also providing agricultural machinery and facilities. There is a strong demand from farmers for funds for machinery and facilities.

(3) Future mechanization policy, specific policies, measures, budget, etc.

<Mechanization policy and measures>

In 1997, the Agricultural Modernization Act (AFMA) was enacted, and in 2013, the Agricultural and Fisheries Mechanization Law (AFMech) was enacted. The government is now and will continue to promote this law. The government now intends to continue to promote agricultural mechanization through the promotion of this law. According to the law, the DA is mandated to prepare a National Agricultural and Fisheries Mechanization Program (NAFMP), and the first phase of the NAFMP (2018-2022) was prepared with the cooperation of industry, academia, and relevant agencies. The program

consists of the following five components.

a) Assembly and manufacturing of agricultural and fisheries machinery in the region (improving the assembly and manufacturing industry in the region); develop a roadmap showing the stages of development of the following assembly and manufacturing industries.
b) Research and development (appropriate agricultural and fishery mechanization technologies to improve agricultural productivity)
c) Standards and Regulations (Establishment and dissemination of standards to ensure the quality and safety of agricultural machinery, testing, evaluation and registration of machinery. Certification of agricultural machinery sellers and assemblers/manufacturers)
d) Support Services and Institution Building Human Resource Development
e) Human Resource Development

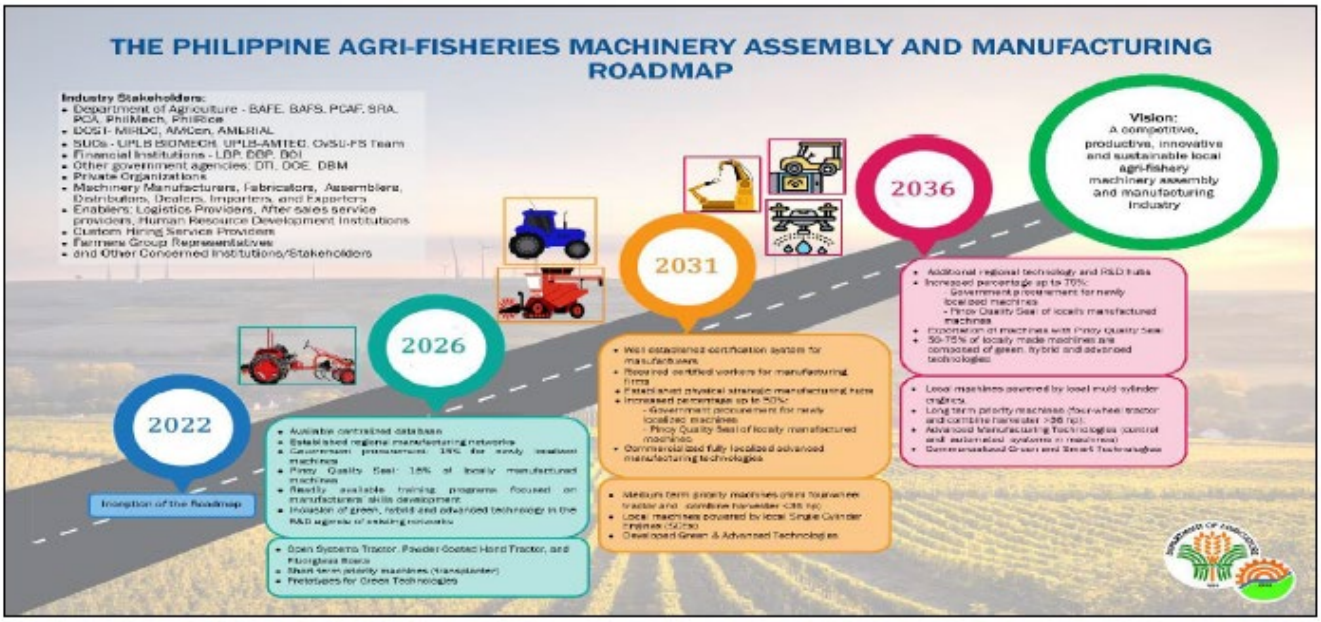


Figure 2.2.5 Roadmap for the Agricultural and Marine Machinery Assembly and Manufacturing Industry

Source: NAFMP 2023-2028

In addition, a second phase of the NAFMP (2023-2028) has been prepared and is currently being implemented, addressing the same issues as the first phase and promoting support and strengthening of private sector efforts to ensure that a higher degree of mechanization is achieved. As shown in the following table, a total cost of 110 billion Php is projected for the five-year period.

In addition, the program calls for the promotion of continuous on-farm farming within the above d) support services and institution-building programs. Specifically, the program will promote the following three points

a) Clustering (rezoning) of 50 hectares of farmland to implement unified and coordinated (synchronized) farming with the aim of improving the efficiency of tractor and other machinery operations.
b) Promoting the creation of agricultural land development plans
c) Strengthening agricultural cooperatives and farmers' associations

Table 2.2.2 NAFMP Required Budget (2023-2028)

Component	Funding requirement (Php Million)						
	2023	2024	2025	2026	2027	2028	Total
Local Assembling and Manufacturing	2,000.00	2,000.00	2,000.00	2,000.00	2,000.00	2,000.00	12,000.00
Research, Development and Extension	582.00	939.80	807.8	742.40	724.40	638.80	4,435.20
Standards and Regulations	500.00	500.00	500.00	500.00	500.00	500.00	3,000.00
Support Services and Institutional Development	12,723.46	14,237.35	14,385.83	14,786.07	15,001.96	15,595.78	86,710.44
Human Resource Development	606.7	1,016.9	654.2	566.3	520.9	519.9	3,884.9
Total	16,412.16	18,694.05	18,347.83	18,594.77	18,747.26	19,254.48	110,050.55

Source: NAFMP 2023-2028

<Specific measures>

1) The Nationwide Agricultural Machinery Inventory Project (NAMIn Project)

Data on the level of mechanization of each crop will be entered and used to allocate resources and review the content of mechanization-related projects. In addition, under the auspices of FAO, the capacity to adopt indicators to improve machinery efficiency in rice and corn is being improved.

PhilMech has assessed the mechanization level (HP/ha) for tractors and combine harvesters and recognizes that they are currently up to 14% of the country's total. The mechanization level of rice drying and preparation facilities has not been assessed, as drying is done in combination with sun drying. The level of mechanization depends on weather conditions.

2) Agricultural and Biosystems Engineering Services

The company provides technical guidance documents and assembly designs for post-harvest.

3) Fuel assistance for agricultural machinery

Cash and other assistance of 3,000 Php in fuel subsidies was provided to farmers and fishermen with a budget of 500 million Php in 2022 and 2023.

< Budget for 2024 and future >

1) Budget related to agricultural machinery (P10,141,213,000)

Agricultural Machinery, Equipment, and Facilities and Infrastructure Program

The budget for agricultural machinery is positioned within the Agricultural Machinery, Equipment, and Facilities and Infrastructure Program, which also includes irrigation and farm road maintenance, as shown in the figure on the right. The main component of this program is the Agricultural Machinery Equipment and Facilities Support Service Program.

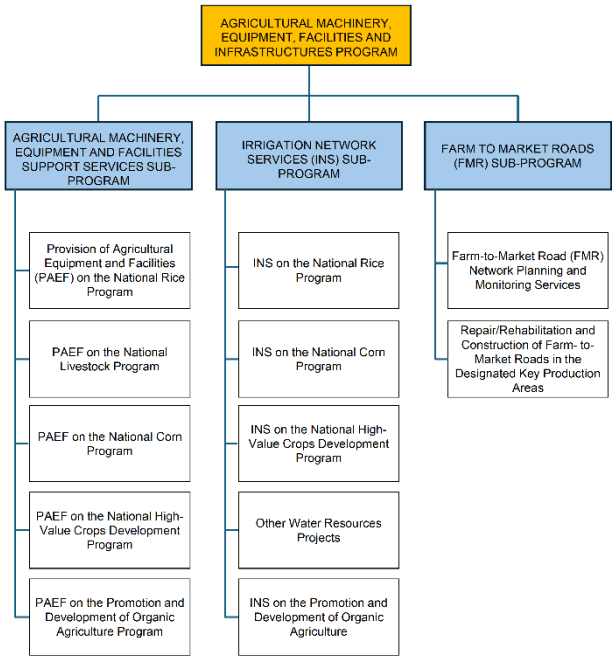


Figure 2.2.6 Agricultural Machinery Budget Chart

Source: Budget Structure Based on the FY 2018 National Expenditure Program (NEP)

2) Agricultural Competitiveness Enhancement Fund

(a) P387,556,000: Within Agricultural Research Enhancement, expansion of research facilities including UPLB-AMTEC and new AMTEC in Visayas and Mindanao (not to exceed P5 million each)

(b) P828,724,000: Includes loans to agricultural machinery manufacturers and assemblers with low-interest loans to farmers and others through the Land Bank (not to exceed P5 million per project).

In addition, although not in the DA budget, an interest-free, three-year repayment loan program is available from DOST for agricultural machinery manufacturers and assemblers.

3) RCEF (5 billion Php) (50% of RCEF) Agricultural machinery and facilities for agricultural cooperatives and farmers' associations

A budget of 9 billion Php is being requested annually after 2025.

4) National Program (43,761,622,000 Php) Includes expenditures for agricultural machinery and facilities for rice, corn, horticultural crops, organic farming, livestock production, and urban agriculture program budgets.

5) MAFIM Program

In the three-year period ending 2024, the NFA has put forth a plan to develop post-harvest facilities for rice and corn in the NFA with a budget of 93 billion Php.[35] It states that this will involve the development of 196 dryers, 48 silos, 221 warehouses, 57 rice milling facilities, 24 corn mills, and 638 ancillary equipment at NFA facilities nationwide.

Table 2.2.3 Postharvest Facility Development Plan for Buffer Stock (2025)

Region	Item No.	Name/title of Projects	120 MT Mechanical Dryer	90 MT Mechanical Dryer	8-10 MT Rice Mill	SMT Rice Mill
R-I.	1	Dingras, Ilocos Norte	115	-	133	-
R-II	2	Carig, Tuguegarao	115	-	133	-
	3	Allacapan, Cagayan	115	-	133	-
	4	Bayombong, Nueva Viscaya	-	50	-	100
R-III	5	Concepcion, Tarlac	115	-	133	-
	6	Munoz, Nueva Ecija	115	-	133	-
	7	Cabanatuan City	115	-	133	-
R-IV	8	Rizal, Occidental Mindoro	115	-	133	-
	9	Narra, Palawan	115	-	133	-
R-V	10	Libmanan, Camarines Sur	-	50	-	100
	11	Libon, Albay	115	-	133	-
	12	Dumangas, Iloilo	115	-	133	-
R-VI	13	Duenas, Iloilo	-	50		100
	14	Jaro, Iloilo	115	-	133	
R-VIII	15	Oras, Samar	-	50		100
	16	Alang-Slang, Leyte	115		133	-
R-IX	17	Molave, ZDS	115	-	133	-
	18	Ipil, Zamboanga Sibugay		50		100
R-X	19	Musuan, Maramag, Bukidnon (CMU)	115	-	133	-
	20	Lala, Lano del Norte	-	50	-	100
	21	Digos, Davao del Sur	115	-	133	-
R-XI	22	Kilada, Matalam, North Cotabato	115	-	133	-
R-XII	23	Kidapawan, North Cotabato	115	-	133	-
	24	Isulan, Sultan Kudarat	115	-	133	-
Sub-total			2,070	300	2,394	600
Grand Total						5,364

Source: NFA

According to NFA's description, NFA's facility capacity will be augmented by MAFIM as follows.

[35] https://pco.gov.ph/news_releases/ph-needs-p93-b-investment-on-post-harvest-facilities-to-address-rice-corn-wastage-lower-prices- says-da-chief/

Table 2.2.4 MAFIM's Forecast for NFA Facility Expansion

Particular	As of November 2024	After MAFIM Implementation Increase
Drying Capacity	20,886,000 bags (101,800 t)	7,950,000 bags (397,500 t)
Rice milling capacity	47,500 bags (2,375 t)	5,913,600 bags (295,680 t)
Storage capacity	20,886,000 bags (1,044,300 t)	

Source: Interviews with NFA staff

2.3 Current Status of the Financial Market and Agricultural Finance Related to the Promotion of Agricultural Mechanization

2.3.1 Background of the Philippines' Agricultural Finance Policy and the Current Status of LBP and DBP

(1) The History and current state of agricultural finance

Agricultural finance policy in the Philippines can be traced back to its colonial period: in the early 20th century, agricultural banks were established under U.S. colonial rule to provide financing to small farmers and agricultural workers. After independence in 1946, the government established a number of government financial institutions to promote agricultural development. In the 1970s, under the Marcos administration, policies focused on agricultural development, particularly the "Green Revolution" agricultural innovation movement, and the Philippine Agricultural Credit Guarantee Corporation (PACC), established in 1963, played an important role as an institution specializing in financing agricultural projects. The Agricultural Credit Guarantee Corporation (AGFC) was established and a mechanism was introduced to reduce the risk of loans to farmers. Agricultural loans at the time were mainly direct credit programs targeted at small farmers and fishermen, and support was provided through government-affiliated banks through a system of highly subsidized agricultural loans, such as a pilot quota system and a deposit withholding system. However, by the end of the Marcos administration, government loan funds were depleted and defaults increased, and the ratio of total public agricultural loans to total loans fell from 18% in 1966 to 10% in 1985.

The Aquino administration, which took office after the EDSA Revolution of 1986, aimed at the sustainable development of agriculture and promoted reforms in agricultural financing policies, particularly the introduction of the Comprehensive Agricultural Reform Program (CARP), which redistributed agricultural land, and promoted loans to farmers who acquired such land by consolidating them in the Comprehensive Agricultural Loan Fund (CALF). In the 1990s and early 2000s, the government began to promote the redistribution of farmland, particularly with the introduction of the CARP program. Subsequently, in the 1990s and early 2000s, along with the progress of globalization, agricultural credit policies were liberalized and the entry of private financial institutions was promoted.

In the Philippines, agricultural finance is provided by government banks, commercial banks, etc., but as mentioned below, there are also many agricultural cooperatives that provide loans to their members, and also informal private financial institutions (lenders) . The ratio of loans provided by financial institutions excluding[36] these agricultural cooperatives and informal financial institutions is as follows:

Table 2.3.1 Category and Loan Percentage of Financial Institutions

Year	*Government Bank	Private Commercial Bank	Thrift Bank	Rural Banks
2015	12%	70%	8%	9%
2016	13%	71%	3%	12%

[36] In the Philippines, private lenders are commonly known as "5/6 (five borrowed, six returned, i.e., 20% interest rate). The total amount of loans extended by these informal private lenders (including individual lenders) is not known. The government has mandated the registration of private lenders with the Securities and Exchange Commission (SEC) under the Lending Company Regulation Act of 2007 (Republic Act No. 9474), but this has not been effective.

Year	*Government Bank	Private Commercial Bank	Thrift Bank	Rural Banks
2017	12%	76%	3%	9%
2018	20%	77%	3%	-
2019	21%	77%	2%	-

* LBP and DBP, to be explained in the next section.
Source : "Agricultural Finance", Fair Finance Asia (2022)

(2) Agricultural Credit Policy Council (ACPC)

Agricultural Credit Policy Council (ACPC) was established by Presidential Decree No. 113 of 1986, "Establishment of the Comprehensive Agricultural Loan Fund (CALF); Establishing the Agricultural Credit Policy Council (ACPC)". This Presidential Decree provided for the establishment of the ACPC as the governing body for the CALF, and Article II of this Decree stipulates that the CALF may be financed by funds from foreign-assisted projects, except when the Central Bank of the Philippines (BSP) is the original or ultimate obligor. The current ACPC functions are as follows:

Table 2.3.2 Functions of ACPC

Functions	Description
1) Policy Research	Conduct policy research to make timely and credible recommendations on appropriate credit policies and programs for the agriculture and fisheries sectors.
2) Action Research	Conduct action research on innovative financing schemes for small farmers and fishermen.
3) Monitoring	Regularly monitor credit flows provided by the agricultural sector, especially the banking sector, including government credit, guarantees, insurance, and capacity building programs.
4) Program Implementation	Oversee the implementation of an agricultural loan and guarantee program to make loans truly accessible to small farmers and fishermen.
5) Capacity Building	Strengthen the rural financial sector by promoting capacity building programs for rural financial institutions, including cooperatives and other popular organizations, as well as for individual farmers and fishermen.
6) Advocacy and Information Dissemination	Conduct advocacy and information dissemination activities to promote and create awareness, understanding, acceptance, and support for agricultural credit policies and ACPC programs.
7) Accreditation of financial institutions	Authorize debt securities and non-bank rural financial institutions in accordance with the implementation of RA 10000 (Agrarian Reform Credit Act of 2009) (DA-SO 605).
8) Administration and Finance	Determine organizational goals and indicators to measure timeliness and quality of services and comply with stakeholder, administrative, and legal requirements.

Source: ACPC

The Council is chaired by the Secretary of Agriculture, vice-chaired by the Governor of the Central Bank of the Philippines (BSP), and its members are the Secretaries of Budget and Management (DBM), the Department of Finance (DOF), and the National Economic Development Authority (NEDA). The Agricultural Credit Policy Council is responsible for the secretariat duties of this entire Council.

As of October 2024, 196 staff members are in place, but only 36 are regular employees, while the rest are contracted or temporary employees. the ACPC does not have regional offices, but has 53 focal persons around the Philippines, working under the regional offices of the Department of Agriculture.

In 2023the maximum of nine (9) loan programs were consolidated into two (2) (Production Loan Easy Access (PLEA) and Survival and Recovery Loan Program (SURE)), and placed under the Program on Unified Lending to Agriculture (PUNLA) program. The programs have been reorganized into the following six (6) loan programs since 2024.

1) Survival and Recovery (SURE) Assistance Program (interest-free loans of up to Php 25,000 for 3 years to help farmers affected by natural disasters to secure their livelihoods)

2) Accessible Loans for Empowered, Resilient, and Transformed Agrarian Reform Beneficiary Organizations (ALERT-ARBOs)

3) Agri-Negosyo Loan Program (up to Php 300,000 to micro-agricultural enterprises and up to Php 15 million to small and medium enterprises for 5 years with no interest)

4) Young Agripreneurs Loan Program (loans of up to Php 500,000 for 5 years to companies started up by young people)

5) Sikat-Saka (loans to rice and corn farmers with interest rates ranging from 9% to 15%, depending on repayment status)

6) Buy Anihan (loans to traders involved in the processing, distribution, and marketing of rice, but with secondary loans to individual farmers)

Lending results for these six (6) financial instruments in 2023are shown in the table below.

Table 2.3.3 ACPC's Financial Program Implementation in the 4th Quarter of 2022 and 2023

Financial instruments	Q4, 2022 (Oct - Nov)			2023 (January - December)			
	Number of Clients		Loan amount (in Million Php)	Number of Clients		Number of beneficiaries	loan amount (in Million Php)
	Small scale farmers/fishermen	Small to medium enterprises		Small scale farmers/fishermen	Small to medium enterprises		
Agri-Negosyo	3,224	23	371.99	15,277	104	81,167	1,686.96
- SFF/MSE	2,923	20	308.06	12,599	86	81,041	1,32.815
- Swine	296	2	55.65	2,273	13	10	318.30
- OFW	-	-	-	3	-	-	0.08
- Agri Pinay	1	-	0.10	271	-	-	17.02
- Coconut	4	-	0.19	81	-	-	4.02
- Onion	-	-	-	-	4	111	15.00
- Agua-culture	-	1	8.00	-	1	5	8.00
Young Arbitrageurs	8	1	2.83	102	2	2	26.32
SURE	1,561	-	30.44	11.276	-	-	163.57
Buy Anihan	-	1	100.00	-	2	4,298	200.00
ALERTARBOs	-	-	6.51	-	47	2,406	122.33
Sikat Saka	362	-	280.50	5,295	-	-	1,014.99
Total	**5,155**	**27**	**792.27**	**31,900**	**155**	**87.873**	**3,216.17**

Source: ACPC 2023 Year End Report

However, as mentioned above, ACPC does not have a banking function, and all of the above financial instruments are actually implemented by state-owned banks, private banks, and financial institutions such as agricultural cooperatives, which are monitored by ACPC. For this reason, the ACPC currently works with 245 ACPC-accredited partner financial institutions nationwide (57 of which are banks), and these financial institutions provide the loans for their respective programs.

The placement and type of ACPC's accredited partner financial institutions are shown in the table below:

Table 2.3.4 Placement and Type of ACPC Accredited Financial Institutions

Region	Banks	Multi-purpose agricultural cooperative	Other (Farmers' organizations, etc.)	Total
Metropolitan Area (NCR)	2	1	0	3
CAR	1	25	1	27
I	2	4	0	6
II	5	9	0	14
III	6	9	1	16
IV-A	5	11	0	16
IV-B	1	12	1	14

Region	Banks	Multi-purpose agricultural cooperative	Other (Farmers' organizations, etc.)	Total
V	3	8	1	12
VI	3	13	0	16
VII	5	15	1	21
VIII	5	12	1	18
IX	2	13	1	16
an unknown	9	15	2	26
XI	2	10	3	15
XII	4	8	1	13
XIII	2	8	1	11
BARMM	0	1	0	1
total	**57**	**174**	**14**	**245**

Source: ACPC

(3) Landbank of the Philippines (LBP)

The Landbank of the Philippines (LBP) was established in 1963 under Republic Act No. 3844 (Agrarian Reform Act). The purpose of this law was to reduce poverty and achieve social equality in rural areas through agrarian reform. Under this program, the Land Bank issued bonds to pay compensation to landowners and collect proceeds from land sales from beneficiary farmers.

Later in 1973, the government, by presidential decree, transformed the Land Bank into a rural-based, government-owned commercial bank. This allowed the Land Bank to function as an institution to provide loans to farmers. Its main activities are to support the establishment of cooperatives and provide financial assistance through loans. After the aforementioned EDSA Revolution, when agrarian reform was initiated under the Aquino administration, land evaluation and landlord guarantee services, which had been handled by the Department of Agrarian Reform, were transferred to the Land Bank in 1991.

Thus, the Land Bank subsequently became an institution with both commercial banking and agrarian reform lending operations, the former of which has since been enhanced, with commercial bank-based agricultural lending increasing from 57% of total lending in 1990 to 68% in 1993, while agrarian reform lending has declined from 21% to Agrarian reform lending declined from 21% to 6% during the same period.

The names of the Land Bank's current major programs for agricultural sector loans and their performance in 2023 are as follows.

Table 2.3.5 Land Bank Agriculture Sector Major Program Names and 2023 Results

Program Name	Implementation Status in 2023
Harnessing Agribusiness Opportunities through Robust and Vibrant Entrepreneurship Supportive of Peaceful Transformation (HARVEST) Project	As of December 31, 2023, sub-loans amounting to P3,220.95 million had been extended to 492 loan accounts in the Bangsamoro Muslim Mindanao Autonomous Region (BARMM) and Conflict-Affected Areas of Mindanao (CAAM), creating 249 jobs with a total amount of P2,616 million and 4,525 The total amount of loans was Php 2,616 million, benefiting 4,525 women.
Agricultural Credit Support Project (ACSP)	As of December 31, 2023, a total of Php 5,533.98 million had been lent to 468 organizations, generating Php 6,247.15 million in agricultural investment and 6,296 jobs. (Interest Rate : 15%/year (shorter than a year), 16%/year (longer than a year))
Agricultural Competitiveness Enhancement Fund (ACEF) Lending Program	From 2018 to 2023, in partnership with the Department of Agriculture, the program has opened 79,545 loan accounts totaling 1Php 1,980,345,000 in direct loans. (99% of the program's borrowers are small farmers and fishermen from 76 states in 16 Regions.) (Interest Rate : 2%/year)
Expanded Rice Credit Assistance under the Rice Competitiveness Enhancement Fund (ERCA-RCEF) Program	As of December 31, 2023, it has provided credit assistance of Php 2,474.44 million to 14,860 rice farmers and 263 cooperatives to improve their productivity. (Interest Rate: 2%/year for agricultural cooperatives, 0% if fund is for the re-loan to individual farmers. In such case Coop can charge interest from farmers but maximum shall be 6%/year)

Program Name	Implementation Status in 2023
Coconut Farmers and Industry Development (CFID) Lending Program	As of December 31, 2023, the bank had extended loans to 21 coconut farmers and cooperatives with a cumulative amount of Php 69.22 million. (Interest Rate : 0%)
Socialized Credit Program under the Sugarcane Industry Development Act (SCP-SIDA)	SCP-SIDA aims to promote and support productivity enhancement programs to promote sugarcane production and increase the income of farmers/growers and agricultural workers, and as of December 31, 2023, it has provided Php 846.64 million to 3,146 sugarcane farmers, Php 28.14 million to 6 farms, and agricultural service providers, and Php 47.68 million to four service providers. (Interest Rate : 2%/year)
Sikat Saka Program	A special loan program of the Departmentof Agriculture launched in 2016, with cumulative loans reaching Php 16.21 billion as of December 31, 2023, benefiting more than 18,000 small farmers. (Interest Rate : 5%/year)
Accessible Funds for Delivery to Agrarian Reform Beneficiaries (AFFORD ARBs) Program	The program, implemented jointly with DAR, has financed more than 3,500 brain death reform beneficiaries with a cumulative amount of Php 739.24 million as of December 31, 2023. (Interest Rate : 2%/year)
Survival and Recovery Assistance Lending Program (SURE Aid Program)	As of December 31, 2023, the cumulative amount of loans has reached Php 2.51 billion and has provided loans to more than 165,000 rice farmers. (Interest Rate : 10%/year)
Agrarian Production Credit Program (APCP)	The loans to farmer cooperatives and farmer associations (also known as Agrarian Reform Beneficiary Organizations (ARBOs)) in collaboration with DA, DAR, DENR, and ACPC, and as of December 31, 2023, the cumulative amount of loans extended to 886 ARBOs reached Php 11.21 billion, benefiting some 69,000 small farmers/ARBO members have benefited. (Interest Rate : 10%/year)
Sulong Saka (High Value Crops Financing Program)	The program promotes crop diversification, especially in high value-added crops such as abaca, bamboo, banana, cacao, cassava, citrus, coffee, mango, oil palm, onion, pineapple, rubber, tomato, and vegetables, with loans totaling Php 47.72 billion as of December 31, 2023 to a total of 1,107 agricultural cooperatives/ individual farmers nationwide. (Interest Rate : 9% - 15%/year)
Palay at Mais ng Lalawigan Lending Program	As of December 31, 2023, the Bank had approved loans of Php 2.944 billion to four LGUs, of which two LGUs had already received loans of Php 115 million, benefiting 1,817 rice farmers. The loans have already been disbursed to two of the four LGUs, benefiting 1,817 rice farmers. (Interest Rate : 2%/year (Short) , 4.5%(Long))
Accelerated Loans for Empowered, Resilient, and Transformed Agrarian Reform Beneficiary Organizations (ALERT ARBOS) Program	It finances the agricultural and fishery activities of individuals or cooperatives that are agrarian reform beneficiaries, as well as agricultural and fishery-based projects. As of December 31, 2023, 65 beneficiary associations have been supported and more than 3,700 people have benefited from a cumulative total of Php 296.61 million in loans. (Interest Rate: 2%/year for agricultural cooperatives, 0% if fund is for the re-loan to individual farmers. In such case Coop can charge interest from farmers but maximum shall be 6%/year)

Source: Compiled by JICA survey team from 2023 LBP Annual Report

Landbank's lending is conducted not through its head office but through 60 Landbank Lending Centers located throughout the country. In recent years, most new loan applications have been evaluated at the centers, and the number of cases settled at the head office has been decreasing. For most of financial products, a feasibility study of the business to be financed shall be attached to the application documents submitted by the applicant, and even after the loan has been approved, the centers monitor each loan recipient to ensure that it is not being used for purposes other than those for which it was applied.

Financial statements and major financial indicators of LBP are as follows:

Table 2.3.6 Financial Statements and Major Financial Indicators of LBP

1) Balance Sheet

Unit: Php

	2023	2022
Assets		
Cash and other cash items	49,021,210,950	51,093,909,679
Due from BSP	411,367,040,708	568,924,698,774
Due from other banks	7,738,260,460	18,608,577,727
Interbank loans receivable	23,442,446,813	14,674,497,972
Securities purchased under agreement to resell	250,322,322,646	29,199,764,104
Fair value through profit or loss	20,656,974,270	19,069,167,492
Fair value though other comprehensive income	479,034,781,224	442,211,398,690
Hold to collect - net	764,892,685,505	848,862,188,569
Loans and receivable - net	1,179,434,486,013	1,104,484,511,820
Investment in subsidiaries - net	0	0
Investments property - net	14,212,036,694	13,708,019,525
Property and equipment - net	11,379,341,237	10,711,794,544
Right-of-use Assets	2,941,545,933	3,452,684,007
Non-current assets held for sale	944,813,733	938,382,076
Other Intangible assets - net	1,476,973,551	1,992,566,249
Other assets - net	67,113,654,272	17,678,369,828
Deferred tax assets	17,516,223,159	13,631,032,309
Total Assets	**3,301,493,797,168**	**3,159,241,563,356**
Liabilities and Equity		
Liabilities		
Deposits liabilities	2,896,748,397,914	2,767,321,049,139
Bills payable	15,829,033,783	33,488,882,866
Bond payable	4,672,721,488	4,543,923,875
Derivative liabilities	11,936,329	8,570,935
Finance lease payment payable	3,008,996,482	3,570,025,695
Treasurer's Manager's and Cashier's checks	2,668,403,475	3,669,797,857
Payment order payable	99,096,244	280,519,967
Marginal deposits	765,690,633	177,973,762
Cash letters of credit	20,540,019,166	18,192,335,451
Other liabities	75,240,432,068	104,168,378,800
Total Liabilities	**3,019,584,727,573**	**2,935,421,458,617**
Equity		
Common stock	163,787,711,308	163,787,711,308
Paid-in surplus	101,098,220	101,098,220
Retained earnings free	58,188,683,026	29,947,894,645
Retained earnings reserves	15,351,295,444	15,483,642,214
Undivided Profits	42,074,646,450	26,332,148,035
Revaluation increment	61,200,000	61,200,000
Other comprehenseive income	2,284,508,894	(11,952,945,820)
Moinority interest	59,926,253	59,356,137
Total Equity	**281,909,069,595**	**223,820,104,739**
Total Liabilities and Equity	**3,301,493,797,168**	**3,159,241,563,356**

Source : 2023 Landbank Annual Report

2) Profit and Loss Statement

Unit: Php

	2023	2022
Interest income		
Loans	76,202,803,047	51,642,282,701
Investments	44,024,864,302	39,070,866,036
Due from BSP	5,020,206,992	2,840,780,038
Deposits with banks	240,068,331	59,069,882
Others	312,013,680	331,987,669
	125,799,956,352	**93,944,986,326**
Interest expense		
Deposit liabilities	32,965,773,110	13,588,808,848
Borrowed funds	1,084,796,561	1,098,095,454
Bonds payable	679,313,029	754,506,176
Finance lease payment payable	61,293,237	69,151,629
others	0	56,787,510
	34,791,175,937	**15,567,349,617**
Net interest income	**91,008,780,415**	**78,377,636,709**
Provision for credit and impairment losses	**7,760,095,965**	**20,247,636,893**
Net interest income after provision for credit and impairment losses	**83,248,684,450**	**58,129,999,816**
Other operation Income		
Dividends	1,112,340,311	1,064,512,946
Fees and comission	4,471,923,734	4,219,972,611
Foreign exchange gain from revaluation	250,332,851	3,253,600,885
Gain from dealings in foreign currency	703,592,766	764,555,867
Gain from salle/redenption	606,869	43,922,381
Gain on financial assets at fair value	1,322,380,256	0
Gain on financial assets and liabilities	26,992,658	0
Miscellaneous income	4,821,222,411	12,552,138,023
	12,714,391,856	**21,898,702,713**
Other operating expenses		
Compensation and fringe benefits	22,403,745,265	19,464,173,291
Taxes and licenses	8,653,783,187	7,548,801,825
Loss on financial assets at fair value	0	3,223,633,191
Loss on financial assets and liabilities	55,400	31,562,951
Depreciatoin and amortization	3,780,914,495	3,739,787,881
Rent	378,163,511	1,211,590,245
Miscellaneous expenses	19,972,597,961	20,915,147,904
	55,189,259,819	**56,134,697,288**
Income before tax	**40,773,816,487**	**23,894,005,241**
Provision for income tax	**2,525,072,168**	**721,720,448**
Income tax benefits	**(3,826,719,401)**	**(3,160,783,429)**
Net Income	**42,075,463,720**	**26,333,068,222**
Attribute to:		
Equity of the Parent Bank	42,074,646,450	26,332,148,035
Non-controlling interest	817,270	920,187

Source : 2023 Landbank Annual Report

3) Major Financial Indicators

Indicators	2023	2022
Return of Equity (ROE)	16.64%	11.46%
Return of Assets (ROA)	1.3%	0.86%
Equity Ratio	16.43%	14.46%

Source : 2023 Landbank Annual Report

In 2023, to respond to the challenges facing the rice production industry by promoting rice production in the region, the LBP has extended loans to 13,701 rice farmers and agricultural cooperatives as of July 31, 2023 through the Extended Rice Credit Support under the Rice Competitiveness Enhancement Fund (ERCA-RCEF).

A total of Php 1.1 billion of the above loans under the ERCA-RCEF were made directly to individual rice farmers registered in the Department of Agriculture's Registration System for Basic Sector in Agriculture (RSBSA); Php 507.5 million were for re-financing rice farmer members of agricultural cooperatives; Php 394.1 million were for rice trading and milling, Php 575.5 million were used to re-finance rice farmer members of agricultural cooperatives, and Php 222 million was used to purchase farm machinery.

Landbank has been allocated Php 500 million of that amount (the same amount as the DBP described below) to execute the loan.

(4) Development Bank of the Philippines (DBP)

Development Bank of the Philippines (DBP), a state-owned development bank established in 1947, became the sixth largest bank in the country in terms of assets with total bank assets reaching Php 1.04 trillion at the end of 2020.

Its total loans to borrowers reached Php 423.32 billion as of December 31, 2020, increased 19% from Php 356.75 billion in the same period of previous year.

In the past, DBP has provided three (3) yen-loan financed two-step loans under Japanese ODA, as described below.

The agricultural sector is not an independent category in DBP's lending program, but is positioned as the Sustainable Agribusiness Financing Program (SAFP) under "Micro, Small and Medium Enterprises". Among the agriculture sector loan programs which includes those for livestock, fisheries, and coconut farmers, two (2) rice-related loan programs are as follows.

1) Expanded Rice Credit Assistance Under Rice Competitiveness Enhancement Fund (ERCA-RCEF) (see 3.3.1 (3))

2) AgriNegosyo Loan Program (described above as a financial instrument of ACPC).

In addition, starting this year, DBP is the implementing bank for the Agri-Puhunan at Pantawid program of the Department of Agriculture. The program provides low-interest loans to rice and corn farmers with a maximum of Php 60,000 per hectare, and Php 5,000 per household as grant, with a target of 50,000 hectares this year, 500,000 hectares next year, and 1.3 million hectares in five (5) years. However, the financial resources are not earmarked specifically for this program, but rather allocated from the unused portion of the existing programs and surplus financial resources.

DBP executes loans through 32 lending centers located in rural areas, but the number of centers is smaller than that of LBP.

Financial statements and major financial indicators of DBP are as follows:

Table 2.3.7 Financial Statements and Major Financial Indicator of DBP

1) Balance Sheet

Unit: Php

	2023	2022
Assets		
Cash and other cash items	5,999,317	6,412,239
Due from BSP	76,109,867	125,147,543
Due from other banks	10,231,396	9,624,316
Interbank loans receivable	10,246,972	22,916,233
Securities purchased under agreement to resell	42,907,022	27,662,401
Financial assets at fair value through profit or loss	2,664,026	2,809,824
Financial assets at fair value though other comprehensive income	42,207,510	39,763,065
Financial assets at amortized cost (held to collect)	262,892,553	282,774,597
Financial assents at amortized cost (loans and receivable, net)	486,237,941	509,642,705
Bank premises, furniture, fixtures, and equipment - net	2,394,203	2,488,671
Rights-of-use assets - net	643,225	471,561
investment property - net	1,652,005	1,584,509
equity investment in subsidiaries - net	-	-
equity investment in associates and joint ventures - net	215,433	231,076
Non-current assets held for sale - net	205,175	218,256
Deferred tax assets	7,639,280	5,360,683
Intangible assets - net	190,434	239,148
Other assets - net	34,677,063	9,426,895
Total Assets	**987,113,422**	**1,046,773,762**
Liabilities and Equity		
Liabilities		
Deposits liabilities	775,346,569	825,627,450
Bills payable		
Official development assistance (ODA)	30,276,018	35,611,650
non-ODA	26,175,849	35,585,125
Bond payable	32,376,486	28,593,260
Manager's checks and demand drafts outstanding	193,639	221,125
Accrued taxes, interests, and expenses	10,955,349	8,048,483
Unsecured subordinated dept	-	1,000,000
Deferred credits and other liabilities	26,679,824	24,819,620
Total Liabilities	**902,003,734**	**968,556,713**
Equity		
Capital stock	32,000,000	32,000,000
Retained earnings	54,125,518	47,375,556
Retained earnings reserves	266,498	265,382
Accumulated other comprehensive income/(loss)	(1,281,941)	(1,423,428)
Non-controlling interest	387	461
Total Equity	**85,110,175**	**78,217,049**
Total Liabilities and Equity	**987,113,422**	**1,046,773,762**

Source : 2023 DBP Annual and Sustainability Report

2) Profit and Loss Statement

Unit: Php

	2023	2022
Interest income		
Loans and receivables	29,917,818	22,563,215
Financial assets - debt securities	13,355,698	11,559,337
Deposits with banks	1,253,879	1,749,017
Interbank loans receivable/Securities purchased under agreement to resell	2,273,636	1,163,468
	46,801,031	**37,035,037**
Interest expense		
Bills payable and other borrowings:		
ODA Borrowings	1,594,014	1,594,014
Other Borrowings	2,667,856	2,375,447
Deposits	19,156,004	8,713,169
	23,417,874	**12,682,630**
Net interest income	**23,383,157**	**24,288,058**
Provision for impairment	**6,421,311**	**7,815,931**
Net interest income after provision for impairment	**16,961,846**	**16,472,127**
Other Income		
Profits/8Loss) from investment and securities trading	419,096	(190,167)
Foreign exchange profit/(loss)	2,717,372	1,852,152
Service charges, fees, and commissions	1,874,852	1,586,438
Dividends - equity investments	212,072	294,781
Miscellaneous	1,606,171	78,898
	6,829,563	**4,332,193**
Other expenses		
Compensation and fringe benefits	6,789,157	6,135,467
Taxes and licenses	4,888,339	4,918,148
Occupancy expenses	58,358	136,843
Other operating Expenses	4,722,444	4,696,453
	16,458,298	**16,066,911**
Profit before tax	**7,333,111**	**4,737,049**
Provision for income tax	**577,931**	**800,773**
Profit of the year	**6,755,180**	**3,936,636**
Attribute to:		
Equity holder of DBP	6,755,222	3,936,690
Non-controlling interest	(42)	(54)
	6,755,180	**3,936,636**

Source : 2023 DBP Annual and Sustainability Report

3) Major Financial Indicators

Indicators	2023	2022
Return of Equity (ROE)	8.27%	5.04%
Return of Assets (ROA)	0.66%	0.36%
Equity Ratio	13.94%	12.41%

Source : 2023 DBP Annual and Sustainability Report

2.3.2 Changes of the Policy Interest Rate in the Philippines and Average Interest Rate of Private Banks

From 2014 to 2016, the Philippine economy enjoyed stable growth. During this period, the Central Bank (Bangko Sentral ng Pilipinas, BSP), kept policy rates low to control inflation, and private bank interest rates remained relatively low. in 2014, policy rates ranged between 3.5% and 4.0%. and private bank lending rates averaged between 6% and 8%. The low interest rate policy during this period was aimed at expanding lending and encouraging consumption, and the following year (2015) was no different, with the policy rate hovering around 4%, private bank lending rates did not change significantly, and the country as a whole continued to enjoy a stable financial environment with economic growth of over 6% during this period.

In 2016, the BSP raised the policy rate to 4.5%, but private bank interest rates were generally within the range of 7% to 9%. However, the following year (2017), due to concerns about rising inflation, the BSP decided to raise the policy rate to 5% to control inflation, and private bank lending rates rose accordingly to around 8% to 10%.

Then in 2020, the COVID-19 pandemic had a major impact on the global economy and the Philippines was no exception. The BSP implemented a significant interest rate cut to support economic development. This was a reduction of the policy rate to a historically low level of 2.25%, which also led to a significant drop in private bank lending rates, from 6% to around 8%.

In 2022, inflation began to rise again and the BSP shifted to raising the policy rate, raising it to 3.5% and raising the private bank lending rate from 7% to around 9%. The BSP further raised the policy rate to 4% in 2023, and then to 7.0% at present (as of October 2024).

The 8-year trends of average lending rates for private banks in the Philippines are shown in the figure below.

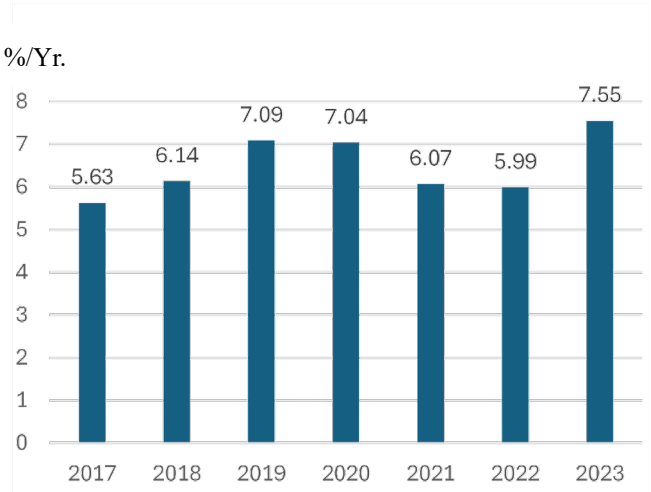


Figure 2.3.1 Average Lending Rates of Private Banks in the Philippines over the Past 8 Years

Source: http://www.statista.com

2.3.3 Challenges of Agricultural Finance in the Philippines

In 2023, the Philippine government's public finance scheme and private financial institutions provided a total of about P500 billion in loans to farmers. Of this amount, about Php 200 billion were allocated for loans to increase productivity, Php 150 billion for loans to recover natural disasters, Php 100 billion for environmental protection loans, and Php 50 billion for loans to support the fishing industry.

Loans to the agriculture and forestry sector have fluctuated since 2015. In 2019, loans to the sector totaled Php 741,787 million, of which Php 414,985 million was for agricultural production, as shown in the table below. Loans to agricultural production as a percentage of the agroforestry sector peaked

between 2016 and 2017 and has continued to decline since then.

Table 2.3.8 Loan Amount for Agricultural Production and Agricultural and Forestry Sector

Year	Loan for Agricultural Production		Loan for Agricultural and Forestry Sector	
	Amount (in Php Millon)	YoY	Amount (in Php Millon)	YoY
2015	378,035	40%	507.566	36%
2016	322,179	-15%	351,881	-32%
2017	453,649	41%	485,400	38%
2018	378,830	-17%	694,238	43%
2019	414,985	10%	741,787	7%

Source : "Agricultural Finance", Fair Finance Asia (2022)

(1) Most farmers are small household, making them vulnerable to natural disasters and market fluctuations. The Philippines is prone to natural disasters such as typhoons and floods, which have caused significant damage to the agricultural sector. As an example, Typhoon Yolanda in November 2013 caused an estimated Php361 billion worth of crop damage, and Typhoon Urduya in December 2017 caused an estimated Php1 billion, affecting the livelihood of 38,466 farmers. In response, the government has strengthened its financing programs for disaster risk management and put in place mechanisms for farmers to quickly restore their farming operations, but recovery has not kept pace with the frequent occurrence of natural disasters[37].

(2) In rural areas, the barriers for smallholders to obtain loans from financial institutions are high due to the complexity of the procedures required for loans, such as preparing applications in English and obtaining birth certificates that must be attached to the application. Some banks do not allow loans to tenant farmers in case of loans to individual farmers, and some require crop insurance by PCIC (Philippine Crop Insurance Corporation). This has resulted in competition with informal lenders who offer higher interest rates but do not require such borrowing requirements.

[37] ACPC estimated that the gap between the need for agricultural loans and the actual amount of loans is approximately Php 370 billion as of 2019.

Chapter 3 Direction for Future Cooperation

This chapter provides an overview of the overall challenges in the rice sector in the Philippines and thereafter discusses the direction of Japanese cooperation. The challenges in the rice sector as a whole are reviewed from the perspective of cause-and-effect relationships, with the major causes and countermeasures summarized. Then, the direction of Japan's cooperation was discussed based on each measure, and the information necessary to formulate Japanese cooperation was organized, assuming an adaptable aid scheme.

3.1 Identification of Important Issues in the Philippine Rice Sector

The challenges in the Philippine rice sector analyzed in Chapter 2 and the main causes behind them are summarized in the table below. As a core issue, "food security concerns" are established and divided into two categories: issues requiring urgency and normal time. The main causes corresponding to each issue and their details are then summarized.

The issues that require urgency are the recent challenges in the rice sector, namely "high and unstable rice prices" and "low resilience", which have become increasingly serious with the frequent occurrence of natural disasters. These are two of the most important issues that need to be addressed urgently, taking into account that a state of food security emergency was declared on February 3, 2025, due to the recent high rice prices and that many victims are in need of assistance due to frequent natural disasters such as typhoons and floods in recent years, including the one in 2024. In light of this situation, the situation is positioned as “the important issue” that needs to be addressed as quickly as possible. On the other hand, regular issues are those that require a response in normal times, such as "low self-sufficiency ratio" and "low competitiveness of the rice industry.

Table 3.1.1 Challenges in the Philippine Rice Sector

Core Issue	Issue		Cause	Cause Details
Food Security Concerns	Urgent	【Important】 High and unstable rice prices	Rising production costs	・ Price pass-through associated with input material price increases (fertilizers, pesticides, labor costs, fuel costs, etc.)
			Decreased or stagnant supply	・ Impact of natural disasters on crop yield (waterlogging/ overflowing, overtopping, drought, pests, etc.) ・ Complex distribution channels (high distribution costs, speculative moves by distributors) ・ Overestimation of unit yield and milling yield (actual distribution volume is much lower)
			International Market Impact	・ Decrease in domestic rice production and suspension of exports in India ・ Soaring international prices of Vietnamese rice and other commodities
		【Important】 Low resilience	Frequent natural disasters	・ Frequent natural disasters (typhoons, floods, drought, volcanic activity) and damage to agricultural products ・ Increase in the number of affected sectors due to fragile infrastructure (uncontrolled expansion of cities and severe and prolonged damage) ・ Weak buffer-stock system and deteriorating quality of buffer stock rice ・ Fragile production base (poor drainage, low irrigation rates, increased typhoon damage in typhoon-free areas, etc.)
	Regular	Low self-sufficiency rate	Low productivity	・ Inappropriate farming techniques (including use of superior seeds, pest control, and inconsistent varieties) ・ Low mechanization, low efficiency (fragmented and irregularly shaped farmland, inadequate access roads within fields), low maintenance capacity and neglect of provided equipment (lack of maintenance techniques and costs) ・ Cultivators are small, with limited capital, and/or have difficulty accessing finance (landowner/smallholder relationships that prevent them from borrowing against their land) ・ Aging producers and labor shortages (concentrated demand and high

Core Issue	Issue		Cause	Cause Details
				labor costs during the busy farming season) ・ Inadequate infrastructure (irrigation, farm roads, warehouses, etc.)
			High post-harvest losses	・ Delayed and aging mechanization of post-harvest processing processes (e.g., delay in mechanization of drying process relative to the rate of spread of combine harvesters, aging rice milling machines, etc.) ・ Inappropriate production and post-harvest handling techniques (mixing of both long and short varieties, moisture and temperature control, etc.) and weak extension system to reduce post-harvest losses ・ Unstable management of post-harvest processing facilities (lack of funds to buy paddy, lack of management personnel, shutdown and neglect of equipment due to maintenance problems, etc.) ・ High loss rate (quality deterioration) during seed and paddy storage stages
			Increase in imported rice	・ Liberalization of rice trade (reduction of tariffs on imported rice, opening rice imports to the private sector) through the Rice Tariff Law ・ High popularity of imported rice (whiteness, aroma) ・ Stagnation in domestic rice production
		Low competitiveness of the rice industry	High production costs	・ High material costs (fertilizers, pesticides, electricity, etc.) ・ Labor shortages and high labor costs ・ Farmers' individualistic tendencies (Kanya Kanya) make it difficult for economies of scale to work.
			Low quality compared to imported rice	・ Lack of quality awareness of domestic rice among producers and distributors (emphasis on high yield, resistance to pests and diseases, etc., rather than varieties popular with consumers) ・ Low technical standards, including post-harvest (mix of both long- and short-grain varieties, improper moisture and temperature control, drying and milling methods, etc.) ・ The market for high-value-added rice has not been developed due to the lack of a quality labeling method and brand registration system.

Source: JICA survey team

3.1.1 Food Security Concerns (Core Issue)

Concerns about food security encompass issues such as low resilience to natural disasters, which is the second most urgent issue after high rice prices, the low self-sufficiency rate that has become an issue in recent years, and the low competitiveness of the rice industry. Food security concerns are often discussed during the survey to DA stakeholders and in the media and are set as the core issue.

In particular, the high price of rice has become a top priority due to the range and severity of its impact, finally leading the DA Secretary to declare a food security emergency on February 3, 2025. This emergency declaration was declared based on the recommendation of the National Price Coordinating Council (NPCC) in response to the continued high prices of rice in the domestic market despite lower prices in the world market and the tariff reduction of rice in July 2024. The emergency declaration is expected to allow the release of government buffer-stock rice held by the NFA to the market, thereby stabilizing rice prices and ensuring that rice, the staple food of Filipinos, will reach consumers in a stable manner.

3.1.2 High and Unstable Rice Prices (Important Issue)

The "high and unstable rice prices" are a threat to all Filipinos, especially the poor with low incomes, where rice is the staple food, thus, price stabilization is a matter of urgency. Behind the soaring consumer price of rice are rising production costs, declining or stagnant supply, and the influence of the international market. Of these, the rise in production costs is due to increased costs of inputs such as fertilizers, pesticides, and labor, which are passed on to farmgate prices and further reflected in wholesale and retail prices. Fertilizers and pesticides are heavily dependent on imports, which affects

international prices, while the increase in labor costs is partly due to labor shortages caused by the aging of farming communities and the departure of young farmers to seek employment/work in urban areas and partly due to the slow mechanization of agriculture.

The "high and unstable rice prices" are a threat to all Filipinos, especially the poor with low incomes, for whom rice is a staple food, and price stabilization is a matter of urgency. Behind the soaring consumer price of rice are rising production costs, declining or stagnant supply, and the influence of the international market. Of these, the rise in production costs is due to increased costs of inputs such as fertilizers, pesticides, and labor, which are passed on to farmgate prices and further reflected in wholesale and retail prices. Fertilizers and pesticides are heavily dependent on imports, which affects international prices, while the increase in labor costs is partly due to labor shortages caused by the aging of farming communities and the departure of young farmers and partly due to the slow mechanization of agriculture.

The decrease and stagnation in supply have also been attributed to the effects of natural disasters and intentional price hikes by distributors. In recent years, natural disasters such as typhoons and droughts have caused serious damage to agriculture, which in turn has caused extensive damage to pre-harvest rice, leading to a decline in domestic rice production and higher consumer prices. On the other hand, an analysis of distributor price manipulation suggests that the reduction of rice import tariffs in July 2024 is having an impact. Prior to the reduction of rice tariffs, importers increased their imports in anticipation of supply shortages due to El Niño, but since the tariffs were subsequently lowered, many traders are reluctant to sell and are trying to prevent losses by raising prices, as reported in a press release by the DA (December 24, 2024).

Furthermore, the surge in international rice prices due to El Niño and La Niña and trade restrictions have led to higher imported rice prices, which is one reason why the effects of the rice tariff reductions have not been apparent. For consumers, the increased cost of rice puts pressure on household budgets and reduces purchasing power, leading to serious concerns about their livelihood. Natural disasters and rising international prices may be temporary problems, but in light of climate change trends and increasing reliance on imported rice, they need to be viewed as risk factors affecting food security.

3.1.3 Low Resilience (Important Issue)

"Low resilience" refers to the lack of resilience to frequent natural disasters. The NFA is responsible for buffer-stock rice that will have to be distributed to victims of natural disasters. However, the current level of rice buffer stock is low compared to the target buffer stock in the MAFIM, and there are also many operational issues, such as insufficient funds to purchase paddy and deteriorating quality of the buffer stock paddy. Therefore, the strategic buffer stock of rice in the NFA and the strengthening of the inventory management system are urgent issues from the perspective of food security.

In considering the direction of Japan's cooperation, the support to NFA, which has been playing an increasing role in recent years will be considered. In addition to emergency assistance to disaster victims, the NFA supplies buffer-stock rice that has reached its storage period to government agencies (DSWD, LGUs, DND, etc.) and the poor during normal times, and the revised Rice Tariff Law (Republic Act No. 12078) enacted on December 9, 2024, allows the rice to be marketed at a lower price in the future when rice prices soar. Therefore, in compiling the direction of support, the NFA will be considered from the perspective of strengthening its functions.

3.1.4 Low Self-sufficiency Rate

Rice "low self-sufficiency" has become a serious challenge following the increase in rice imports since the Rice Tariffication Act (Public Act. No. 11203, Feb. 2019) was enacted. The Philippine government aims to increase rice self-sufficiency, with a target of 95% by 2028. In order to improve self-sufficiency,

it is necessary to increase production volume, but this has been sluggish compared to the growth rate of the population and rice consumption. Challenges behind the low self-sufficiency rate include low productivity, high post-harvest losses, and increasing rice imports. Imports of foreign rice are increasing every year, and after 2023 the country will be the world's largest importer of rice.

Of particular note is the fact that imported rice is preferred by consumers because its quality is better than domestically produced rice, and as much as 1.7 times the calculated supply-demand gap is being imported (see 3.1.5 for details). This point suggests that simply increasing domestic rice production measures alone will make it difficult to gain a competitive edge over imported rice and will not lead to higher incomes for farmers, and that this may escalate farmer turnover, especially among young people, further delaying the achievement of the self-sufficiency goal.

Another challenge in post-harvest is post-harvest losses, which are larger than in other countries. Post-harvest losses occur particularly during the harvesting, drying, and milling processes. Traditionally, post-harvest losses occurred during harvesting, threshing, and before and after leaving the field, but with the widespread use of combine harvesters, significant improvements have been seen. Despite this, the drying speed cannot keep up with the harvesting speed of combine harvesters, thus, a new problem has been observed: deterioration of rice quality due to waiting for drying. Therefore, the modernization of post-harvest processing, including the strengthening of dryer capacity, has become an urgent issue.

3.1.5 Strengthening and Improving the Competitiveness of Domestic Rice Industry

The factors that have reduced the competitiveness of the rice industry include high production costs and low quality compared to imported rice. High production costs are due to high input costs, such as fertilizers and pesticides, and high labor costs caused by labor shortages, which in turn contribute to higher prices for domestically produced rice. In addition, to strengthen the competitiveness of the rice industry, it is important to ensure the quality of domestically produced rice that can compete adequately with the quality of imported rice.

Regarding quality, the market surveys conducted in three cities (Manila, Iloilo, and Davao) showed that consumers were mostly interested in “whiteness”, followed by “long or short grain”, “percentage of stones”, and “percentage of yellow rice”. This trend was shared almost equally by wholesalers and HoReCa industry workers. Behind the inferiority of domestic rice to imported rice in these respects lies the low level of technology related to quality control, including post-harvest, particularly in terms of moisture and temperature control during storage and transportation, drying and milling methods, and the mixing of both long and short grain types of rice. Therefore, if the competitiveness of the domestic rice industry is to be enhanced over the medium to long term, it is necessary to work on strengthening the VC as a whole to improve quality.

3.2 Measures to Address Each Issue and Feasibility of Countermeasures

Table 3.2.1 shows the measures to solve the issues identified in Table 3.1.1 and their feasibility. Negative expressions in Table 3.1.1. are replaced by positive expressions in Table 3.2.1. That is, the core objective is "strengthening food security," and the urgent objectives to achieve this are defined as "stabilizing rice prices" and "improving resilience," while the regular objectives are "increasing self-sufficiency" and "strengthening the competitiveness of the rice industry”. The feasibility of the countermeasures was then examined in terms of the current system, legal framework, and implementing agencies and their capacity to implement the measures in the Philippines.

In the study, measures for which the current support system (including projects) can already be used and measures for which the available technology and budget from Japan are limiting factors were determined to be feasible in the short term. On the other hand, measures that require VC improvement, including production processes, are considered feasible but require medium- to long-term efforts. In addition, the

measures that cannot be improved overnight, such as customs and human relations that have traditionally taken root in the Philippines' rural areas, and systems related to the landowner-tenant farmer relationship, including land ownership, were judged to be feasible on a limited basis and on a medium- to long-term efforts. The short-, medium-, and long-term feasibility is specified in the feasibility column in the table below.

Table 3.2.1 Measures to Address each Issue and Feasibility of Support

Core Objective	Objective		Method to Achieve	Countermeasures (Draft)	Feasibility
Food Security Enhancement	Urgent	Stabilization of rice prices	Curbing the rising cost of rice distribution	・ Implement emergency release of buffer-stock rice	・ [Feasible: Short-term] In response to the soaring price of rice caused by a decrease in the amount of milled rice in the market due to the entry of new distributors with a speculative purpose, the Philippine government has already introduced a system to release NFA-buffer stock rice through a bidding process (Revised Rice Tariff Act: RA 12078). ・ Under this law, the NFA has been given the authority to stock imported rice. However, it is essential to improve the facilities and equipment that can reliably maintain the quality of the rice, and to improve the management of buffer stock rice. Therefore, Japanese assistance is possible in this field.
				・ Strengthen monitoring and early warning systems for imported rice and rice market conditions	・ [Feasible: Short-term] Under RA12078, the BPI is responsible for collecting information and recommending the timing and amount of rice to be released to the NFA. In order for DA to accurately grasp the amount of rice distributed domestically, including to the private sector, it is necessary to refine data such as crop condition index, yield measurement, and milling yield measurement.
				・ Mitigating the impact of international markets	・ [Feasible: Short-term] Through the food security emergency declaration by the DA Secretary under RA12078, the market supply of NFA stockpiled rice has become possible. However, financial support is needed to achieve the long-term goal of 56 tons of NFA buffer-stock rice. In addition, international cooperation through efforts by APTERR is essential.
			Stabilization of domestic rice prices	・ Reduction of input costs (mechanization, input subsidies, economies of scale, promotion of compost, green manure, useful microorganisms, earthworms)	・ [Feasible: Short-term] Rice producers are mostly small farmers and have difficulty accessing finance, so government support, including organization, is needed. Various public support is currently provided, including RCEF (mechanization), F2C2 (clustering), and NRP (input cost subsidies). It would be efficient to provide support by focusing on mechanization and economies of scale, which are expected to reduce production costs. ・ [Feasible: Short-term] The RCEF is currently being implemented in a relatively comprehensive manner from the perspective of strengthening the competitiveness of the rice industry, and the second phase will cover the entire country. However, it is expected that it would be difficult to secure a project budget based on tariff revenues alone, but a method of focusing on model agricultural cooperatives and deploying the project is possible. ・ [Feasible: Short-term] Some farmers' organizations have problems with equipment maintenance and management skills and need immediate support. ・ [Feasible: Mid- to Long-term] As ATI, BSWM, the University of the Philippines, and private companies are developing technologies for biological pest control and utilization of unutilized resources, increase opportunities to

Core Objective	Objective		Method to Achieve	Countermeasures (Draft)	Feasibility
					provide information on these technologies and improve the farming capacity of cooperative members.
			Increase in domestic rice supply	・ Introduction of disaster-resistant varieties	・ [Feasible: Mid- to Long-term] PhilRice is developing and introducing varieties, and seed distribution is underway at RCEF, but securing a budget and human resource development are key to nationwide expansion. However, securing budget and human resource development are key to nationwide deployment. Priority will be given to establishing a system for propagating certified seeds.
				・ Strengthening farmers' sales capabilities and streamlining distribution channels	・ [Limited Feasible: Mid- to Long-term] Strengthening farmers' marketing capabilities is possible through support to agricultural cooperatives, but streamlining distribution channels is constrained by traditional rural society. It is desirable to gradually rationalize distribution channels through the construction of a distribution platform, such as through vertical integration of VCs and DX.
				・ Improvement of rice milling process	・ [Feasible: Short-term] In addition to preventing mixing of long- and short-grain rice to reduce broken rice and improve whiteness, it is also necessary to improve management. It is necessary to establish a technical support and dissemination system for improving post-harvest processing technology through PhilMech and PhilRice.
		Improving Resilience	Mitigation of the impact of frequent natural disasters	・ Strengthen buffer-stock system and improve quality of buffer-stock rice	・ [Feasible: Short-term] NFA is in the process of renovating the warehouse at MAFIM, but to achieve the short-term target of 15-day buffer-stock (540,000 tons), it is necessary to reduce losses during storage, expand facility capacity, and strengthen inspection capabilities, and securing budget for this purpose is a challenge.
				・ Development of Disaster-Resistant Production Infrastructure	・ [Limited Feasible: Short- to Mid-term] Rehabilitation of irrigation intakes and canals and drainage systems could be implemented with field development, but it is likely to take time to get landowners to agree to field development in terms of traditional land ownership systems.
	Regular	improvement of the self-sufficiency ratio	Increased Productivity	・ Improvement of production efficiency (unification of varieties, larger scale, mechanization, etc.)	・ [Feasible: Short-term] RCEF is in the process of implementation from the viewpoint of strengthening competitiveness. In addition, there are various government support programs such as F2C2 (clustering) and NRP (input cost subsidy), but both technology and budget are insufficient.
				・ Larger and larger plots of land	・ [Limited Feasible: Mid- to Long-term] Since the land ownership system is a constraint for developing land consolidation, it is desirable to create a model area with the cooperation of new areas (e.g. agrarian reform area) and understanding landowners and to have many landowners understand the benefits, and it is necessary to support.
				・ Renovation and enhancement of production infrastructure	・ [Feasible: Mid- to Long-term] Various programs and donor support are in place, but they are insufficient. Needs to be strengthened, especially in terms of resilience enhancement.
				・ Strengthen dissemination and distribution of superior seeds	・ [Feasible: Mid- to Long-term] Development and introduction is underway at PhilRice, and seed distribution is underway at RCEF, but priority is given to establishing an inspection system and seed multiplication system for certified seeds by BPI.
				・ Modernization of post-harvest	・ [Feasible: Short-term] Currently being implemented at RCEF (for small and medium farmers' organizations) and

Core Objective	Objective		Method to Achieve	Countermeasures (Draft)	Feasibility
			Reduction of post-harvest losses	handling (Updating dryer and rice milling machine)	MAFIM (for NFAs), but financial support is needed. ・ [Feasible: Mid- to Long-term] There are many people involved, and efforts need to be made as a VC, but support is needed for the establishment of technology and dissemination systems for this purpose. ・ [Feasible: Mid- to Long-term] A system that includes support by manufacturers for maintenance and upkeep of equipment is needed. The development of a specialized agricultural machinery service department within the agricultural cooperative will be effective in increasing the utilization rate of agricultural machinery.
				・ Improve and enhance post-harvest handling techniques (humidity, management of storage pests, bird damage, etc.)	
				・ Strengthen management of post-harvest processing facilities (human resource development, kaizen, access to finance)	・ [Feasible: Short-term] Although RPS organizational strengthening and human resource development are being implemented at ATI, many organizations are facing challenges in strengthening their management mindset, and there is an urgent need to train managers.
		Strengthening the competitiveness of the rice industry	Production Cost Reduction	・ Reduction of production costs	・ The same support measures for input cost reductions are used to stabilize domestic rice prices. ・ [Feasible: Short-term] Although it is promoting strengthening competitiveness under RCEF, in the second phase, the target will be expanded to cover the entire country, so it is expected to be difficult to secure the project budget from tariff revenues alone, and financial support will be necessary. ・ [Feasible: Short-term] F2C2 has a strategy for clustering and strengthening linkages with LGUs, but needs support based on good practices in implementation. ・ [Feasible: Short-term] Bulk handling from harvest and transport to paddy storage has begun at some major private companies and can be achieved with investment in dedicated harvesters, trucks, dryers, and silos.
				・ Promotion of mechanization (labor saving)	
				・ Strengthen organization, clustering, and collaboration with LGUs	
				・ Bulk handling by agricultural cooperatives and private companies	
			Ensure quality as good as imported rice	・ Strengthening VC to improve quality	・ [Feasible: Mid- to Long-term] It is necessary to improve the quality efforts of the entire VC, but the establishment of technology and dissemination systems for this purpose requires technical support in addition to the dissemination of modern equipment.
				・ Strengthen collaboration among VC stakeholders	・ [Feasible: Mid- to Long-term] Support is needed to establish a system to compete with the increasing imports of rice, such as a forum by rice VC officials.
				・ Development of domestic brand and high value-added rice market	・ [Limited Feasible: Mid- to Long-term] Both the domestic brand and high-value-added rice markets need to be nurtured to compete with the increasing imports at present. medium- to long-term: Efforts need to be made through collaboration among AMAS, PhilRice, BPI, BAR, etc. In particular, there is a need to increase domestic production in the region (Oriental Mindoro) as there is a lot of aromatic rice in the high-end imported rice market.

Source: JICA survey team

3.3 Direction of Support and Proposed Cooperation

Based on the feasibility analysis above, the direction of JICA support for the core objective, "strengthening food security," was examined. In the table above, the countermeasures (draft) that were analyzed as methods to achieving the objective were too detailed, and some were similar or duplicated, so by grouping together similar countermeasures, we were able to roughly categorize them into four directions of support. As a result, the countermeasures (draft) that were highly important from the perspective of urgency were grouped together as “Strengthening Food Security”, and the others were divided into “Updating and Modernizing Post-Harvest Processing Technology”, “Improving Quality”, and “Strengthening Rice Value Chains”. As there are many issues to be addressed in the area of post-harvest for the former three categories, specific details will be discussed in Section 3.5. On the other hand, "Strengthening Rice VC" is to be addressed by VC as a whole, including the production stage, and is therefore discussed in 3.6 as other cooperation proposals.

Table 3.3.1 Measures and Support Directions for the Rice Sector in the Philippines

Core Objective	Objective		Support Direction
Strengthening Food Security	Urgent	Stabilization of rice prices	[Strengthening food security (government intervention in the market)] ・Measures to strengthen market intervention by the government in times of emergency, including strengthening buffer-stock capacity and systems by the NFA and improving buffer-stock rice quality. Top priority in terms of alleviating consumers' livelihood insecurity and combating poverty. [Rice VC enhancement] ・Strengthening rice VC as a mid- to long-term measure (reviewing inputs, reducing production costs through labor-saving, mechanization, and clustering, and increasing domestic rice production by introducing disaster-resistant and other high-yielding varieties)
		Improving Resilience	[Strengthening food security (buffer-stock capacity and systems)] ・Strengthening buffer-stock capacity and systems to cope with frequent disasters and improving the quality of buffer-stock rice should be a top priority (support to MAFIM) ・Mid- to long-term efforts to improve disaster-resistant production infrastructure (strengthening drainage functions and improving the function of irrigation facilities as drought countermeasures)
	Regular	Improvement of the self-sufficiency ratio	[Updating and modernizing post-harvest processing technology] ・Strengthening support for post-harvest processing as an area where support has been lacking. In particular, the upgrading and modernization of equipment and facilities related to harvesting, drying, milling, and storage processes, where post-harvest losses are particularly high. In particular, the modernization of the drying process, which has become a bottleneck in the post-harvest treatment process, is a high priority. In addition, as the impact of rice imports increases, it is important to improve quality and quantity. Also, technical improvements in post-harvest processing, including the effective use of equipment, and the establishment and strengthening of a system for their dissemination, as well as strengthening organizational capacity and ensuring the sustainability of management through clustering and strengthening cooperation with LGUs, will be implemented concurrently. [Rice VC enhancement] ・Increasing production through rice VC enhancement (labor saving, mechanization, and clustering) as a mid- to long-term initiative is essential for improving self-sufficiency.
		Strengthening the competitiveness of the rice industry	[Updating and modernizing post-harvest processing technology] ・Support RCEF efforts to strengthen competitiveness against increasing rice imports. In rice-producing areas in the northern Philippines, a model field development project is recommended to improve the efficiency of farm machinery use, and in the southern Philippines, where mechanization has been relatively low, mechanization promotion is recommended. In addition, to decrease unutilized equipment and facilities, which are likely to increase in the future, it is important to realize economies of scale through the clustering of producers and to stabilize

Core Objective	Objective		Support Direction
			management through diversification of income sources such as the use of by-products. [Quality Improvement] ・In addition, even if production volume is increased, poor quality rice will lose out to competition from imported rice. Therefore, it is important to strengthen VC (improvement of seed, production, harvesting, drying, milling, storage, and transportation) in order to improve quality.

Source: JICA survey team

3.3.1 Strengthening Food Security

In recent years, typhoons and floods have become more frequent and severe due to climate change, and the role of NFAs is being reemphasized from the perspective of food security, including relief for victims and vulnerable groups, hence the strengthening buffer-stock capacity has become an urgent issue. For example, in 2024, multiple typhoons hit the Philippines, making landfall within six weeks from September to November alone, causing floods, landslides, and other disasters in northern Luzon and other areas. As a result, 111,411 farmers and fishermen were affected, and an estimated total amount of about 6 billion Php (about 15.7 billion yen) were lost to crops.[1]

The current administration's Masagana Agriculture and Food Infrastructure Modernization Program (MAFIM) calls for a budget of 93 billion Php to upgrade NFA facilities nationwide by the end of FY2028 Under the program, 46 warehouses in priority NFA areas are being progressively constructed and renovated. However, there is no indication of future budget allowances, and assistance from donor agencies is expected.

Currently, rice stored by the NFA is supplied to disaster victims and, after its storage period, to the socially vulnerable, government-controlled institutions such as prisons, and the military and the DSWD at a low price. However, Republic Act No. 12078, which received presidential approval this December 2024, officially allows the NFA to sell buffer-stock rice to government agencies and the general public through the KADIWA ng Pangulo Center in areas where rice supply shortages and abnormal price hikes are occurring. The release of white rice by the NFA through LGUs to victims of natural disasters is equivalent to 50 to 70% of the 300,000 tons stored in 2019 to 2024. DSWD (Department of Social Welfare and Development), DND (Department of National Defense), and DOJ (Department of Justice), 20 to 30%, and 10 to 20% for disposal or feed, including storage losses.

Thus, the role of the NFA is being strengthened, but it faces many challenges in terms of the amount of buffer-stock rice for emergencies and the quality of the buffer-stock rice. The current buffer-stock is a 9-day supply, but the goal is to expand this to at least a 15-day supply (the President's goal is 60 days), but budgetary measures to achieve this goal are not in sight. In addition, the buffer-stock rice of the NFA is of poor quality, and consumers have always commented that NFA rice does not taste good. This is because the rice is already hot and humid at the time of delivery, causing serious problems such as yellowing during storage, and quality control based on HACCP. Furthermore, since the domestic stock and distribution volumes are not being monitored in a timely and appropriate manner, it is necessary to review the monitoring system, including reviving the registration system for rice collectors, millers, and distributors.

Based on the above and after organizing the issues facing the NFA, the support (draft) for strengthening the NFA's functions in terms of both engineering and management components are presented in the table below.

[1] "FLASH UPDATE No. 3 Philippines: Tropical Cyclone Trami/Kristine, As of 05 November 2024, United Nations Office for the Coordination of Humanitarian Affairs (OCHA)"

Table 3.3.2 Challenges and Measures Faced by NFAs

Challenges facing the NFA	Proposed Support	Support to	Proposed Components
・Extremely low quality of NFA milled rice (taste, powdery rice, broken rice, yellowish rice, degree of whiteness, foreign object contamination, etc.) ・Storage losses are as high as 10 to 20%, and the amount of rice available for shipment is low compared to the inventory target of 300,000 tons. ・Current facilities and equipment cannot handle the 540,000 tons targeted in RA 12078	・Strengthen food buffer-stock system (establishment of model NFA facility)	・NFA (MAFIM Program)	・Establishment of modernized NFA facilities (large mechanical dryers, rice milling lines, silos, and warehouses) ・Introduction of bulk handling system ・Technical training for maintenance, management, and operation of PH equipment and facilities ・Enhancement of milled rice quality inspection
・Failure to monitor domestic inventory and distribution volumes in a timely and appropriate manner	・Strengthen operational capacity related to strategic buffer-stock and inventory management bodies	・NFA (MAFIM Program)	・Support for strengthening food buffer stock and emergency assistance plans and monitoring systems ・Enhancing technology for the operation of post-harvest processing facilities ・Strengthen information collection (import volume, private inventories, consumer prices, accurate crop condition index and milling yield)

Source: JICA survey team

3.3.2 Updating and Modernizing Post-harvest Processing Technologies

In order to reduce post-harvest losses, which are high compared to other countries, critical points need to be identified and more effective support is needed. Most losses occur in the drying and milling processes (36% and 33% of the total, respectively), followed by harvesting operations (14%), thus, focused improvements in these processes would be effective. Improvements to these processes may include the introduction of equipment, upgrading of aging equipment, and increasing the efficiency of the entire system. Support can be provided by private contractors, cooperatives such as MPCs, local governments such as LGUs and NFAs.

The process of post-harvest processing is mostly carried out by private companies such as collectors (palay traders) and millers (68%, according to Figure 2.1.5 in Chapter 2). From the perspective of reducing post-harvest processing losses, support to private traders is effective. In addition, private contractors are highly business-minded, as they immediately repair the equipment they have invested during breaks down and they are considered to have a high level of interest in reducing losses, as it is directly related to their profits. On the other hand, in terms of benefits to farmers, support to cooperatives has a direct effect as it is returned to the farmers who are its members, and clusters of cooperatives have an even higher effect. In particular, there are examples of clusters linked to LGUs that are operating successfully, and it is possible to demonstrate good practices in farmer support by supporting RCEF taking into account the F2C2 strategy.

The updating and modernizing post-harvest processing technologies is currently being implemented by the RCEF. The project is expected to complete its first phase from 2019 to 2024, but a new second phase has already been decided to be implemented from 2025 to 2031[2]. RCEF is providing small and medium-sized FCAs with agricultural machinery and modern post-harvest processing equipment and facilities at no cost. Continued implementation of this will allow rice producers to increase vertical integration of VC and will contribute significantly to increasing the productivity of rice farmers and reducing post-harvest losses.

[2] "Republic Act No. 12078," Sec. 16, states that the RCEF is extended until 2031 from the passage of the Act.

However, some have pointed out concerns about the maintenance and sustainable operation of the equipment distributed free of charge. In fact, we have already seen cases where the use of equipment and the operation of facilities have been halted due to breakdowns of agricultural machinery or lack of spare parts. In order to prevent such problems, it is important to have the financial wherewithal to use surpluses generated from other business revenues to pay for repairs and other expenses, as MPC does.

In addition, relatively large-scale processing facilities such as dryers and rice mills need to process a certain amount of paddy rice in order to make a profit on a sustainable basis. According to PhilMech's calculations, the break-even point is 300 tons, 600 tons, and 1,000 tons, for low (RPS-1), medium (RPS-2) and large (RPS-3) scale processing centers, respectively in terms of the amount of paddy to be purchased. In order to achieve and maintain this break-even point, it is essential to secure an appropriate allocation of management resources, such as securing funds to purchase hulled rice, as well as to secure management infrastructure and foster a business mindset.

The F2C2 concept is extremely useful as an approach to achieving economies of scale in management, as it encourages cooperation among farmers in the same regional cluster to realize economies of scale, to improve efficiency in rice production, processing, and distribution, and to materialize bargaining power in marketing. In order to achieve effective collaboration with LGUs, it is effective to form a single cluster at the municipality level. For the municipality officers, it is more effective to support one cluster intensively than to support several cooperatives, which would make more effective use of limited resources. Thus, it would be effective to support the formation of a good cluster as a model, together with the components that works to strengthen the organizational management of the RPS for sustainable management.

It was pointed out from various sources throughout this survey that when implementing organizations such as FCAs are weak, project operations do not last long. In addition to the problems of the management and business mindset of the organization itself, some pointed to external factors such as the lack of sustained administrative support when the provincial governor or municipal mayor is replaced after each election. It should be noted that in the case of the KOICA-supported RPC, the facility itself was advanced, but the organization lacked operational and maintenance management capacity, including access to spare parts for equipment, an exodus of trained personnel, and working capital essential for management.[3]

Table 3.3.3 Proposed Cooperation for Updating and Modernizing Post-harvest Processing Technologies

Proposed Cooperation	Support to	Proposed Components
Updating and modernizing post-harvest handling equipment and facilities for private contractors	Private rice millers and distributors, large FCAs	・Update post-harvest processing equipment and facilities (harvesters, dryers, rice mills, silos, warehouses) ・Technical training for maintenance, management, and operation of post-harvest processing equipment and facilities ・Working capital loans
Support for updating and modernizing post-harvest processing technologies (establishment of model RPS)	FCA, LGU (RCEF2.0)	・Modernization of post-harvest processing equipment and facilities (harvesters, dryers, rice mills, silos, warehouses) ・Infrastructure development to promote efficient use of post-harvest processing equipment and facilities (model field development, drainage improvement, in-field road maintenance) ・Enhancement of equipment maintenance and management systems
Developing a model for reducing post-harvest loss in rice	PhilMech, PhilRice, RPS/, MPC	・Support for clustering (implementation system, operating rules, support for establishment of joint production and shipping systems, etc.) ・Management support (business plan preparation, business diagnosis and consulting, improvement guidance)

[3] "Public officials' and operators' perceptions of the implementation of four modern rice processing facilities (KOICA RPCs) in the Philippines: an evaluation study," Nancy Morsiquillo Supil et al, Journal. 11 of Lntemation, 11 Development Cooperation 2022 17(1). 73-100.

Proposed Cooperation	Support to	Proposed Components
		・Support for improving post-harvest handling techniques (including introduction of bulk handling and quality improvement) ・Establish sustainable operations

Source: JICA survey team

3.3.3 Quality Improvement (Modernization of Rice Seed Post-Harvest Technology)

A wide range of quality control efforts are needed, from production to post-harvest processing. While some of these efforts may be addressed in the project proposed in the support for updating and modernizing post-harvest processing technology, the "Modernization of Rice Seed Post-Harvest Processing Technology" in which the Philippine government has expressed interest is discussed here as an initiative for modernizing post-harvest technology.

Post-harvest losses of seed are estimated at 10 to 15%[4] and therefore, post-harvest technology needs to be upgraded and modernized. In particular, aging seed storage warehouses and stagnated maintenance of equipment for temperature control are challenges identified. Currently, the Crop Research and Production Support Division (CRPSD) of BPI is in charge of the national seed stockpile (registered and certified seeds), and has one rice seed storage warehouse in Manila and one in Quezon City with three rooms. The warehouse in Quezon City where rice seed is stockpiled, the air-conditioning facility has stopped functioning and is being replaced by a commercial air conditioner. This storage facility was constructed in 1997 with the cooperation of the Japanese government.

DA's Regional Field Offices (RFOs) stockpile seed in 16 regions, but a few RFOs have cold storage facilities without air conditioning, with some RFOs have storage facilities with only room temperature control. There are also RFOs that do not have storage facilities. Considering the magnitude of post-harvest losses of seeds, early development and improvement of such facilities is also urgently required and will be considered for project development. The following is a proposal for support based on the above directions of cooperation.

Table 3.3.4 Proposed Cooperation for Quality Improvement

Proposed Cooperation	Support to	Proposed Components
Modernization of rice seed storage facilities	BPI, PhilRice	・Upgrading and modernization of seed storage facilities (air conditioner) ・Support for the provision of seed production facilities and equipment (rice transplanters, seedling cultivation facilities and equipment) ・Infrastructure development for seed production (model field development, drainage improvement, farm road maintenance)
Support for strengthening seed production technology	BPI, PhilRice, Seed Production Associations	・Support for strengthening production and distribution technologies for superior seeds ・Support for strengthening seed production associations (improvement of quality control technology)

Source: JICA survey team

3.4 Applicable Schemes and Criteria for Application

3.4.1 JICA Assistance Scheme

Among JICA's assistance schemes applicable to support the post-harvest processing sector in the Philippines, the table below presents a summary of yen loan projects and technical cooperation projects.

[4] Based on interviews with Nueva Ecija Seed Growers MPC. Seed certification standards are strict, and seeds are rejected if the germination rate is less than 85% (even 1%) or if there is even one insect present.

Table 3.4.1 Summary of JICA Cooperation Schemes

Scheme Type		Detail
1. Project type Loans		
(1)	Project Loan	Project loans, which account for the largest portion of ODA Loans, finance projects such as roads, power plants, irrigation, water supply and sewerage facilities. The loans are used for the procurement of facilities, equipment and services, or for conducting civil and other related works.
(2)	Engineering Service (E/S) Loan	Engineering Service (E/S) loans are for engineering services which are necessary at the survey and planning stages of projects. These services include reviews of feasibility studies, surveys on detailed data on project sites, detailed designs and the preparation of bidding documents. In the same manner as Project Loans, completion of feasibility studies or their equivalent and confirmation of the project's overall necessity and relevance are prerequisite for this type of loan.
(3)	Financial Intermediary Loans (Two-step Loan: TSL)	Financial intermediary loans are implemented through the financial institutions of the recipient country based on the policy-oriented financial system of the partner country. These loans provide funds necessary for the implementation of designated policies, such as the promotion of small and medium-scale enterprises in manufacturing, agriculture and other specified industries and the construction of facilities to improve the living standards of the poor. These loans are known as "two-step loans (TSL)" because under the process, funds pass through two or more financial institutions before the end-beneficiaries receive the funds.
(4)	Sector Loan	Sector loans are for materials and equipment, services and consulting required for the implementation of development plans in a specific sector consisting of multiple sub-projects. This type of loan also leads to improved policies and systems in the sector.
2. Program Loan		Program loans assist recipient countries seeking to improve policies and implement general system reforms. Loan agreements are signed and funds are provided based on confirmation that reform items have been achieved by the partner country's government. In recent years, the most common type of these loans is one in which proceeds are incorporated into the target partner country budget. There are many instances in which these types of loans take the form of co-financing with the World Bank and other multilateral development banks (MDBs).
3. Technical Cooperation Project		Cooperation projects that combine multiple means (cooperation tools) to address development issues faced by the Philippines, such as the dispatch of experts from Japan, the dispatch of Philippine officials as trainees to Japan or third countries, and the provision of necessary equipment, to achieve a specific goal within a certain period of time.

Source: JICA

3.4.2 Criteria for Applying the Scheme

In applying the above schemes, the criteria for judgment include the public nature of the assistance, the needs of the target beneficiaries, economic impact, technical appropriateness, and environmental and social considerations. Among these, the needs of stakeholders, eligibility for yen loans, and economic impact, especially post-harvest benefits, are summarized below.

(1) Needs of the parties concerned and eligibility for yen loans

In considering the formation of a yen loan project, the needs of the target involved and their eligibility for a yen loan were analyzed. The results are as follows.

Table 3.4.2 Needs and Eligibility for Yen Loans by Stakeholder

Target	Needs	Contents	Conditions	Eligibility as Yen Loan
Individual Farmer	Equipment Procurement	Purchase of tractors and other equipment	For individual farmers, the funds are not provided directly as loans, but rather the intermediary bank provides loans to agricultural cooperatives, etc., and each agricultural cooperative provides sub-loans to individual farmers. The terms of the loans are determined by each agricultural cooperative (the maximum interest rate needs to be restricted). In	TSL
	Operation Cost	Purchase of seeds, fertilizers, pesticides, etc.		TSL, Project Loan

Target	Needs	Contents	Conditions	Eligibility as Yen Loan
	Operation Cost	Labor, fuel	addition to the cost of purchasing equipment, the funds for purchasing agricultural inputs such as seeds, pesticides and fertilizers are also eligible for loans, but labor costs, fuel costs, etc., are not eligible.	Not Eligible
Agricultural Cooperatives/ Corporations	Equipment Procurement	Purchase of tractors and combine harvesters	Loans may be provided to agricultural cooperatives as TSL via intermediary banks for the construction/renovation of facilities and the procurement of equipment. At the same time, as mentioned above, TSL will also provide loans for sub-loans to individual farmers (members). Operation cost can be provided for the purchase of paddy for milling, but not for labor or fuel costs associated with the operation of equipment. It is also possible for local governments to implement the construction of transport facilities and some of the production facilities (agricultural roads and irrigation facilities) through the Department of Agriculture, using project loan funds. (Monitoring of the loan situation and guidance on the operation of the equipment will be provided by consulting services and technical cooperation.	TSL
	Expansion of Contract Farming	Loans to individual farmers		TSL
	Storage Facilities	Warehouse construction/ rehabilitation, procurement of conveyors, etc.		TSL
	Rice Milling/ Polishing Facilities	Equipment and facility construction		TSL
	Other Processing Facilities	Equipment and facility construction		TSL
	Operation Cost	Purchase of paddy		TSL
	Operation Cost	Fuel and labor costs		Not eligible
	Transportation Facilities	Procurement of trucks, Farm-to-market roads		TSL, Project loans
	Production Facilities	Small scale irrigation facilities		Project loans
Rice Processor	Facility construction/ Rehabilitation	Rice milling/storage facilities	Loans are also provided to private rice processing companies via intermediary banks through TSL (for facility construction /rehabilitation, and for the procurement of new equipment and update). Operation cost can be provided in the same way as the loans to agricultural cooperatives mentioned above (technical assistance is also provided in the same way as above).	TSL
	Equipment Procurement/ Upgrades	Rice mills, sorting/packaging equipment		TSL
	Operation Cost	Fuel and labor costs		Not Eligible
Government Facilities	Storage Facilities	Warehouse	Government-related facilities will be implemented through project loans via Department of Finance and Department of Agriculture. In cases it is difficult to include part of the operating capital (such as the purchase of rice husks) in the project loan (when it is difficult to set the quantity, frequency, unit price, etc. in advance), it is also possible to provide funds via TSL to private companies, etc. (As for technical assistance, see above.)	Project loan
	Equipment Procurement/ Upgrades s	Drying/milling equipment		Project loan
	Operation Cost	Fuel and labor costs		Not Eligible
	Working Capital	Fuel and labor costs		Nonqualified

Source: JICA survey team

(2) Assumed Impacts by Reduction of Post-Harvest Loss

Regarding the target for improving the post-harvest loss rate, the National Development Plan (2023-2028) has an indicator to improve the post-harvest loss rate to 13.01% by FY2028. In addition to this, the DA is also looking at 8%, which is considered the level of Vietnam's post-harvest loss rate, although

this is seen as a long-term goal. Table 3.4.3 estimates the production of milled rice and the population capable of self-sufficiency when the above target post-harvest loss rate is applied, based on the amount of paddy produced in 2022 (19,756.6 thousand tons), the population and per capita consumption of milled rice as published by the PSA. Here, the production of milled rice estimated from the production of paddy in 2022 and the per capita consumption of milled rice in 2022, 373 g/day, were used as given conditions for the calculations. These calculation conditions are summarized in Table 3.4.4.

Table 3.4.3 Impact of Improved Post-harvest Losses

Item	Present Condition	Mid-term Target Year 2028	Long-term Goal
Post-harvest loss ratio*.	14.52%	13.01%	8%
Milled rice production (thousand tons)	12,920.8	13,149.0	13,906.3
Self-sufficient population (thousands)**	94,936	96,613	102,177
Rice self-sufficiency rate	83%	85%	90%

Source: *PhilMech, DA, **Estimated by palay production and milling recovery ratio

Table 3.4.4 (Reference) Conditions for Impact Calculation

Item	Unit	Value	Notes/ Source
Paddy Production	1000 ton	19,756.6	PSA 2022
Estimated milled rice production in FY2022	1000 ton	12,920.8	PSA recovery rate at 65.4
Rice consumption per capita	kg/year	136.1	Net Food Disposable (NFD) per capita, PSA 2022
Population (2022)	1000 people	113,964.3	PSA 2022

Sources: Listed in the table

In 2022, with a post-harvest loss ratio of 14.52%, the domestic supply of milled rice was estimated at 12.9 million tons. This quantity was sufficient to meet the annual rice consumption needs of approximately 94.9 million people, based on the per capita rice consumption of 136.1 kilograms per year. This accounted for 83% of the national population, which stood at 113.9 million.

Achieving the Philippine National Development Plan (PNDP) target of reducing the post-harvest loss ratio to 13.01%, while maintaining other conditions constant, would increase the domestic rice supply to feed an estimated 96.6 million people. This would cover 85% of the national population's rice consumption needs.

Looking further ahead, attaining the long-term target of an 8% post-harvest loss ratio would significantly enhance the domestic rice supply. Under this scenario, it is projected that the supply will feed additional 7% of the population, which could meet the annual rice consumption needs of 102.2 million people, representing 90% of the Filipino population in total.

(3) Financial support for large blue-chip agricultural cooperatives through larger two-step loans

In two-step loan projects in the past using Yen Loans, the interest rate imposed to the end-user was inevitably higher than that of a normal loan through commercial banks because the interest rate paid to JICA and the foreign currency exchange guarantee fee paid to the DOF had to be added to the borrower’s interest rate. Therefore, the banks to participate in this new TSL are looking for proposals that offer advantages to them other than interest rates. For example, among LBP's financial products, the maximum loan amount is Php 5 million under ACEP to agricultural cooperatives and SMEs. If this limit can be removed or the maximum amount can be increased to Php 50 million, and the repayment period and grace period can be longer than those for commercial banks' financial products, such conditions that other commercial banks cannot offer will become advantage and make the product more competitive.

This is supported by the situation of large-scale agricultural cooperatives that were not envisioned when the ACEF was implemented. Some of these cooperatives which originally started its operation of joint

purchasing and distributing dividend to members, have grown to the stage of operation by running retail shops and banking business to provide loan to members. Such large cooperatives operate not only in their municipality but expand their area of business not only to neighboring municipalities but also outside its originated provinces. Although these large agricultural cooperatives operate by borrowing working capital from banks, some of them want a larger infusion of capital. Therefore, the large-scale financial products proposed for this new TSL, as proposed above, may have needs among such large cooperatives.

3.4.3 Proposed Future Cooperation and Proposed Scheme

The proposed JICA support schemes listed in 3.3 were reviewed in terms of public nature, needs and eligibility of recipients, economic impact, technical appropriateness, and environmental and social considerations, and are summarized in the table below. The three main support schemes are project loans, development finance loans (TSL), and technical cooperation projects, and management support that has a high synergistic effect when combined with the project loans is included in the project loans as consulting services.

Table 3.4.5 Proposed Future Cooperation and Proposed Scheme

Proposed Future Cooperation	Support to	Determinants for Cooperation Scheme	Cooperation Scheme
Support for Strengthening Food Security			
Strengthen food buffer-stock system (establishment of model NFA facility)	NFA (MAFIM Program)	・Public nature: NFA's role in stabilizing rice prices, providing relief to victims of disasters, etc., is highly public, and the objective is to strengthen its functions. ・Needs of recipients: Direct support will be for government facilities (NFA), and the target will be public facilities and equipment. ・Economic Impact: Stabilization of rice prices will benefit all people who consume rice as a staple food. ・Technically, it is support for MAFIM, and the trust in Japanese technology is high and reasonable. ・Enables introduction of technologies that reduce environmental impact as a heat source for dryers. Stabilization of prices will greatly benefit the poor and contribute to the relief of socially vulnerable groups such as victims of disasters.	・Project Loan
Strengthen operational capacity related to strategic buffer-stock and inventory management bodies	NFA (MAFIM Program)	・The basis for scheme decisions is the same as above ・Since the objective is to strengthen operational capacity, there is a strong element of technical cooperation. Since synergistic effects can be obtained by combining this project with the above-mentioned strengthening of the food buffer-stock system (establishment of a model NFA facility), it is desirable to implement this project as a consulting service under the project loan or as a technical cooperation project in advance.	・Consulting services for the above project loans and technical cooperation projects
Support for Updating and Modernizing Post-Harvest Processing Technologies			
Updating and modernizing post-harvest handling equipment and facilities	Large FCAs, agricultural corporations, processors	・Public nature: Activities are mainly conducted by the private sector. Reduction of post-harvest losses through modernization of post-harvest handling and improvement of milled rice quality to contribute to self-sufficiency. ・Needs of recipients: Large FCAs, agricultural corporations, processors, etc., which are private, have collateral, economies of scale, good business acumen, and high repayment capacity. Target facilities are private assets. ・Economic Impact: Reduced post-harvest losses through modernization of post-harvest processing for the entire country, and increased self-sufficiency through improved milled rice quality. ・Technically, there is a high degree of trust in Japanese technology and a high validity. ・Reducing Environmental impact technology can be introduced as a heat source for dryers	・Development Finance Loan (TSL)

Proposed Future Cooperation	Support to	Determinants for Cooperation Scheme	Cooperation Scheme
Support for Strengthening Food Security			
Support for updating and modernizing post-harvest processing technologies (establishment of model RPS)	Small and medium-sized FCAs and LGUs (RCEF 2.0)	・Public nature: Highly public as RCEF (grant-in-aid) support aims to strengthen the competitiveness of the rice industry ・Needs of recipients: Small- and medium-scale FCAs are targeted, but they may be inexperienced in business and need to develop a sense of management. The needs are to introduce and modernize agricultural machinery, processing equipment, and facilities, and to strengthen management capacity. ・Economic Impact: Aim to establish a model that can be deployed nationwide. ・Technically, there is a high degree of trust in Japanese technology and a high validity. ・Environmental load reduction technology can be introduced as a heat source for dryers	・Project Loan
Developing a model for reducing post-harvest loss in rice	PhilMech, PhilRice, RPS/ MPC	・Public nature: The goal is to establish the technology to reduce post-harvest losses of rice, and the public nature is great by developing the model nationwide through dissemination. ・Needs of recipients: PhilMech and PhilRice will be targeted for support to C/Ps, while the post-harvest loss reduction model will be targeted to national rice post-harvest processing stakeholders (in collaboration with MAFIM/RCEF). Needs are for the introduction and modernization of equipment and facilities and strengthening of management capacity. ・Economic Impact: After the model is developed, the goal is to spread it throughout the country. ・Technical validity: The Philippines has significant post-harvest losses and needs to strengthen systematic technology based on VC to improve self-sufficiency. ・Environmental impact reduction technology can be introduced as dryer fuel	・Technical Cooperation Projects
Support for Modernization of Post-harvest treatment technology for rice seeds			
Modernization of rice seed post-harvest technology (development of model seed storage facility)	BPI, PhilRice, Seed Production Association	・Public nature: The public nature is great as the objective is to strengthen the technology of preservation of high quality seeds. ・Needs of recipients: government facilities (BPI/PhilRice), seed production cooperatives are targeted, and modernization of public facilities. ・Economic Impact: Contributes to increased productivity through the dissemination of high quality seeds ・Technical achievements have been made in the past through grant aid. ・No specific environmental and social considerations	・Project Loan
Support for strengthening seed production technology	BPI, PhilRice, Seed Glowers Association	・Basis for scheme decisions is the same as above ・Since the objective is to strengthen operational capacity, there is a strong technical cooperation component. Since synergistic effects can be obtained by combining this project with the modernization of seed storage facilities mentioned above, it is desirable to implement this project as a consulting service under the project loan.	・Consulting services for the above project loans

Source: JICA survey team

3.5 Consideration of Future Cooperation

3.5.1 Overall Picture of the Proposed Future Cooperation

The following diagram summarizes the process that led to the future cooperation (draft) in this chapter. The core objective of "food security enhancement" was divided into two categories: "stabilization of rice prices" and "improving resilience" which have become more urgent and severe due to frequent natural disasters, and "improvement of self-sufficiency rate" and "strengthening of competitiveness of the rice industry" as regular objective. The following five projects were selected as countermeasures for each of these objectives. Note that the measures were sifted through while considering the feasibility

and the direction of support, and only those directly related to the measure to achieve are listed in the figure below.

① Strengthening of food buffer-stock system (establishment of model NFA facility)	Project Loan/ Technical Cooperation Project
② Support for updating and modernizing post-harvest processing technologies (establishment of model RPS)	Project Loan
③ Modernization of rice seed post-harvest processing technologies (development of model seed storage facilities)	Project Loan
④ Updating and modernizing post-harvest handling equipment and facilities	Development Finance Loans (TSL)
⑤ Developing a model for reducing post-harvest losses in rice	Technical Cooperation Project

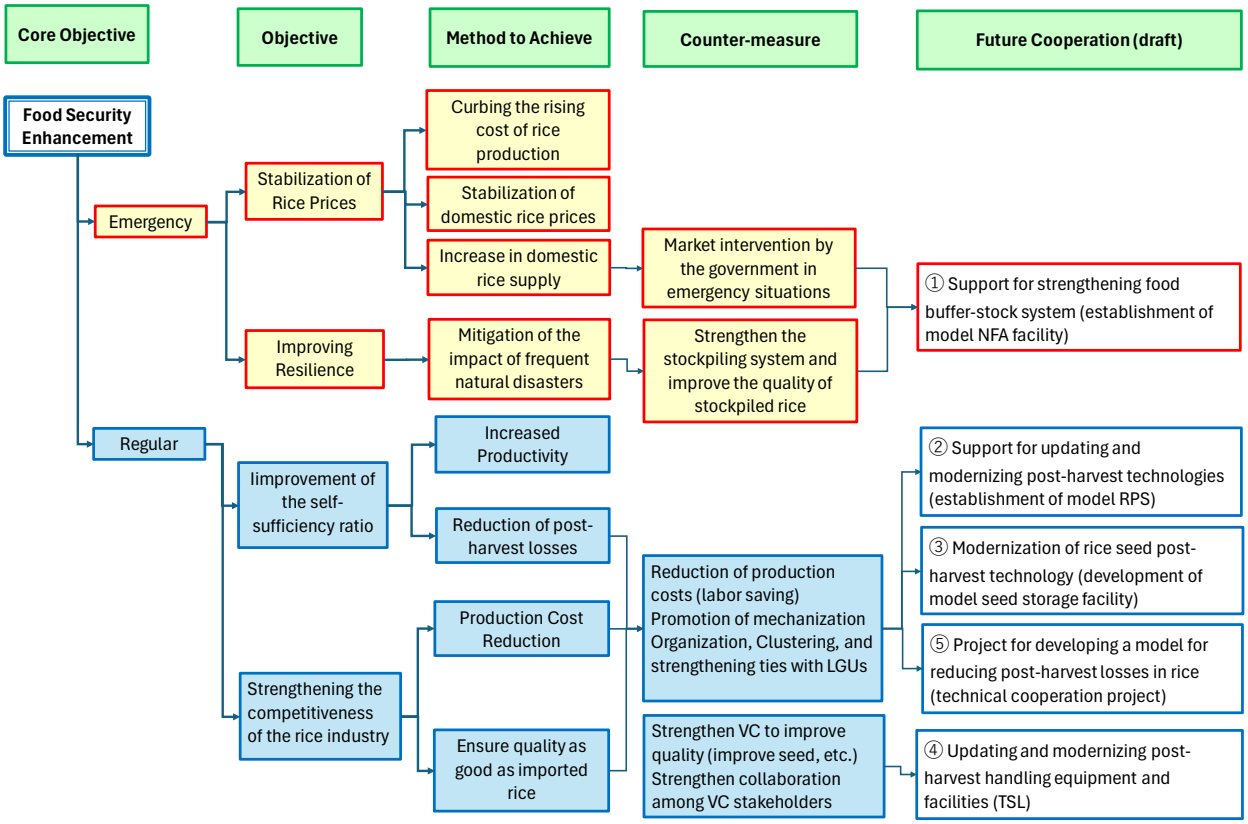


Figure 3.5.1 Objectives and Proposed Future Cooperation in the Philippine Rice Sector
Source: JICA survey team

3.5.2 Geographic Priority

In considering the specific details of the five candidate projects mentioned above, we examined the geographical priorities for determining the most suitable areas in which to implement them. Modernization of post-harvest processing facilities and equipment is effective from the perspective of reducing post-harvest losses by focusing on areas with high rice production. The figure on the right shows the supply-demand gap for rice in the Philippines, with darker blue indicating stronger supply capacity and darker red indicating greater shortages. The black arrows indicate the flow of rice during emergencies, as identified by the NFA, from rice-producing regions with large surpluses to urban areas with large shortages. Most NFA facilities are located in areas with large surpluses, and the priority for rehabilitation of NFA facilities is better to follow this pattern. NFA sites of particular importance in terms of the supply-demand gap include Isabela, Cagayan, and Nueva Ecija in Luzon, Iloilo in the Visayas, and Bukidnon and North Cotabato in Mindanao.

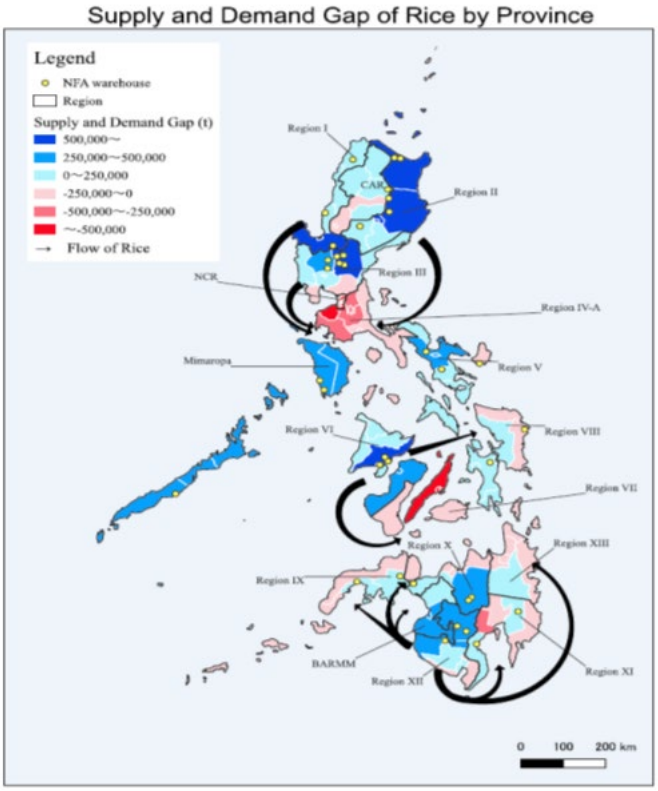


Figure 3.5.2 Rice Supply-Demand Gap
Source: prepared by the survey team from PSA and FAOSTAT data

On the other hand, mechanization of agriculture in the Philippines is most advanced in the northern part of the country, including Luzon Island, and lags behind as one moves south. In Mindanao, the BARMM region is particularly lagging behind, due to the lack of government support until recently due to security reasons. Against this background, with regard to the dissemination of agricultural machinery, priority could be given to areas with high rice production but where mechanization has lagged behind. Regions with large gaps between production and mechanization index include Isabela, Cagayan, Ilocos Norte, and Ilocos Sur in Luzon; Iloilo, Capiz, and Aklan in Visayas; and Bukidnon and Davao del Sur in Mindanao.

The center of the rice industry in the Philippines is located in Central and Northern Luzon. Central Luzon, in particular, has many large farmers and is the most mechanized area. It is said that almost 100% of the paddy field is harvested by combine harvesters in this area, so there is a high need for efficient use of farm machinery through land consolidation. Therefore, a model land consolidation project may be implemented in Nueva Ecija, Central Luzon, taking into account the exhibition effect.

3.5.3 Candidate Projects for Project Loans

(1) Support for strengthening the food buffer-stock system (establishment of model NFA facilities)

Efforts related to food security may include stabilizing rice prices through market intervention by the government and strengthening the food buffer-stock system in preparation for disasters, both of which are roles played by the NFA. For this reason, we have formulated the project (draft) in terms of both strengthening the food buffer-stock system through modernization of equipment and facilities at NFAs and strengthening operational capacity related to strategic buffer-stock and inventory management systems.

In the Philippines, the MAFIM project is currently underway to strengthen NFA's grain buffer-stock. The project plans to build 196 mechanical dryers, 48 silos, 221 warehouses, 57 rice milling facilities, 24 corn milling facilities, and 638 transportation units in three years from 2024. As a result, the goal is to expand the current buffer-stock rice of 300,000 tons (enough for 9 days of the entire population) to 540,000 tons (enough for 15 days). The overall project cost is estimated at 93 billion Php, of which approximately 5 billion Php is for the construction and renovation of grain warehouses. The current plan is to build 36 grain warehouses, with bids for new and renovated warehouses to be awarded in 2024, and procurement of machinery and equipment to begin in 2026.

Table 3.5.1 NFA's Plan to Construct Grain Warehouse and Project Costs under MAFIM Fund

Area	Region	#	Province	Municipality	Cost of new or renovated warehouse (Php)			
					Survey	New Construction	Renovation	Total by Region
Luzon	R-I.	1	Ilocos Norte	Dingras	350,000	70,003,397	55,779,998	267,248,482
		2	Pangasinan	Rosales	350,000	65,415,088		
		3	La Union	Santo Tomas	350,000	75,000,000		
	R-II	4	Cagayan	Allacapan	350,000	112,654,118	121,906,000	720,662,683
		5	Isabela	Roxas	350,000	76,215,617		
		6	Isabela	Cauayan	350,000	91,213,411		
		7	Cagayan	Camalanugan	350,000	117,554,107		
		8	Nueva Viscaya	Bayongbong	350,000	92,035,634		
		9	Rizal.	Kalinga	350,000	106,983,795		
	R-III	10	Tarlac.	Concepcion	350,000	67,276,663	57,027,390	473,089,545
		11	Nueva Ecija	Munos	350,000	67,099,658		
		12	Nueva Ecija	Cabanatuan D	350,000	62,090,659		
		13	Nueva Ecija	Guimba	350,000	75,000,000		
		14	Tarlac.	Aguso	0	75,000,000		
		15	Nueva Ecija	Cabanatuan M	350,000	67,844,884		
	R-IV	16	Occidental Mindoro	Rizal M	350,000	75,000,000	144,960,000	407,476,592
		17	Occidental Mindoro	Rizal T	350,000	75,000,000		
		18	Palawan	Narra	350,000	81,466,592		
	R-V	19	Virac	Catanduanes	350,000	75,000,000	214,11,640	456,455,836
		20	Camarines Sur	Libmanan	350,000	75,000,000		
		21	Albay	Libon	350,000	91,294,196		
Visayas	R-VI	22	Iloilo	Dumangus	350,000	87,302,448	128,886,200	385,834,267
		23	Iloilo	Duenas	350,000	81,037,745		
		24	Iloilo	Jaro	350,000	87,557,874		
	R-VII	-	Central Visayas		0	0	91,670,000	91,670,000
	R-VIII	25	Samar	Oras	350,000	60,033,791	130,004,000	310,606,636
		26	Leyte	Alang-Alang	350,000	119,868,845		
Mindanao	R-IX	27	Zanboanga del Sur	Molave	350,000	131,837,475	34,272,500	330,197,600
		28	Zamboanga Sibugay	Ipil	350,000	163,387,625		
	R-X	29	Bukidnon	Musuan	350,000	75,000,000	61,100,000	287,150,000
		30	Bukidnon	Maramag	350,000	75,000,000		
		31	Lalanao de Norte	Lala	350,000	75,000,000		
	R-XI	32	Davao del Sur	Digos	350,000	114,023,451	157,550,000	361,245,624
		33	Compostela Valley	Nabunturan	350,000	88,972,173		
	R-XII	34	North Cotabato	Kilada	350,000	118,939,114	318,700,000	677,117,778
		35	North Cotabato	Kidapawan	350,000	119,189,263		
		36	Sultan Kudarat	Isulan	350,000	119,239,402		
	R-XIII	-	Caraga		0	0	38,955,214	38,955,214
	BARMM	-	Bangsamoro		0	0	65,089,000	65,089,000
	NCR	-	Metro Manila		0	0	46,683,000	46,683,000
Surveying: 12,250,000 Php; New construction: 3,240,537,315 Php; Renovation: 1,666,694,942 Php; Total construction cost: 4,919,482,257 Php								

Source: NFA, Oct 2024

The DA expects JICA to cooperate with the MAFIM project and expects at least nine locations to be equipped with country elevators (mechanical drying, paddy storage, rice milling, rice milling storage, inspection equipment, and handling-related equipment) as a modern model. For these nine locations, NFA officials point out that the sites must be in areas where paddy is accumulated and easy to collect, where there is no competition with private rice mills, and where there are no land ownership issues. In addition, NFA's operational capacity needs to be improved in order to establish a strategic buffer-stock and inventory management system. In addition, a quality control system based on HACCP for example, a strengthened quality inspection system including inspection for hazardous substances, and a strengthened monitoring system for distributors' inventory and distribution volume from the aspect of operational capacity for food security are also required.

In addition to strengthening equipment and facility capacity, it is important to strengthen the NFA's ability to operate, which may be implemented as a technical cooperation project in addition to consulting services under the project loan. The operational capacity enhancement could be implemented as a technical cooperation project in addition to consulting services under the project loan. The proposed project is outlined below.

Table 3.5.2 Proposed Project Loan: (1) Support for Strengthening Food Buffer-Stock System (Establishment of Model NFA Facility)

Number	Item	Contents
1.	Project Purpose	Quantitative control of post-harvest losses and improved milling quality following RA12078 (MAFIM support)
2.	Corresponding issue (outcome)	Food security (stabilizing rice prices, strengthening resilience)
3.	Implementing Agency	NFA
4.	Scope of Support	A large volume of paddy collection areas with a large area of rice cultivation in the vicinity and little competition from private rice mills. For example, Echague (Isabela), Dumangas (Iloilo), Quilada (North Cotabato), Musuan (Bukidnon), Sorsogon (Bicol), Sablayan (Occidental Mindoro), Sigma (Capiz), La Paz - San Francisco City (Agusan del Sur), San Miguel (Surigao del Sur)), 9 locations. Paddy storage capacities are designed at 6,000 tons for Echague and 2,400 tons for the other 8 locations. A total of 25,200 tons of paddy, or equivalent to 15,000 tons of milled rice, are designed. NFA recommends the capacities.
5.	Equipment	Includes a series of equipment for bulk transportation and bulk handling. Specifically, grain tank combine harvesters, trucks with cranes, flexible containers, truck scales, circulating mechanical dryers, paddy storage bins (silos), rice milling lines, forklifts, plastic containers, portable moisture meters, compressors, diesel generators, inventory control PC set
6.	Procurement Method	Procurement by NFA
7.	Warehousing, Infrastructure	MAFIM's NFA budget
8.	Paddy Procurement Funds	NFA Budget
9.	Consulting Services (or Technical Cooperation Projects)	・ Training in procurement equipment operation and repair techniques ・ Computerization of incoming and outgoing shipment slips, anti-corruption measures (prevention of diversion), and strengthening of management systems ・ Real-time inventory checks at headquarters linked to incoming and outgoing shipment slips, and enhanced audits by headquarters staff ・ Enhanced quality inspection of paddy and rice, and strengthened analysis of aflatoxin and other harmful substances ・ Establishment of a quality control system based on HACCP from field to sale ・ Strengthening monitoring system for inventory and distribution volume of rice distributors (collection, milling, and sales) ・ Refinement of crop condition index forecasts and coordination of imported rice information with the Customs and Tariff Bureau ・ Creation of market release rules (establishment of trigger clauses), transportation and sale of milled rice to the poor ・ Disposal of liabilities (crediting) of LGUs and other shipping partners

Number	Item	Contents
		・ Participation in a technology dissemination platform to produce a certain standard of paddy rice for production farmers (in collaboration with LGUs and BPI) ・ ASEAN in collaboration with Japan's MAFF＋3 strengthens information sharing in the framework of the Emergency Rice Reserve (APTERR) and promotes personnel exchange
10.	Project Cost	26.2 billion yen (tentative)
11.	Operational Indicators	・ Number of model NFA facilities developed ・ Rice buffer-stock capacity (Mt/period) ・ Rice drying and milling capacity (Mt)
12.	Effect Indicators	・ Number of households supplied with rice in an emergency (households) ・ Stabilization of the average market price of rice in an emergency (Php/kg)

Source: JICA survey team

(2) Support for updating and modernizing post-harvest processing technologies (establishment of a model RPS)

The project aims to reduce the volume of post-harvest losses and improve the quality of milled rice, and is intended to support RCEF's efforts through the implementation of the project loan. RCEF 1.0 was implemented from 2019 to 2024, and RCEF 2.0 will be implemented from 2025 to 2031. By the time this project is launched, RCEF 2.0 will be in its middle phase but will be implemented to establish a model for effective post-harvest losses reduction through the development of peripheral infrastructure, including land consolidation, and through combination and coordination with technical cooperation projects if possible.

The following is an overview of the "support for updating and modernizing post-harvest processing technologies (establishment of a model RPS)" project related to RCEF2.0 support under the project loan.

Table 3.5.3 Proposed Project Loan: (2) Support for Updating and Modernizing Post-harvest Processing Technologies (Establishment of a Model RPS)

Number	Item	Contents
1.	Project Purpose	Quantitative control of post-harvest losses and improved milling quality following RA12078 (supported by RCEF)
2.	Corresponding issue (outcome)	Strengthen rice competitiveness (reduce post-harvest losses)
3.	Implementing Agency	DA-BAFE, PhilMech, PhilRice, DA-BSWM, LGU
4.	Scope of Support	Model FCA that can be linked to Mindanao (Regions 10, 12, 13, BARMM) and other islands where rice farming mechanization is low and NFA. 6 locations in total.
5.	Equipment	Includes a range of equipment for bulk transportation and bulk handling. Specifically, four-wheel tractors, work equipment (polly disc plows, rotary, front loaders), grain tank combine harvesters, trucks with cranes, flexible containers, weighing equipment, circulating mechanical dryers, paddy storage bins, rice polishing lines, forklifts, plastic containers, Portable moisture meter, compressor, rice husk compactor, seed color sorter, diesel generator, PC set for inventory control
6.	Procurement Method	Procurement by PhilMech
7.	Warehousing, Infrastructure	Warehouses, Model land consolidation projects, small-scale irrigation facilities (solar pumps), FMR
8.	Paddy Procurement Funds	Utilization of TSLs
9.	Consulting Services	DD/SV support for facilities, equipment procurement support, operational support, equipment maintenance services through private partnerships, guidance on seedling and rice transplanters, clustering of unit agricultural cooperatives, collaboration with LGU agricultural specialists, coordination of varieties and planting times, quality enhancement of certified seeds
10.	Project Cost	3 billion yen (tentative)
11.	Operational Indicators	・ Number of model RPS facilities ・ Rice drying and milling capacity (Mt)
12.	Effect Indicators	・ Post-harvest loss rate improvement (%) ・ Improvement of milled rice quality (unit price of milled rice)

Source: JICA survey team

The project proposes the construction of a model land consolidation to reduce post-harvest losses in the field through the efficient use of agricultural machinery and the development of drainage systems. For many years, land consolidation has been considered difficult to implement in the Philippines. One of the reasons for this has been pointed out to be the complicated rights relations over land use. Most farmers cultivate rice on smallholdings or leased land, and the large number of absentee landlords is another characteristic of rice cultivation in the Philippines. It is a common view among both the government and private sectors that landowners are afraid of losing their land rights from tenant farmers and are not likely to cooperate in the land consolidation that involves land conversion or exchange and subdivision because of their strict rights relations.

However, with the spread of combine harvesters, farmers are forced to cross fields before harvest due to the lack of in-field roads, and paddy fields with poor drainage problems are seriously damaged by typhoons and heavy rains that submerge rice plants before harvest. In response to this situation, the need for land consolidation has been increasing, and PhilRice has prepared guidelines for land consolidation, and many parties involved, from the government to farmers, have come to share a common understanding of the need for such maintenance.

Under these circumstances, an outstanding farmer in Nueva Ecija was identified during the course of this survey who offered to cooperate in the implementation of the model land consolidation development. This outstanding farmer has a desire to realize the efficient use of agricultural machinery by developing a showcase plot together with his relative's farmland in the surrounding area. This farmer was one of the first to introduce combine harvesters when they first became popular, and has a track record of improving the efficiency of farm work despite criticism from those around him that they take away workers' jobs. In Nueva Ecija, combine harvesters are now used for almost 100% of the harvesting work. With the cooperation of these outstanding farmers, we propose that model land consolidation be developed as part of Japan's support, ushering in a new era in rice cultivation in the Philippines.

(3) Support for modernization of rice seed post-harvest processing technology (development of model seed storage facilities)

In the post-harvest processing of rice seed, aging seed storage warehouses and delays in upgrading air-conditioning equipment have become issues. The seed stockpile warehouse in the capital city of Manila is deteriorating, with the air conditioning facility having stopped functioning, and the following seed storage facilities are also in need of renovation due to problems with air conditioning and other equipment.

In addition, there are associations in charge of seed production throughout the Philippines, some of which own and operate cold storage facilities for seed preservation and have plans to distribute them to rice seed producers in the event of a disaster. As part of efforts to strengthen post-harvest technology for rice seed, BPI will supply cold storage units to these associations to strengthen post-harvest technology for seed production. The following is an inventory of seed storage facilities in need of renovation requested by BPI in this study, but storage capacity and refrigeration capacity will require further investigation.

Table 3.5.4 Inventory of Rice Seed Storage Facilities in Need of Renovation

Operating Entity	Location	Type	Objective	Storage Capacity	Area	Problem
CRPSD	Manila	Multi-chamber	Conventional storage for seed storage	70 tons	11.70m x 11.85m	The HVAC system is out of order and the facility deteriorate.
CRPSD	Manila	Multi-chamber	Conventional storage for seed storage	60 tons	9.90m x 13.41m	The HVAC system is out of order and the facility deteriorate.

Operating Entity	Location	Type	Objective	Storage Capacity	Area	Problem
BPI Baguio	CAR	Single Chamber	Refrigeration equipment for organic seed production	6.0 HP	4.0m. x 4.40m.	Insufficient insulation to maintain required temperatures
BPI La Granja	Negros Occidental	Multi-chamber	Refrigeration equipment for conventional storage	2 HP	96 m2 and 6m x 4m	Refrigerated rooms are not insulated and require a new refrigeration system to operate efficiently
BPI La Granja	Negros Occidental	Multi-chamber	conventional storage	3 tons	2 - 5m x 3m	Maintenance is required to ensure smooth operation
BPI La Granja	Negros Occidental	Single chamber	conventional storage	5 tons	47 m2	Maintenance is required to ensure smooth operation
BPI Guimaras	Guimaras	Multi-chamber	Many varieties of seeds from conventional farming methods	5 tons	3 x 3.5 m (cold storage room)	Refrigerated rooms are not insulated.
BPI Davao	Davao City	Multi-chamber	conventional storage	1.5 Tons	4 rooms (6x6)	All air conditioners (split type) failed, AVR required to prevent damage from power surges. No insulation, no dehumidifier, no humidity measuring device. Currently not usable.
BPI Davao	Davao City	Multi-chamber	conventional storage	1.5 Tons	4 rooms (6x6)	All air conditioners (window type) failed, AVR required to prevent damage from power surges. No insulation, no dehumidifier, no humidity measuring device. Currently not usable.

Source: BPI

The project will support BPI (CRPSD) under DA and MPC for seed production. Below is a summary of the yen loan project.

Table 3.5.5 Proposed Project Loan: (3) Support for Modernization of Rice Seed Post-harvest Technology (Development of Model Seed Storage Facility)

Number	Item	Contents
1.	Project Purpose	Modernization of rice seed post-harvest processing technology through the development of a model seed storage facility
2.	Corresponding Issue (outcome)	Strengthen competitiveness (improve rice quality)
3.	Implementing Agency	BPI, PhilRice, LGU. MPC
4.	Scope of Support	・ CRPSD Headquarters (Quezon City: 2) and BPI regional seed saving facilities in need of renovation (Baguio: 1, Eastern Negros: 3, Guimaras: 1, Davao: 2), total of 9 locations ・ Seed production cooperatives that are motivated by seed production in areas close to areas affected by typhoons and heavy rains
5.	Facilities, Equipment and Infrastructure	・ Facilities for seed preservation (air conditioning, wall insulation, humidifier, specific gravity meter, thermometer, forklift, plastic container, compressor, diesel generator, etc.) ・ Facilities and equipment for seed production (support for dissemination of rice transplanters, seedling cultivation facilities and equipment) ・ Infrastructure development for seed production (model field development, drainage improvement, farm road maintenance)
6.	Procurement Method	Procurement by BPI Facilities, equipment, and production infrastructure are covered by yen loans, while electricity, land, and other basic infrastructure are borne by the Philippines.
7.	Seed Procurement Funds	BPI Budget

Number	Item	Contents
8.	Consulting Services	・ DD/SV support for facilities, equipment procurement support ・ Support for strengthening production and distribution technologies for superior seeds ・ Support for strengthening seed production associations (improvement of quality control technology)
9.	Project Cost	600 million yen (tentative)
10.	Operational Indicators	・ Number of model seed saving facilities developed ・ Seed storage capacity (Mt)
11.	Effect Indicators	・ Improved post-harvest loss rate of rice seed (%) ・ Rice seed quality improvement (unit price of milled rice) ・ Number of farmers with access to high quality rice seed (units)

Source: JICA survey team

(4) Other considerations for project loan implementation

1) Implementing and operating agencies

As mentioned above, the scope of projects proposed under the project loans is wide-range, including facility construction (warehouses, etc.), procurement of equipment and civil works (model land consolidation project, etc.). In addition, the implementing agencies for each sub-project will be a mixture of government agencies, government-owned corporations, and local government units. In this case, from the perspective of procurement management and also taking into account the experience of each implementing agencies in international bidding, it is desirable that DA shall take lead in managing fund form Yen Loan to be disbursed to each implementing agencies, and each implementing agencies shall be responsible for procurement including bidding process.

In other words, a project secretariat should be established at Project Development Service (PDS) within the DA, with consultants permanently assigned. This secretariat will be responsible for preparing budget proposals and managing expenditures on an annual basis, as well as preparing budget proposals for the following year. It will also accept proposals from the participating agencies (for building construction, equipment procurement, and civil work), review feasibility studies and determine project costs, check procurement methods, check detailed designs, allocate yen loan budgets and request disbursements, check construction supervision systems and maintenance management systems, and prepare implementation manuals for each sector.

In addition, the DA will make requests to JICA for approval of procurement (bidding) activities carried out by each implementing agency, and for confirmation of contracts, as stipulated in the loan agreement between JICA and the Government of the Philippines. Each implementing agency will carry out detailed design, procurement (bidding), and operation and maintenance after implementation, using the approved budget.

The proposed set-up for the implementation stated above is indicated in the following figure.

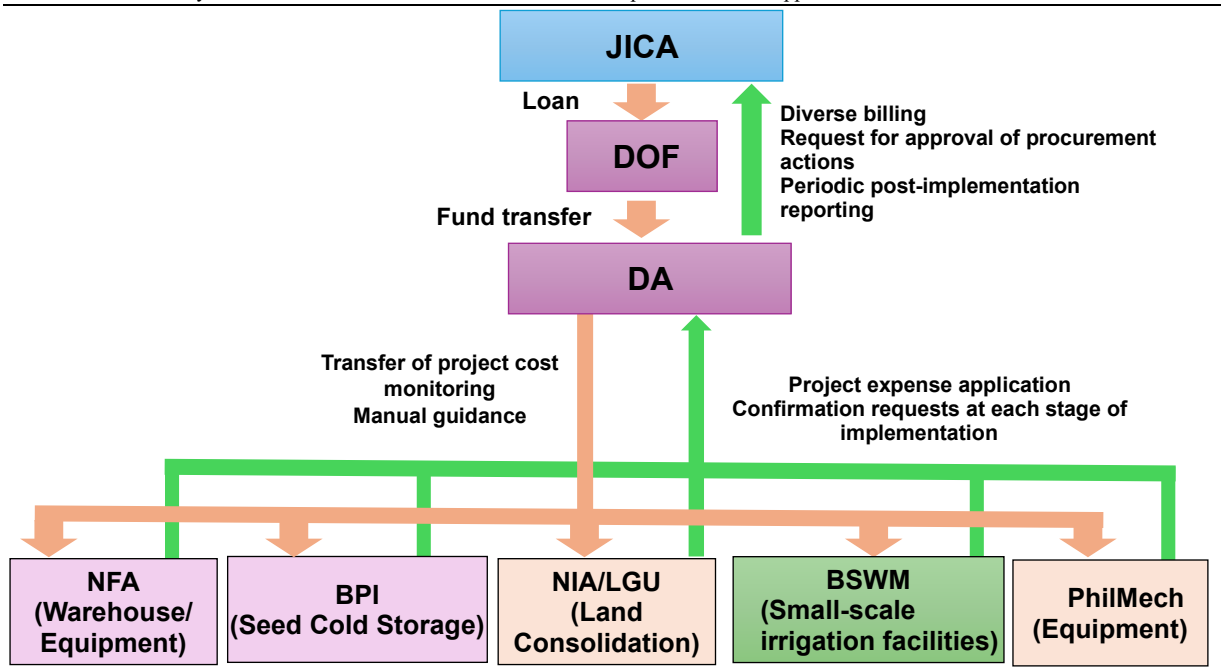


Figure 3.5.3 Proposed Implementation Structure for Yen Loans (Project Loans)

Source: JICA survey team

2) Consulting services

In implementing project loan proposed above, consultant services are required to provide guidance on detailed design, preparation and implementation of bidding, construction supervision, procurement management, and equipment operation and maintenance management. The purpose of the service is mainly to supervise the construction of facilities and procurement of equipment and to provide guidance on operation and maintenance management. However, the contents of the Technical Cooperation proposed in Chapter 3.3 can be included and simultaneously executed with said consulting services.

3) Environmental and social considerations

In the Philippines, Presidential Proclamation (PP) No. 2146 (1981) and No. 803 (1996) require that projects in Environmental Critical Project (ECP) and Environmentally Critical Area (ECA), an Environmental Impact Assessment (EIA) to be conducted and an Environmental Compliance Certificate (ECC) shall be obtained. The flow chart below illustrates the steps involved when an EIA and ECC are required.

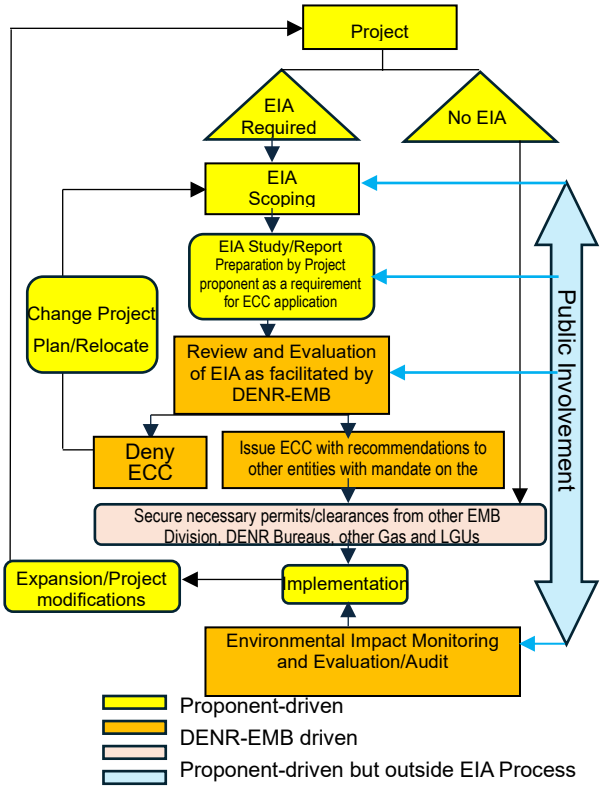


Figure 3.5.4 Flow of obtaining environmental conformity certificates in the Philippines

Source: "Revised Procedural Manual for DAO 2003-30."
Prepared by the survey team based on

The former (ECP) covers golf course construction, heavy industries (steel metal mining, nonferrous metal mining, petrochemical industry, etc.), resource extraction industries (mining plants, fishpond

development projects, etc.), and infrastructure projects (mining sites, large dams, large reclamation projects, etc.).[5] The latter (ECA) include national parks, conserved watersheds, wildlife sanctuaries and nature reserves, scenic spots and potential tourist destinations, habitats of endangered and endemic Philippine wildlife species (including both flora and fauna), areas of unique historical, archaeological, geological, and scientific importance, and geologically significant archaeological sites, Ethnic communities with unique cultures, etc.

The proposed project loan for construction of facilities and provision of equipment is expected to include construction of warehouses, drying yards and silos for storing harvested products, mechanical dryers, rice milling plants, harvesters, etc. However, though these facilities are not expected to be large-scale, loan applications which contain issues with may lead to ECP condition shall be rejected.

3.5.4 Candidate Projects for Financial Intermediary Loan (TSL)

(1) Support for updating and modernization of post-harvest processing equipment and facilities (TSL)

The following is a summary of the support for updating and modernizing post-harvest processing equipment and facilities that are considered as candidates for two-step loans. The objective of the proposed project is to reduce the volume of post-harvest losses and improve the quality of milled rice, and the project will provide loans (two-step loans) for the purchase of post-harvest processing equipment and facilities to private contractors (including FCA) that have financial needs. The loan will be used to procure equipment and facilities such as mechanical dryers for bulk handling, rice milling plants, silos, warehouses, and management equipment, and will also support operational funds such as funds for the purchase of paddy. In addition, as part of its consulting services, the company will collaborate with AMTEC, which conducts type testing of agricultural machinery, to share the results of quality tests of agricultural machinery, dustproof and waterproof function tests, rear axle output tests, rice milling yield tests, and other tests to develop appropriate specifications for the bidding. The level of exhaust emission control will be adopted in consideration of ease of repair and fuel quality.

Table 3.5.6 Proposed TSL Project: Updating and Modernizing Post-harvest Processing Equipment and Facilities

Number	Item	Contents
1.	Project Purpose	Quantitative control of post-harvest losses and improved milling quality following RA12078
2.	Corresponding issue (outcome)	Strengthen rice competitiveness (reduce post-harvest losses)
3.	Implementing Agency	LBP, PDB, DA-BAFE, PhilMech, AMTEC-UPLB
4.	Scope of Support	Model FCA that can be linked to Mindanao (Regions 10, 12, 13, BARMM) and other islands where rice farming mechanization is lagging behind and NFA
5.	Target Equipment	・ Updating mechanical dryer, rice milling plant (10 tons/hr), silo, ancillary machinery, and warehouse to accommodate bulk transportation ・ Updating mechanical dryer, rice milling plant (3 tons/hr), and warehouse ・ Mechanical dryer, harvester, rice grinder, color sorter
6.	Procurement Method	non
7.	Warehousing, Infrastructure	Includes warehouse expansion. Land, electricity, etc. to be borne by the beneficiary.
8.	Paddy Procurement Funds	Utilization of TSLs
9.	Project Cost	18.5 billion yen (tentative)
10.	Operational Indicators	・ Number of sub-loans (Number of loans) ・ Sub Loan Amount ・ Number of equipment purchased ・ Loan recovery rate (%)
11.	Effect Indicators	・ Post-harvest loss rate (%)

5 The size of the projects that is considered to fall under this category is not specified.

Number	Item	Contents
		・ Percentage increase in rice yield (%) ・ Increase in profit per FCA (Php/year)

Source: JICA survey team

(2) Selection of intermediary banks

In order for financial institutions to participate in this two-step loan program, they must meet certain conditions. The conditions shall include experience with similar projects by the Japanese Government (Yen Loan) or under other donor institutions, and also (1) general conditions such as compliance with laws and regulations by the central bank and external audits, (2) conditions related to financial aspects such as capital adequacy ratio, (3) conditions related to corporate governance such as management team capacity and business plan preparation, and (4) the existence of their own environmental and social management systems.

From the perspective of experience in implementing TSL projects under Japanese ODA yen loan projects, the following two banks can be candidates for intermediary banks.

Land Bank of the Philippines (LBP):

2009 - Agricultural Credit Support Project (ACSP) : 14,608 million Yen
2017 - Harnessing Agribusiness Opportunities through Robust and Vibrant Entrepreneurship Supportive of Peaceful Transformation (HARVEST) : 4,928 million Yen

Development Bank of the Philippines (DBP):

1991 - ASEAN-Japan Development Fund (AJDF) : 30,084 million Yen
1994 - Industrial and Support Services Expansion Program (ISSEP) : 22.5 billion Yen
2009 - Logistics Infrastructure Development Project (LIDP) : 30,380 million Yen

1) LBP

LBP has already ceased providing funds from Yen Loans under ACSP and HARVEST as mentioned above, and is now continuing to provide secondary loans (2nd generation loan) as a revolving fund using repayment from the loan recipients in both cases. During the period of the Yen Loans, the Japanese government's yen loans were intermediated by the Department of Finance (DOF), which required a guarantee fee and a foreign currency exchange risk premium totaling 3.75% to be paid to the DOF.[6] This high interest rate made the loan less competitive with market interest rates, but after the second loan period mentioned above, the interest rate was lowered, and ACSP now offers the loan at 5.15% per annum.

Meanwhile, the RCEF fund has been allocated Php 500 million for the LBP portion, and it is expected to be able to finance the entire fund by the end of this year. The funds go through ACPC, but since ACPC is under the Department of Agriculture and RCEP funds are disbursed through the DA's general appropriation, there is no need to pay guarantee fees to DOF as described above (LBP receives 2.5% as a management fee from DA). Therefore, the LBP provides funds to agricultural cooperatives at 2% (when agricultural cooperatives provide sub-loans to their members from these funds, there is no interest to the cooperatives, but the interest rate on sub-loans to individual farmers is stipulated to be up to 6% per annum).

During the Survey this time, the LBP made the following proposal for this new TSL project.[7]

[6] At the start of the ACSP, LBP was charged a guarantee fee of 0.25% and a foreign exchange risk premium of 3.5% by the Department of Finance, to which LBP added a minimum interest rate of 5.50%, for a minimum finishing interest rate of 10.75% (1.5% + 0.25% + 3.5% + 5.5% on the yen loan itself). The higher-risk borrowers were charged a higher rate of 6.50% as LBP, so the borrower's interest rate was set at 11.75% (1.5% + 0.25% + 3.5% + 6.5%).

[7] Opinion from the Vice President for Lending Programs Management Group 2, during an interview on October 28, 2024.

a) Unlike LBP's own fund and government funds, they do not plan to provide loans to individual farmers even if two-step loans are to be provided through Yen Loans, because loans through Yen Loans are expected to be large in scale. In other words, the loans should be extended to agricultural cooperatives, agricultural organizations, large-scale businesses, and small and medium-sized enterprises (SMEs). In addition, it is not realistic for these agricultural cooperatives to make sub-loans to individual members because the original interest rates are already high.

b) Until the repayment amount increases enough to establish the revolving fund for secondary loans, the interest rate must be set high and it is of little advantage to the user. For this reason, they offer the following suggestions:

- Longer loan periods that are more attractive to agricultural cooperatives (i.e., for them not opting for loans from commercial banks). The ACSP had short-term loans for 1 year and long-term loans for 7 years (with a grace period of 3 years), but if these long-term loans could be extended to 10 years with fixed interest rates, etc., this would increase the willingness of agricultural cooperatives to use these new products.
- In the past, the Japanese side imposed loan eligibility requirements for two-step loans using yen loans, such as Japanese environmental and social considerations guidelines and GAP certification, and in some cases the loan approval process took a long time. These procedures shall be relaxed or simplified.
- In order to reduce the foreign currency exchange risk premium to be delivered to the DOF as described above, it would be good if the Japanese government could provide a loan to the DOF in Peso currency from the beginning.
- As a bank, they feel that it would be more advantageous for the Bank to implement consultancy services as grants (technical cooperation) rather than disbursed from Yen Loans.[8]

2) DBP

Similar to LBP for the aforementioned RCEF fund, DBP has established an annual interest rate of 2% for up to 90% of the project cost for agricultural cooperatives, and when agricultural cooperatives make sub-loans to their members, no interest is charged to the cooperatives and the maximum rate is 6% from the cooperatives to their members. The loan period is operated for a short term of 2 years and a long term of 10 years.

As for the fund, the allocation for DBP is Php 500 million as the same amount as LBP, and is granted by the DA via ACPC. (DA gives 2.5% to DBP as a management fee.)

During the Survey this time, the DBP made the following proposal for this new TSL project.[9]

a) In the past, the interest rates on Yen Loans to end-users were inevitably higher than those on conventional loans because of the guarantee fee to the DOF. The fact that many borrowers were still able to obtain loans despite this is due in part to the credibility of foreign government funds, but also because users had the advantage of being able to continue to borrow long-term loans at the interest rate at which the initial loan was granted. This is one of the advantages of using Yen Loans.

b) For banks, there is not much difference in administrative expenses whether they are funded by foreign government funds, Philippine Government funds, or DBP's own funds. In this regard, the

[8] In 2014, during the implementation of the Agricultural Credit Support Project, a 2009 yen loan project, consulting services funded by the loan were terminated due to lack of funds.

[9] The opinions from the Executive Vice President for Development and Resiliency Sector, during the interview on November 6, 2024.

RCEF, which receives a steady flow of management fees from DA, is advantageous to the Bank, and it would be desirable for the Japanese government to inject funds into such a flow of funds.

c) On the loan side, there is a noticeable difference in the level of agricultural cooperatives as compared with the past. There are many cooperatives that are receiving large loans, making large initial investments, and earning stable income (e.g., rice milling fees) from farmers through good quality operations. For such cooperatives, a higher maximum loan amount and a longer repayment period (with a fixed interest rate) would be attractive, even if the interest rate is a little higher.

(3) Consideration of fund flow and borrower's interest rate

There are two possible patterns for the flow of funds for the proposed TSL[10] as shown in the figure below.

Pattern (1) is a normal TSL through yen loans, with a higher borrower's interest rate (accumulated final interest imposed to end-users), but with the advantage of a higher loan ceiling and longer loan period compared to other loan programs. Furthermore, as with past TSLs via LBP and DBP, a revolving fund can be set up, so that a secondary loan with repayment proceeds can be used to ensure sustainability after the loan period ends.

Pattern 2) is to inject yen loans as a source of funds for Philippine government projects such as RCEF. In this case, the interest rate for loans to agricultural cooperatives and individual farmers can be set at the same level as that of the current RCEF loans, and the number of users can be expected to increase. On the other hand, the guarantee fee to the DOF cannot be added to borrower's interest rate of the bank loan, so the DA has to bear this fee, which would put burden on the general appropriation of DA.

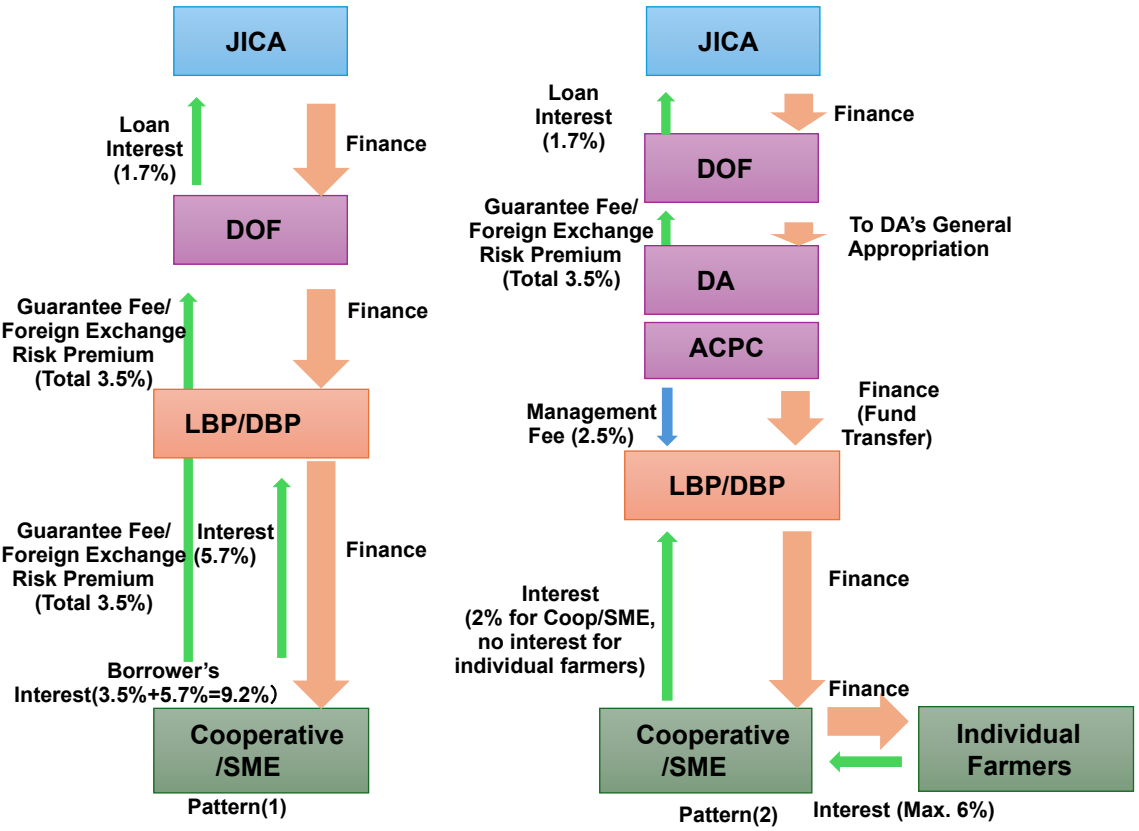


Figure 3.5.5 Two Patterns of Flow of Funds and Interest Rates

Source: JICA survey team

[10] From October 2024, the general conditions for low- and middle-income countries will be 1.7%, a repayment period of 15 years, and a grace period of 5 years.

(4) Implementation System

For the TSL project, the structure is proposed as shown in the figure below (ACPC shall be excluded in case of aforementioned funding flow pattern (1)). In this case, two new organizations are proposed: a Steering Committee and a Technical Committee. The former will be responsible for reviewing the overall policy of the project, the results/achievement of the previous year, and approving the project plan for the current year, while the latter will be responsible for monitoring each project, discussing and recommending solutions to problems that arise in each project, and proposing improvements.

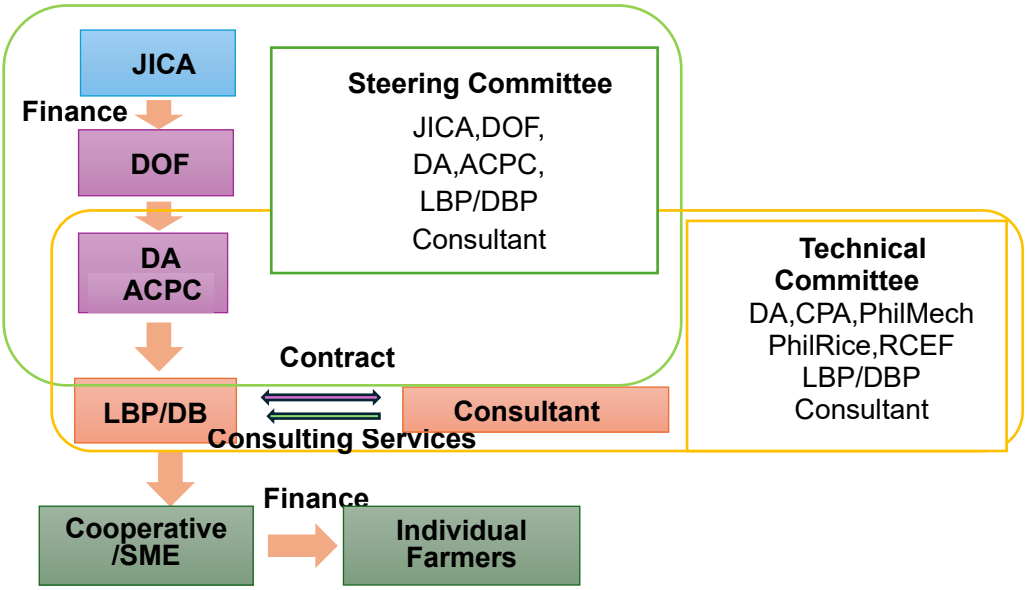


Figure 3.5.6 Proposed TSL Implementation Structure
Source: JICA survey team

(5) Consulting Services

The following consultancy services are proposed for the implementation of the above-mentioned TSL. The purpose of the consultancy services is to support the smooth implementation of the TSL project by financial experts, etc., however contents of proposed technical cooperation (technical cooperation in the agricultural sector for post-harvest improvement described below) can be included and simultaneously implemented.

A. TSL Project Operation and Management
   a) Assist implementing agencies in the overall management of TSL projects
   b) Administrative support and advice for implementing agencies
   c) Assistance in monitoring and controlling loan disbursements by the implementing agency
   d) Support for reporting by implementing agencies

B. Capacity building for TSL implementation
   a) Promote understanding of TSL concepts and procedures among implementing agencies
   b) Improve ability to create action plans
   c) Assistance in developing action plans
   d) Assist implementing agencies in handling day-to-day matters related to TSL implementation (accounting, revolving fund management, reporting procedures, sub-loan monitoring, etc.)
   e) Support for monitoring of operation and effect indicators
   g) Assistance in preparing operating manuals
   h) Assistance in repayment collection and monitoring using the Operations Manual

C. Capacity building for credit risk management

a) Assist in improving credit risk management systems, including credit underwriting and monitoring

D. Capacity building for marketing/promotion
a) Assistance in developing marketing/promotion strategies for implementing agencies
b) Assistance in developing the ability to select clients
c) Support for farmers, agricultural cooperatives, and agriculture-related companies to promote understanding of TSL

E. Capacity building on monitoring project indicators
a) Support for the creation of a project benefit monitoring and evaluation (PBME) system for monitoring project implementation using operational and effectiveness indicators by the implementing agencies

F. Capacity Building for Environmental and Social Considerations in Sub-Loans
a) Assist implementing agencies to ensure that environmental and social considerations are properly addressed as part of the sub-loan review process.
b) Assistance in developing guidelines and procedures for monitoring the social and environmental impacts of the project.
c) Recommendations for measures to avoid potential negative impacts of the project

The following are suggested areas of expertise for the consultant needed

A. International Consultants
a) Team Leader/Financial Expert
b) Banking Expert
c) Human Resource Development Specialist
d) Training planning and implementation Expert
e) Project Benefit Monitoring and Evaluation (PBME) Expert
f) Environmental and Social Considerations Expert

B. National Consultants
a) Joint Team Leader/Financial Expert
b) Banking Expert
c) Training planning and implementation Specialist
d) Project Benefit Monitoring and Evaluation (PBME) Expert
e) Environmental and Social Considerations Expert

(6) Environmental and social considerations

In the proposed TSL project, the loan from JICA will be provided to a financial intermediary such as a bank, and the financial intermediary will select and screen specific sub-projects after JICA's loan approval. In other words, the sub-project is classified as Category FI according to the Guidelines for Environmental and Social Considerations (January 2022 edition), since the specific project contents and scale of the sub-project cannot be specified before JICA's loan approval (or TSL project review). In this case, the financial intermediary and the sub-project implementing agency need to agree that (1) the sub-project implementing agency shall submit the results of environmental and social considerations monitoring to the financial intermediary on a regular basis, and (2) JICA shall disclose the submitted monitoring results on its website.

The proposed TSL project will be for agricultural cooperatives through intermediary banks such as LBP/DBP to construct warehouses, drying areas and silos for storing harvested products, and to install mechanical dryers, rice milling plants, harvesting machines, etc. The facilities are not expected to be large-scale. as newly constructed. Therefore, it is assumed that most of the aforementioned ECP conditions will be satisfied. Depending on the scale of the sub-projects, there is a possibility that ECC

may be applied to some of them, but whether ECC is required or not as equivalent to categories A and B in the JICA Guidelines, the agencies can[11] find the sub-projects for which ECC is required (i.e., sub-projects other than category C in the JICA Guidelines), especially those that are subject to the ECP conditions may be screened once the details of the sub-project have been determined, and therefore, the intermediary banks may not apply for loans other than Category C.

As for the aforementioned ECA, it is assumed that the new rice milling facilities, etc. subject to the loan will be constructed in the vicinity of existing rice paddies or on the premises of existing rice milling facilities, and therefore it is determined that an ECC is not required.

The two candidate banks (LBP and DBP) as intermediary banks in this new TSL are both implementing screening for environmental and social considerations in their loan appraisal. As for DBP[12], they conduct its loan screening based on the following categories:[13]

Category A (high risk): Projects with potentially significant adverse environmental impacts
(Project Evaluation and Endorsement Report (PEER) procedure by the Program Development Department (PD)).

Category B (medium risk): judged to have adverse environmental effects, but of lower severity than Category A.
(The Program Development Department (PD) will determine if the project needs to be put through the PEER process using the Rapid Environment Assessment.)

Category C (low risk): Projects with low potential for adverse environmental impacts
(No environmental assessment is required, but need to comply with any necessary environmental permits or clearances, such as discharge permits, ECCs (Environmental Compliance Certificates), etc.)

For Category A and B projects[14], the PD team examines the environmental requirements and risk level of the project and summarizes in the PEER the technical eligibility of the project financing, adequacy of the proposed technology, environmental requirements, administrative and technical capacity, socio-economic impacts, regional, local and provincial development plans and programs.

(7) Private-sector Collaboration

In addition to yen loans (two-step loans), JICA's Private Sector Investment Finance supports through finance include overseas investment and loans. The possibility of further promoting and supporting agricultural mechanization through the use of these loans can be considered.

Table 3.5.7 Summary of JICA's Private Sector Investment Finance

Classification	Terms	Summary
Loan	Scheme	Project finance, corporate loans, bank loans
	Amount	Within 70% of total project cost
	Period	In principle, up to 20 years (with a grace period of up to 5 years)

[11] At the time of the meeting with the LBP on October 28, 2024, the person in charge at that time of the 2017 Yen-financed two-step loan "Harnessing Agribusiness Opportunities through Robust and Vibrant Entrepreneurship Supportive of Peaceful Transformation (HARVEST)," stated that this was the understanding in HARVEST.

[12] LBP has its own Environmental and Social Safeguard Policy, but it is for internal use only and was not opened to the team.

[13] DBP does not approve loans for projects that are determined to be in the following categories as a pre-screening to the environmental and social considerations review: non-renewable energy generation, public passenger transportation that emits more than 75g CO^2 per passenger km, freight transportation that emits more than 25g CO^2 per km, biomass operations that compete with food production, expenditures related to landfill and hazardous waste management, hydroelectric projects greater than 25 megawatts, production activities involving violence against women and production activities involving child labor, substances of health concern (e.g. asbestos fiber), and financing for the production or trade of palm oil.

[14] Definitions (e.g., standard values) for the classification of each category are not disclosed.

Classification	Terms	Summary
	Purpose of Loan	Capital investment (including expansion, renovation, etc.), recurring operating funds requiring long-term financing, etc.
	Currency	Yen, U.S. dollars, euros (some local currencies are also available)
	Interest Rates	Fixed interest rate in yen (Fiscal Investment and Loan interest rate + risk premium) Floating rate denominated in dollars and euros Local currency denominations are fixed by swapping to a yen or dollar-based interest rate level.
	Security	If necessary, JICA will require physical collateral/guarantee that it deems eligible.
	Cooperation	Cooperation with Japanese financial institutions requires qualitative supplementation (interest rate, term, claim ranking, etc.)
investment	Scheme	Investment for business companies / Investment for funds
	Amount	Up to 25% of capital contribution, but not the largest shareholder (preferred equity contributions are also possible)
	Withdrawal	Exit policy determined in advance and agreed upon by all parties concerned
	Currency	No special restrictions

Source: Compiled by Survey Team based on data from JICA's Overseas Investment and Loan Division, Private Sector Cooperation Projects Department (January 2023).

In the Philippines, several Japanese agricultural machinery manufacturers have been developing their business by establishing their own sales networks and local subsidiaries, but it has not been easy to break through the barrier of inexpensive third-country products. For this reason, it is conceivable that JICA could use the aforementioned system to provide capital injection to Japanese companies when they set up local subsidiaries and loans for the purchase of these Japanese products at favorable interest rate conditions. In other words, even if the bank does not meet the aforementioned conditions for yen loan experience, there is a high demand for using the above system to invest funds in other commercial banks, and for providing funds for the development of Japanese products in a set of Japanese agricultural machinery manufacturers and such commercial banks.

3.5.5 Candidate Projects for Technical Cooperation

(1) Proposed Technical Cooperation Project

The following is a summary of possible technical cooperation projects. The project name is "Project for Developing a Model for Reducing Post-Harvest Losses in Rice", which corresponds to the issue organized at the beginning of Chapter 3, which is to strengthen the competitiveness of rice (reducing post-harvest losses).

The project purpose is "a post-harvest loss reduction model for rice will be developed in the target areas" with the overall goal being "post-harvest losses of rice are reduced", with the indicator being a reduction in post-harvest losses from the current 16.5% to 8%. The project aims to achieve the following outputs: 1) formation of clusters, 2) strengthening of cluster management, 3) improvement of post-harvest handling technology, 4) establishment of a sustainable management system, and 5) development of a dissemination model.

Inputs from the project side will include consultant experts and training in third countries, as well as equipment for quality inspections. As for training in third countries, one of the candidates is Thailand, a rice-producing country with a low rate of post-harvest losses. Thailand is also a producer of aromatic rice, which is popular in the Philippines, and there is much to learn about its processing and distribution technology. In this case, the Rice Department of the Department of Agriculture and Cooperative could be considered as the receiving organization.

Table 3.5.8 shows a summary of the projects based on the Project Design Matrix (or Log Frame) structure.

Table 3.5.8 Proposed Technical Cooperation Project

Project Title: Project for Developing a Model for Reducing Post-Harvest Losses in Rice

Implementing agency: Department of Agriculture (DA)

Organizations involved: PhilMech, PhilRice, ATI, LGU

Target area: Up to 9 locations

Target group: FCAs in the target areas (9 locations)

Implementation period: 5 years

		Narrative Summary
1.	Overall Goal	Post-harvest losses of rice are reduced (16.5%→8%)
2.	Project Purpose	A post-harvest loss reduction model for rice will be developed in the target areas
3.	Corresponding Issue	Strengthen rice competitiveness (reduce post-harvest losses)
4.	Outputs	1） Clusters are formed 2） Cluster management will be strengthened 3） Post-harvest handling techniques will be improved 4） A sustainable RPS management system will be established 5） A dissemination model will be developed
5.	Activities	0） Project implementation structure is established 0-1 PCC members, eligible sites, and eligible FCAs are determined 0-2 baseline surveys will be conducted (post-harvest treatment technologies and losses, FCA summary, farm income, etc.) 1） Clusters are formed 1-1 Determination of the cluster's member FCAs 1-2 Develop RPS operating rules 1-3 Establishment of project implementation systems such as joint production and marketing 1-4 Establishment of a cooperative system with LGUs 2） Cluster management will be strengthened. 2-1 A management assessment is conducted 2-2 A cluster development plan (business plan) is developed 2-3 Guidance for improvement is provided based on regular monitoring 3） Post-harvest handling techniques will be improved 3-1 Identification of post-harvest handling techniques to be improved 3-2 Establishment of post-harvest loss reduction technology (drying, milling, storage, and transportation technology) 3-3 Post-harvest loss reduction model for rice developed 3-4 A manual on post-harvest loss reduction of rice will be developed 4） A sustainable RPS management system will be established. 4-1 Establish initiatives for quality improvement (HACCP analysis, contract farming, inspection system) 4-2 Activities related to income diversification (by-product use, crop diversification) are implemented 4-3 Market development of blended/ high value-added rice 5） A dissemination model will be established. 5-1 Establishment of dissemination manual and system
6.	Inputs	[The Japanese side] ・Expert (TL/ Rice VC enhancement, agricultural management, post-harvest handling technology, quality improvement, farming technology) ・Quality inspection equipment (moisture meter, microscope, PC, etc.) ・Third Country Training / Domestic Training [The Philippines side] ・Post-harvest processing equipment/facilities, land consolidation by RCEF (or yen loan) ・Expert's office, miscellaneous expenses (utilities, etc.) ・C/P, motorcycle fuel
7.	Project Cost	300 million yen (tentative)

Source: JICA survey team

(2) Dissemination of New Technologies and Training Systems for Farmers and FCAs

1) Existing Channels for Technology Dissemination

Technology dissemination to farmers and cooperatives is primarily conducted by Agricultural Extension Workers (AEWs) under Local Government Units (LGUs). The DA also certifies exceptional farmers as Local Farmer Technicians (LFTs), who facilitate peer-to-peer technology dissemination within communities and support the activities of AEWs, whose numbers remain chronically insufficient nationwide.

The Agricultural Training Institute (ATI), an agency under the DA, develops and implements training programs for AEWs and LFTs. ATI has 16 Regional Training Centers and they collaborate with specialized agencies such as PhilRice and PhilMech to design and deliver training.

Table 3.5.9 Basic Information of ATI

Mandate	The capacity builder, knowledge bank and catalyst of the Philippine Agriculture and Fisheries extension system.
Manpower	594, as of February 2025
Network	HQ (Quezon City), 16 Regional Training Centers, including International Training Center on Pig Husbandry.
Budget	PHP 88,809,704 (FY 2023)
Main Programs	1. Farm and Business Advisory Services 2. Library Services and Information, Education and Communication (IEC) Materials 3. e-Learning Courses 4. Scholarship Programs 5. Dormitory and Training Room Services

Source: ATI

In the fiscal year 2023, ATI conducted a total of 141 training sessions and agriculture- and fisheries-related activities, with a total of 3,700 AEWs, LFTs, and farmers/fishers participating [15]. Among these, 23 training sessions were related to the DA's Rice Program, attended by 510 AEWs, LFTs, and farmers. The training content included topics for AEWs such as the Palay Check System, Rice Crop Manager, agricultural research statistical tools, and results-based monitoring and evaluation learning methods. For LFTs, the training covered proper fertilization management techniques and the integrated rice farming system.

Additionally, the Technical Education and Skills Development Authority (TESDA), under the Department of Labor and Employment, offers vocational training tailored to industry needs, including a range of agricultural courses from cultivation techniques to farm management.

Under RCEF's technology dissemination component, ATI leads the Rice Extension Services Program (RESP) in collaboration with PhilRice, PhilMech, and TESDA, focusing on rice production and agricultural management.

Table 3.5.10 Dissemination Channels for New Technologies of Rice Production

Institution	Role in the Rice Sector
Agricultural Training Institute (ATI)	As the agency responsible for technology extension under DA, it programs and conducts training for agricultural extension agents and Local Farmer Technicians in collaboration with PhilRice and PhilMech experts.
PhilRice	In collaboration with ATI, PhilRice conducts technology transfer activities related to rice production technology to AEW, LFT and farmers.
PhilMech	In collaboration with ATI, PhilMech is engaged in technology transfer activities related to post-harvest processing of rice.
Technical Education And Skills Development Authority (TESDA)	An agency under the Department of Labor and Employment. It manages and oversees technical education and skills development and is responsible for setting direction, formulating policies, and implementing programs aimed at ensuring quality and comprehensive technical education and skills development. It offers programs in a variety of formats, including school-based, training institute, community-based, and enterprise-based programs in a variety of fields. RCEF is responsible for the implementation of Farmer Field School (FFS) in the Rice Extension Services Program (RESP).

[15] ATI Annual Report 2023

Institution	Role in the Rice Sector
LGUs (Agricultural Extension Workers)	It belongs to the LGU and is responsible for technology transfer between government agencies and farmers.
Local Farmer Technician	Good farmers certified by the DA, complementing AEW and promoting technology diffusion among farmers.

Source: ATI, RCEF RESP

2) Dissemination System in Technical Cooperation Programs

In the context of technical cooperation projects, the above mentioned existing channels for agricultural technology dissemination must be leveraged. Collaborative planning with institutions such as ATI for dissemination frameworks and with specialized agencies like PhilRice and PhilMech for technical content is essential to avoid duplication and address gaps effectively.

Technologies for reducing post-harvest losses should be documented in a project manual and used as a dissemination tool. For instance, strict preventive measures are required to address the frequent occurrence of yellowish rice. Approaches such as HACCP should be conducted in each production area to assess the causes, ensuring stakeholders understand the underlying mechanisms. FCAs should then be guided in developing and implementing appropriate countermeasures. To support this, subsidies for analysis costs and extension activities should be considered.

Additionally, reassessing the quality of domestic rice through taste evaluations is crucial. Establishing a market where high-quality domestic rice commands premium prices, with locally produced premium rice positioned at the top, will be key to expanding sales and enhancing market value.

3.6 Evaluation of Proposed Projects

The proposed projects in 3.5 were evaluated in terms of contribution to the core objectives, economic benefits, utilization of Japanese technology, trends in past support and assistance (Gap Analysis), appropriateness and sustainability of the management (target) entity, and the needs of the government of the Philippines. In addition, the core objective was set as an objective that addresses the core issue that encompasses several of the various challenges in the Philippine rice sector through the issue analysis in Chapter 2: "Enhancing Food Security. Four indicators were identified as ways to directly contribute to achieving this objective: stabilizing rice prices, improving resilience, increasing self-sufficiency, and strengthening the competitiveness of the rice industry.

The evaluation was done qualitatively in light of the project's objectives, results, and activities. The contribution to the achievement of the indicators was then scored on a four-point scale: most direct = 3, direct = 2, indirect = 1, and irrelevant = 0. In assigning points to the four indicators that contribute to the core objective (strengthening food security), three times as much points were given to the most urgent indicators of "stabilizing rice prices" and "improving resilience," and twice as much to the less urgent indicators of "increasing self-sufficiency" and "strengthening the competitiveness of the rice industry," which are also indispensable for the achievement of the core objective. However, please note that the evaluation results are presented as reference information only, as the evaluation content may change in the future in response to changes in the situation in the Philippines and understanding of issues in Chapter 2.

3.6.1 Support for Strengthening the Food Buffer-stock System (Establishment of Model NFA Facility)

The objective of the proposed project is to strengthen the NFA's food buffer-stock system and to support the Philippine government's ongoing efforts under MAFIM, which is upgrading and modernizing post-harvest processing equipment and facilities such as dryers, silos, and rice milling facilities at 36 priority sites nationwide over a three-year period beginning in 2024. MAFIM is strengthening and modernizing its food buffer-stock system. Although bids for the construction and renovation of warehouses have been

successively put out by the Philippine government, there is no clear prospect for the budget allocation, which is estimated to total 93 billion Php.

Therefore, the proposed project will provide financial and technical support to help NFAs strengthen their food buffer-stock systems. The proposed project will be implemented under the project loan, and nine target sites recommended by the NFA will be selected to establish model NFAs. Three of the nine target sites (Iloilo, North Cotabato, and Bukidnon) were selected from the aforementioned MAFIM 2025 list, while the remaining six sites (Isabela, Bicol, Occidental Mindoro, Capiz, Agusan del Sur, and Surigao del Sur) are recommended from the list of project sites (with a planned FY2026 budget) to be added in the future. It should be noted that the list of candidate sites may be updated from year to year, and locations and numbers may be updated in the future.

The economic benefits of the project are food security, resilience enhancement, and rice price stabilization. The Marcos administration is emphasizing food security, and the NFA's functions are being strengthened: according to RA 12078, which was enacted in December 2024, the NFA's buffer-stock rice is now authorized to be replenished with domestic or imported rice in cases of domestic rice supply shortages, and in areas where rice supply shortages or abnormal price hikes. During discussions with the DA on February 4, the DA's Undersecretary for Special Concerns and for Official Development Assistance-Foreign Aid/Grants expressed the highest expectations for the implementation of the project. The results of the evaluation are shown in the table below.

Table 3.6.1 Evaluation of Proposed Project: (1) Support for Strengthening Food Buffer-stock System (Establishment of Model NFA Facility)

Evaluation Criteria	Evaluation Contents	Score
Contribution to strengthening food security		
・ Stabilization of rice prices	In areas where rice supply shortages and price spikes are occurring, NFA can sell buffer-stock rice at cheaper price, and stabilizing rice prices is an operation itself.	3x3
・ Strengthening Resilience	Strategic buffer-stock for natural disasters. Assistance to disaster victims.	3×3
・ Self-sufficiency Improvement	Contributes to increased rice supply through quantitative control of post-harvest losses and improved milling quality	2×2
・ Strengthening the competitiveness of the rice industry	Contribute to improved rice quality through the use of large post-harvest processing equipment and facilities and enhanced inventory management systems, leading to increased competitiveness	2×2
Contribution to loss reduction	Reduce post-harvest losses quantitatively and qualitatively through modernization of harvesting, drying, and milling processes	3
Improvement of farm income	To increase government buffer-stock rice, contribute to higher incomes by purchasing rice from farmers at a higher price than in the market.	3
(positive) economic effect	Food security, resilience improvement, and rice price stabilization. The project is targeted to develop models at nine major NFA-recommended sites.	3
Utilization of Japanese Technology	Large-scale post-harvest processing equipment and facilities are areas where Japanese companies can show their strengths.	3
Gap Analysis	There are few initiatives in the area of post-harvest treatment, both by the government of the Philippines and by other donors.	3
Relevance and sustainability of the operating entity	NFA, a government agency, is the managing entity and is highly sustainable.	3
Need of the Government of the Philippines	The government intends to give the highest priority to support for MAFIM.	3
Total Amount		47

Source: JICA survey team

3.6.2 Support for Updating and Modernizing Post-harvest Processing Technologies (Establishment of Model RPS)

The objective of the proposed project is to reduce the volume of post-harvest losses and improve the quality of milled rice, and it is intended to support the efforts of RCEF through the implementation of

the project loan. The project is intended to support the efforts of the RCEF through the implementation of the project loan. The project is intended to select and intensively support about six RPSs for the purpose of establishing a model RPS, but the number of RPSs to be supported will be determined in consultation with the DA. Under the proposed project, a model RPS will be developed by providing loans for procurement of agricultural machinery, post-harvest processing equipment and facilities, and materials and equipment necessary for quality control, as well as technical support for RPS operation. The economic benefits of the project are expected to be reduction of post-harvest losses and improvement of milled rice quality.

In addition to the regular components including supply of quality seeds, technical training, and financial support provided in RCEF 1.0, RCEF 2.0 will also add new component such as soil health improvement, pest and disease management, solar-powered irrigation systems, and small water impounding projects. This project (draft) also has in mind the incorporation of components related to infrastructure development, such as land consolidation in order to promote the effective use of agricultural machinery. The results of the evaluation are presented in the table below.

Table 3.6.2 Evaluation of Proposed Project: (2) Support for Updating and Modernizing Post-harvest Processing Technologies (Establishment of Model RPS)

Evaluation Criteria	Evaluation Contents	Score
Contribution to strengthening food security		
・ Stabilization of rice prices	Contribution through increased supply through quantitative control of post-harvest losses	2×3
・ Strengthening Resilience	Fossil fuel consumption can be reduced by introducing energy-efficient and biomass-utilizing equipment.	1×3
・ Self-sufficiency Improvement	Contributes to increased rice supply through quantitative control of post-harvest losses and improved milling quality	3×2
・ Strengthening the competitiveness of the rice industry	Contribute to strengthening competitiveness through promotion of mechanization and modernization of rice VC and quantitative control of post-harvest losses	3×2
Contribution to loss reduction	Reduce post-harvest losses quantitatively through modernization of harvesting, drying, and milling processes	3
Improvement of farm income	The introduction of the combine harvester will reduce harvest losses and increase yields; increase incomes of farmers participating in the RPS; and increase the number of farmers who are able to harvest their own crops.	3
(positive) economic effect	Reduction of post-harvest losses and improvement of milled rice quality. Support will be provided to establish model RPS at up to 6 production sites. Synergistic effects with the technical cooperation project are expected to ensure more effective implementation and to have a ripple effect.	3
Utilization of Japanese Technology	Large-scale post-harvest processing equipment and facilities are areas where Japanese companies can show their strength. However, small- and medium-scale agricultural machinery and facilities are competitive markets, and there is potential for competition with products from other countries.	2
Gap Analysis	Few initiatives in the area of post-harvest processing, both by the government of the Philippines and by other donors.	3
Relevance and sustainability of the operating entity	The operating entity is the FCA (cluster), and one key is whether economies of scale can be realized. Sustainability will be enhanced if collaboration with the technical cooperation project is realized.	2
Need of the Government of the Philippines	Support to the RCEF program that are expected to be insufficient in the future is welcome.	2
Total Amount		39

Source: JICA survey team

3.6.3 Modernization of Rice Seed Post-harvest Technology (Development of Model Seed Storage Facility)

The objective of the proposed project is to improve rice seed storage technology and is envisioned to be implemented under the project loan. Components include the construction of seed storage facilities (with air conditioning) and procurement of necessary equipment, including quality testing equipment. The

development of seed production infrastructure may include the installation of seed sorting machines. Soft component support for seed production and distribution technology will be provided as consulting services.

For seed production, PhilRice produces Basic Seed (BS) and Foundation Seed (FS), while BPI and some certified seed producing MPCs produce Registered Seed (RS) and Certified Seed (CS). The proposed project (draft) will support BPIs and seed producers cooperatives to improve storage technology and strengthen distribution of RS and CS.

The target areas are envisioned to be one BPI headquarters (Quezon City) recommended by BPI and about 8 key sites nationwide, with BPI, LGUs, and MPCs as the operating entities. Some seed-producing MPCs plan to operate cold storage facilities for seeds and sell them to LGUs and seed producers in neighboring areas in the event of a disaster, etc. In areas where there are good seed-producing cooperatives, the development of model seed storage facilities by the private sector is also an option. The seed storage facility at the BPI headquarters was established in 1997 at no cost from Japan and is deteriorating, with a broken air conditioning system.

It is reported that KOICA is considering support for seed production and distribution for PhilRice. since BS/FS to RS/CS require coordination, if KOICA implements support for the former, information should be exchanged in terms of distribution/storage volume, facility size, facility locations, etc., and a coordination system should be established. The economic impact of the project is an increase in the amount of quality seeds distributed, an increase in rice production, and an improvement in quality. The evaluation results are shown in the table below.

Table 3.6.3 Evaluation of Proposed Project: (3) Modernization of Rice Seed Post-harvest Technology (Development of Model Seed Storage Facility)

Evaluation Criteria	Evaluation Contents	Score
Contribution to strengthening food security		
・ Stabilization of rice prices	Contribute to increased rice supply through increased dissemination of good quality seeds	1x3
・ Strengthening Resilience	Seed supply to disaster-stricken areas in the event of a disaster	2×3
・ Self-sufficiency Improvement	Contribute to increased rice supply through increased dissemination of good quality seeds	2x2
・ Strengthening the competitiveness of the rice industry	Contributing to improved rice quality through increased dissemination of good quality seeds	2x2
Contribution to loss reduction	Project objective is to reduce post-harvest losses of seed through the supply of cold storage	3
Improvement of farm income	Contributing to higher income for seed farmers. Increased rice production through increased dissemination of good quality seeds, contributing to higher farm income.	3
(positive) economic effect	Increased distribution of quality seeds, increased rice production, and improved quality. Support will be provided by establishing a model at one BPI headquarters and eight other sites nationwide, for a total of nine sites.	2
Utilization of Japanese Technology	Utilization of technology related to cold storage	2
Gap Analysis	There are several examples of support for the seed production sector. However, there is little support for post-harvest process of seeds.	2
Relevance and sustainability of the operating entity	Sustainability is high because BPI, a government agency, and seed production associations are the managing entities.	3
Need of the Government of the Philippines	Interest is high, but KOICA is considering support for PhilRice. In this case, PhilRice is targeted for FS/BS and BPI/MPC is targeted for RS/CS.	2
Total Amount		34

Source: JICA survey team

3.6.4 Updating and Modernizing Post-harvest Handling Equipment and Facilities (TSL)

The objective of the proposed project is to reduce the volume of post-harvest losses and improve the quality of milled rice by providing loans (two-step loans) for the purchase of post-harvest processing equipment and facilities to private entities (including FCA) that have financial needs. The target sites are nationwide, and the program is expected to be implemented through the Land Bank of the Philippines and the Development Bank of the Philippines, with large farmers and private entities not eligible under the RCEF as borrowers. Since more than 100 business entities are expected to be eligible for the loan support, the scale of the project cost will be larger, but the economic impact will be greater as a result. The economic benefits of the project are reduction of post-harvest losses and improvement of milled rice quality. Synergistic effects with the technical cooperation project are expected to ensure the realization of more benefits, as well as to strengthen the financial structure of the management entity and the extension system to achieve the top targets. The evaluation results are shown in the table below.

Table 3.6.4 Evaluation of Proposed Project: (4) Support for Updating and Modernizing Post-harvest Handling Equipment and Facilities (TSL)

Evaluation Criteria	Evaluation Contents	Score
Contribution to strengthening food security		
・ Stabilization of rice prices	Contribution through increased supply through quantitative control of post-harvest losses	2×3
・ Strengthening Resilience	Fossil fuel consumption can be reduced by introducing energy-efficient and biomass-utilizing equipment.	1×3
・ Self-sufficiency Improvement	Contributes to increased rice supply through quantitative control of post-harvest losses and improved milling quality	3×2
・ Strengthening the competitiveness of the rice industry	Contribute to strengthening competitiveness through promotion of mechanization and modernization of rice VC and quantitative control of post-harvest losses	3×2
Contribution to loss reduction	Quantitative control of post-harvest losses through modernization of harvesting, drying, and milling processes	3
Improvement of farm income	Targets private companies and FCAs and does not directly benefit farmers	-
(positive) economic effect	Reduction of post-harvest losses and improvement of milled rice quality. Support will be provided to private enterprises of all sizes, and synergistic effects with the technical cooperation projects will ensure more effective implementation and have a ripple effect.	3
Utilization of Japanese Technology	Large-scale post-harvest processing equipment and facilities are areas where Japanese companies can demonstrate their strengths.	3
Gap Analysis	Few initiatives in the area of post-harvest treatment, both by the government of the Philippines and by other donors.	3
Relevance and sustainability of the operating entity	The main operating entities are private companies and have a strong business sense.	3
Need of the Government of the Philippines	Expect support from Japan to promote the introduction of large post-harvest processing equipment and facilities	2
Total Amount		38

Source: JICA survey team

3.6.5 Project for Developing a Model for Reducing Post-harvest Loss of Rice

The objective of this project is to reduce post-harvest losses of rice, and several FCAs (clusters) will be selected to develop models for post-harvest loss reduction. The project is intended to be implemented as a technical cooperation project, and the project objective is "to develop a model for reducing post-harvest losses of rice in the target region. The project also sets "reduction of post-harvest losses of rice" as the upper goal, and aims to reduce the post-harvest loss rate from the current 16.5% to 8%, which is the target of the Philippine government, by disseminating the post-harvest loss reduction models developed through the project throughout the country.

Since this project includes support for the formation of clusters and management strengthening, it could be implemented ahead of the yen loan project and linked to the yen loan project (3.6.2 and 3.6.4), which will be implemented a few years later. The technical cooperation project itself would be similar to the "Kaizen Approach" and would aim to be effective without spending any funds, but with the modernization of post-harvest processing machinery and equipment, which would have a synergistic effect. The economic benefits of the proposed project include reduction of post-harvest losses, diversification and improvement of farmers' income, and strengthening of the financial structure of the management organization. The evaluation results are shown in the table below.

Table 3.6.5 Evaluation of Proposed Project: (5) Project for Developing a Model for Reducing Post-harvest Loss in Rice

Evaluation Criteria	Evaluation Contents	Score
Contribution to strengthening food security		
・ Stabilization of rice prices	Contribution through control of post-harvest losses and supply of high-quality rice	1×3
・ Strengthening Resilience	Reducing greenhouse gas emissions through effective use of field residues	1×3
・ Self-sufficiency Improvement	Contributes to increased rice supply through quantitative control of post-harvest losses and improved milling quality	2×2
・ Strengthening the competitiveness of the rice industry	Contribute to strengthening competitiveness through promotion of mechanization and modernization of rice VC, quantitative control of post-harvest losses, and improvement of rice quality	3×2
Contribution to loss reduction	Quantitative control of post-harvest losses through modernization of the harvesting, drying, and milling processes (effectiveness increased in conjunction with the yen loan project).	3
Improvement of farm income	Contribute to improving farmers' income through activities such as reduction of harvest losses, improvement of rice quality, and income diversification (use of by-products, diversification of second-crops, etc.).	3
(positive) economic effect	Reduce post-harvest losses, diversify and increase farm income, and strengthen the financial structure of the operating entity	3
Utilization of Japanese Technology	Improvement of farmer income through activities related to the efficiency and enhancement of rice VC (reduction of post-harvest losses) and diversification of income sources using KAIZEN methods. In addition, synergistic effects with the yen loan project are expected to ensure more effective implementation, strengthen the financial system of the management entity, and enhance the extension system to achieve the top targets.	3
Gap Analysis	Few initiatives in the area of post-harvest processing, both by the government of the Philippines and by other donors	3
Relevance and sustainability of the operating entity	The governing body is the FCA (cluster), and strengthening the capacity of the governing body itself is the objective of the activity.	3
Need of the Government of the Philippines	Helping to ensure the sustainability of RCEF	2
Total Amount		36

Source: JICA survey team

3.6.6 Comparison of Proposed Projects

Table 3.6.6 compares the evaluation results for the above five proposed projects.

Table 3.6.6 Comparison of Proposed Projects

Item	Proposed Project Loan Project			Proposed TSL Project	Proposed Technical Cooperation Projects
Business name	①Support for Strengthening Food Buffer-stock System (Establishment of Moel NFA Facility)	②Support for Updating and Modernizing Post-harvest Processing Technologies (Establishment of Model RPS)	③Modernization of Rice Seed Post-harvest Technology (Development of Model Seed Storage Facility)	④Updating and Modernizing Post-harvest Handling Equipment and Facilities	⑤Project for Developing Model for Reducing a Post-harvest Loss in Rice
Objective.	Strengthening NFA's food buffer-stock system (MAFIM support)	Quantitative control of post-harvest losses and improvement of milled rice quality (RCEF support)	Improvement of rice seed storing technology	Quantitative control of post-harvest losses and improvement of milled rice quality	Reduction of post-harvest losses in rice (RCEF/ MAFIM/ VC Support)
implementing agency	NFA	DA-BAFE, PhilMech, DA-BSWM, LGU, AMTEC	BPI, PhilRice, LGU, MPC	DA-BAFE, PhilMech, AMTEC-UPLB, LB, PDB	DA-BAFE, PhilMech, NFA, DA-BPI, ATI, PhilRice, IPB-UPLB, BioTech-UPLB
Target Area	9 locations (Isabela, Iloilo, North Cotabato, Bukidnon, etc.)	Up to 6 locations (Isabela or Nueva Ecija), Iloilo, North Cotabato, Bukidnon, Camarines Sur, Mindoro), and 1 location for model land conservation	Up to 9 locations (considering coordination with (1) and (2))	Nationwide (for large farmers and private entities not covered by RCEF)	Up to 9 locations (considering coordination with (1) and (2))
Target Equipment	Equipment for bulk transport and bulk handling, circulating mechanical dryer, rice storage bin (silo), rice milling line (for mixing long and short grain types), front loader, forklift, plastic pallets, portable moisture meter, rice whiteness meter, compressor, diesel generator, PC set for inventory control, etc.	Equipment for bulk transport and bulk handling, 4-wheel tractors/working machines, combine harvesters, trucks, flexible containers, weighing equipment, circular type dryers, rice storage bins, rice milling lines, forklifts, plastic pallets, moisture meters, compressors, rice husk compactors, seed sorting machines, diesel generators, PCs for inventory control sets, etc.	Facilities for seed preservation (air conditioning, wall insulation, humidifier, specific gravity meter, thermometer, forklift, plastic pallets, diesel generator), facilities and equipment for seed production (seed preparation facility), etc.	Mechanical dryers for bulk transport, rice milling plants (3, 5, and 10 tons/hr) including rice grinders and color sorters, silos, ancillary machinery, warehouse update and renovation, harvesters, crane trucks for bulk transport, small construction machinery for bulk handling, etc.	Utilize equipment already procured under RCEF 1.0 and equipment from project loan operations, rice quality inspection equipment, educational equipment, and processing machinery for by-product utilization
Infrastructure	Warehousing, basic infrastructure (water and electric)	Warehouses, model land consolidation projects, small-scale irrigation facilities (solar pumps), FMR	Seed storage facilities (cold storage), infrastructure development for seed production	Including warehouse expansion. Land, electrical equipment, etc. to be borne by the beneficiary.	-

Item		Proposed Project Loan Project						Proposed TSL Project		Proposed Technical Cooperation Projects	
Business name		①Support for Strengthening Food Buffer-stock System (Establishment of Moel NFA Facility)		②Support for Updating and Modernizing Post-harvest Processing Technologies (Establishment of Model RPS)		③Modernization of Rice Seed Post-harvest Technology (Development of Model Seed Storage Facility)		④Updating and Modernizing Post-harvest Handling Equipment and Facilities		⑤Project for Developing Model for Reducing a Post-harvest Loss in Rice	
Consulting Services		Operational support such as inventory management, coordination of varieties and planting times with unit agricultural cooperatives, collaboration with NFA inspectors and LGU agricultural experts, collaboration with ASEAN＋ 3 Emergency Rice Reserve (APTERR)		Operational support, equipment maintenance services, guidance on seedlings and rice transplanters, clustering of unit agricultural cooperatives, collaboration with LGU agricultural specialists, coordination of varieties and planting times, quality enhancement of certified seeds		Support for strengthening production and distribution technologies for superior seeds Support for strengthening seed production associations (improvement of quality control technology)		Collaboration and strengthening with AMTEC (quality testing of agricultural machinery, dustproof and waterproof function testing, rear axle output testing, rice milling yield testing, etc.)		[Outputs] ・ Clusters formation ・ Strengthening cluster management ・ Improvement of post-harvest handling technique ・ Establishment of a sustainable RPS management system ・ Development of dissemination model	
project cost		26.2 billion yen (tentative)		3 billion yen (tentative)		600 million (tentative)		18.5 billion yen (tentative)		300 million yen (tentative)	
evaluation	Contribution to strengthening food security		point		point		point		point		point
	・ Stabilization of rice prices	Direct contribution through market intervention during emergencies	9	Contribution through increased supply	3	Contribution through increased supply	3	Contribution through increased supply	3	Contribution through increased supply	3
	・ Strengthening Resilience	Emergency Assistance for Survivors	9	Fossil fuel reduction through eco-technology	3	Seed supply in times of disaster	6	Fossil fuel reduction through eco-technology	3	Fossil fuel reduction through eco-technology	3
	・ Improvement of self-sufficiency	Contribute to increased supply	4	Contribute to increased supply	6	Contribute to increased supply	4	Contribute to increased supply	6	Contributes to increased supply	4
	・ Strengthening the competitiveness of the rice industry	Direct contribution	4	Direct contribution	4	direct contribution	4	direct contribution	4	Direct contribution to rice VC strengthening, etc.	6
	Contribution to loss reduction	Direct effect	2	Direct effect	3	Indirect effects (dissemination of superior seeds → improved milled rice yield)	3	Direct effect	3	Direct effect	2

Item		Proposed Project Loan Project						Proposed TSL Project		Proposed Technical Cooperation Projects	
Business name		①Support for Strengthening Food Buffer-stock System (Establishment of Moel NFA Facility)		②Support for Updating and Modernizing Post-harvest Processing Technologies (Establishment of Model RPS)		③Modernization of Rice Seed Post-harvest Technology (Development of Model Seed Storage Facility)		④Updating and Modernizing Post-harvest Handling Equipment and Facilities		⑤Project for Developing Model for Reducing a Post-harvest Loss in Rice	
	Improvement of farm income	Direct effect (increase in purchase volume from farmers)	3	Direct Effects (income increase for RPS participants)	3	Increased yields through the use of superior seeds	3	Indirect effect	-	Direct Effects (income increase for RPS participants)	3
	(positive) economic effect	Resilience improvement effects, increased rice supply (limited supply but approved for sale to the poor)	3	Effect of increased rice supply (loss reduction)	2	Increased supply of superior seeds → effect of increased production	2	Effect of increased rice supply (loss reduction)	2	Increase in rice supply (synergistic effect with yen loan project)	2
	Utilization of Japanese Technology	Introduction of large post-harvest processing equipment (Japanese companies have a competitive advantage)	3	Competitive market for small and medium-sized farm machinery and equipment	2	cold storage	2	Introduction of large post-harvest processing equipment (Japanese companies have a competitive advantage)	3	Japanese agricultural machinery and facilities, management technology, kaizen (technology in which Japan excels)	3
	Gap Analysis	Little support for post-harvest processing sector	3	Little support for post-harvest processing sector	3	Support for the seed production sector has multiple achievements	2	Little assistance to the post-harvest processing sector	3	Little assistance to the post-harvest processing sector	3
	Relevance and sustainability of the operating entity	NFA (cost recovery from LGUs, etc. is an issue)	3	FCA (Cluster). Subject to collaboration with technical professionals.	2	BPI	3	Private company (strong business sense	3	FCA (cluster)/NFA/BPI/LGU, etc.	3
	Intentions of the Government of the Philippines (C/P)	Expects JICA to provide support for large post-harvest processing equipment. Partial burden of insufficient project cost is welcomed	3	Partial funding of insufficient project costs is welcomed.	2	Under consideration.	1	Looking to JICA for assistance in improving efficiency of production and post-harvest processing	3	Strengthen the capacity of agriculture-related staff and experts based on appropriate technology and ensure sustainability of RCEF	1
	Total points or score		46		39		34		38		36

3.7 Time Schedule for Project Implementation

The time schedule for each support scheme by JICA is shown below. After this basic study, a Loan Agreement (LA) will be signed to implement the project loan after conducting a preparatory study for cooperation, and the project will start at this point, which usually takes 2 to 3 years. For this reason, we assumed that project loans would start in 2027 at the earliest. On the other hand, in the case of TSL, we assumed that the project would start in 2026 at the earliest, since it could start in 1 to 2 years. For the technical cooperation project, we also assumed that the project would start in 2026 at the earliest, since the project would start after the request survey in August, a detailed planning study would be conducted, and the RD would be concluded.

Of the proposed yen loan projects, the highest priority is "Support for Strengthening Food Buffer-stock System (Establishment of Model NFA Facility)," which is intended to strengthen food security with the MAFIM assistance currently being implemented. Since this assistance is highly urgent and MAFIM is scheduled to end in 2028, it should be implemented as soon as possible. However, since the MAFIM is not expected to be extended due to the lack of budgetary measures, the progress of the project and the government's policy should be closely monitored in the future.

RCEF 2.0, an initiative to strengthen competitiveness, is scheduled to be implemented until 2031, and the project is expected to be able to start the "Support for updating and modernizing post-harvest processing technology (establishment of a model RPS)" project in 2029, the midpoint of the project. By 2029, equipment and facilities will be provided in many areas. In addition, the project in (1) is expected to identify a number of issues that need to be addressed. The project in (1) will be more effective by taking these challenges into account and incorporating effective measures to solve the issues into its components. If possible, it is expected to have a synergistic effect if a technical cooperation project ("Project for Development of a Model for Post-harvest Loss Reduction of Rice") is implemented in advance to establish a model for post-harvest loss reduction, and in conjunction with this, a yen loan project is launched after understanding the issues and measures for RCEF 2.0.

Thus, support for strengthening food security and competitiveness should be prioritized in the short term, and efforts to strengthen rice VC, such as productivity improvement, should be considered as medium- to long-term efforts, with a target date of around 2031, when RCEF 2.0 is completed.

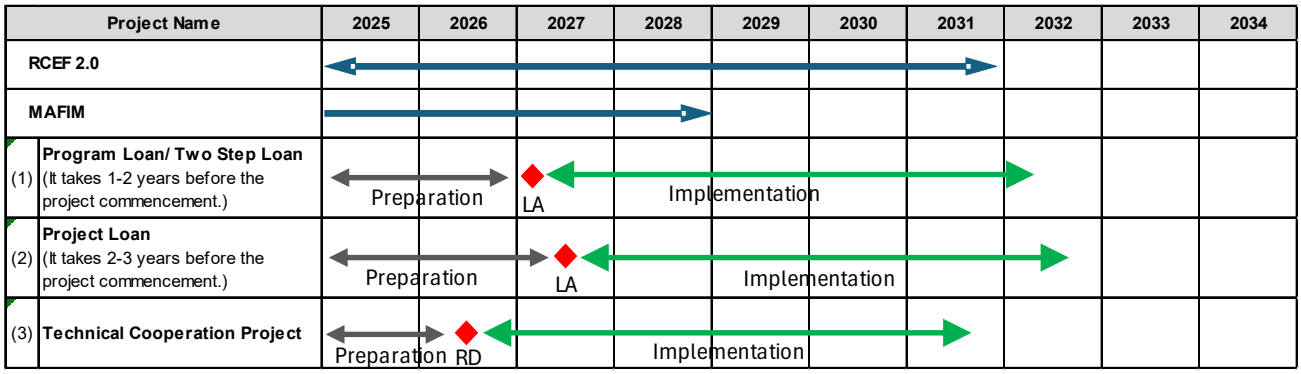


Figure 3.7.1 General Time Schedule of JICA Projects

Source: JICA survey team

3.8 Other Cooperation Proposals

In order to strengthen the competitiveness of the rice industry, it is necessary to consider support for the upstream side of rice VC, including the dissemination of superior seeds, productivity improvement, and production cost reduction. Improvement of upstream rice VC technologies is also essential to reduce post-harvest losses. The following table summarizes the factors that affect the quality of paddy and rice

and their responses by growth stage, and shows that post-harvest treatment alone is not sufficient to improve quality, but must be traced back to the seed and cultivation management stages.

Table 3.8.1 Factors Affecting Quality and Correspondence by Growth Stage

Grade Parameter		Quality Affecting Factors	Measures by Growth Stage*		
			Seed	Crop Manage-ment	Post Harvest
Paddy	Purity	Purity of foundation and registered seeds, weed control	++	+	
	Total foreign matters			+	++
	Of which, weed seeds and other crop seeds	Weeding management, processing (grading)			++
	Of which, other foreign matters	Harvesting, sun drying, processing (grading)			++
	Chalky and immature kernels	Weather (high temperatures, low temperatures, poor solar radiation), crop management (no-leveling, excess numbers of kernels, root rotting, lack of water, late harvest), processing (grading)		++	+
	Damaged kernels	Crop management (seed management, early drainage, uneven paddy ear, etc.), over-drying, storage methods, weather (high temperature drought), physical damages, pests and diseases, processing (grading		++	+
	Discolored kernels	Insect damage, pest damage (high moisture storage)		+	++
	Contrasting types	Not renewed seeds, crop management (weed rice removal)	++	++	
	Red kernels	Not renewed seeds, crop management (weed rice removal)	++	++	
Rice	Broken kernels	Weather (high temperature, low temperature, poor solar radiation), crop management ((no-leveling, excess numbers of kernels, root rotting, lack of water, late harvest), over-drying, processing (grading)	++	++	++
	Brewers				
	Damaged kernels	Insect damage, pest damage (high moisture storage)		++	++
	Discolored kernels	Insect damage, pest damage (high moisture storage), poor storage management, processing (grading)		++	++
	Chalky kernels	Weather (high temperature, low temperature, poor solar radiation), crop management (no-leveling, excess numbers of kernels, root rotting, lack of water, late harvest), over-drying, processing (grading)		++	++
	Immature kernels	Weather (high temperature, low temperature, poor solar radiation), crop management (no-leveling, excess numbers of kernels, root rotting, lack of water, late harvest), over-drying, processing (grading)		++	++
	Contrasting types	Not renewed seeds, crop management (weed rice removal)	++	+	
	Red kernels	Not renewed seeds, crop management (weed rice removal)	++	+	+
	Foreign matters	Harvesting, sun drying, processing (grading and milling)		+	++
	Mixed with paddy	Processing (de-husking, grading, milling)			++

Source: Prepared by JICA survey team, *++Most important, +Important

Reference: Seed Certification Standard for Rice, Seed Quality Control Services, BPI

Philippine National Standard for Grains-Grading and classification-Paddy and milled rice, PNS/BAFS 290:2019

In this field survey, there were many requests for irrigation development as a countermeasure to water shortages, and if support is organized around DA, it would be beneficial from the perspective of not only increasing rice supply but also combating global warming to promote the introduction of solar pumps and renovate or develop new facilities for the small-scale irrigation schemes under the jurisdiction of BSWM. This will be beneficial not only from the perspective of increasing rice supply but also from the perspective of global warming countermeasures. It is also important to improve productivity and income by diversifying back-crops, promoting the use of by-products, and modernizing farming techniques, including smart farming, with the aim of stabilizing rice farmers' income.

The following is a summary of the direction of support for strengthening rice VC. Since these activities are not directly related to post-harvest efforts, they are proposed as mid- to long-term initiatives.

Table 3.8.2 Proposed Cooperation for Strengthening Rice VC

Countermeasure	Component	Assumed Scheme
Strengthening the Rice Production Base	・ Development of small-scale irrigation facilities (introduction of solar pumps, new/rehabilitation irrigation systems) ・ Development of production infrastructure (model field development, drainage improvement, FMR development)	Project Loan
Support for Strengthening Rice Production Technology	・ Enhancement of rice production technology to improve post-harvest handling techniques (quality improvement technology) ・ Improve income for rice farmers (diversification of second crops, use of by-products, reduction of production labor costs)	Technical Cooperation Projects
Promoting the Introduction of Smart Agriculture Technology	・ Model projects for the introduction of smart agriculture technology (ICT for cultivation management such as paddy field management, drone technology)	Public-Private Partnership

Source: JICA survey team

Appendix

Appendix 1 List of Contact Persons

List of Contact Person

Organization	Section	Position
The Philippines Government (Counterpart)		
Department of Agriculture (DA) Central Office	Undersecretary for Special Concerns and for Official Development Assistance (ODA)-Foreign Aid/Grants	Undersecretary
		Project Evaluation Officer IV
	Special Concerns and for ODA	Assistant Secretary (DA Sporksperson)
		Assistant of A-SEC.
		Assistant of A-SEC.
The Philippines Government (Central)		
Department of Agriculture (DA) Central Office	Undersecretary for Operations and Agri-Fisheries Mechanization	Undersecretary
	Undersecretary for Rice Industry Development	Undersecretary
	Undersecretary for Policy, Planning, and Regulations	Undersecretary
	Undersecretary for Administration	Undersecretary
	Agribusiness and Marketing Assistant Services (AMAS)	Director
		Senior Agriculturist
		Market Assistant II
		Senior Administrative Assistant
	Assistant Secretary for Operations/ National Rice Program	Officer-in-Charge -Assistant Secretary/ Program Director
	Assistant Secretary for Planning and Project Development	Assistant Secretary
	Markert Development Division under AMAS	Chief
	F2C2	F2C2 Staff
	Field Operations Service (FOS)	Officer-in-Charge
		EA-IV
	Field Programs Coordination and Monitoring Division under FOS	Chief
	Interim Agricultural Cooperative Enterprise Development Service/F2C2	Director/Program Director
	IPMS (Interim Management Program Services)	Director
		EA IV
	OURID (Ofice for the Undersecretary of Rice Industry Development)	EA-III
	OUS-SCODA (Office for the Undersecretary of Special Concerns and for the Official Development Assistance)	Project Evaluation Officer IV
		PDO III
	PDS (Project Development Services)	Director
		PDO III
	Planning and Monitoring Services (PMS)	Officer-in-Charge - Director, Planning and Monitoring Service
	Planning and Programming Divison under PMS	Officer-in-Charge - Chief
	PMS (Planning and Monitrig Services) Project Identification and Evaluation Division	Chief PIED
	PPRMD (Project Packaging and Resources Mobilization Division)	Chief PPRMD
		PDO II
	RCEF-Program Management Office	Team Leader
		Director for Rice Clustering
	Special Concerns and for Official Development Assistance	Assistant of A-SEC.
		Contact person and coordinator
Bureau of Agriculture and Fisheries Engineering (BAFE)	Office of the Director	Director IV
		Director III
		Planning Officer II
	Programs and Projects Management Division	Engineer III
		Engineer II
		Engineer I
	Special Engineering Programs and Project Division	nc-chief
		Engineer III
		AO II
	Planning Knowledge, Management and Digitalization Division	ISR II
		ITO 1
	Programs and Projects Management Division	Engineer IV, PPMD

List of Contact Person

Organization	Section	Position
Agricultural Training Institute (ATI)	Office of the Executive Director	Director
		Assistant Director
		DMO II
		DMO I
		PEV II
Buerau of Soils and Water Management (BSWM)	Agro-Hydrology and Rain Stimulation	Engineer II
	Design and Engineering Division of the Water Resources Management Division	Enginneer IV
		Engineer III
	Hydrology Department	Engineer II
	Office of the Assistant Director	Assistant Director
	Water Resources Division	Community Development Officer II
	Water ResourcesManagement Division	Division Chief
	Water Services Division	Senior Agriculturist
Bureau of Plant Industry (BPI)	Crop Research and Production Support	Director CRPSID
		Senior Agriculturist
		Supervising Agriculturist
		Warehouse Supervisor
	National Seed Quality Control Services Division	Staff Head
	Office of the Director	Director III
Bureau of Agricultural Research (BAR)	Project Monitoring , Evaluation and Linkaging Division	Project Evaluation Officer II
Nationnal Food Authority (NFA)	Office Deputy Administrator	OIC Deputy Administrator
	Office of the Administrator	Administrator
	Office Operations Department	Adminnistrator for Operations
	Technical Services Division	Division Manager
		OfficerIII
		EngineerIII
National Irrigation Administration (NIA)	Administrator's Office	Administrator
	Equipment Management Division (EMD)	PEA
		SEA
		Supervising Manager A
	Institutional Development Division (IDD)	IDD Manager
		IDC
		CDO-IV
		CDO-II
		ASA-B
		Statistician
	Irrigation Engineering Center	PEA
	Office of the Administrator	Department Manager A
	Office of the Deputy Adminnistrator for Engineering and Operations	Deputy Administrator
	Operations Department	OD Manager
	Project Planning Department	Division Manager (Acting)
Cooperative Development Authority (CDA)	Instituional Development Services	Sr.CDS
		CDS II
		Acting supv. CDS
		Supervising Community Development Specialist
Luzon area		
RFO-II Office	Office of the Executive Director	OIC Executive Director
		Regional Rice Program Focal Person
RFO-III Office	Rice Program	Rice Focal Person
	PRDP-IPLAN	Planning Officer
	Planning, Monitoring & Evaluation Division (PMED)	Planning Officer II
	Agricultural Coordinating Office (APCO)	Agricultural Program Coordinator Officer (APCO)
	Office of the Regional Director	Regional Executive Director
	F2C2	Project Development Officer I
		Enterprise Development & Marketing Specialist
		Agricultural Center Chief II
		Agriculturist II
	Field Operations Division	Agri I

List of Contact Person

Organization	Section	Position
RFO-IV-B Office	Office of the Regional Director	OIC Executive Director
		Acting APCO
		Staff
		Regional Executive Director
RFO-IV-A Office	F2C2	F2C2 Program Coordinator
		Project Development Officer I
		Project Development Officer I
NFA Region I	Laoag, Ilocos Norte	Branch Manager
		Warehouse Supervisor
		Standard and Quality Assurance Engineer
		Engr III
NFA Region II	Santiago, Isabela	Regional Manager, Reg II
		Assistant Regional Manager, Reg. II
		Branch Manager, Santiago, Isabela
		Engr. III
	Echague, Isabela	Warehouse Supervisors
		Quality Assurance
		Warehouse Assistants
		Mechanical Plant Operators
NFA Region III	Rosales, Pangasinan	Acting Manager
	Cabanatuan, Nueva Ecija	Acting Provincial Manager
NFA Region IV	Calapan, Mindoro	Acting Branch Manager
PhilMech	Facility Management and Field Operations Division	Supervising Reseach Specilaist
		Senior Science Research Specialist
		Science Research Specialist I
		Chief Science Research Specialist
		AOV
	Interim Director for Operations, and Program Management Office	Director III
	Office of the Director	Director
	Socio-Economic Policy Research Division (SEPRD)	Chief Science Research Specialist
		Senior Science Research Specialist
Philrice	Executive Director's Office	Executive Director
		Executive Assistant
	Rice Engineering and Mechanization Division	Supervising Science Research Specialist
PhilRice-BDD	Sales and Promotion	Super.III
	Field Operations	Development mgt officer V
PhilRice-RCEF PMO	Field Operations	head
	SRSII	Data officer
University of the Philippines Los Banos (UPLB)	Center for Agri-Fisheries and Biosystems Mechanization, College of Engineering and Argo-Industrial Technology	Engineer II
	Agricultural Machinery Testing and Evaluation Center (AMTEC)	Director
		Engineer II
		UES II
		UES I
	National Institute of Molecular Biology and Technology (BIOMEC)	Director
	Institute of Plant Breeding	Director
International Rice Research Institute (IRRI)	Digital and Spatial Landscape Transformation Unit	Associate Scientist-Agricultural Enginneering
PLGU- Ilagan, Isabela	Provincial Agriculture Office (PAO)	Provincial Agriculture Office Head
PLGU- Ilagan, Isabela	Provincial Agriculture Office (PAO)	OIC Assistant Provincial Agriculturist
PLGU- Cabanatuan City, Nueva Ecija	Provincial Agriculture Office (PAO)	PAO- Head
MLGU- General Natividad, NE	Municipal Agriculture Office	MAO
MLGU- San Anton, NE	Municipal Agriculture Office	MAO
MLGU- San Anton, NE	Municipal Agriculture Office	Agriculturist
MLGU- Sta. Cruz Laguna	Office of the Municipal Agriculturist (MAO	Municipal Agriculturist
MLGU- Sta. Cruz Laguna	Office of the Municipal Agriculturist (MAO	Agriculturist II
MLGU Siniloan, Laguna	Office of the Municipal Agriculturist (MAO	Municipal Agriculturist

List of Contact Person

Organization	Section	Position
Visayas area		
RFO-VI Office	RFO-VI Office of the Regional Director	Regional Executive Director
	RFO-IV Field Operations Division	Field Operations Division Chief
	RFO-IV Regional Agricultural Engineering	Division Chief
		Engineer 1
		Engineer 1
NFA Region VI	NFA Regional Office	Acting Regional Manager
		Acting Ad. Assistant
		Assistant
		OIC Branch Manager, Iloilo Branch
		Acting Regional Accountant
		Regional Engineer
	Dumangas	Warehouse Supervisor II
PLGU- Calapan, Misamis Oriental	Provincial Agriculture Office (PAO)	Provincial Agriculturist
Mindanao area		
RFO-X Office	Office of the Executive Director	Regional Executive Director
		Regional Technical Director for Operations
		MS 1
		Agriculturist 1
RFO-XI Office	Office of the Executive Director	Regional Executive Director
	Industry Services Division	Assistant Chief
	Research and Technology	Regional Technical Director for Research and Regulatory
	Agricultural Cooperative Division	Chief / Area Coordinator for Davao del Sur
NFA Region X	Aglayan, Malaybalay, Bukidnon	OIC Branch Manager
		Acting Supervising Grain Officer
		QA Officer-Classifier
NFA Region XII	Koronadal, South Cotabato	Acting Regional Manager
	Tacurong, Sultan Kudarat	Assistant Branch Manager
		Engineer II
		JO
PLGU- Koronadal, South Cotabato	Provincial Agriculture Office (PAO)	Provincial Agriculture Office Head
PLGU- Koronadal, South Cotabato	Provincial Agriculture Office (PAO)	Staff
Cooperatives		
Buklurang Magsasaka ng San Anton, Nueva Ecija		President
		MAO of San Leonardo
		LGU of San Leonardo-MAO office
		APCO Staff- DA Region III
Bantug Agricultural MPC		Presdient
Nagkakaisang Magsasaka Agricultural PMPC (NMAPMPC)		Chairman
		Marketing Officer
		Treasurer
		Manager
SALIKA Agricuktural Cooperative		Chairman
		BOD
Soro-Soro Development Cooperative (SIDC)		Regional Manager Mindoro
		Rice Mill head
		Business Development Manager
		Vice President
		Support Service Manager
Diffun Saranay Development Cooperative-DISADECO		

List of Contact Person

Organization	Section	Position
Providers MPC		Vice Chairman
		Board Member
		Specialist
Piddig-Basi Multi-Purpose Cooperative		
Bongga Irrigators Association		NIA-IDC
Bacarra Zanjera Irrigators MPC		Manager
		BOD
Sarrat Namnama MPC		Manager
		BOD
		Board Secretary
Bonga Pump#1 Irrigators Association		WRFT
Asosasyon ng Magbubukid ng Gatid		President
		Secretary
		Assistant Secretary
		Finance
		Vice President
Pangkalahatang Samahan ng Magsasaka sa Sinoloan (PASAMASI)		Chairman
		BOD
Caridad Sur Farmer's MPC		Chairman
		Manager
Nag-iisang Masikap Primary MPC		Chairman
		Manager
		BOD
Nueva Ecija Seed Growers MPC		Chairman
		Vice Chairman
		MGR
		Marketing official Mgt Sec
		Finance/ Marketing Assistant
Tumbaga 1 Bukal Irrigators Association (TIBIA)		
Sariaya Farmers Federation (Rice Cluster)		
Maramag Multi-Purpose Cooperative		
Tinagacan Agrarian Reform Beneficiaries Association		Chairman
		Bookeeper
		Member
Binhian ng Timog Kutabato MPC		Manager
DFMC		General Manager
Firmus Farm Services Cooperative		Chairman
		Manager
Private Rice Mills		
Jenrey Rice Mill		Owner
JD Aguilar Commercial, Inc		Chief Executive Officer
Aliaga Rice Corp		
BBC Rice Mill		Owner
BBC Rice Mill		Chairman
BBC Rice Mill		BOD
LP Rice Mill		Owner
GID- Bagsik Rice Mill		Owner
VC Ong Rice Mill		Owner
Agbayani Rice Mill		Owner
Agbayani Rice Mill		Staff
Golden Season Grains Center, Inc		Plant Operations Manager
CDEA Enterprise Rice Mill		Owner
Bantuyong Rice Mill		Owner

List of Contact Person

Organization	Section	Position
Intercity Rice Mill Estate		Administrative Officer of Estate
New Rice Mill		Owner
G and P Agri ventures		Owner
JK Salazar		Owner
International Organization		
KOICA	Philippines Office	Program Manager
Private Sector (Japanese Firm)		
Satake Corporation		
Satake Asia Co. Ltd		
Yanmar Philippines Corporation		
HOKOKU PLANT SYSTEM		
Private Sector (Philippine Firm)		
Aisa United Bank (AUB)		Vice Chairman
Aisa United Bank (AUB)/ Rural Bank of Angels (RBA)		Executive Vice President (AUB), President (RBA)
Yovel East Agri venture		CEO
MECHAPHIL Corp.		President
		Staff Assistant
HEROPHIL (Manufacturing Corporation)		Vice President
Nature Tech Innovation Group Inc		President
Laquihon Agro-environmental Consultancy Services		Executive Director
Right Agri Dev. Inc		President/ CEO
Central Isabela Agri-Manufacturing Corp (CIAMC)		Operations Director, CIAMC
Agricomp Machineries and Construction Corp		President
Agricultural Machinery Manufacturers and Distributors Association, Inc		President
Agri Component Corporation		Sales and Operations Manager
		Administrative Staff
DR1 Farmtech		General Manager
Private Sectors and Others		
C.P. Engineering (Cambodia) Co., Ltd.		Project Consultant
Resource Persons		
Former Undersecretary of DA		Policy Advisor
Former Secretary of NEDA		Chairperson and Founding Partner
Department of Agrarian Reform-Davao Regional Office		Chief Agrarian Reform Program Officer (CARPO)/ MinSSAD and MinSAAD Lead Person

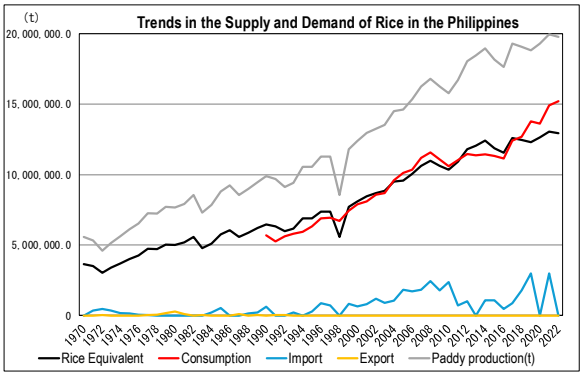
Appendix 2 Supply and Demand Trend of Rice in the Philippines

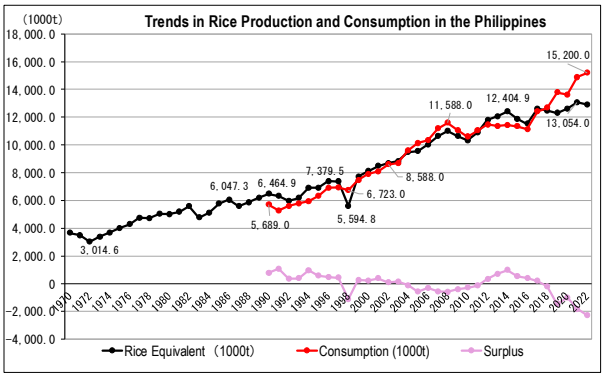
1. Trends in the supply and demand of rice

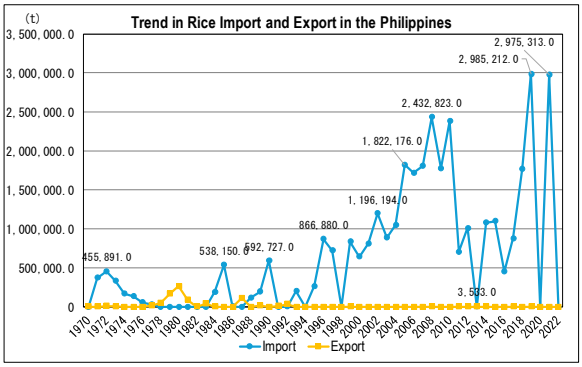
Year	Yield (100g/ha)	Harvested Area (ha)	Paddy Production (t)	Rice Equivalent (1000t)	Consumption (1000t)	Surplus (1000t)	Inport (t)	Export (t)	For consumption (1000t)	Self-sufficiency rate (%)
1970	17,460.0	3,195,000.0	5,578,470	3,648.3	-	-	-	1,906.0	-	-
1971	15,980.0	3,332,290.0	5,324,999	3,482.6	-	-	370,404.0	769.0	-	-
1972	14,431.0	3,194,150.0	4,609,478	3,014.6	-	-	455,891.0	7,200.0	-	-
1973	14,624.0	3,527,750.0	5,158,982	3,374.0	-	-	336,221.0	5,201.0	-	-
1974	15,458.0	3,632,490.0	5,615,103	3,672.3	-	-	166,292.0	1.0	-	-
1975	16,636.0	3,674,040.0	6,112,133	3,997.3	-	-	134,777.0	25.0	-	-
1976	17,967.0	3,641,380.0	6,542,467	4,278.8	-	-	55,444.0	-	-	-
1977	20,142.0	3,601,700.0	7,254,544	4,744.4	-	-	30,874.0	14,996.0	-	-
1978	20,253.0	3,560,700.0	7,211,486	4,716.3	-	-	-	48,114.0	-	-
1979	21,131.0	3,636,810.0	7,684,943	5,025.9	-	-	24.0	165,604.0	-	-
1980	22,105.0	3,459,130.0	7,646,407	5,000.7	-	-	3.0	263,370.0	-	-
1981	22,977.0	3,442,830.0	7,910,591	5,173.5	-	-	13.0	89,270.0	-	-
1982	26,342.0	3,239,630.0	8,533,833	5,581.1	-	-	1.0	451.0	-	-
1983	23,227.0	3,140,670.0	7,294,834	4,770.8	-	-	6.0	40,400.0	-	-
1984	24,300.0	3,221,770.0	7,828,901	5,120.1	-	-	189,718.0	3,353.0	-	-
1985	25,879.0	3,402,610.0	8,805,614	5,758.9	-	-	538,150.0	58.0	-	-
1986	27,173.0	3,402,910.0	9,246,727	6,047.3	-	-	2,058.0	28.0	-	-
1987	26,229.0	3,255,900.0	8,539,900	5,585.1	-	-	30.0	111,644.0	-	-
1988	26,442.0	3,392,670.0	8,970,898	5,867.0	-	-	119,187.0	6.0	-	-
1989	27,046.0	3,497,280.0	9,458,744	6,186.0	-	-	195,179.0	16,000.0	-	-
1990	29,786.0	3,318,720.0	9,885,139.4	6,464.9	5,689.0	775.9	592,727.0	2.0	-	-
1991	28,243.0	3,424,960.0	9,673,114.5	6,326.2	5,263.0	1,063.2	59.0	10,009.0	-	-
1992	28,545.0	3,198,070.0	9,128,890.8	5,970.3	5,600.0	370.3	634.0	35,100.0	-	-
1993	28,742.0	3,282,350.0	9,434,130.4	6,169.9	5,792.0	377.9	201,605.0	1.0	-	-
1994	28,859.0	3,651,530.0	10,537,950.4	6,891.9	5,935.0	956.9	-	-	-	-
1995	28,043.0	3,758,691.0	10,540,497.2	6,893.5	6,325.0	568.5	263,248.0	-	-	-
1996	28,558.0	3,951,136.0	11,283,654.2	7,379.5	6,907.0	472.5	866,880.0	-	-	-
1997	29,329.0	3,842,270.0	11,268,993.7	7,369.9	6,944.0	425.9	722,397.0	-	-	-
1998	26,986.0	3,170,042.0	8,554,675.3	5,594.8	6,723.0	▲1,128.2	-	1.0	-	-
1999	29,468.0	3,999,839.0	11,786,725.6	7,708.5	7,451.0	257.5	834,379.0	294.0	-	-
2000	30,681.0	4,038,085.0	12,389,248.6	8,102.5	7,892.0	210.5	642,294.0	224.0	-	-
2001	31,866.0	4,065,441.0	12,954,934.3	8,472.5	8,086.0	386.5	810,903.0	13.0	-	-
2002	32,797.0	4,046,318.0	13,270,709.1	8,679.0	8,588.0	91.0	1,196,194.0	2.0	-	-
2003	33,696.0	4,006,421.0	13,500,036.2	8,829.0	8,677.0	152.0	886,470.0	-	-	-
2004	35,130.0	4,126,645.0	14,496,903.9	9,481.0	9,595.0	▲114.0	1,049,311.0	-	-	-
2005	35,876.0	4,070,421.0	14,603,042.4	9,550.4	10,127.0	▲576.6	1,822,176.0	188.0	-	-
2006	36,844.0	4,159,930.0	15,326,846.1	10,023.7	10,324.0	▲300.3	1,716,865.0	90.0	-	-
2007	38,008.0	4,272,889.0	16,240,396.5	10,621.2	11,183.0	▲561.8	1,805,636.0	274.0	-	-
2008	37,703.0	4,459,977.0	16,815,451.3	10,997.3	11,588.0	▲590.7	2,432,823.0	1,134.0	-	-
2009	35,890.0	4,532,310.0	16,266,460.6	10,638.3	11,059.0	▲420.7	1,774,873.0	177.0	12,578	84.6
2010	36,224.0	4,354,161.0	15,772,512.8	10,315.2	10,601.0	▲285.8	2,379,115.0	241.0	11,898	86.7
2011	36,776.0	4,536,642.0	16,683,954.6	10,911.3	11,043.0	▲131.7	706,669.0	538.0	12,415	87.9
2012	38,448.0	4,690,061.0	18,032,346.5	11,793.1	11,473.0	320.1	1,008,749.0	298.0	12,943	91.1
2013	38,852.0	4,746,091.0	18,439,512.8	12,059.4	11,354.0	705.4	3,533.0	2,664.0	12,840	93.9
2014	40,019.0	4,739,672.0	18,967,693.4	12,404.9	11,420.0	984.9	1,079,470.0	1,118.0	12,943	95.8
2015	38,980.0	4,656,227.0	18,149,972.8	11,870.1	11,336.0	534.1	1,100,042.0	217.0	12,811	92.7
2016	38,690.0	4,556,043.0	17,627,330.4	11,528.3	11,133.0	395.3	450,451.0	140.0	12,567	91.7
2017	40,061.0	4,811,808.0	19,276,584.0	12,606.9	12,407.0	199.9	877,318.0	297.0	13,966	90.3
2018	39,718.0	4,800,406.0	19,066,252.6	12,469.4	12,665.0	▲195.6	1,768,696.0	230.0	14,210	87.8
2019	40,449.0	4,651,490.0	18,814,811.9	12,304.9	13,778.0	▲1,473.1	2,985,212.0	316.0	15,299	80.4
2020	40,888.0	4,718,896.0	19,294,622.0	12,618.7	13,624.0	▲1,005.3	-	57.0	15,181	83.1
2021	41,540.0	4,805,077.0	19,960,289.9	13,054.0	14,886.0	▲1,832.0	2,975,313.0	108.0	16,494	79.1
2022	41,121.0	4,804,498.0	19,756,576.2	12,920.8	15,200.0	▲2,279.2	3,860,000.0	-	16,793	76.9

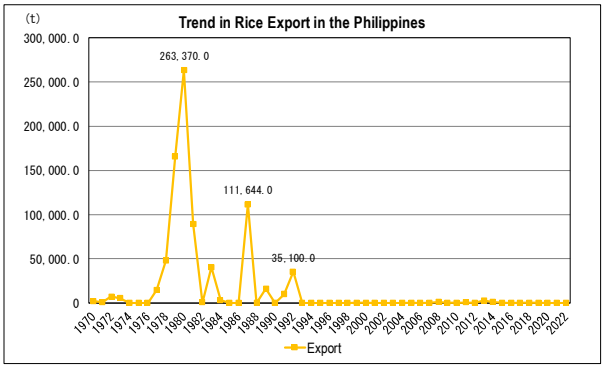
Source) FAOSTAT, the Philippine Statistics Authority OpenSTAT

2. Rice production and consumption









The production of rice is on the increase, and this is thought to be due to the increase in the area under cultivation and the yield. In addition, consumption is also on the increase. In particular, it can be seen that it has increased rapidly in recent years. This increase is thought to be due to the fact that the population continues to increase. Since around 2000, domestic consumption has exceeded domestic production, and it can be seen that the amount of imports has also increased rapidly. In particular, in recent years, consumption has greatly exceeded production, and it can be seen that the gap is widening year by year. From 1978 to 1990, there were years when the amount of exports exceeded the amount of imports, and it seems that a small amount of exports is also being made in recent years, but it can be seen that the amount of exports has decreased dramatically compared to the peak period. The annual amount of imports is at its highest around 2019.

Source

Yield, Harvested Area, Import/ Export Volume：FAOSTAT
Consumption（Net Food Disposable）：Philippine statistics authority

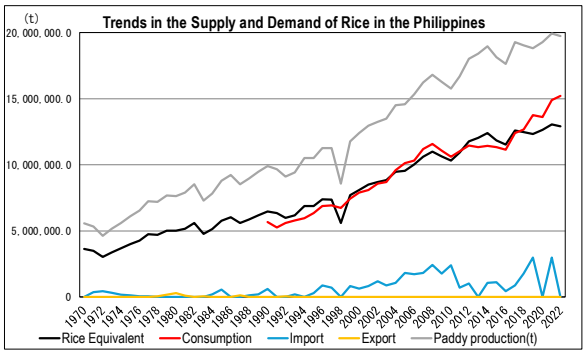
Calculation method

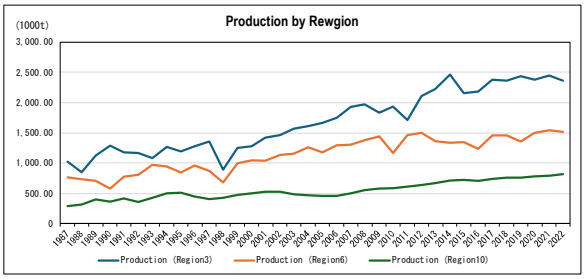
※ Production：Yield×Harvested Area
※ The amount of rice produced was calculated by converting the data on the production of paddy (palay) using the conversion ratios published by the Philippine Statistics Authority. (Rice = Palay x 0.654)
※ The consumption amount uses the Net Food Disposable (NFD) value. The calculation method for NFD is as follows.

Gross Supply(GS)=Beginning stock＋Production＋Imports
Net Supply Disposable(NSD)=GS-(Exports＋Ending Stock)
Net Food Disposable(NFD)=NSD-(F＋S＋W＋FU＋NFU)
F: quantity used for feeds
S: quantity used for seeds
W: quantity lost/spoiled(waste)
FU: quantity processed for food use
NFU: quantity processed for non-food use

※ The surplus amount was calculated as the difference between the amount of rice produced and the amount consumed.
※ The self-sufficiency rate was calculated as production volume/NSD (net sales).

3. Supply and Demand Trends by Region

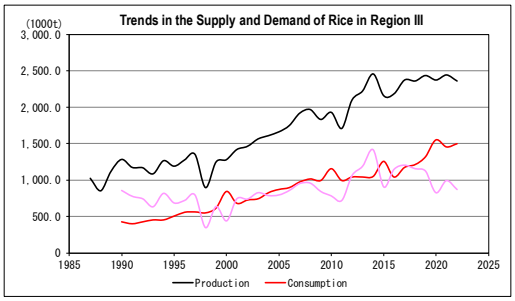


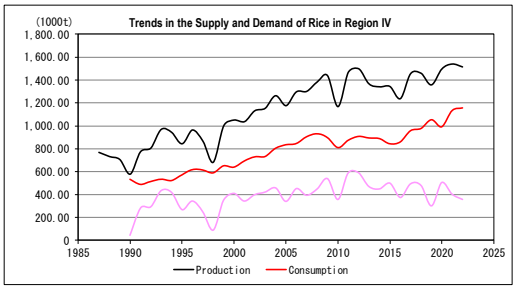


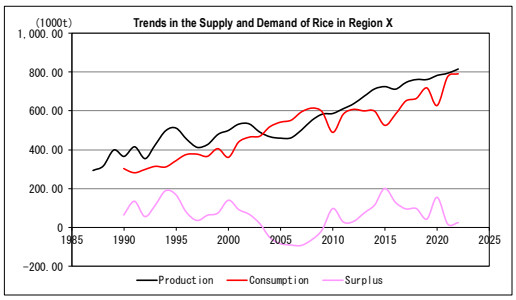
*Production, consumption and surplus figures are all calculated on a rice-milled basis.
*Production figures are calculated using the Conversion Ratios published by the Philippine Statistics Authority, which converts the production data for paddy rice (palay) into rice. (Rice=Palay×0.654)
*Consumption figures are calculated using NFD (per capita) x population. The population figures used here are estimated from the census figures for each decade.

Source） FAOSTAT,Philippine Statistics Authority OpenSTAT

Looking at the country as a whole, the trend of consumption exceeding production continues, and the gap between production and consumption is widening. In Regions III and VI, where rice production is high, production greatly exceeds consumption. On the other hand, in Region X, consumption and production are about the same.







Source

Yield, Harvested Area, Import/ Export Volume：FAOSTAT
Consumption（Net Food Disposable）：Philippine statistics authority

Calculation method

※ Production：Yield×Harvested Area
※ The amount of rice produced was calculated by converting the data on the production of paddy (palay) using the conversion ratios published by the Philippine Statistics Authority. (Rice = Palay x 0.654)
※ The consumption amount uses the Net Food Disposable (NFD) value. The calculation method for NFD is as follows.

Gross Supply(GS)=Beginning stock＋Production＋Imports
Net Supply Disposable(NSD)=GS-(Exports＋Ending Stock)
Net Food Disposable(NFD)=NSD-(F＋S＋W＋FU＋NFU)
F: quantity used for feeds
S: quantity used for seeds
W: quantity lost/spoiled(waste)
FU: quantity processed for food use
NFU: quantity processed for non-food use

※ The surplus amount was calculated as the difference between the amount of rice produced and the amount consumed.
※ The self-sufficiency rate was calculated as production volume/NSD (net sales).

Appendix 3 Results of the Value Chain Workshop (VC Matrix)

(1) Value Chain Matrix (Nueva Ecija)

	Farmer Group		Collectors (Palay Buyer)	Rice Millers	Wholesalers (Rice Trader)	Retailers (Rice Seller)
Stakeholders (name/location)	Golden Valley Agriculture Cooperative Kalabalihan ng Tabatas PMPC		BAMC(member:680) NAGKAKAISANG MAGSASAKA AGRI PMPC (member:1,400)	NMA PMPC BAGUMBAYAN PMPC (700 members)		KADIWA STORE
Products	Dry Season Palay (Hybrid, Fresh)		[Inbred Rice/ Palay] N-SIC 216 N-SIC 222 [Hybrid Rice] LP937,534 SL8H	[RICE] 1. Straight mill 2.Semi Graded 3.Whole Grain 4.Special rice Rice bran, Rice husk, Sorter	[Palay] A: 222, SL8, Hybrid B: 216, 218, 160, 402, 480, 152 [Rice] Regular Mill (SINANDOMENG, ANJELICA) Well Milled (DINURADO, JASMINE)	[Varieties] ・R-216/218: 500 sacks/25kilo/season ・LONGPING: 200 sacks/25kilo/season - Inbred: R-216/218 low yield →More production cost - Hybrid: LONGPING High yield →Less production cost LP2096(RC404H):112 days MAGAT(PSB RC26H):110 days MESTIZO(PSB RC72H):123 days
Activities	①Harvesting ②Hauling ③Selling	①Harvesting ②Hauling ③Drying ④Selling	Collecting Palay from farm, Dryer(Mechanical during wet, Solar during dry), Storage, Selling	Palay buying, Palay drying, Rice milling, Milling services, Rice trading, Whole sale, Retail	Buying, Drying, Delivery, selling, milling, storing	・Buying ・Selling ・Repacking
Price (average buying & selling price)	Fresh： PHP23.0/kg (buyer's price)	Fresh： PHP28.0/kg (buyer's price)	[Farm gate Price](unhusk) - Wet: PHP20/kg N-SIC 216,218,160/ LP 937,534/ SL 19,20 →After drying PHP28/kg Jackpot: PHP17-18/kg, N-SIC 222 - Dry: PHP23/kg N-SIC 216,218,160/ LP 937,534/ SL 19/20 →After drying PHP30-32/kg Jackpot: PHP20/kg, N-SIC 222 →After drying PHP28/kg	・Palay Buying Dry: PHP26-30/kg (218 is ＋ PHP3) ・Rice selling Average Price: PHP1100-1300/25kg ・Milling fee PHP80/50kg ・Drying fee PHP2/kg of palay	[Buying palay] ・Wet A: PHP17.50/kg B: PHP18/kg ・Dry A: PHP24.50/kg(Pick-up price) PHP25/kg(deliver) B: PHP26/kg (Pick-up price) PHP27/kg(deliver)	[Buying] R-216/218: PHP52/kg LONGPING: PHP46/kg [Selling] R-216/218: PHP54/kg LONGPING: PHP48/kg
Condition of Transaction w/Buyers and/or Sellers, Consumers preferences	Moisture Content:25-30% 180 cavans/10tons/ha Mode of payment cash	Moisture Content:14% Mode of payment cash	・Moisture content high moisture content: lower price lower moisture content: high price ・Payment: cash basis ・The price depends on rice variety. Mix variety(rumble): lower price ・the more cavans(1 load truck the higher price)	・Ideal moisture content: 14-15% ・Variety 1.Long Grain 2.Hybrid 3.Inbred 4.Rumble	・Long Grain ・Moisture(Wet:28%,Dry;14%) ・Varietal (Consideration) ・Straight Mill(includes Broken, Head Rice) ・Whole Grain(Head Rice)	・Buying stock ratio: 60% Well Milled, 40% Milled ・Consumer preference: Sticky/ Aromatic ・Payment terms: 1. cash, 2. 15 day credit, 3. 30 day credit

	Farmer Group	Collectors (Palay Buyer)		Rice Millers	Wholesalers (Rice Trader)	Retailers (Rice Seller)
Machinery/ Equipment	[Combine Harvester] DC-70 Kubota(owned by the cooperative) [Four wheel tractor] Kubota 3608	[Combine Harvester] DC-70 Kubota(owned by the cooperative) [Four wheel tractor] Kubota 3608	[Wet season] Use Mechanical dryer (rental) 80cavan for 8 hours 40t/8 hours PHP150/kilo (cost) [Dry season] Solar Drying PHP15/cavan with food Trucking PHP10-12/cavan depends on distance.	[Trucks] ELF, Forward, 10 wheeler, Trailer [Mechanical Drier] 2400 cav./50kg [Rice mill] ・G tech China ・4-6 tons rice/ hr ・Huller, Separator, Stoner, Whitener, Polisher, Color Sorter ・Fork Lift, Truck Scale ・Weighing scale, Automatic bagger	・Trucks ・Moisture Meter ・Warehouse ・Truck scale ・Dryers(Mechanical/Solar) ・Rice Mill ・Fork Life ・Trucks ・Weighing Scale ・Sacks	・Weighing scale 5 kilos ×1 10 kilos×1 ・Stitching machine (Sewing machine) ・Bags: 5kilos ・Rice box/Scoop
Facilities	3ha		Warehouse	Warehouse 150,000 cav. 30,000 cav.	Dryers (Mechanical, Solar) Rice mill Warehouse	・Warehouse(mini): 100 bags capacity ・Store(20 ㎡) ・Transport: Kolong kolong(1), Truck(2), Hauling(2)
Postharvest Losses	N/A	Max of 5% ①Post harvest losses due to lack of drying Facilities. ②Inclement weather condition leads to low quality of palay.	[Wet season] Higher moisture content: depends on weather condition Handling(karyada) PHP15-20/Cavan [Dry season] Lower moisture content the same cost in Handling(karyada) by storing rats/ birds/ binuriki/ resacking	・Warehousing palay 2% loss because rat and bird ・Milling recovery: 63-67% around 63%: LONGPING,NSIC 216,160 around 67%: NSIC 218	・Shrinkage 8-10kg/sack(50kg) Solar:8kg/sack Mechanical:10kg/sack ・Insect infestation(kuto,bukbok) ・Rodent/Birds ・Patogens	・Incomplete weight when delivered/ bought. ・Sudden/ abrupt price increase/ decrease. ・Spoilage ・Eaten by rodents
Ideal Solutions to the losses	N/A	Construction of post harvest facilities	[Wet season] ・adjust planting calendar ・Planting date May-September [Dry season] ・Harvest must be on time to avoid shattering ・Dry palay according to varieties to avoid mixing that causes lower price	Grain silo(silo)	Proper/Ideal Moisture content: 29% Right age of palay(120 days, late maturing) Good warehouse management ・Monitoring ・Sanitary(Cleanliness, orderliness) ・Pest control & management	・Weighing (1 by 1 or Sampling) ・Machine dispenser ・Baiting
Issues/ Concerns/ problems/ in the post harvest process	・Insufficient drying facilities specially during wet season ・Lack of storage facilities		1.Lack of drying facilities 2.Lack of man power(laborer) 3.Lack of warehouse 4.Lack of farm road 5.Lack of hauler(Machine) ・Produce in using Mechanical dryer is better in appearance than solar dryer	・Basic/ rudimentary drying ・Drying is a critical process where grains moisture is monitored before storage	・Quality ・Solar(low milling output) High percentage of broken grains ・Mechanical High milling output ・Good storage practices	・Quality manipulation(mixing graded/premium) ・Price fluctuation ・Poor housekeeping

(2) Value Chain Matrix (Iloilo City)

	Farmer Group	Collectors (Palay Buyer)		Rice Millers	Wholesalers (Rice Trader)	Retailers (Rice Seller)
Stake-Holders (name/ location)	BUFA-UGASAN-JUANICO IA POBSUR IA JALAS FA	BGA.DAWIS POTOTAN ILOILO CREDIT COOPRATIVE	Bangga Dawis Pototan Iloilo Credit Coop. Joel Patriarca (Private)	HAMTIC MPC/ HAMTIC, ANTIQUE	IBON MPC(AKLAN)/ PARRENAS GRAINS STORE(CAPD)	PARRENAS AGRICULTURAL SUPPLIES
Products (Variety, Grade, Volume)	・Palay ・Corn ・Farm service providers	Long Grains 216/ 512/ 402/ 480/ 508/ 506/ Habilis/ LP 937	[Short Grain] RC10/ 222 …not eating quality [Long Grain] 216/ 508/ 506/ 512/ 402/ 480/ SL19/ SL18/ Habilis/ LP937/ 308 …eating quality	Palay	[Local rice] -RMR:222/ RC10/ 216 -WMR: 222/ RC10/216 -Hybrid: BIGAME/ TA82/ SL8/ TACK POT 500bag/50kg/month [Imported] Princess BEA/ Sweet Hasmin/ Lutos 1000bag/50kg/month	[regular/local] ・proper grading ・Single pass rice mill [well milled/local] ・multi pass rice mill ・high % of whole grain [imported rice] ・Vietnam, Thailand
Value by Variety/ Grade (Sources of Value)	・RC-10 ・RC-222,216 ・Hybrid rice, Hybrid corn	[Wet] PHP24/kg [DRY] PHP28-30/kg	Buy [Wet] short:PHP20/kg long:PHP21/kg Sell [Wet] short:PHP20/kg long:PHP21/kg During dry season PHP31/kg	・Long grain [Well milled] PHP2,150/sack of 50kg, 0-10% brokens [Premium] PHP2,450/sack of 50kg, 0-1% broken	[Local rice] RMR: PHP2,400/50kg WMR: PHP2,500/50kg [Imported rice] PRINCESSBEA: PHP1,250/25kg SWEET HASMIN: PHP1,300/25kg LUTOS:PHP1,225/25kg	[Retailed Price/kilo] ・regular: PHP52.00 ・well milled: PHP54.00 ・imported rice: PHP56.0((Last Harvest Season) ・regular: PHP55.00 ・well milled: PHP57.00 ・imported rice: PHP53.0(
Condition of Transaction w/Buyers and/or Sellers	Fresh palay: Farmers→buyers Dry palay: Farmers→IA The price depends on the quality and variety of palay and also volume. [Average price last cropping] ・Fresh palay:20.00-24.00 ・Dry palay:24.00-28.00	CASH (From the operating funds of coop /DA seeds money), Milled rice Php2700/50kg (All variety)	・Color of the grain at >20% visible green grain(immature)	Color: White Variety: Hybrid (free from DA/ Certified seeds from seed growers) Moisture Content: Wet/Dry	[Quality of the rice] ・color/ texture ・expand of the rice ・25-30% of broken rice ・aroma	[Quality] Aroma/ Texture/ Whiteness color [Weight] sometimes the weight of local milled bag varies
Machinery/ Equipment (type, spec, owner, issues)	[Land preparation] ・4IA&FA Hand tractor 7Hp(8ha/day) Disadvantage: Time-consuming ・4IA&FA 4wheel tractor(2-3ha/day) Disadvantage: Expensive maintenance and cannot operat in muddy areas. [Crop establishment] ・4IA&FA Transplanter ・2IA&FA Walk behind -3IA&FA ride-on Disadvantage: cannot operate on puddy areas -2IA&FA precision rice seeder -1FA drum seeder [Harvesting] -4IA&FA Reaper -4IA&FA Harvester Disadvantage: can't operate in muddy area, high maintenance cost , expensive investment/ mobilization/ soil compaction	Weighing Scale ×2 Moisture Meter ×1 Flatbed Dryer ×1 Hauling truck ×1 Trailer for farm to market road ×2	6 wheel trucks	Combined harvester ×4units Tractor (rotary) ×4units Rice Mill ×1: RPC3 with color sorter Recirculating Dryer ×3: diesel & electric Flatbed Dryer ×1: powered by rice hull	[Delivery] ・Elf (Isuzu, small size) ・Forward (Isuzu, medium size) ・10-wheeler truck	Scale Wholesaler delivers to the store

	Farmer Group		Collectors (Palay Buyer)		Rice Millers	Wholesalers (Rice Trader)	Retailers (Rice Seller)
Facilities (ha, name, spec, issues)	[UGASAN-JUANCO IA] ・151 ha, 102 members (ave. 1.4ha/member), Irrigated CIS, 3.6 MT/ha(total:543.6 MT) [JALAS FA] ・63ha, 115 members (ave. 5ha/member), Irrigated: NIS, 5.4 MT/ha(total:340.2 MT)	[BUFA] ・102ha, 70 members (ave. 1.45ha/member), Rainfed, 4.3 MT/ha(total:436.6 MT) [POBSUR IA] ・65ha, 46 members (ave. 1.4ha/member), Irrigated: CIS, 4.05 MT/ha(total:263.25 MT)	Flat bed dryer Farmland of member(300 ha)	sacks/ties truck(6wheeler) weighing scale	Irrigated (1,324ha), Rainfed (1,659ha), Upland (150ha) Rice mill-TPH: 50 sacks/hr Dryer-TPB: Recirculating 6t/Batch Flatbed 6t/Batch 2 Warehouse: 3,000 sacks capa. Seed Growers: 100ha with different variety of seeds	Dryer(flat bed) 900bag/load Warehouse 5000bag Store 500bag	Store: 1 store in CAPIS Storage room: 50 bags at 50kg/bag LGU's rent
Losses (volume or %,cause)	[Production losses] Weather condition/ Forced Majeure. Pest & disease/ Lack of water supply [Post Harvest losses] 12% [Solar dryer] Animals/ Vehicles		・Decrease in weight due to moisture reduction ・Impurities ・Immature Grains ・Rodents infestation ・Transportation ・10-15% Losses	If millers cannot get the palay immediately, it causes loss weight at approximately 2 kg/sack due to shrinkage. (overnight)	[Factors] ・lack of new technology ・effects of climate change ・common pests ・sun drying on the road ・traditional way of harvesting involves a lot of workers ・poor irrigation system resulting to high cost of water to supply the farms	2%-5% ・rodents ・moisture from storage ・transportation losses due to unexpected weather	Infestation Rats, Wet air 10% Loss Due to the condition of storage
Ideal Solutions to the losses	・Lack of storage and dryer facilities We need assistance for the provision of machinery, storage, dryer, and rice mill(upgraded) ・Lack of capital We need cash assistance, farm inputs support.	・Lack of Agricultural extension Workers (AEWs) in terms of proper information dissemination. ・LGU propose additional AEWs to supervise the farmers in the locality. We need enough water supply.	・Harvest must be pre cleaned ・The palay should be harvest when 80-85% of the grains are yellow colored ・Good storage ・Additional hauling truck	enough transportation from the millers	・Religions monitoring and assistance of farm technicians from the MLGU ・Improve irrigation system ・Improve soil condition by introduction of bio-fertilizer and soil ameliorants ・Use of mechanical dryers ・Shift to mechanization ・Continuous access to seminars and trainings for farmers	・Improving storage facilities ・Improving delivery equipment	[Improve the storage] ・Pest Control ・Proper Piling
Challenges in the post-harvest process	To improve the production process, we need the upgraded.		・Weather conditions ・Increase in fuel ・Warehouse ・Rice mill ・Hauling truck(150 bags capacity)	transportation	・SAMA-SAMA: variety, time of land prep and harvest ・Standardize the size or area of farm plot(land consolidation) ・Reduce production cost to lower price of rice ・Procurement of add combined harvester(DC-93) ・Lack of warehouse space	Over stocking and over/ under supply of imported rice	Climate Change (General) Transportation(General) Communication(General) Local Competitors Inventory Management

(3) Value Chain Matrix (Bukidnon)

	Farmer Group	Collectors (Palay Buyer)		Rice Millers	Rice Miller and Wholesalers (Rice Trader)	Retailers (Rice Seller)
Stakeholders (name/location)	Mabuhay St. Nino G-16 IA Sinayawan G-7 IA KVC IA MCF IA	MARAMAG COMMUNITY MULTIPURPOSE COOPERATIVE (MACO MPC) & NATIONAL FOOD AUTHORITY (NFA)		Mr. Ariel E Alcosaba (mobile) VIMIAL, Valencia	MACO MPC	
Products	[Palay] ・Red rice ・Inbred RC222, RC216, RC440, TH82, LONGPING ・Hybrid Bigante, Quadro Alos	[Palay] ・Hybrid and inbred ・Any varieties(Premium and Ordinary)	Rice	Palay ※Service Provider	Milled Rice	
Activities	Transplanting(manual)/ Transplanter Sold direct to buyer/ trader(picked up)	* Weighing * Hauling/Trucking Services * Drying * Storage * Milling	* Storage * Canvassing/Marketing * Selling * Delivery * Collection	1. Grading 2. Hauling 3. Weighing 4. Drying 5. Storing 6. Milling	Milling	
Price (average buying & selling price)	[selling] ・Inbred PHP25/kg (moisture content 20%, Dry season) PHP20/kg (wet season) ・Hybrid same as inbred	Field Weight: 20-23.00 Pesos Dry Weight: 26.00 Pesos	PREMIUM RICE : 58-62.00 Pesos ORDINARY RICE : 55-57.00 Pesos	Grading: free Hauling: 20cent/kg Weighing: free Drying: free Storing: free Milling: PHP200/sack of 50kg rice, PHP100/sack of 25kg rice	[Buying] PHP22/kg(Palay) [Selling] PHP44/kg(milled rice) [Milling service fee] PHP150/50kg rice(wet palay) PHP140/50kg rice(dried palay) ready to mill	
Condition of Transaction w/Buyers and/or Sellers, Consumers preferences	Picked up by buyer cash later payment of buyer 7 days: ＋PHP1.00 30 days: ＋PHP1.50-2.00	* Variety Of Palay (Premium/Ordinary) * Moisture Content (Field Wet/Skin Dry) * Purity * Volume * Existing Farm Gate Price	Depends on variety	Package	・Cash ・Depending on the quality of palay, the net weight is deducted by 7%-20%	
Machinery/ Equipment	・Combine Harvester ・Thresher ・Bagging ・Tractor(50hp): Plowing ・Weighing scale	* Trucks * Moisture Meter Tester * Weighing Scale (Dial Type or Platform)	* Trucks * Weighing Scale (Dial type)	・Moisture content tester ・Tractor(50hp) with trailer ・Truck ・Large Scale (weighing scale) ・Solar Dryer(500 ㎡) (Cement permanent) ・Warehouse(100 ㎡) ・Single Pass Rice Mill(1.5t/hour) RMR (Regular Milled Rice) only	[Rice mill] ・Single pass 0.5-0.6t/hour ・Multi pass 3.0TPH Fork lift	

	Farmer Group	Collectors (Palay Buyer)		Rice Millers	Rice Miller and Wholesalers (Rice Trader)	Retailers (Rice Seller)
Facilities	・Sacks ・Laminated Sakoline /Tarp	* Mechanical Dryer / Solar Dryer/Multi Purpose Drying Pavement (MACO is 6t/Unit) (NFA is 5t/Unit) * Rice Mill (MACO is 10 Bags/Hour) * Warehouse (MACO 2,000 Bags) (NFA 50,000 - 100,000 Bags)	* Warehouse		Solar dryer warehouse(1000 ㎡)	
Postharvest Losses	・Lack of combine harvester ・Delayed Harvesting services ・Losses due to stop buying during unfavorable weather condition a synchronize harvesting ・Threshing losses ・Lodging due to weather condition ・Shattered during piling and transferred to threshing machine	[Quantitative] * MACO is 15-20% (Hauling to milling) * NFA is 1% per MC (Drying Activity) [Qualitative] * MACO is 10% * -condition of palay upon purchase * -circumstance that may arise attributed by environmental factors	* Storage and transportation of goods (MACO 3-5%)	1) Hauling 1% 2) Drying 5% 3) Storing 5% (pest, rodents, birds, sweeping) 4) Milling loss 3% Overall loss: 14% Milling recovery 61-67%	N/A ※Milling recovery is 60-67% for good palay/ 48% for low quality palay	
Ideal Solutions to the losses	・Provision of adequate combine harvester to cater the whole area ・Provide paddy hauler with rotavator ・Provision of post-harvest facilities	[Quantitative] * Efficient handling of goods [Qualitative] * Efficient handling of goods * Varietal Selection * Adaption of modern technique of grains processing (RPC /Mechanization)	* Employment of handling efficiency	・Use new sacks ・mechanical sewer ・Proper warehouse (facility, screen, steel roofing, ventilator) ・Stationary multi pass rice mill	accept well-dried palay only	
Issues/ Concerns/ problems/ in the post harvest process	・Farm road ・Lack of maintenance ・available tractor lack of paddy wheel ・Lack of post harvest facilities Warehouse/ Solar dryer/ mechanical dryer/ truck hauler ・ Lack of farm road access	* Shortage of available manpower * Frequent power interruption * Unstable price of fuel * Weather condition * Lack Of Silo	* High competition on market * Collection of on credit sales	・Insufficient capital to upgrade facility ・Insufficient training on operation of equipment ・Lack of proper operation of rice mill	・Lack of Mechanical dryer for back up in case of bad weather	

Appendix 4 Result of the Gap Analysis

1. List of Rice Project by Philippines government

No.	Project code	Implementing organization	Activity	Contents of Project	Target area	Period	Budget
1	APRP-1	DA	Production Support, Irrigation Development Services, other infrastructure and Post-Harvest Development Services, Market Development Services, Training Services, Research and Development Services	Support Service(Production) Infrastructure(Production) Mechanization(Postharvest) Training(Marketing)	All over the country	2011-2016	
2	APPP-1	DA, DBP	Financial Assistance	Credit(Production)	All over the country	2024	PHP3.0billion
3	PGP-1	DOST-PCAARRD	Research and develop red edible seaweeds for enhancing rice production	R & D(Production)			
4	F2C2-1	DA-PAFES	Clustering of farmers, Market facilitation and linkage, Tranining	Training(Marketing)	All over the country	2020	
5	MRIDP-1	DA	Developing and rehabilitating infrastructure, Farm clustering, Degitalization of value chain system	Infrastructure(Production)	All over the country	2023	
6	NOAP-1	DA	Developing organic agriculture technologies	R & D(Production)	All over the country	2010-2020 2020-(ongoing)	
7	NRP-1	DA	Production Support Services, Nitrogen-Fixing Bio-Fertilizer and Vouchers	Support Service/ Provision(Production)	All over the country		PHP30.8billion(2024)
8	NIA-1	NIA	Contract farming (Providing imput, Training management of IA)	Support Service(Production)	All over the country	2024-	PHP3.4billion(2024)
9	RCEF-1	PhilMech PhilRice LandBank DBP DA-ATI TESDA	Providing machinery and equipment, Provideing rice seeds, Financial Assistance, Training for rice production and operation of machinery	Mechanization(Production) Mechanization(Postharvest) Provision(Seed) R & D(Seed) Training(Production) Training(Credit)	All over the country	2019-2025	PHP10.0billion
10	RRP-1	DA	Providing inbrid and hybrid rice seeds with fertilizer	Provision(Production)	All over the country	2022	PHP8.5billion

2. List of Rice Project by International institutions

No.	Funding Agency	Project code	Implementing organization	Activity	Contents of Project	Target area	Period	Budget
1	IFAD	IFAD-1	DA NIA NFA	Strengthening Irrigator's Associations, Provision of Production Inputs and Related Support Services, Rural Infrastructure Improvement, Provision of Marketing and Post-Harvest Support Services	Infrastructure(Production) Training(Production) Provision(Production) Provision(Postharvest) Training(Marketing)	Region II, III, V, VI, VIII, X, XI	December 17, 2008 – December 31, 2016	PHP2.0billion
2	IFAD	IFAD-2	DA-RFO VI,VIII	Providing good quality certified rice seeds and fertilizers	Provision(Seed) Provision(Production)	Region VI,VIII	April 2, 2014 – June 30, 2015	PHP180million
3	USAID	USAID-1	PhilRice	Construction of innovation center	R&D(Seed) R&D(Production)	Region III	2017- 2021	PHP302million
4	KOICA	KOICA-1	PhilMech	Construction of the Modern Integrated Rice Processing Complexes Facilities, Training of professional management team in the operation, Management of the RPC facilities and equipment	Infrastructure(Postharvest) Training(Postharvest)	Region II, III, VI, XI	March 7,2009 – June 30, 2014	PHP865million
5	KOICA	KOICA-2	PhilRice BPI	Providing facilities and advanced equipment for high-quality seed production	Infrastructure(Seed)	Region I, III	November 31, 2013 – May 2, 2017	PHP180million
6	KOPIA	KOPIA-1	PhilRice	Providing high-quality seeds and training rice production	Mechanization(Production) Training(Production) Support Service(Seed)	Region III, VI, VII	July 1, 2018 – December 31, 2019	PHP4.5million
7	MAFRA,KRC	MAFRA-1	PhilRice NFA	Providing warehouses and cold storage for seeds	Infrastructure(Seed)	Region I, II, III	November 1, 2022 – December 31, 2026 (ongoing)	USD4.5million
8	GIZ	GIZ-1	ATI PhilRice	Training for farming and marketing	Training(Production) Training(Marketing)	Region II, VI, VIII	March 1, 2014 – November 30, 2017	PHP90million
9	People's Republic of China	CHINA-1	DA–RFO III	Promoting mechanization of hybrid rice production and processing system, Developing varieties of hybrid rice seeds in the Philippine market	R&D(Seed) Mechanization(Production)	CAR, Region I, II, III, IV-B, V, VI, X, XI, XIII	September 23, 2011 – July 31, 2017	PHP163million
10	Ministry of Commerce, People's Republic of China	CHINA-2	DA–RFO III PhilSCAT-Project Management Office	Improving agricultural research (high yielding and quality hybrid rice varieties)	R&D(Seed) Mechanization(Production) R&D(Production)	Region III	January 1, 2018 – April 30, 2023	USD10million
11	FAO	FAO-1	PhilRice	Traning for promoting direct-seeded rice production system	Mechanization(Seed)	Region III	June 1, 2022 – October 31, 2023	PHP2.7million
12	FAO	FAO-2	PhilRice	Improving policies and training for farmers on sustanable rice production and mechanization	Training(Production)	Region III	January 22, 2021 – December 31, 2024 (ongoing)	PHP3.5million
13	ADB	ADB-1	DA	Financial assistance for reforming policy (Policy Based Loan)	Credit(Production) Credit(Marketing)	Philippines	May 2018-April 2020	USD400million
14	ADB	ADB-2	DA	Strengthing rice reserve system, Enhancing rice trade, Dezitalizing forecast of the rice market	Credit(Marketing)	Philippines	July 2014-September 2016	USD0.8million
15	WB	WB-1	DA NCIP BARMM	Improving infrastructure for production and marketing	Infrastructure(Production) Infrastructure(Marketing)	Region IX, X, XI, XII, XIII,BARRM	2023-2029 (ongoing)	USD125.0million

3. GAP Matrix of Rice Project

a) GAP Matrix of Rice Project【Philippines government】

	Infrastructure	Mechanization	Training	Provision/ Support Service	Research and development	Credit/Financial Assistant
Seed				RCEF-2	RCEF-2	
Production	MRIDP-1,APRP-1	RCEF-1,APRP-1	RCEF-4	NRP-1,RRP-1,APRP-1,NIA-1		RCEF-3,APPP-1
Post-harvest		RCEF-1				
Marketing			F2C2-1,APRP-1			

b) Summary of GAP Matrix of Rice Project【Philippines government】

	Infrastructure	Mechanization	Training	Provision/ Support Service	Research and development	Credit/Financial Assistant
Seed				1	1	
Production	2	2	1	4		2
Post-harvest		1				
Marketing			2			

c) GAP Matrix of Rice Project【International institutions】

	Infrastructure	Mechanization	Training	Provision/ Support Service	Research and development	Credit/Financial Assistant
Seed	KOICA-2,MAFRA-1	FAO-1		KOPIA-1,IFAD-2	USAID-1, CHINA-1, CHINA-2	
Production	IFAD-1,WB-1	KOPIA-1,CHINA-1,CHINA-2,FAO-2	IFAD-1, KOPIA-1 , FAO-2,GIZ-1	IFAD-1,IFAD-2	USAID-1,CHINA-2	ADB-1
Post-harvest	KOICA-1		KOICA-1	IFAD-1		
Marketing	WB-1		IFAD-1,GIZ-1			ADB-1,ADB-2

d) Summary of GAP Matrix of Rice Project【International institutions】

	Infrastructure	Mechanization	Training	Provision/ Support Service	Research and development	Credit/Financial Assistant
Seed	2	1		2	3	
Production	2	3	4	2	2	1
Post-harvest	1		1	1		
Marketing	1		2			2

e) GAP Matrix of Rice Project by Region【International institutions】

NCR

	Infrastructure	Mechanization	Training	Provision/ Support Service	Research and development	Credit/ Financial Assistant
Seed						
Production						
Post-harvest						
Marketing						

CAR

	Infrastructure	Mechanization	Training	Provision/ Support Service	Research and development	Credit/ Financial Assistant
Seed					CHINA-1	
Production		CHINA-1				
Post-harvest						
Marketing						

Region1

	Infrastructure	Mechanization	Training	Provision/ Support Service	Research and development	Credit/ Financial Assistant
Seed	KOICA-2, MAFRA-1				CHINA-1	
Production		CHINA-1				
Post-harvest						
Marketing						

Region2

	Infrastructure	Mechanization	Training	Provision/ Support Service	Research and development	Credit/ Financial Assistant
Seed	MAFRA-1				CHINA-1	
Production	IFAD-1	CHINA-1	IFAD-1, GIZ-1	IFAD-1		
Post-harvest	KOICA-1		KOICA-1	IFAD-1		
Marketing			IFAD-1, GIZ-1			

Region3

	Infrastructure	Mechanization	Training	Provision/ Support Service	Research and development	Credit/ Financial Assistant
Seed	KOICA-2, MAFRA-1	FAO-1		KOPIA-1	[illegible]	
Production	IFAD-1	[illegible]	[illegible]	IFAD-1	USAID-1, CHINA-2	
Post-harvest	KOICA-1		KOICA-1	IFAD-1		
Marketing			IFAD-1			

Region4A

	Infrastructure	Mechanization	Training	Provision/ Support Service	Research and development	Credit/ Financial Assistant
Seed						
Production						
Post-harvest						
Marketing						

Region4B

	Infrastructure	Mechanization	Training	Provision/ Support Service	Research and development	Credit/ Financial Assistant
Seed					CHINA-1	
Production		CHINA-1				
Post-harvest						
Marketing						

Region5

	Infrastructure	Mechanization	Training	Provision/ Support Service	Research and development	Credit/ Financial Assistant
Seed					CHINA-1	
Production	IFAD-1	CHINA-1	IFAD-1	IFAD-1		
Post-harvest				IFAD-1		
Marketing			IFAD-1			

Region6

	Infrastructure	Mechanization	Training	Provision/ Support Service	Research and development	Credit/ Financial Assistant
Seed				IFAD-2, KOPIA-1	CHINA-1	
Production	IFAD-1	KOPIA-1, CHINA-1	[illegible]	IFAD-1, IFAD-2		
Post-harvest	KOICA-1		KOICA-1	IFAD-1		
Marketing			IFAD-1, GIZ-1			

Region7

	Infrastructure	Mechanization	Training	Provision/ Support Service	Research and development	Credit/ Financial Assistant
Seed				KOPIA-1		
Production		KOPIA-1	KOPIA-1			
Post-harvest						
Marketing						

Region8

	Infrastructure	Mechanization	Training	Provision/ Support Service	Research and development	Credit/ Financial Assistant
Seed				IFAD-2, KOPIA-1		
Production	IFAD-1		IFAD-1, GIZ-1	IFAD-1, IFAD-2		
Post-harvest				IFAD-1		
Marketing			IFAD-1, GIZ-1			

Region9

	Infrastructure	Mechanization	Training	Provision/ Support Service	Research and development	Credit/ Financial Assistant
Seed						
Production						
Post-harvest						
Marketing	WB-1					

Region10

	Infrastructure	Mechanization	Training	Provision/ Support Service	Research and development	Credit/ Financial Assistant
Seed					CHINA-1	
Production	IFAD-1, WB-1	CHINA-1	IFAD-1	IFAD-1		
Post-harvest				IFAD-1		
Marketing	WB-1		IFAD-1			

Region11

	Infrastructure	Mechanization	Training	Provision/ Support Service	Research and development	Credit/ Financial Assistant
Seed					CHINA-1	
Production	IFAD-1, WB-1	CHINA-1	IFAD-1	IFAD-1		
Post-harvest	KOICA-1		KOICA-1	IFAD-1		
Marketing	WB-1		IFAD-1			

Region12

	Infrastructure	Mechanization	Training	Provision/ Support Service	Research and development	Credit/ Financial Assistant
Seed						
Production	WB-1					
Post-harvest						
Marketing	WB-1					

Region13

	Infrastructure	Mechanization	Training	Provision/ Support Service	Research and development	Credit/ Financial Assistant
Seed					CHINA-1	
Production	WB-1	CHINA-1				
Post-harvest						
Marketing	WB-1					

BARMM

	Infrastructure	Mechanization	Training	Provision/ Support Service	Research and development	Credit/ Financial Assistant
Seed						
Production	WB-1					
Post-harvest						
Marketing	WB-1					

f)Summery of GAP Matrix of Rice Project by Region【International institutions】

NCR

	Infrastructure	Mechanization	Training	Provision/ Support Service	Research and development	Credit/ Financial Assistant
Seed						
Production						
Post-harvest						
Marketing						

CAR

	Infrastructure	Mechanization	Training	Provision/ Support Service	Research and development	Credit/ Financial Assistant
Seed					1	
Production		1				
Post-harvest						
Marketing						

Region1

	Infrastructure	Mechanization	Training	Provision/ Support Service	Research and development	Credit/ Financial Assistant
Seed	2				1	
Production		1				
Post-harvest						
Marketing						

Region2

	Infrastructure	Mechanization	Training	Provision/ Support Service	Research and development	Credit/ Financial Assistant
Seed	1				1	
Production	1	1	2	1		
Post-harvest	1		1	1		
Marketing			2			

Region3

	Infrastructure	Mechanization	Training	Provision/ Support Service	Research and development	Credit/ Financial Assistant
Seed	2	1		1	3	
Production	1	3	3	1	2	
Post-harvest	1		1	1		
Marketing			1			

Region4A

	Infrastructure	Mechanization	Training	Provision/ Support Service	Research and development	Credit/ Financial Assistant
Seed						
Production						
Post-harvest						
Marketing						

Region4B

	Infrastructure	Mechanization	Training	Provision/ Support Service	Research and development	Credit/ Financial Assistant
Seed					1	
Production		1				
Post-harvest						
Marketing						

Region5

	Infrastructure	Mechanization	Training	Provision/ Support Service	Research and development	Credit/ Financial Assistant
Seed					1	
Production	1	1	1	1		
Post-harvest				1		
Marketing			1			

Region6

	Infrastructure	Mechanization	Training	Provision/ Support Service	Research and development	Credit/ Financial Assistant
Seed				2	1	
Production	1	2	3	2		
Post-harvest	1		1	1		
Marketing			2			

Region7

	Infrastructure	Mechanization	Training	Provision/ Support Service	Research and development	Credit/ Financial Assistant
Seed				1		
Production		1	1			
Post-harvest						
Marketing						

Region8

	Infrastructure	Mechanization	Training	Provision/ Support Service	Research and development	Credit/ Financial Assistant
Seed				2		
Production	1		2	2		
Post-harvest				1		
Marketing			2			

Region9

	Infrastructure	Mechanization	Training	Provision/ Support Service	Research and development	Credit/ Financial Assistant
Seed						
Production						
Post-harvest						
Marketing	1					

Region10

	Infrastructure	Mechanization	Training	Provision/ Support Service	Research and development	Credit/ Financial Assistant
Seed					1	
Production	1	1	1	1		
Post-harvest				1		
Marketing	1		1			

Region11

	Infrastructure	Mechanization	Training	Provision/ Support Service	Research and development	Credit/ Financial Assistant
Seed					1	
Production	1	1	1	1		
Post-harvest	1		1	1		
Marketing	1		1			

Region12

	Infrastructure	Mechanization	Training	Provision/ Support Service	Research and development	Credit/ Financial Assistant
Seed						
Production	1					
Post-harvest						
Marketing	1					

Region13

	Infrastructure	Mechanization	Training	Provision/ Support Service	Research and development	Credit/ Financial Assistant
Seed					1	
Production	1	1				
Post-harvest						
Marketing	1					

BARMM

	Infrastructure	Mechanization	Training	Provision/ Support Service	Research and development	Credit/ Financial Assistant
Seed						
Production	1					
Post-harvest						
Marketing	1					

Appendix 5 Rice Quality Standards and Factors Affecting Quality in the Philippines

Grade Parameter		Standard			Quality Affecting Factors	Measures by Growth Stage		
						Seed	Crop Management	Post Harvest
	Type	Registered Seed	Certified Seed					
Seed* (field)	Contrasting types (per 100m^2, Maximum)	1 hill	2 hills		Hybrid isolation, weed control	++	+	
	Red kernels (per 100m2, Maximum)	0 hill	1 hill		Hybrid isolation, weed control	++	+	
	Harmful weeds (per 100m2, Maximum)	5 hills	10 hills		Weed frequency	++	+	
Seed* (labo)	Ouilty (Minimum)	98.00%	98.00%		Weed control, quality and storage methods for foundation seeds	++	+	
	Weed seeds and other crop seeds (Maximum)	0.05%	0.10%		Weed frequency, adjustment (sorting)	++	+	+
	Foreign matters (Maximum)	2.00%	2.00%		Sun drying, preparation (sorting)			++
	Red kernels (per 500g, Maximum)	1 grain	2 grains		Weed control (early detection of abnormal plants, abnormal awns, and falling ears)	++	+	
	Foreign grain (per 500g, Maximum)	5 grains	20 grains		Weed control	++	+	+
	Germination rate (Minimum)	85.00%	85.00%		Water management, pest control, sorting, storage methods	++	+	++
	Moisture contents (Maximum)	14.00%	14.00%		Field management (drainage before harvest), preparation (drying)	++	+	++
	Grade	Premium	Grade 3		(4 grade in total)			
Paddy**	Purity (Maximum)	98.00%	85.00%		Purity of foundation and registered seeds, weed control	++	+	
	Total foreign matters (Maximum)	2.00%	15.00%				+	++
	Of which, weed seeds and other crop seeds (Maximum)	0.10%	0.50%		Weeding management, processing (grading)			++
	Of which, other foreign matters (Maximum)	1.90%	14.50%		Harvesting, sun drying, processing (grading)			++
	Chalky and immature kernels (Maximum)	3.00%	20.00%		Weather (high temperatures, low temperatures, poor solar radiation), crop management (no-leveling, excess numbers of kernels, root rotting, lack of water, late harvest), processing (grading)		++	+
	Damaged kernels (Maximum)	0.50%	5.00%		Crop management (seed management, early drainage, uneven paddy ear, etc.), over-drying, storage methods, weather (high temperature, drought), physical damages, pests		++	+
	Discolored kernels (Maximum)	0.50%	8.00%		Insect damage, pest damage (high moisture storage)		+	++
	Contrasting types (Maximum)	3.00%	18.00%		Not renewed seeds, crop management (weed rice removal)	++	++	
	Red kernels (Maximum)	1.00%	10.00%		Not renewed seeds, crop management (weed rice removal)	++	++	
	Grade	Premium	Grade 5		(6 grade in total)			
Rice**	Broken kernels (Maximum)	5.00%	45.00%		Weather (high temperature, low temperature, poor solar radiation), crop management		++	++
	Brewers (Broken rice with a milling precision of 1/4 or less, Maximum)	0.10%	2.00%		((no-leveling, excess numbers of kernels, root rotting, lack of water, late harvest), over-drying, processing (grading)		++	++
	Damaged kernels (Maximum)	0.50%	3.00%		Insect damage, pest damage (high moisture storage)		++	++
	Discolored kernels (Maximum)	0.50%	8.00%		Insect damage, pest damage (high moisture storage), poor storage management, processing (grading)		++	++
	Chalky kernels (Maximum)	4.00%	15.00%		Weather (high temperature, low temperature, poor solar radiation), crop management (no-leveling, excess numbers of kernels, root rotting, lack of water, late harvest), over-drying, processing (grading)		++	++
	Immature kernels (Maximum)	0.20%	2.00%		Weather (high temperature, low temperature, poor solar radiation), crop management (no-leveling, excess numbers of kernels, root rotting, lack of water, late harvest), over-drying, processing (grading)		++	++
	Contrasting types (Maximum)	3.00%	10.00%		Not renewed seeds, crop management (weed rice removal)		+	
	Red kernels (Maximum)	1.00%	7.00%		Not renewed seeds, crop management (weed rice removal)		+	+
	Foreign matters (Maximum)	0.025%	0.25%		Harvesting, sun drying, processing (grading and milling)		+	++
	Mixed with paddy (per 1000g, Maximum)	5粒	25粒		Processing (de-husking, grading, milling)			++

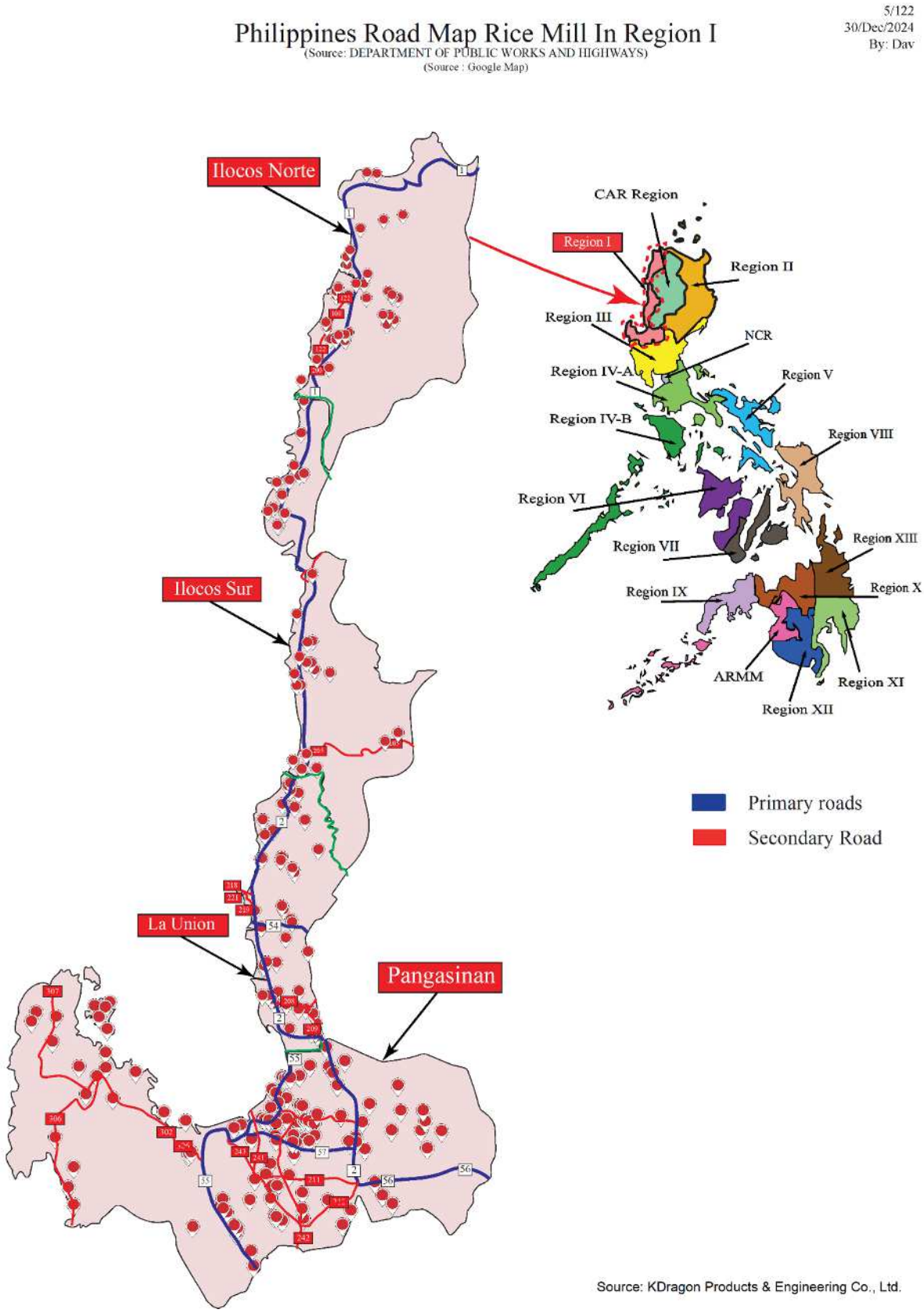
Souce: JICA Survey Team

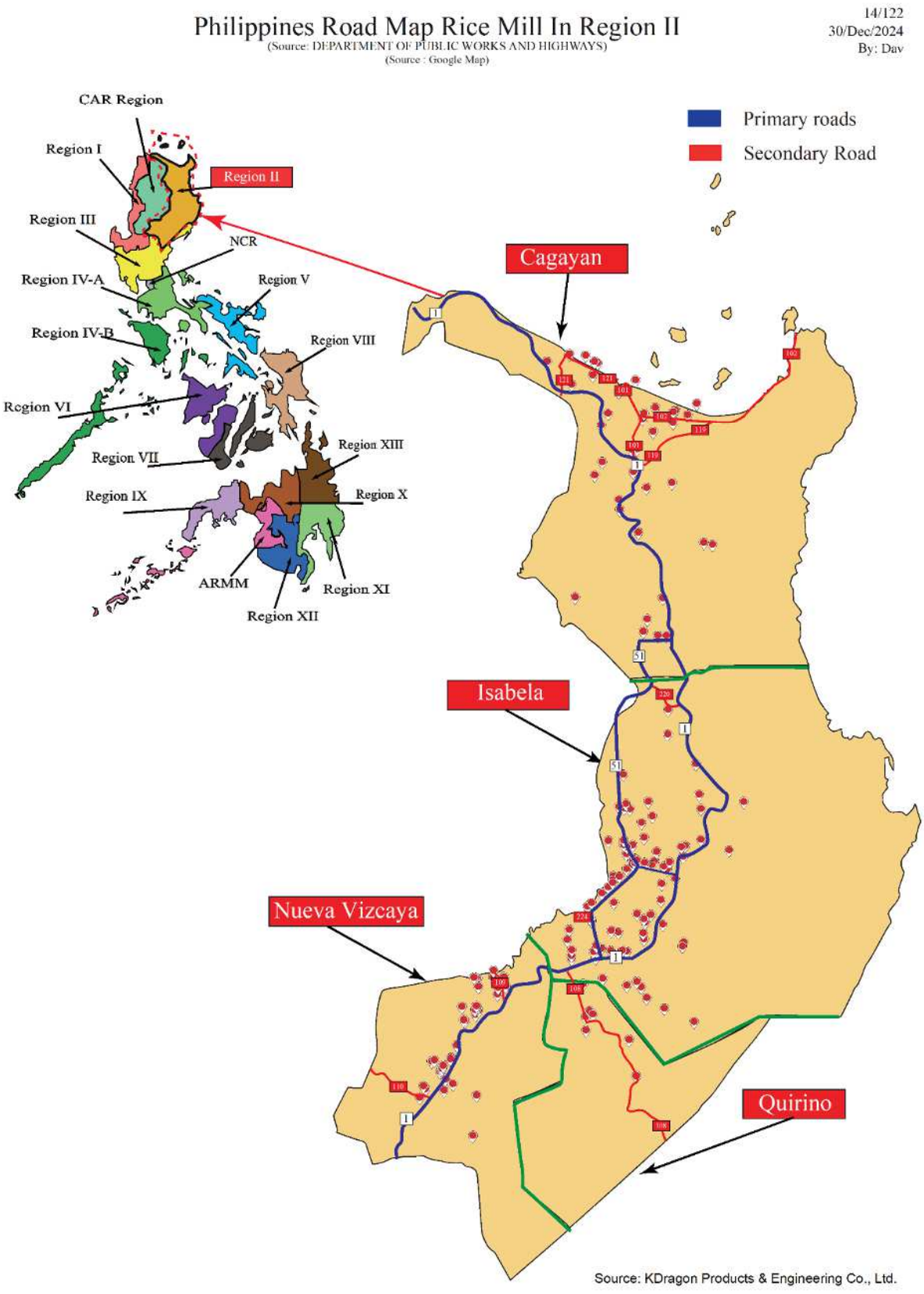
Note) *1 : Seed Certification Standard for Rice, Seed Quality Control Services, BPI

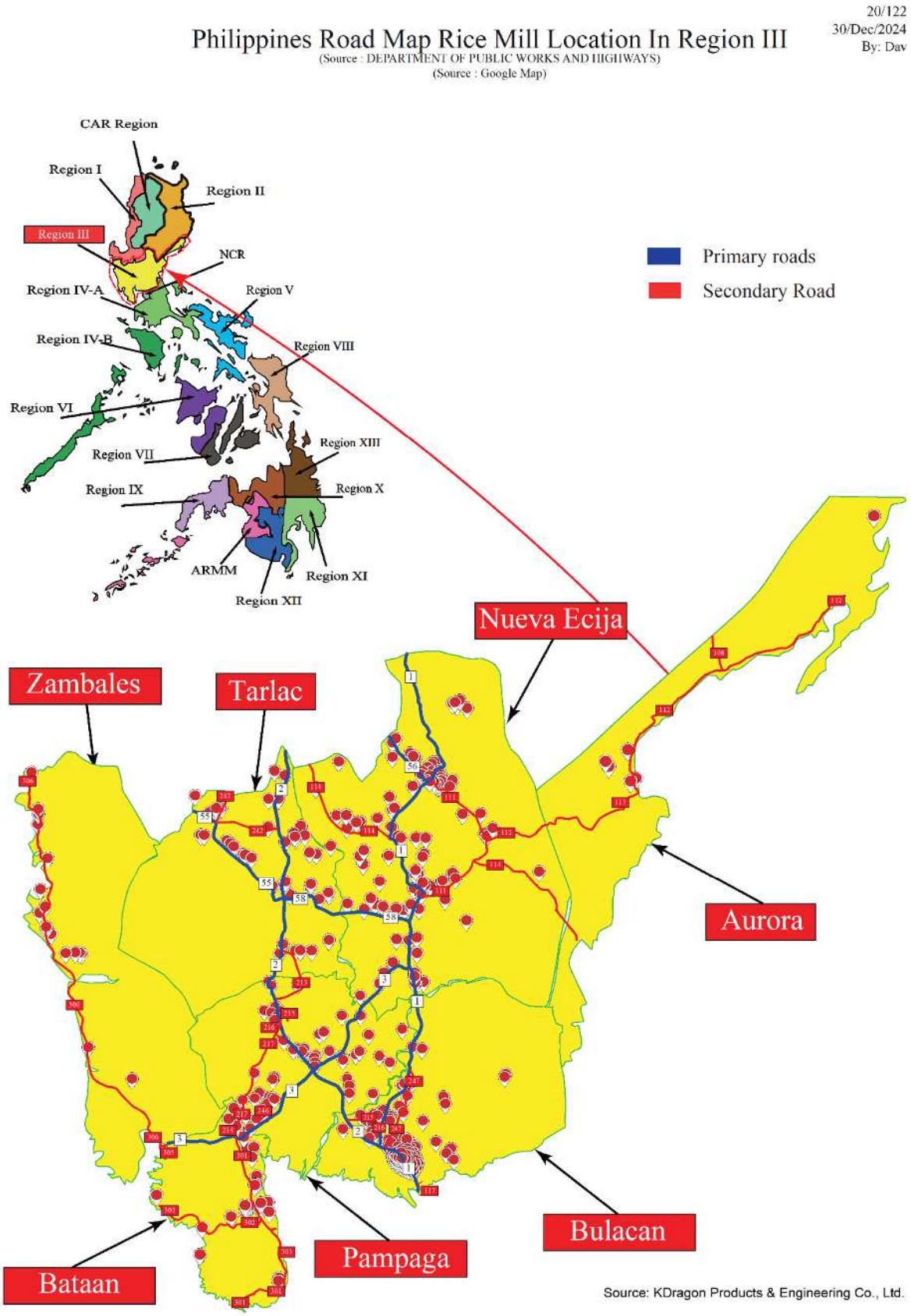
*2 : Philippine National Standard (PNS) for Grains – Grading and classification – Paddy and milled rice PNS/BAFS 290:2019

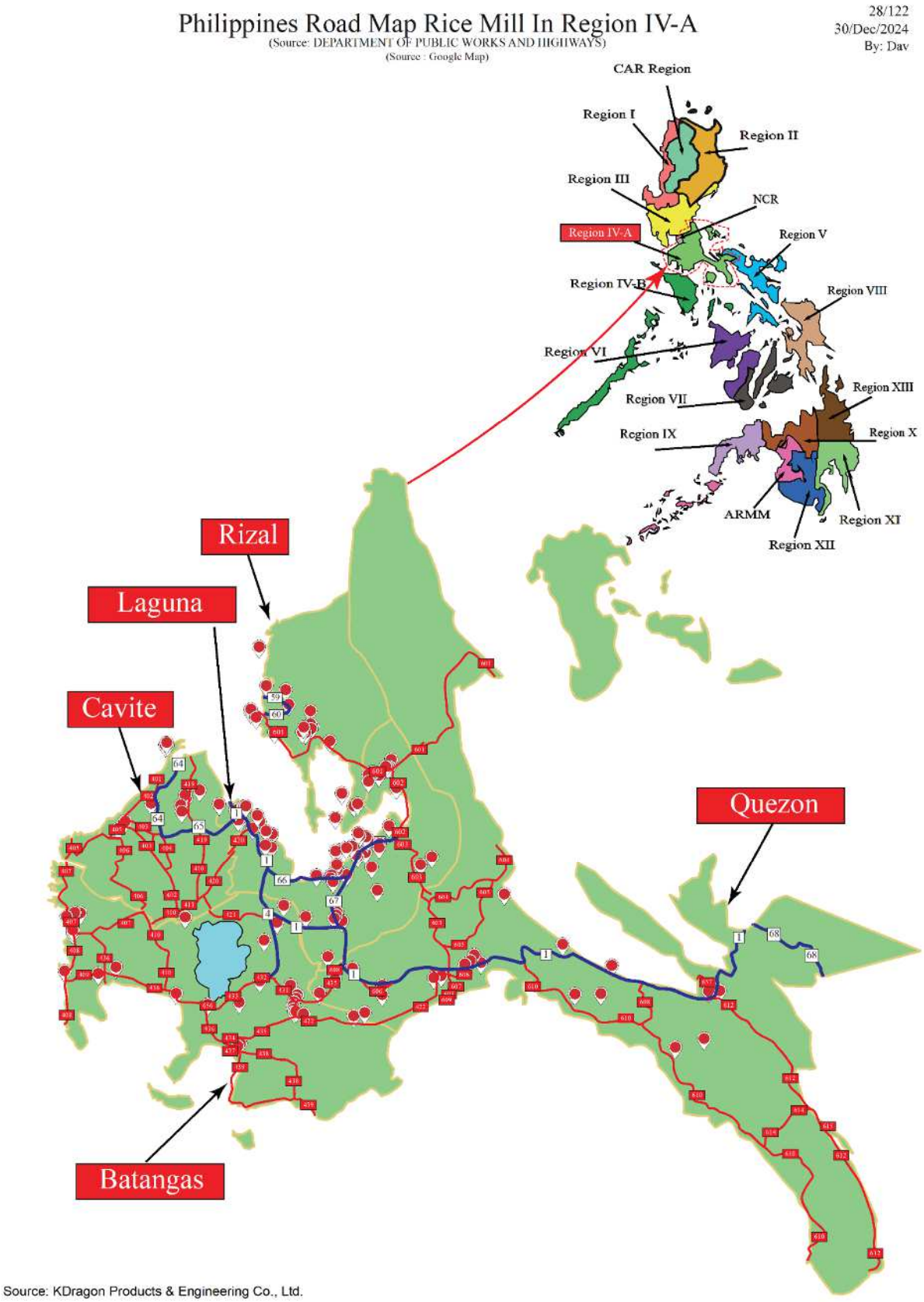
++: most important、+important

Appendix 6 Location Map of Rice Mills in the Philippines




Philippines Road Map Rice Mill In Region II
(Source: DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS)
(Source : Google Map)
14/122
30/Dec/2024
By: Dav
Primary roads
Secondary Road
CAR Region
Region I
Region II
Region III
NCR
Region IV-A
Region V
Region IV-B
Region VIII
Region VI
Region VII
Region XIII
Region IX
Region X
ARMM
Region XI
Region XII
Cagayan
Isabela
Nueva Vizcaya
Quirino
Source: KDragon Products & Engineering Co., Ltd.


20/122
30/Dec/2024
By: Dav
Philippines Road Map Rice Mill Location In Region III
(Source : DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS)
(Source : Google Map)
CAR Region
Region I
Region II
Region III
NCR
Region IV-A
Region V
Region IV-B
Region VIII
Region VI
Region XIII
Region VII
Region IX
Region X
ARMM
Region XI
Region XII
Primary roads
Secondary Road
Nueva Ecija
Zambales
Tarlac
Aurora
Bulacan
Pampaga
Bataan
Source: KDragon Products & Engineering Co., Ltd.

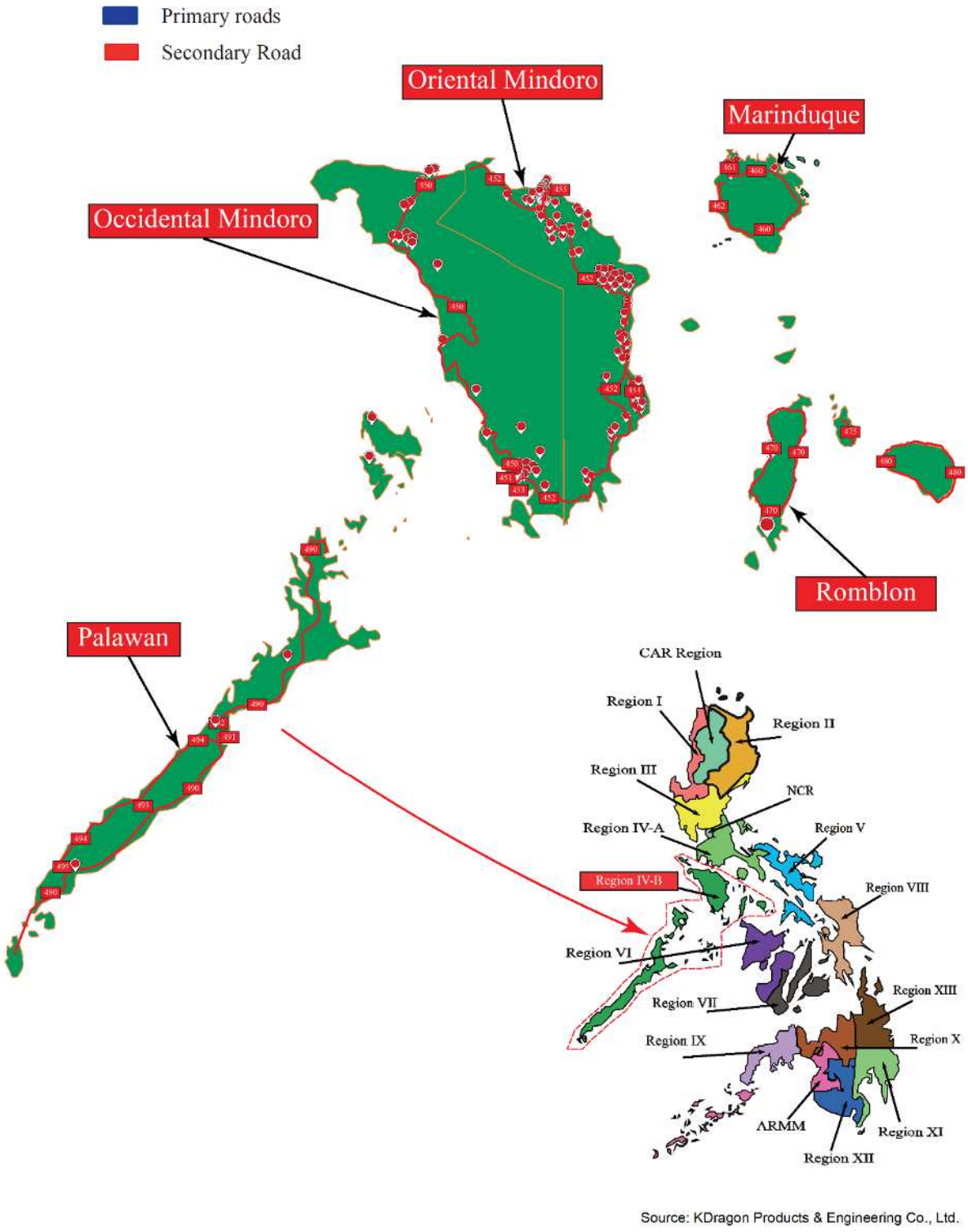


Source: KDragon Products & Engineering Co., Ltd.

35/122
30/Dec/2024
By:Dav

Philippines Road Map Rice Mill Location In Region IV-B

(Source : DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS)
(Source : Google Map)

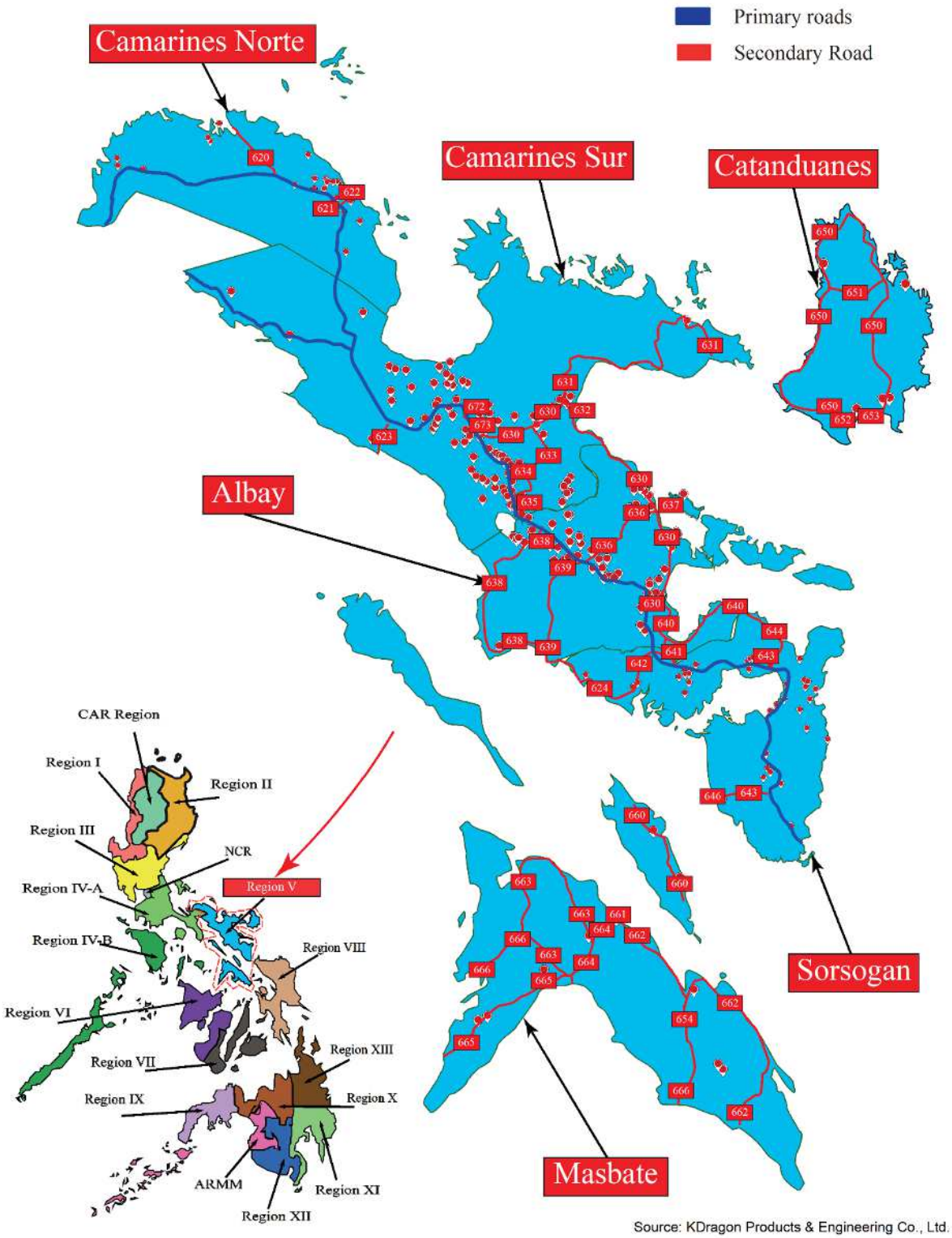


Source: KDragon Products & Engineering Co., Ltd.

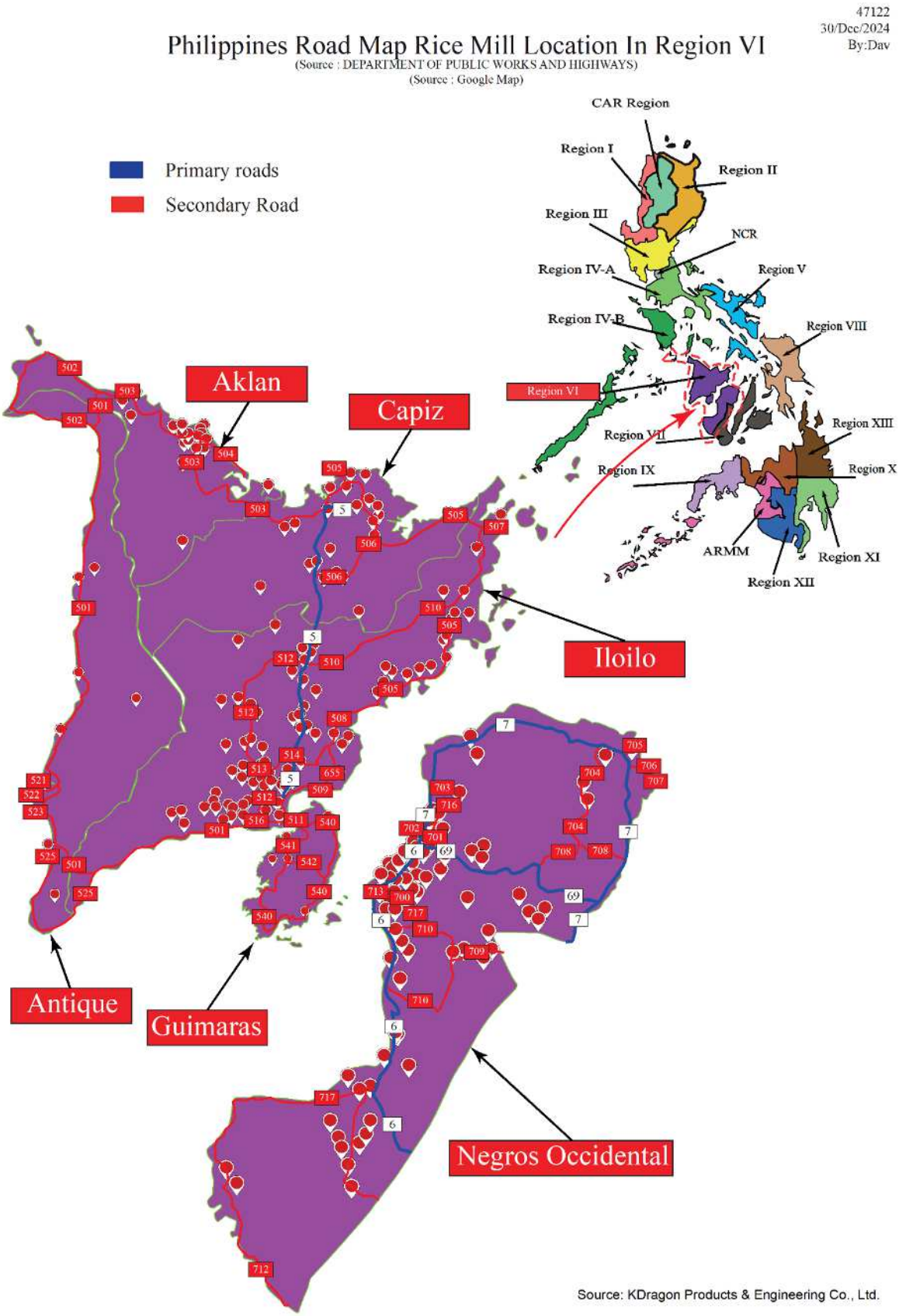
42/122
30/Dec/2024
By: Dav

Philippines Road Map Rice Mill Location In Region V

(Source : DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS)
(Source : Google Map)



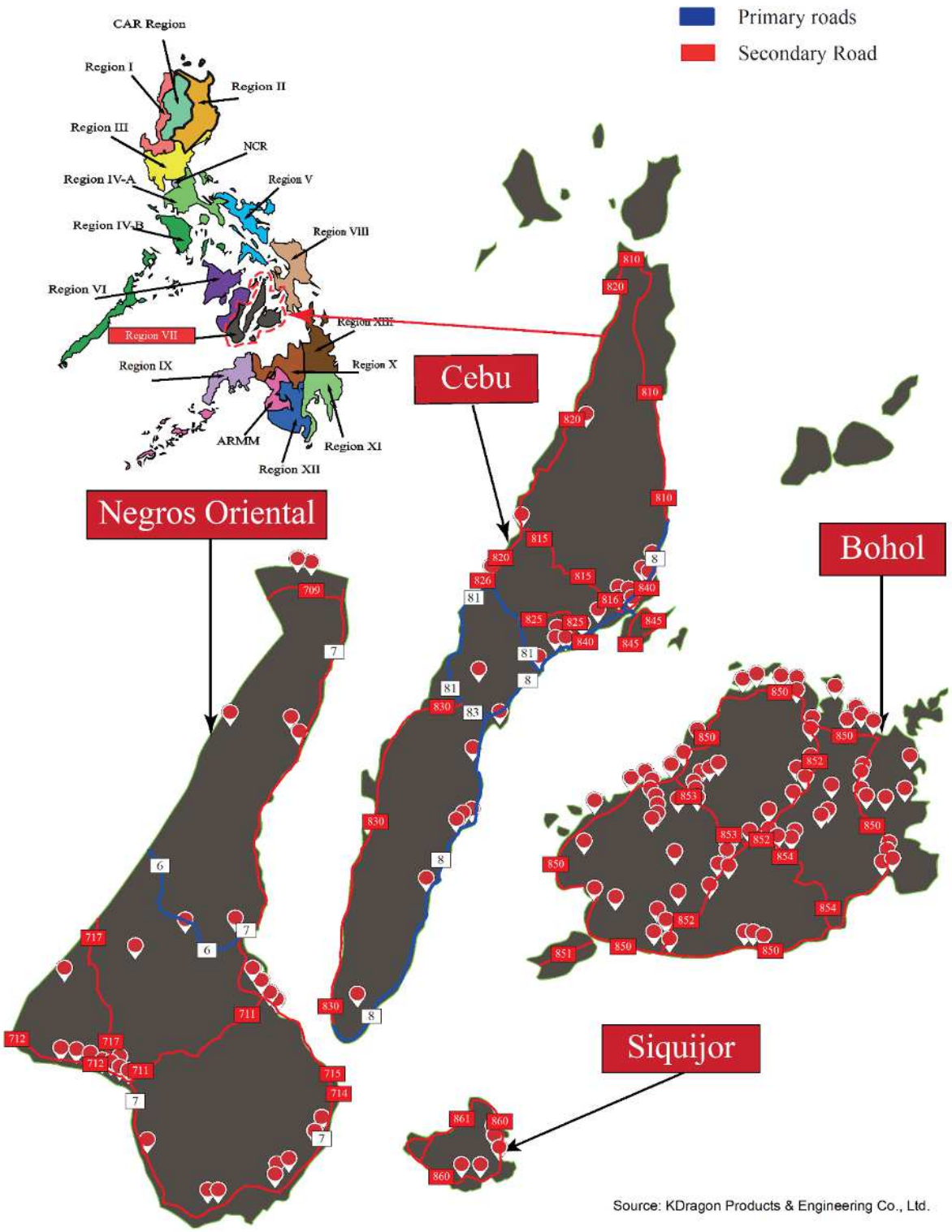
Source: KDragon Products & Engineering Co., Ltd.

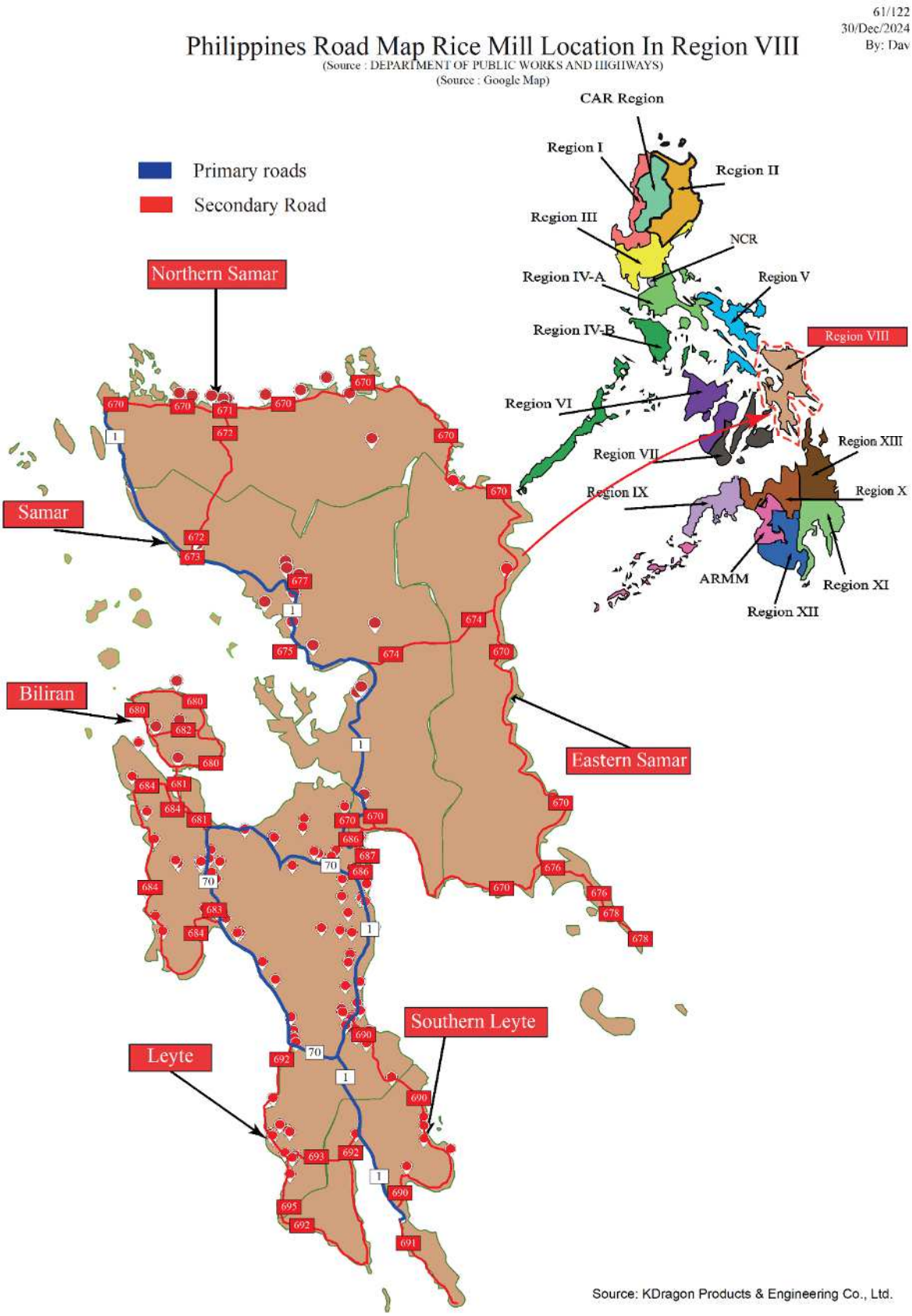

47122
30/Dec/2024
By:Dav
Philippines Road Map Rice Mill Location In Region VI
(Source : DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS)
(Source : Google Map)
Primary roads
Secondary Road
CAR Region
Region I
Region II
Region III
NCR
Region IV-A
Region V
Region IV-B
Region VIII
Region VI
Region VII
Region XIII
Region IX
Region X
ARMM
Region XI
Region XII
Aklan
Capiz
Iloilo
Antique
Guimaras
Negros Occidental
Source: KDragon Products & Engineering Co., Ltd.

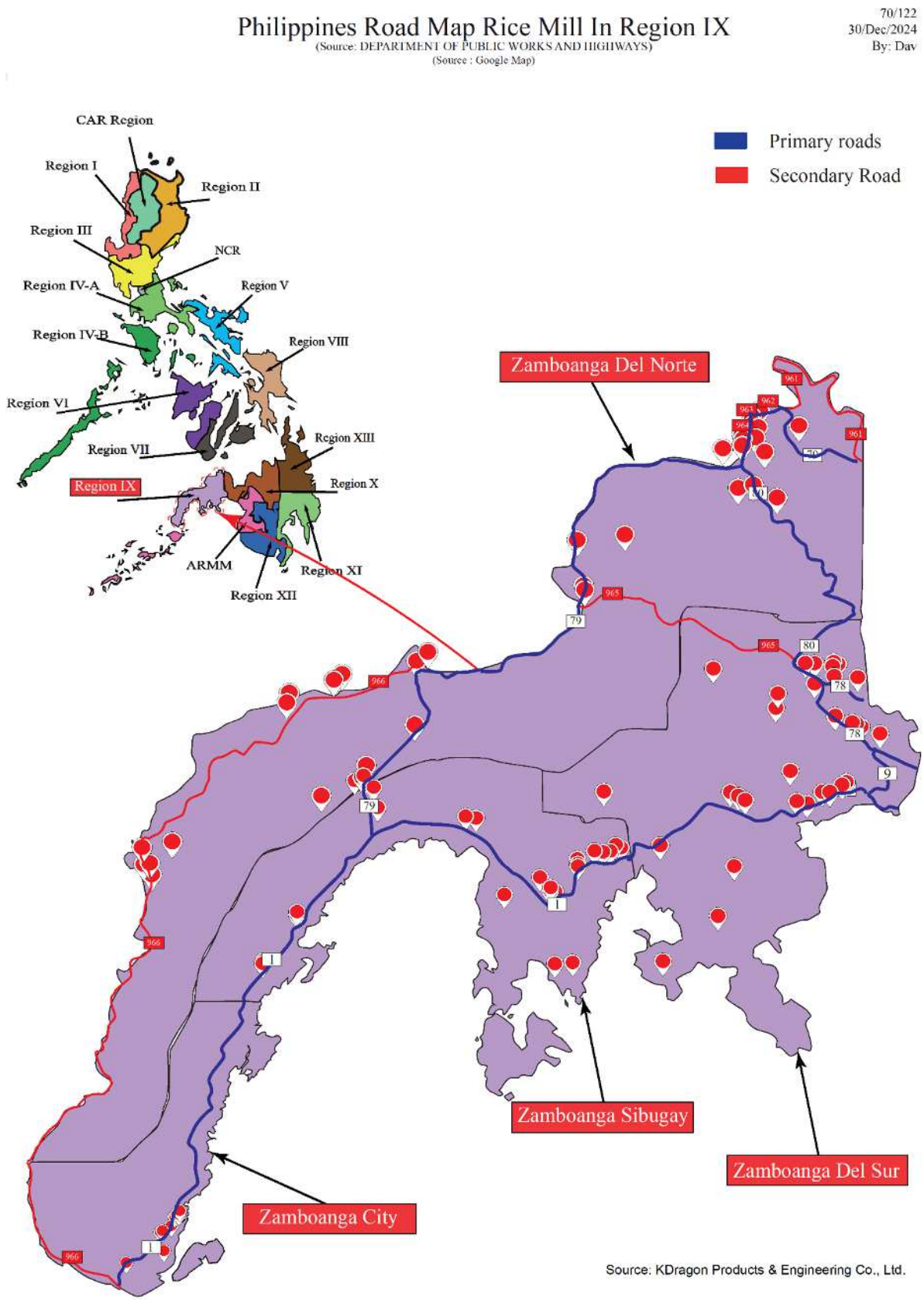
54/122
30/Dec/2024
By: Dav

Philippines Road Map Rice Mill Location In Region VII

(Source : DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS)
(Source : Google Map)



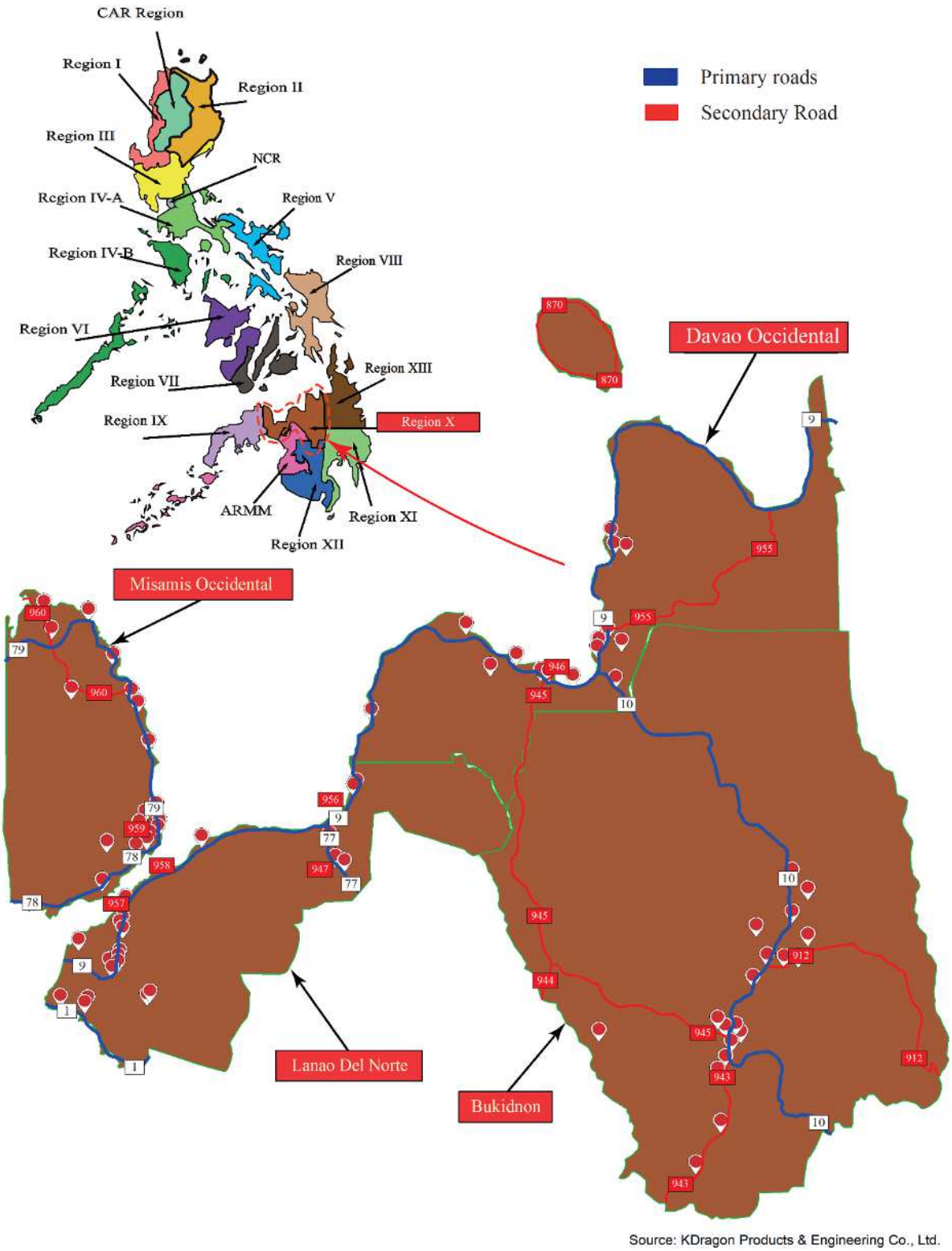

61/122
30/Dec/2024
By: Dav
Philippines Road Map Rice Mill Location In Region VIII
(Source : DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS)
(Source : Google Map)
Primary roads
Secondary Road
CAR Region
Region I
Region II
Region III
NCR
Region IV-A
Region V
Region IV-B
Region VIII
Region VI
Region VII
Region XIII
Region IX
Region X
ARMM
Region XI
Region XII
Northern Samar
Samar
Biliran
Eastern Samar
Southern Leyte
Leyte
Source: KDragon Products & Engineering Co., Ltd.


Philippines Road Map Rice Mill In Region IX
(Source: DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS)
(Source : Google Map)
70/122
30/Dec/2024
By: Dav
Primary roads
Secondary Road
CAR Region
Region I
Region II
Region III
NCR
Region IV-A
Region V
Region IV-B
Region VIII
Region VI
Region VII
Region XIII
Region IX
Region X
ARMM
Region XI
Region XII
Zamboanga Del Norte
Zamboanga Sibugay
Zamboanga Del Sur
Zamboanga City
Source: KDragon Products & Engineering Co., Ltd.

75/122
30/Dec/2024
By: Dav

Philippines Road Map Rice Mill Location In Region X

(Source : DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS)
(Source : Google Map)

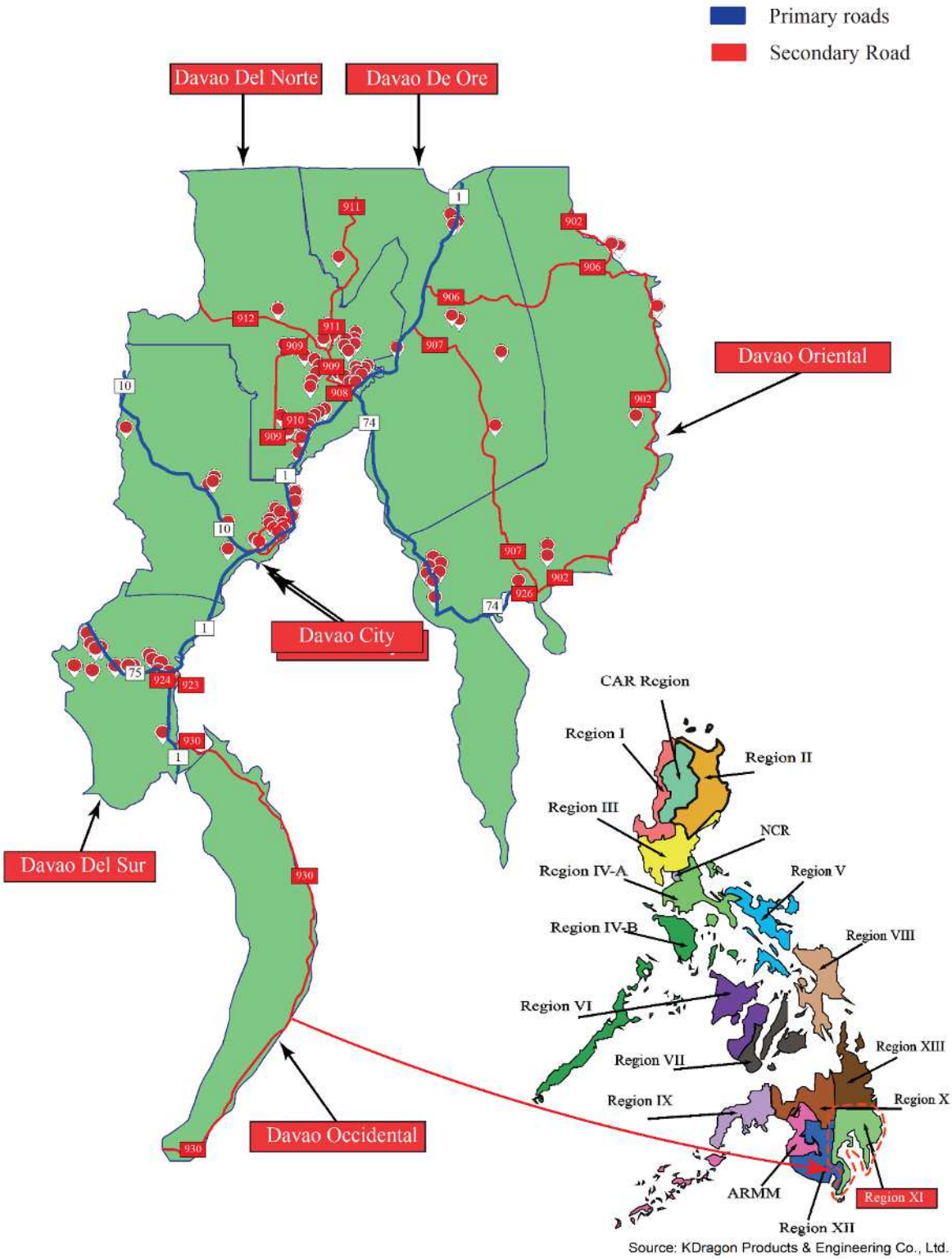


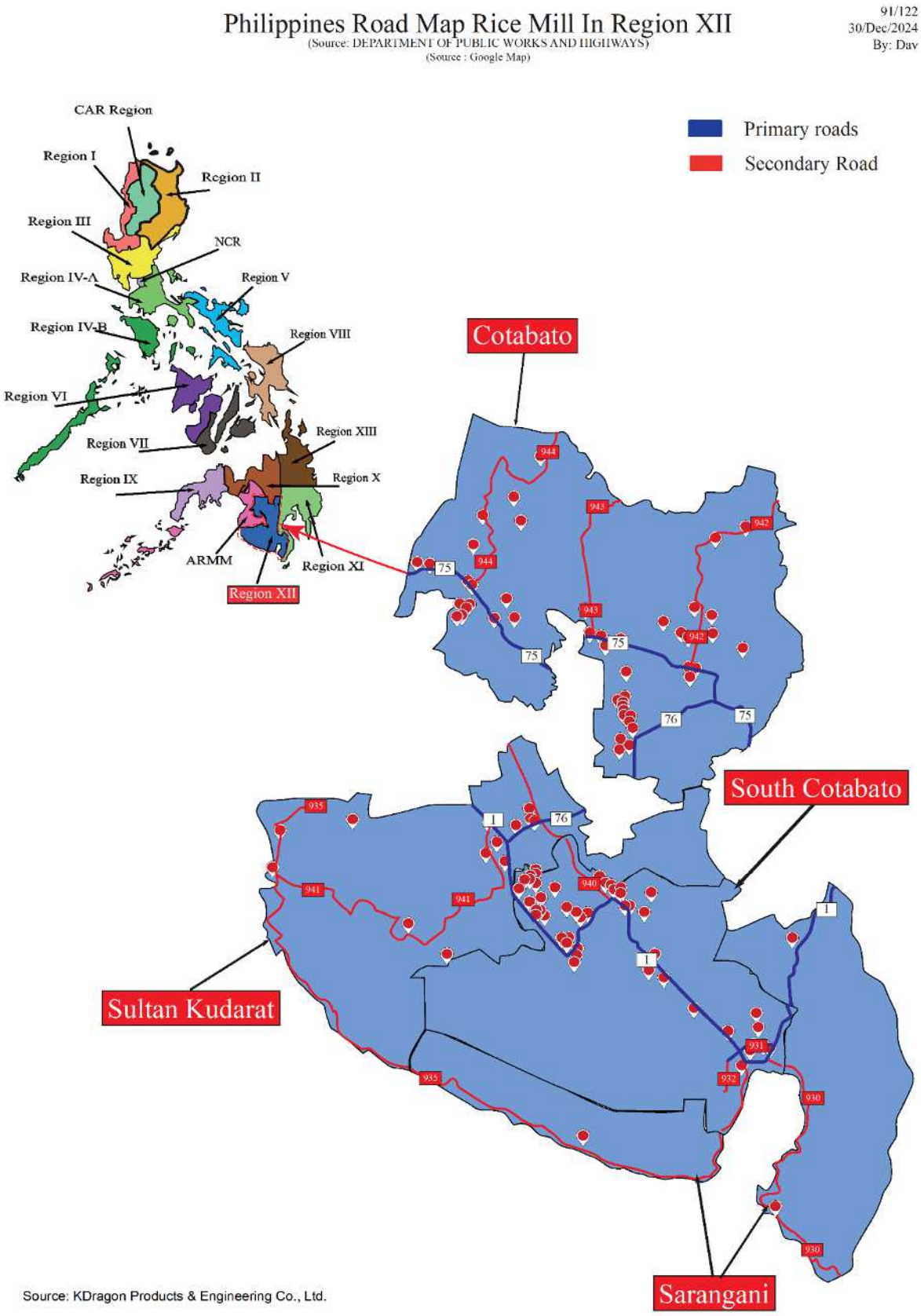
Source: KDragon Products & Engineering Co., Ltd.

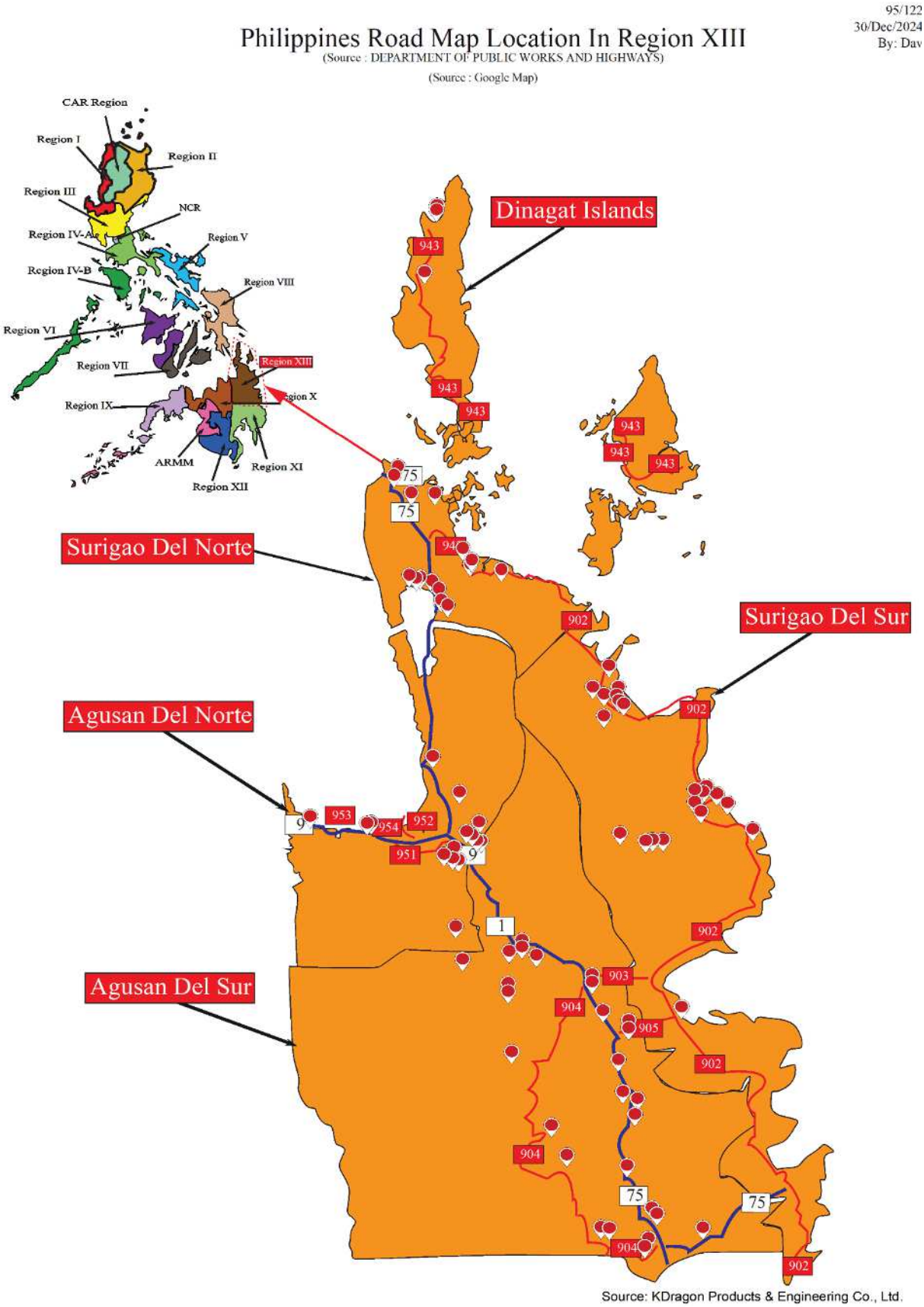
82/122
30/Dec/2024
By: Dav

Philippines Road Map Rice Mill Location In Region XI

(Source : DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS)
(Source : Google Map)




Philippines Road Map Rice Mill In Region XII
(Source: DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS)
(Source : Google Map)
91/122
30/Dec/2024
By: Dav
Primary roads
Secondary Road
CAR Region
Region I
Region II
Region III
NCR
Region IV-A
Region V
Region IV-B
Region VIII
Region VI
Region XIII
Region VII
Region IX
Region X
ARMM
Region XI
Region XII
Cotabato
South Cotabato
Sultan Kudarat
Sarangani
Source: KDragon Products & Engineering Co., Ltd.

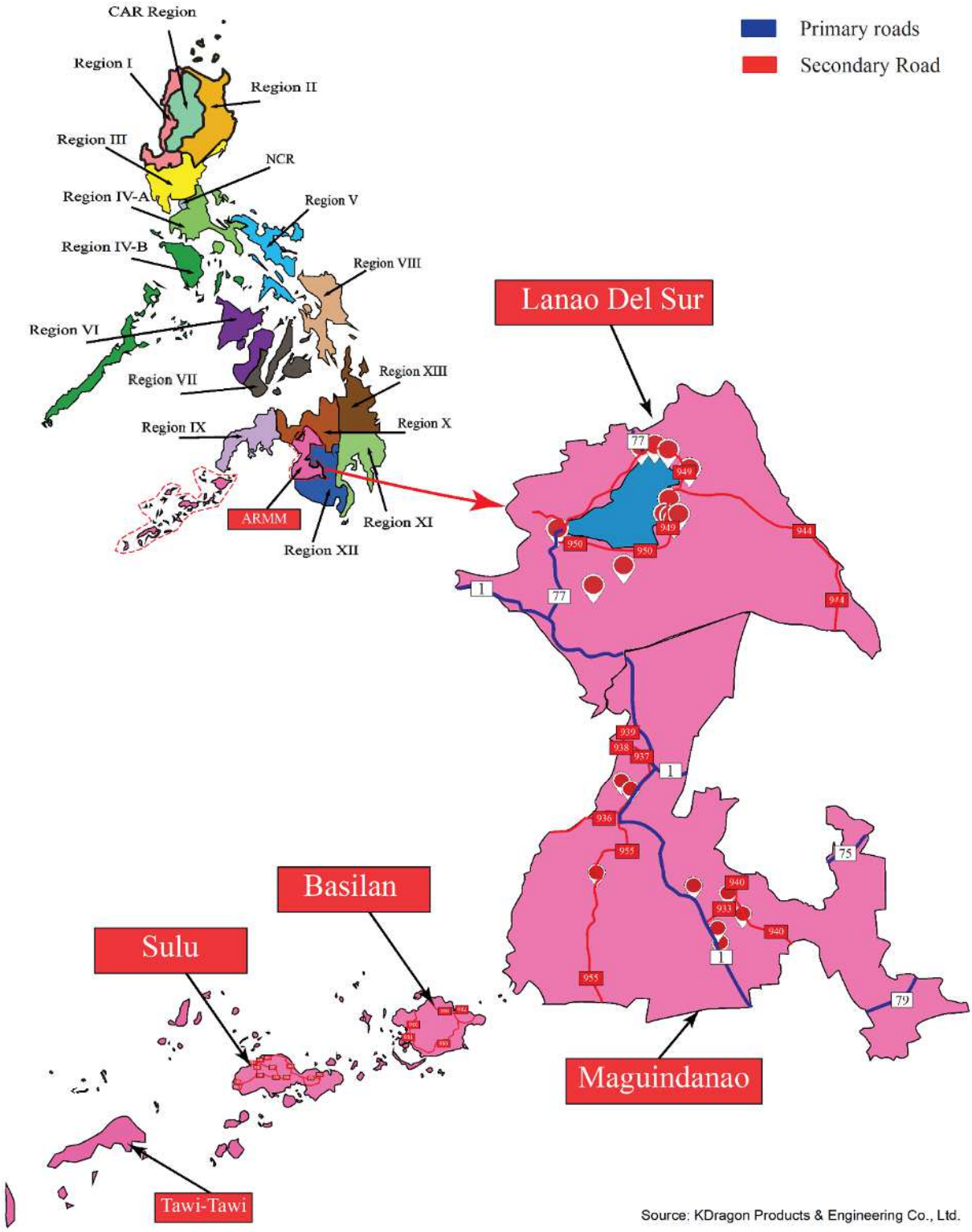


※This map includes the locations of rice mills and agricultural cooperatives.

Philippines Road Map Rice Mill In Region ARMM

104/122
30/Dec/2024
By: Dav

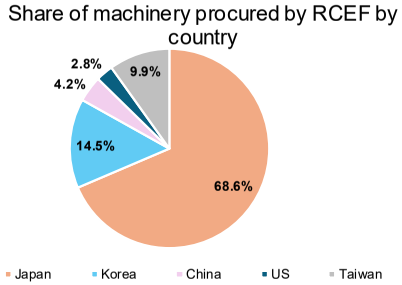
(Source: DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS)
(Source : Google Map)



Appendix 7 Share of Procured Machinery of RCEF by Country

1. Share of machinery procured by RCEF by country

	Number	Ratio
Japan	11,415	68.6
Korea	2,417	14.5
India	-	-
China	701	4.2
US	473	2.8
Taiwan	1,652	9.9
Vietnam	-	-
Switzerland	-	-
Philippines	-	-
total	16,658	100.0



※ Only in categories that contain Japanese-made items（Four-Wheel Tractors,Walk-Behind Transplanters,Riding-Type Transplanters,Rice Combine Harvesters,Rice Reapers）

2. Share of Japanese-made machinery in the total number of machinery procured by RCEF

	Number	Ratio
Japan	11,494	37.4
total	30,733	100.0

※ The total number of machines is from the PhilMech website (accessed on 29 January 2025).
https://rcef.philmech.gov.ph/?page=accomplishment&action=technologies

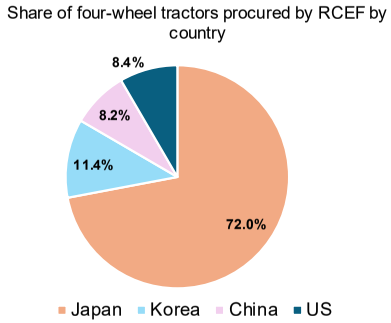
	Four-Wheel Tractors	Walk-Behind Transplanters	Riding-Type Transplanters	Rice Combine Harvesters	Rice Reapers	Recirculating Dryer	Multi-Stage Rice Mill
Japan	4,047	1,691	634	3,984	1,059	-	79
Korea	640	1,302	475	-	-	281	8
India	-	-	-	-	-	-	-
China	463	-	-	238	-	-	-
US	473	-	-	-	-	-	-
Taiwan	-	-	-	-	1,652	367	-
Vietnam	-	-	-	-	-	-	6
Switzerland	-	-	-	-	-	-	34
Philippines	-	-	-	-	-	236	31
total	5,623	2,993	1,109	4,222	2,711	884	158

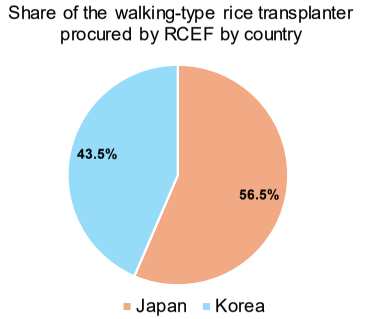
Source）PhilMech（as of December 2024）

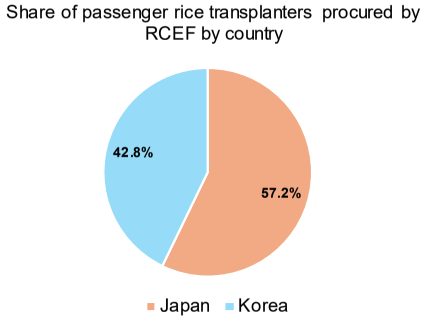
4. Percentage by machine and country

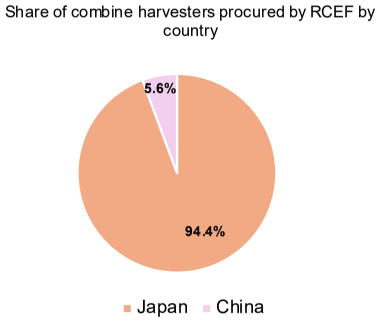
	Four-Wheel Tractors	Walk-Behind Transplanters	Riding-Type Transplanters	Rice Combine Harvesters	Rice Reapers	Recirculating Dryer	Multi-Stage Rice Mill
Japan	72.0	56.5	57.2	94.4	39.1	-	50.0
Korea	11.4	43.5	42.8	-	-	31.8	5.1
India	-	-	-	-	-	-	-
China	8.2	-	-	5.6	-	-	-
US	8.4	-	-	-	-	-	-
Taiwan	-	-	-	-	60.9	41.5	-
Vietnam	-	-	-	-	-	-	3.8
Switzerland	-	-	-	-	-	-	21.5
Philippines	-	-	-	-	-	26.7	19.6
total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

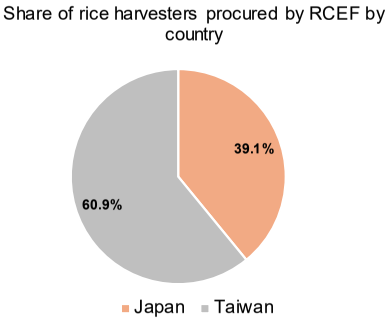
Source） PhilMech（as of December 2024）

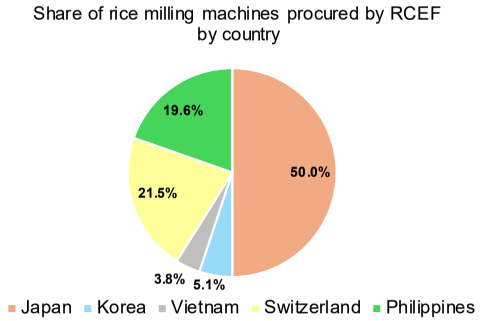












5. Number of machines procured by RCEF

	Four-Wheel Tractors	Hand Tractor※	Floting Tiller※	PTO-driven Disc Plow※	Mechanical Seed Sowing ※	Walk-Behind Transplanters	Precision Seeder※	Riding-Type Transplanters	Rice Thresher※
Japan	4,047					1,691		634	
Korea	640					1,302		475	
India	-					-		-	
China	463					-		-	
US	473					-		-	
Taiwan	-					-		-	
Vietnam	-					-		-	
Switzerland	-					-		-	
Philippines	-					-		-	
total	5,623	6,751	3,487	416	2	2,993	358	1,109	1,581

	Rice Combine Harvesters	Rice Reapers	Mobile Dryer ※	Recirculating Dryer	Single Pass Rice Mill (Stationary)※	Multi-Stage Rice Mill	Single Pass Rice Mill (Mobile)※	Impeller Rice Mill※
Japan	3,984	1,059		-		79		
Korea	-	-		281		8		
India	-	-		-		-		
China	238	-		-		-		
US	-	-		-		-		
Taiwan	-	1,652		367		-		
Vietnam	-	-		-		6		
Switzerland	-	-		-		34		
Philippines	-	-		236		31		
total	4,222	2,711	6	884	285	158	496	31

Source） PhilMech（as of December 2024）
※ Philmech HP（2025.1.30 Access）
https://rcef.philmech.gov.ph/?page=accomplishment&action=technologies